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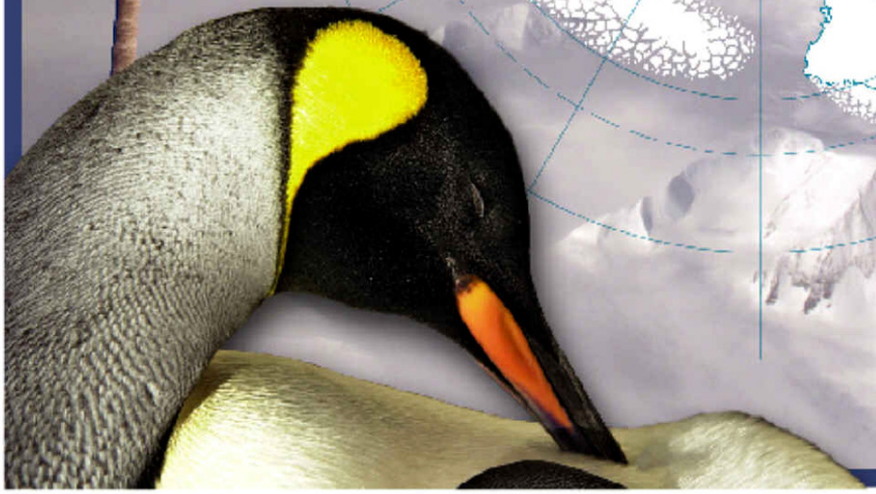
10th International Symposium on Antarctic Earth Sciences




August 26 – August 31, 2007

ISAES 2007
UC Santa Barbara



The Tenth International Symposium on Antarctic Earth Sciences (ISAES X)

University of California, Santa Barbara (UCSB)
Santa Barbara, California

August 26 through 31, 2007

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A view to the future

Welcome to the 10th International Symposium on Antarctic Earth Sciences **Antarctica: A Keystone in a Changing World** convened at the University of California, Santa Barbara. The International Symposium on Antarctic Earth Sciences (ISAES) is the major international Antarctic geoscience meeting, convened once every four years, that brings together over 400 scientists from more than 35 countries. This week-long symposium in 2007 is sponsored by the Scientific Committee on Antarctic Research, the U.S. National Science Foundation, the U.S. Geological Survey, and the University of California, Santa Barbara. This meeting of the Antarctic Earth science community will address major topics including climate change, biotic evolution, magmatic processes, surface processes, tectonics, geodynamics, and the cryosphere. The program of talks and posters is truly multi-disciplinary reflecting the cutting edge of Antarctic Earth science. The topics to be covered range from supercontinents to DNA, from dinosaurs to diatoms, from the core to the cryosphere, and from penguins to permafrost.

Today understanding the changes in the polar regions is imperative for our global society, global economy, and global environment. As study of planetary change is core to all Earth science, knowledge of Antarctica and Antarctic Earth science has never been more important. Convened at the beginning of the International Polar Year 2007-8, the International Symposium on Antarctic Earth Sciences is a critical opportunity for our global scientific community to share results, data, and ideas and to plan future cooperative programs.

The International Polar Year 2007-8 is motivated by both our changing planet and the quest to explore the unknown frontiers, both being core to Antarctic Earth science. The work accomplished in the next 2 years will define future research directions, and collaborations established during the International Polar Year will serve as the basis for decades of future research programs. Antarctica is a global keystone in the Earth system. Antarctic Earth science must be both international and global to remain relevant. This week of talks, poster sessions, excursions, workshops, business meetings, and social events is a unique opportunity to build on the collaborative framework of the International Polar Year 2007-8.

As Fridtjof Nansen noted, humankind is driven to seek knowledge "till every enigma has been solved." We have the luxury to be embarking on a week of sharing our knowledge and discussing solutions to planetary enigmas. I trust you will find Santa Barbara, a beautiful venue on the Pacific. Beyond the meeting rooms, Santa Barbara offers everything from marvelous wine, to tremendous geology, to surfing. Enjoy the week of discussions, surf, and enigmas.

Robin Elizabeth Bell
Chair of the U.S. Organizing Committee for the 10th ISAES

Program Book

for the

10th International Symposium on Antarctic Earth Sciences

Edited by

Alan Cooper, members of the ISAES X editorial team,[1]
UCSB staff,[2] and Kevin Bobbett[3]

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[1]ISAES X editorial team:

John Anderson	Dieter Futterer	Tony Payne
Peter Barrett	John Gamble	Carol Raymond
John Barron	John Goodge	Carlo Alberto Ricci
Phil Bart	William Hammer	Howard Stagg
Don Blankenship	Pat Helton	Bryan Storey
Fred Davey	Erik Ivins	Edmund Stump
Mike Diggles	Phil Kyle	Michael Studinger
Carol Finn	Wes Lemasurier	Vanessa Thorn
Paul Fitzgerald	Paul Mayewski	Terry Wilson
Fabio Florindo	Tim Naish	Woody Wise
Jane Francis	Sandra Passchier	

[2]UCSB staff: Bruce Luyendyk, Whitney Morris, Sally Vito

[3]Employee of Conference Exchange, 30 Martin Street, Suite 2C1, Cumberland, RI 02864 -- the contractor that provided manuscript-handling, printout and online services for ISAES

ISAES X Important Information

Registration/ Information Desk

The registration desk will be located under a tent in Manzanita Village on Sunday, August 26 from 17:00-20:00. On Monday, August 27, the registration location will permanently move to the Corwin Pavilion Lobby and will be open at 7:30 each remaining day of the conference. The Registration Desk will have limited hours on the Wednesday excursion day. Staff & conference volunteers will be identifiable by colored t-shirts.

Message Board

A message board will be located at the Registration Desk.

Internet

All residence hall sleeping rooms offer high-speed Internet access at no charge; however, **conferees must provide their own Ethernet cables**. Participants staying on-campus will receive a Perm Number & Pin at the residence hall upon check-in. These numbers will also be used to access the wireless network in the common areas in the residence halls and in the University Center. Residential Network Service Centers are available for support: For minor problems that you think can be handled on the phone, call the ResNet Service Centers at 805-893-8777 (hours are weekdays, 16:00-20:00 / Saturdays and Sundays, 11:00-15:00. Most problems can be solved over the phone, but they will also make "house calls" if necessary.

Off-campus attendees (those NOT staying in the residence halls), can receive a User ID and Password for wireless access in the University Center at the Conference Registration Desk.

There are several computer stations located within the University Center to access your email. The locations are as follows (please refer to the University Center map included in the program/abstract book): 2 Computer Stations are located at the Rotunda Entrance; 6 Computer Stations are located in the Main Lobby, across from Nicoletti's; 15 Computer Stations are located UPSTAIRS on the 3rd Floor in the Computer Lounge (Access to the stairs is from the Main Lobby).

In addition, computers linked to the Internet will be available in the University Center Mission Room, which is also a preview room for speakers.

Phone, Fax, and Copying

There are public phones in the UCEN. For those staying on-campus, there are also courtesy phones in the hall lounges of Manzanita, Santa Rosa and in the lobbies of other Residence Halls. Photocopying and faxing can be done during regular business hours in the FedEx-Kinko's store adjacent to Corwin Pavilion.

Emergency Contact

For emergency contact of individuals using on-campus housing, call (805) 893-6161 for those staying in Manzanita Village and (805) 893-2772 for those staying in Santa Rosa. People needing to contact Meeting participants in an emergency (especially those staying off-campus) may also call Whitney Morris' cell phone number: (805) 698-2992. (This number is operational only during the Meeting).

Medical Assistance

For police, ambulance and other security matters, dial 9-911 from the residence hall courtesy phones or 911 elsewhere.

Emergency Rooms:
Goleta Valley Cottage Hospital Emergency Room, 351 S. Patterson, Goleta
681-6473

Santa Barbara Cottage Hospital Emergency Room, Pueblo at Bath, Santa Barbara
569-7210

Non-Emergency - Local Urgent Care Centers:
Sansum - SB Medical Foundation Urgent Care, Hitchcock Branch - 51 Hitchcock Way
M-F 08:00-18:00
Sat.-Sun. 09:00-17:00

Goleta Pacific Oaks Medical Center, 17127 Hollister Ave Suite 8, Goleta
685-5600
M-S 08:00-20:00
Sun. CLOSED

Field Trips and Social Excursions Wednesday Afternoon

There may be additional room available for some of the trips, and inquiries should be made at the Registration Desk. Excursions on Wednesday afternoon will depart in front of the Santa Rosa Residence Hall (adjacent to the University Center).

Banquet Thursday Evening

Buses will depart in front of Santa Rosa Residence Hall and from the Manzanita Village Bus Loop. See registration materials for arranged transportation times.

Recreation

The Guest Services Representatives at the Residence Hall front desks can direct you to beach access and the University Recreation Center (fee required). They will also have other helpful information.

Exhibitors

All Exhibitors will be in the Lagoon Plaza tent, adjacent to the University Center. Exhibitor hours are as follows:

Monday, August 27	Show 10:30 – 12:00 pm; 1:30 – 6:00 pm
Tuesday, August 28	Show 9:10 – 12:00 pm; 1:30 – 6:00 pm
Wednesday, August 29	Show 9:30 am – 12:00 pm
Thursday, August 30	Show 9:10 – 12:00 pm; 1:30 – 5:00 pm
Friday, August 31	Show 9:10 – 12:00 pm

Session Chairs

Please arrive 30 minutes before the session begins to ensure that audio-visual equipment is in place and functional. At each session, a UCSB representative will be available to take care of A/V needs. Each room will also be equipped with a stop watch and a laser pointer.
* A/V Support Cell Phone Numbers for the University Center Rooms and MCC Theater: (805) 451-5512, (805) 451-5513 & (805) 451-5514. You may also use the courtesy phone in the Corwin Pavilion Lobby and dial Line 2 to receive direct access to a University Center Service Manager.

Speakers

The following are the times and locations where UCSB staff will be available to help you review presentations that you either sent electronically via the UCSB Conference Presentation Server or have brought with you. We recommend that the morning or afternoon that you will be presenting, you meet with the Audio Visual Staff during the following times and locations:

Plenary Session Testing [Corwin Pavilion]
Monday, August 27: 7:30-8:30 & 9:30-10:30
Tuesday, August 28: 7:30-8.30
Wednesday, August 29: 7:30-8:30
Thursday, August 30: 7:30-8:30
Friday, August 31: 7:30-8:30

Monday, August 27 [Corwin West, Corwin East, Flying A Room, MCC Theater]
PM Session Testing Only: 12:30-13.30 & 15.10-15.40

Tuesday, August 28 [Corwin West, Corwin East, Flying A Room, MCC Theater]
AM Session Testing: 9:40-10:10
PM Session Testing: 12:00-13:30 & 15:10-15:40

Wednesday, August 29 [Corwin West, Corwin East, Flying A Room, MCC Theater]
AM Session Testing Only: 9:40-10:10

Thursday, August 30 [Corwin West, Corwin East, Flying A Room, MCC Theater]
AM Session Testing: 9:40-10:10
PM Session Testing: 12:00-13:30 & 15:10-15:40

Friday, August 31 [Corwin West, Corwin East, Flying A Room, MCC Theater]
AM Session Testing: 9:40-10:40
PM Session Testing: 12:00-13:30

You may also preview your presentation in the Mission Room, in the University Center.

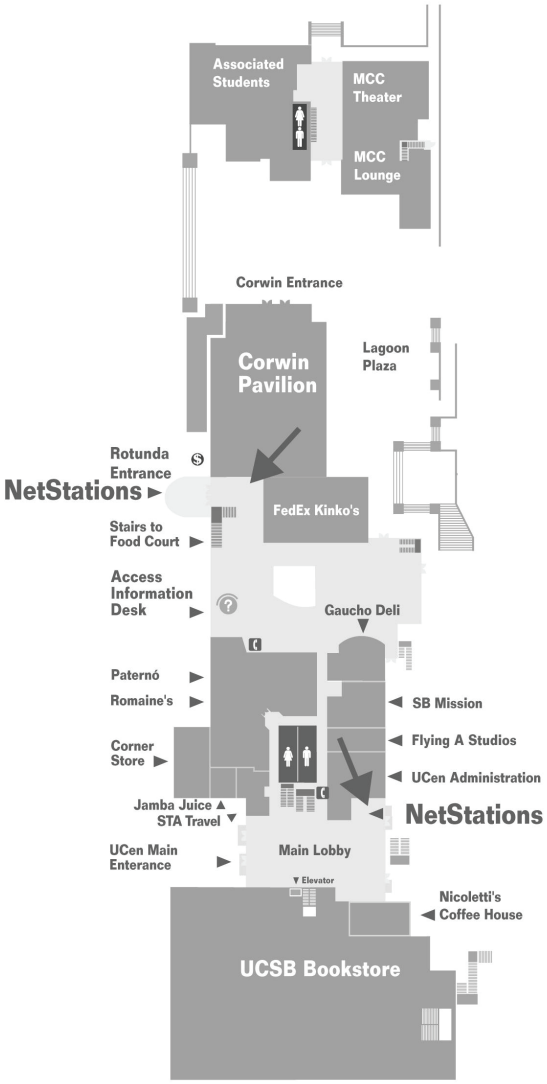
Poster Guidelines

Posters should be no larger than 3 ft. wide by 4 feet high. There will be 1 poster on each side of the board, for a total of 2 posters per board. Posters will be located in the Lagoon Plaza, adjacent to the University Center. Participants may begin putting up their posters at 7:30 each morning, so they are available for viewing at 8:30. Authors should be present at their displays for discussion during morning and afternoon breaks and during scheduled poster sessions (see program outline). Posters must be removed between 21:00 and 21:30 Monday - Wednesday, between 17:00 and 17:30 on Thursday, and by 17:00 on Friday. Posters left behind will not be saved.

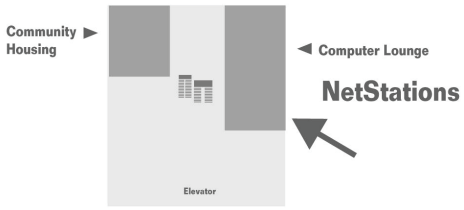
University Center

NETSTATIONS

MAIN LEVEL



UPPER LEVEL

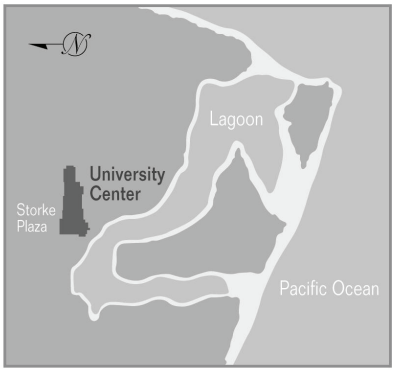


NetStations may be found at the following locations:

2 at Kiosk inside Rotunda Entrance

8 in the UCen Lobby across from Nicoletti's

14 in the third floor computer lounge



UCen Administration (805) 893-4463 • UCen Information (805) 893-2464
UCSB Bookstore (805) 893-3271 • UCen Dining (805) 893-3773

www.ucen.ucsb.edu

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ISAES X EXHIBITORS

Blackwell Publishing

Taryn Goggin
Tgoggin@bos.blackwellpublishing.com

Blackwell publishing is the world's leading society publisher, partnering with 665 academic and professional societies. Blackwell publishes across a wide range of academic, medical and professional subjects. Blackwell Publishing merged with John Wiley & Sons, Inc.'s Scientific, Technical and Medical business in February, 2007.

NASA Earth System Science - Data and Service

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NASA's unique view of Earth from space enables us to study and advance our understanding of the planet's interrelated processes. NASA data centers provide a variety of interdisciplinary Earth science data, information, services and tools to a diverse group of end users.

NatureBrella, LLC - The Most Beautiful Umbrellas in the World

Bob Anderson
robert@naturebrella.com

NatureBrella, LLC produces umbrellas designed on nature or science-inspired themes. Their first two products offered at this conference are umbrellas featuring circum-polar seafloor maps. The Arctic Ocean umbrella is based upon the International Bathymetric Chart of the Arctic Ocean; the Antarctica umbrella is based upon an ETOP02 map provided by NOAA/NGDC.

ISAES X Symposium Schedule

SUNDAY, AUGUST 26

Time	Event	Location
07:00	Pre-Conf. Workshop Registration	Corwin Pavilion Lobby
17:00-20:00	Main Registration Begins	Manzanita Village
17:30-18:00	Beer & Wine Reception	Manzanita Village
18:00-20:00	Welcome Dinner	Manzanita Village

MONDAY, AUGUST 27

Time	Event	Location
07:00-8:15	Breakfast	See Registration Materials for Assigned Dining Commons
07:30	Registration Desk Open	Corwin Pavilion Lobby
07:30-08:30	Posters Up	Lagoon Plaza
08:30-09:30	Opening Ceremony	Corwin Pavilion
09:30-10:40	Break - Poster Viewing	Lagoon Plaza
10:40-11:40	Plenary I & II	Corwin Pavilion
11:40-12:00	Group Photo	Storke Tower Plaza
12:00-13:30	Lunch	Ortega Dining Commons
13:30-15:10	Concurrent Sessions	Corwin West, Corwin East, MCC Theater, Flying A
15:10-15:40	Break - Poster Viewing	Lagoon Plaza
15:40-17:00	Concurrent Sessions	Corwin West, Corwin East, MCC Theater, Flying A
17:00-18:00	Poster Session	Lagoon Plaza
18:00-19:30	Dinner	Ortega Dining Commons
19:30-21:00	Beer & Wine Poster Session	Lagoon Plaza
21:00-21:30	Posters Down	Lagoon Plaza

TUESDAY, AUGUST 28

Time	Event	Location
07:00-8:15	Breakfast	See Registration Materials for Assigned Dining Commons
07:30	Registration Desk Open	Corwin Pavilion Lobby
07:30-08:30	Posters Up	Lagoon Plaza
08:30-08:40	Program Updates	Corwin Pavilion
08:40-09:40	Plenary III & IV	Corwin Pavilion
09:40-10:10	Break - Poster Viewing	Lagoon Plaza
10:10-12:10	Concurrent Sessions	Corwin West, Corwin East, MCC Theater, Flying A
12:00-13:30	Lunch	Ortega Dining Commons
13:30-15:10	Concurrent Sessions	Corwin West, Corwin East, MCC Theater, Flying A
15:10-15:40	Break - Poster Viewing	Lagoon Plaza
15:40-17:00	Concurrent Sessions	Corwin West, Corwin East, MCC Theater, Flying A
17:00-18:00	Poster Session	Lagoon Plaza
18:00-19:30	Dinner	Ortega Dining Commons
19:30-21:00	Beer & Wine Poster Session	Lagoon Plaza
21:00-21:30	Posters Down	Lagoon Plaza

WEDNESDAY, AUGUST 29

Time	Event	Location
07:00-8:15	Breakfast	See Registration Materials for Assigned Dining Commons
07:30	Registration Desk Open	Corwin Pavilion Lobby
07:30-08:30	Posters Up	Lagoon Plaza
08:30-08:40	Program Updates	Corwin Pavilion
08:40-09:40	Plenary V & VI	Corwin Pavilion
09:40-10:10	Break - Poster Viewing	Lagoon Plaza
10:10-12:10	Concurrent Sessions	Corwin West, Corwin East, MCC Theater, Flying A
12:00-13:30	Lunch	Ortega Dining Commons
13:30-18:00	Excursions	See Registration Materials for Details
18:00-19:30	Dinner	Ortega Dining Commons
19:30-21:00	Beer & Wine Poster Session	Lagoon Plaza
21:00-21:30	Posters Down	Lagoon Plaza

THURSDAY, AUGUST 30

Time	Event	Location
07:00-8:15	Breakfast	See Registration Materials for Assigned Dining Commons
07:30	Registration Desk Open	Corwin Pavilion Lobby
07:30-08:30	Posters Up	Lagoon Plaza
08:30-08:40	Program Updates	Corwin Pavilion
08:40-09:40	Plenary VII & VIII	Corwin Pavilion
09:40-10:10	Break - Poster Viewing	Lagoon Plaza
10:10-12:10	Concurrent Sessions	Corwin West, Corwin East, MCC Theater, Flying A
12:00-13:30	Lunch	Ortega Dining Commons
13:30-15:10	Concurrent Sessions	Corwin West, Corwin East, MCC Theater, Flying A
15:10-15:40	Break - Poster Viewing	Lagoon Plaza
15:40-16:40	Concurrent Sessions	Corwin West, Corwin East, MCC Theater, Flying A
16:00-17:00	Poster Session	Lagoon Plaza
17:00-17:30	Posters Down	Lagoon Plaza
18:00-21:00	Closing Banquet	Santa Barbara Museum of Natural History / See Registration Materials for Arranged Transportation

FRIDAY, AUGUST 31

Time	Event	Comments
07:00-8:15	Breakfast	See Registration Materials for Assigned Dining Commons
07:30	Registration Desk Open	Corwin Pavilion Lobby
07:30-08:30	Posters Up	Lagoon Plaza
08:30-08:40	Program Updates	Corwin Pavilion
08:40-09:40	Plenary IX & X	Corwin Pavilion
09:40-10:40	Break - Poster Viewing	Lagoon Plaza
10:40-12:00	Concurrent Sessions	Corwin West, Corwin East, MCC Theater, Flying A
12:00-13:30	Lunch	Ortega Dining Commons
13:30-14:50	Concurrent Sessions	Corwin West, Corwin East, MCC Theater, Flying A
14:50-15:30	Break - Poster Viewing	Lagoon Plaza
15:30	Closing Session	Corwin Pavilion

SATURDAY, SEPTEMBER 1

Time	Event	Location
07:00	Post-Conf. Workshop Registration	Corwin Pavilion Lobby

Monday, 27 August 2007

	Corwin West	Corwin East
0830	**Opening and welcoming remarks (Corwin Pavilion)**	
0930	**Coffee break and poster viewing (Lagoon Plaza) 1.PS: Antarctic climate and glacial records**	
	1.PL: Plenary Lectures	
1040	**Robin Bell** Antarctic Earth System Science in the International Polar Year 2007- 2008	
1110	**Ken Miller** A view of Cenozoic Antarctic glaciation from sea- level and deep- sea isotope changes	
1200	**LUNCH**	
	1.P1.A: Antarctica, the southern ocean, and climate evolution: Insights from drilling, coring, and geophysical surveys ORAL Chairs: Timothy R. Naish & Ross D. Powell	**1.P1.B: Subglacial lake environments ORAL** Chairs: Michael Studinger & Irina Filina
1330	**Naish et al.**: Late Neogene climate history of the Ross Embayment: Initial results from the ANDRILL McMurdo Ice Shelf Project	**Bell et al.**: Tectonic Control of Subglacial Lakes and Ice Sheet Stability
1350	**Powell et al.**: Antarctic Ice Sheet dynamics through the Neogene from evidence in the ANDRILL–McMurdo Ice Shelf Project drillcore (AND-1B)	**Leitchenkov et al.**: Insight into geology of East Antarctic hinterland: study of mineral inclusions from ice cores of Lake Vostok borehole
1410	**Niessen et al.**: Comprehensive Downhole and Core Physical-Property Measurements at the AND-1B Drillsite, ANDRILL McMurdo Ice Shelf Project	**Filina et al.**: New bathymetry model of Lake Vostok from airborne gravity data
1430	**Krissek et al.**: Sedimentology and stratigraphy of the ANDRILL McMurdo Ice Shelf (AND-001B) core	**Dietrich et al.**: Flow dynamics and mass balance of the ice sheet above the southern part of subglacial Lake Vostok
1450	**Pompilio et al.**: The volcanic record in the ANDRILL McMurdo Ice Shelf AND-1B drill core	**Studinger**: Estimating the salinity of subglacial lakes from aerogeophysical data
1510	**Coffee break and poster viewing (Lagoon Plaza) 1.PS: Antarctic climate and glacial records**	
	1.P2.A: Antarctica, the southern ocean, and climate evolution: Insights from drilling, coring, and geophysical surveys ORAL Chairs: Peter Barrett & Gary Wilson	**1.P2.B: Subglacial lake environments ORAL** Chairs: Donald D. Blankenship & Malte Thoma
1540	**Scherer et al.**: The diatom record of the ANDRILL – McMurdo Ice Shelf project drillcore	**Thoma et al.**: Modelling tracer dispersion in subglacial Lake Vostok, Antarctica
1600	**Ross et al.**: Preliminary 40Ar/39Ar results from the AND-1B core	**Carter et al.**: Ice surface anomalies, hydraulic potential and subglacial lake chains in East Antarctica
1620	**Wilson et al.**: Preliminary chronostratigraphy for the upper 700 m (upper Miocene – Pleistocene) of the AND-1B drillcore recovered from beneath the McMurdo Ice Shelf, Antarctica	**Fricker et al.**: Water budget through a series of interconnected subglacial lakes on Recovery Ice Stream, East Antarctica
1640	**Barrett et al.**: Future geological drilling in Antarctica – a discussion paper on ANDRILL and beyond	**Tulaczyk et al.**: Thick lacustrine sedimentary sequence in Christie Arm, Canada, suggests a dynamic subglacial paleo-lake beneath Laurentide Ice Sheet
1700	**Poster Session: 1.PS: Antarctic Climate and Glacial Records**	
1800	**DINNER**	
1930	**Evening poster viewing with wine & beer (Lagoon Plaza)**	

Monday, 27 August 2007

	Multicultural Theater	Flying A
0930	**Coffee break and poster viewing (Lagoon Plaza) 1.PS: Antarctic climate and glacial records s**	
1200	**LUNCH**	
	1.P1.C: Antarctica in Rodinia, Gondwana and Pangea: In honor of the contributions of Campbell Craddock ORAL Chairs: Wesley LeMasurier & John P. Craddock	**1.P1.D: IPY and IGY: History, policy and outreach ORAL** Chairs: Carlo Alberto Ricci & John C. Behrendt
1330	Introductory Remarks - John Craddock	**Berkman**: Earth Science in the Antarctic Treaty System
1340	**Rutford**: Summary of Cam Craddock's Contributions to Antarctic geoscience	
1350		**Borbor-Cordova et al.**: An international effort to manage and monitor Admiralty Bay (ASMA No. 1), King George Island, Antarctica
1405	**Dalziel**: The Ellsworth Mountains: Critical and enduringly enigmatic	
1410		**Behrendt**: IGY to IPY, the U.S. Antarctic oversnow and airborne geophysical-glaciological research program from 1957 to 1964 from the view of a young graduate student
1430	**Webers & Splettstoesser**: Geology and paleontology of the Ellsworth Mountains, Antarctica	**Gootee**: Glacial and permafrost exploration in the Dry Valleys during the 1957/58 IGY: The personal records of Troy L. Péwé
1450	**Gildea & Splettstoesser**: Craddock Massif and Vinson Massif Remeasured	**Trummel & Dahlman**: The ANDRILL ARISE educational outreach program: Educators immersed in science research in Antarctica
1510	**Coffee break and poster viewing (Lagoon Plaza) 1.PS: Antarctic climate and glacial records**	
	1.P2.C: Antarctica in Rodinia, Gondwana and Pangea: In honor of the contributions of Campbell Craddock ORAL Chairs: David H. Elliot & John P. Craddock	**1.P2.D: Understanding Antarctic biological evolution: Molecular, biogeographic, glaciological and geological studies ORAL** Chairs: Sherwood Wise Jr. & Scott E. Ishman
1540	**Craddock et al.**: Major, trace element and stable isotope geochemistry of synorogenic breccia bodies, Ellsworth Mountains, Antarctica	**Convey et al.**: New terrestrial biological constraints for Antarctic glaciation
1600	**Elliot et al.**: Jurassic silicic volcanism in the Transantarctic Mountains: was it related to plate margin processes or to Ferrar magmatism?	**Jansen van Vuuren et al.**: Molecular data can help to unveil biogeographic complexities since the Miocene: lessons from ameronothroid mites and isotomid springtails
1620	**Miller**: History of views on the relative positions of Antarctica and South America: a 100-year tango beween Patagonia and the Antarctic Peninsula	**Strugnell & Linse**: Evolution of the Antarctic marine fauna: What can DNA and fossils tell us?
1640	**Le Masurier**: Neogene tectonic events in the West Antarctic rift system inferred from comparisons with the East African rift and other analogs	**Ishman et al.**: The rise and fall of an Antarctic cold-seep community
1700	**Poster Session: 1.PS: Antarctic climate and glacial records**	
1800	**DINNER**	
1930	**Evening poster viewing with wine & beer (Lagoon Plaza)**	

Monday, 27 August 2007

Poster Session 1.PS: Antarctic climate and glacial records

Posters on display: Lagoon Plaza 0830 – 2200

Poster viewing sessions: 0930 – 1040; 1510 – 1540; 1700 – 1800; 1930 – 2200

1.PS-1 **V. E. Tymofeyev:** Recent warming at the Antarctic Peninsula and global changes

1.PS-2 **E. Santana & J. F. Dumont:** "Granulometric analysis of pebble beach ridges in Fort Williams Point, Greenwich Island, Antarctic Peninsula; elements for paleoclimate variations during the Holocene"

1.PS-3 **A. Shevenell, A. Ingalls & E. W. Domack:** Orbital and atmospheric forcing of western Antarctic Peninsula climate in the Holocene: The TEX86 paleotemperature record of Palmer Deep

1.PS-4 **L. Teitler, G. Kupp, D. Warnke & L. Burckle:** Evidence for a long warm interglacial during Marine Isotope Stage 31: Comparison of two studies at proximal and distal ODP sites in the Southern Ocean

1.PS-5 **S. E. Ishman, M. Prentice, S. McCallum, E. W. Domack, A. Leventer & V. Willmott:** Stable isotopic and foraminiferal evidence of Larsen-B Ice Shelf stability throughout the Holocene

1.PS-6 **S. Warny, J. B. Anderson, L. Londeix & P. J. Bart:** Analysis of the dinoflagellate cyst genus Impletosphaeridium as a marker of sea-ice conditions off Seymour Island: an ecomorphological approach

1.PS-7 **A. R. Hey, J. Pike, C. Allen & D. A. Hodgson:** Palaeoclimate reconstructions from the Antarctic Peninsula: Diatoms as indicators of Holocene environmental change

1.PS-8 **A. Leventer, L. Armand, D. Harwood, R. Jordan & R. Ligowski:** New approaches and progress in the use of polar marine diatoms in reconstructing sea ice distribution

1.PS-9 **L. Collins, C. Allen, J. Pike & D. Hodgson:** The Scotia Sea: Reconstructing glacial climates from diatom assemblages

1.PS-10 **D. K. Kulhanek:** Paleocene and Maastrichtian calcareous nannofossils from clasts in Pleistocene glaciomarine muds from the Northern James Ross Basin, Western Weddell Sea, Antarctica

1.PS-11 **A. Gazdzicki:** Provenance of recycled stromatolites from the Polonez Cove Formation (Oligocene) of King George Island, West Antarctica

1.PS-12 **K. Johnson:** Kerguelen Plateau benthic foraminifera as a proxy for Late Neogene water mass history and linkages to Antarctic glacial-deglacial cycles

1.PS-13 **C. Baroni, S. Lorenzini, M. C. Salvatore & S. Olmastroni:** "Adélie Penguins colonization history and paleodiet trends document Holocene environmental changes in Victoria Land (Antarctica)"

1.PS-14 **L. Ganzert & D. Wagner:** Microbial communities in different Antarctic mineral deposits characterised by denaturing gradient gel electrophoresis (DGGE)

1.PS-15 **G. Villa, C. Lupi, M. Cobianchi, F. Florindo & S. F. Pekar:** A Pleistocene Warming Event at 1 Ma in Prydz Bay, East Antarctica: Evidence from Odp Site 1165

1.PS-16 **C. Escutia, M. A. Barcena, R. Lucchi, O. Romero & A. M. Ballageer:** Early Pliocene circum-Antarctic warming between 3.5 and 3.7Ma recorded in sediments from ODP Sites 1165 (prydz Bay) and 1095 and 1096 (Antarctic Peninsula)

1.PS-17 **K. L. Detterman, D. Warnke & C. Richter:** Petrographic analyses of lonestones from ODP Drill Sites Leg 188, Prydz Bay, Antarctica

1.PS-18 **S. Brachfeld, S. R. Hemming, T. Van de Flierdt, S. L. Goldstein, M. Roy, T. Williams & M. Rosig:** Integrated provenance characteristics of glacial-marine sediment from the East Antarctic Margin

1.PS-19 **A. Venuti, F. Florindo & A. Caburlotto:** Environmental magnetic records of Mid-Late Pleistocene drift sedimentary sequences from the Antarctic Peninsula, Pacific Margin

1.PS-20 **A. Nagi & G. Giorgetti:** Mineralogy of late Quaternary marine sediments from central Ross Sea: a provenance study

1.PS-21 **E. F. Palmer & K. J. Licht:** Sand petrography and U/Pb detrital zircon geochronology of late Quaternary tills from the Byrd Glacier and central/western Ross Sea, Antarctica

1.PS-22 **F. M. Talarico, S. Sandroni & A. M. Science Team:** Clast provenance and variability in MIS (AND-1B) core and their implications for the paleoclimatic evolution recorded in the Windless Bight - southern McMurdo Sound area (Antarctica)

1.PS-23 **F. M. Canile, A. C. Rocha-Campos, P. R. D. Santos & L. E. Anelli:** Weathered Eocene basalt (Mazurek Point Formation) overlain by Early Oligocene glacigenic diamictites (Krakowiak Member, Polonez Cove Formation): Record of change from mild to glacial conditions in West Antarctica

1.PS-24 **A. M. Priestas & S. W. Wise:** Distribution and origin of authigenic smectite clays in Cape Roberts Project Core 3, Victoria Land Basin, Antarctica

1.PS-25 **G. Giorgetti, T. J. Wilson, C. Millan & F. Aghib:** Authigenic clay minerals in rock matrices and fractures from CRP-2 and CRP-3 cores (Antarctica)

1.PS-26 **D. Helling & G. Kuhn:** Geochemical variations detected with continuous XRF measurements on ANDRILL AND-1B core - preliminary results

1.PS-27 **D. Magens & F. Niessen:** Determination of and preliminary results from the high-resolution physical properties record of the AND-1-1B sediment core from beneath Ross Ice Shelf, Antarctica

1.PS-28 **D. Hansaraj, S. A. Henrys & T. R. Naish:** McMurdo Ice Shelf seismic reflection data and correlation to the AND-1B drillhole

1.PS-29 **E. Armadillo, F. Ferraccioli, M. Gambetta, F. Talarico, A. Zunino, M. Zangani & E. Bozzo:** A high resolution aeromagnetic survey over the Cape Roberts Rift Basin: correlations with seismic reflection and magnetic susceptibility log data

1.PS-30 **S. A. Henrys, C. Sauli, T. J. Wilson, C. C. Sorlien, B. P. Luyendyk, N. Wardell, P. J. Bart, F. Davey, R. Granot, C. R. Fielding & R. Group:** ROSSMAP: Ross Sea Digital Geophysical and Geological Maps

Tuesday, 28 August 2007

Corwin West

Corwin East

2.PL: Plenary Lectures

0830 **Joe Kirschvink** Four Billion Years of Change: Earth's Precambrian Glacial Record

0900 **Trond Torsvik** Antarctica and Global Paleogeography: From Rodinia, through Gondwanaland and Pangea, to the opening of gateways and the birth of the Southern Ocean

0940 **Coffee break and poster viewing (Lagoon Plaza) 2.PS. Mesozoic-Cenozoic tectonic and magmatic history and processes**

2.A.A: Antarctica, the southern ocean, and climate evolution: Insights from drilling, coring, and geophysical surveys ORAL
Chairs: John B. Anderson & R. M. McKay

2.A.B: Technologies and tools for exploring the antarctic environment ORAL
Chairs: Carol A. Raymond & Chung-Chi Lin

1010 **Anderson et al.**: Seismic and chronostratigraphic results from SHALDRIL II, northwestern Weddell Sea

Smith et al.: Methods for determining topography in data sparse regions of East Antarctica

1030 **Hillenbrand et al.**: Glacial dynamics of the West Antarctic Ice Sheet in the southern Bellingshausen Sea during the last glacial cycle

Lin: Airborne and spaceborne ice sounding of Antarctica, Mars and Europa

1050 **McKay et al.**: A glacial to interglacial sediment model and retreat history for the Ross Ice (Sheet) Shelf in Western Ross Sea since the Last Glacial Maximum

Sanchez et al.: The Applicability of Topographic Mapping in Antarctica with the Advanced Land Observing Satellite (ALOS)

1110 **Rebesco & Camerlenghi**: Does the Late Pliocene change in the architecture of the Antarctic margin correspond to the transition to the modern Antarctic Ice Sheet?

Nengcheng et al.: Global Polar geospatial information service retrieval based on search engine and ontology reasoning

1130 **Passchier**: East Antarctic ice-sheet dynamics 5.2-0 Ma from a high-resolution terrigenous particle size record, ODP Site 1165, Prydz Bay-Cooperation Sea

Knuth et al.: Estimation of Snow Accumulation in Antarctica Using Automated Acoustic Depth Gauge Measurements

1150 **Williams et al.**: Insights into the East Antarctic Ice Sheet, 3.5 to 19 Ma, inferred from iceberg provenance

Behar: Recent Advances in Low-Power Real Time Comms Using New Iridium Data Capabilities

1210 **Nielsen & Hodell**: Antarctic ice-rafted detritus in the South Atlantic: Indicators of iceshelf dynamics or ocean surface conditions?

Fleckenstein & Eustes: Proposed Subglacial Antarctic Lake Environment Access Methodology

1200 **LUNCH**

2.P1.A: Antarctica, the southern ocean, and climate evolution: Insights from drilling, coring, and geophysical surveys ORAL
Chairs: Jim Kennett & Carlota Escutia

2.P1.B: Biotic evolution and radiation of life: Before and after Gondwana breakup ORAL
Chairs: Margaret A. Bradshaw & Molly Miller

1330 **De Santis et al.**: New insights into submarine geomorphology and depositional processes along the George V Land continental slope and upper rise (East Antarctica)

Bradshaw & Harmsen: The Paleoenvironmental significance of trace fossils in Devonian sediments (Taylor Group), Darwin Mountains to the Dry Valleys, southern Victoria Land

1350 **Escutia et al.**: Extensive debris flows on the eastern Wilkes Land margin: a key to changing glacial regimes

Ryberg & Taylor: Silicified wood from the Permian and Triassic of Antarctica: Tree rings from polar paleolatitudes

1410 **Leitchenkov et al.**: Cenozoic environmental changes along the East Antarctic continental margin inferred from regional seismic stratigraphy

Miller & Isbell: Abrupt (how abrupt?) Permian – Triassic changes in southern polar ecosystems

1430 **Verducci et al.**: East Antarctic Ice Sheet fluctuations during the Middle Miocene Climatic Transition inferred from faunal and biogeochemical data on planktonic foraminifera (Kerguelen Plateau)

Taylor et al.: Ovule-bearing reproductive organs of the glossopterid seed ferns from the Late Permian of the Beardmore Glacier Region, Antarctica

1450 **Jiang & Wise**: Abrupt turnover in calcareous-nannoplankton assemblages across the Paleocene/Eocene Thermal Maximum: implications for surface-water oligotrophy over the Kerguelen Plateau, Southern Indian Ocean

Bomfleur et al.: Exceptionally well-preserved Triassic and Early Jurassic floras from North Victoria Land, Antarctica

1510 **Coffee break and poster viewing (Lagoon Plaza) 2.PS. Mesozoic-Cenozoic tectonic and magmatic history and processes**

2.P2.A: Climate transitions: Greenhouse-refrigerator-freezer ORAL
Chairs: Philip J. Bart & Christina R. Riesselman

2.P2.B: Biotic evolution and radiation of life: Before and after Gondwana breakup ORAL
Chairs: William R. Hammer & James E. Martin

1540 **Tripati et al.**: Evidence for synchronous glaciation of Antarctica and the Northern Hemisphere during the Eocene and Oligocene: Insights from Pacific records of the oxygen isotopic composition of seawater

Collinson & Hammer: Migration of Triassic tetrapods to Antarcica

1600 **Gray & Bart**: Sediment accumulation rates from the Ross Sea continental shelf and deepwater sites, Antarctica: A physical proxy for the onset of polar conditions

Smith et al.: The dinosaurs of the Early Jurassic Hanson Formation of the central Transantarctic Mountains: phylogenetic review and synthesis

1620 **Riesselman et al.**: High resolution stable isotope and carbonate variability during the early Oligocene climate transition: Walvis Ridge (ODP Site 1263)

Martin et al.: Occurrence of a Young Elasmosaurid Plesiosaur Skeleton from the Late Cretaceous (Maastrichtian) of Antarctica

1640 **Pekar & Christie-Blick**: Showing a strong link between climatic and *p* CO_2 changes: resolving discrepancies between oceanographic and Antarctic climate records for the Oligocene and early Miocene (34-16 Ma)

Case et al.: A Dromaeosaur from the Maastrichtian of James Ross Island and the Late Cretaceous Antarctic Dinosaur Fauna

1700 **Poster Session: 2.PS. Mesozoic-Cenozoic tectonic and magmatic history and processes**

1800 **DINNER**

1930 **Evening poster viewing with wine & beer (Lagoon Plaza)**

Tuesday, 28 August 2007

	Multicultural Theater	Flying A
0940	**Coffee break and poster viewing (Lagoon Plaza) 2.PS. Mesozoic-Cenozoic tectonic and magmatic history and processes**	
	2.A.C: Antarctica in Rodinia, Gondwana and Pangea: In honor of the contributions of Campbell Craddock ORAL Chairs: John W. Goodge & Franz Tessensohn	**2.A.D: Active and ancient surface processes ORAL** Chairs: David Sugden & Jaakko Putkonen
1010	**Tessensohn**: Continental transform faults - break-up examples from the Antarctic and the Arctic	**Swanger & Marchant**: Sensitivity of ice-cemented Antarctic slopes to increases in summer thaw
1030	**Bradshaw**: The Ross Orogen and Lachlan Fold Belt in Marie Byrd Land and New Zealand: implication for the tectonic setting of the Lachlan Fold Belt in Antarctica	**Putkonen et al.**: Regolith transport in the Dry Valleys of Antarctica
1050	**Gemelli et al.**: Nature and timing of lower crust of the Robertson Bay terrane (northern Victoria Land, Antarctica)	**Gooseff et al.**: Trends in Discharge and Flow Season Timing of the Onyx River, Wright Valley, Antarctica Since 1969
1110	**Stump et al.**: Constraints from detrital zircon geochronology on the early deformation of the Ross orogen, Transantarctic Mountains, Antarctica	**Marchant et al.**: Establishing a chronology for the world's oldest glacier ice
1130	**Rocchi et al.**: Postcollisional magmatism of the Ross Orogeny (Victoria Land, Antarctica): a granite-lamprophyre genetic link	**Head et al.**: Slope streaks in the Antarctic Dry Valleys: Characteristics, candidate formation mechanisms, and implications for slope streak formation in the Martian environment
1150	**Adams**: Provenance connections between Late Neoproterozoic and Early Paleozoic sedimentary basins of the Ross Sea region, Antarctica, southeast Australia and southern Zealandia	**Head et al.**: Transient streams and gullies in the Antarctic Dry Valleys: Geological setting, processes and analogs to Mars
1210	**Bracciali et al.**: The Morozumi Range Intrusive Complex (northern Victoria Land, Antarctica)	**No talk**
1200	**LUNCH**	
	2.P1.C: Antarctica in Rodinia, Gondwana and Pangea: In honor of the contributions of Campbell Craddock ORAL Chairs: Edmund Stump & Robert H. Rutford	**2.P1.D: Mesozoic-Cenozoic magmatic processes within the antarctic plate ORAL** Chairs: Philip R. Kyle & Ricarda Hanemann
1330	**Korhonen et al.**: Petrologic and geochronological constraints on the polymetamorphic evolution of the Fosdick migmatite dome, Marie Byrd Land, West Antarctica	**Schöner et al.**: Triassic-Jurassic epiclastic and volcaniclastic deposits in North Victoria Land, Antarctica: A revised stratigraphic model
1350	**Drewry & Jankowski**: Magnetic susceptibility of West Antarctic Rocks	**Viereck-Goette et al.**: "Multiple shallow level sill intrusions coupled with hydromagmatic explosive eruptions mark the initial phase of Ferrar Magmatism in North Victoria Land, Antarctica"
1410	**Behrendt et al.**: One hundred negative magnetic anomalies over the West Antarctic Ice Sheet (WAIS), in particular Mt. Resnik, a subaerially erupted volcanic peak, indicate eruption through at least one field reversal	**Leat et al.**: Jurassic magmatism in Dronning Maud Land: synthesis of results of the MAMOG project
1430	**Barker**: The history of Antarctic Peninsula glaciation	**Heinonen & Luttinen**: Ferropicritic dikes of Vestfjella, western Dronning Maud Land: Fe-enriched mantle source for late-stage Karoo magmas
1450	**Rutford & McIntosh**: Jones Mountains, Antarctica:Evidence for Tertiary glaciation revisited	**Hanemann & Viereck-Goette**: Evolution of low-Ti and high-Ti rocks of the Jurassic Ferrar Large Igneous Province, Antarctica: Constraints from crystallisation experiments
1510	**Coffee break and poster viewing (Lagoon Plaza) 2.PS. Mesozoic-Cenozoic tectonic and magmatic history and processes**	
	2.P2.C: Antarctica in Rodinia, Gondwana and Pangea: In honor of the contributions of Campbell Craddock ORAL Chairs: Carol Finn & Werner Buggisch	**2.P2.D: Mesozoic-Cenozoic magmatic processes within the antarctic plate ORAL** Chairs: Fabio Florindo & Stefan Kraus
1540	**Goodge et al.**: Pieces of Laurentia in East Antarctica	**Kraus et al.**: New Ar/Ar and K/Ar ages of dykes in the South Shetland Islands (Antarctic Peninsula)
1600	**Finn & Pisarevsky**: New airborne magnetic data evaluate SWEAT reconstruction	**Mortimer et al.**: Basal Adare Volcanics, Robertson Bay, North Victoria Land, Antarctica: Late Miocene intraplate basalts of probable subglacial origin
1620	**Buggisch & Kleinschmidt**: The Pan-African Nappe Tectonics in the Shackleton Range	**Panter & Castillo**: Petrogenesis and source of lavas from seamounts in the Adare Basin, Western Ross Sea: Implications for the origin of Cenozoic magmatism in Antarctica
1640	**Zhao et al.**: Sub-glacial Geology of Antarctica- a preliminary investigation and results in the Grove Mountains and Vestfold Hills, East Antarctica and its tectonic implication	**Gaffney & Siddoway**: Heterogeneous sources for Pleistocene lavas of Marie Byrd Land, Antarctica: New data from the SW Pacific diffuse alkaline magmatic province
1700	**Poster Session: 2.PS. Mesozoic-Cenozoic tectonic and magmatic history and processes**	
1800	**DINNER**	
1930	**Evening poster viewing with wine & beer (Lagoon Plaza)**	

Tuesday, 28 August 2007

Poster Session 2.PS: Mesozoic-Cenozoic tectonic and magmatic history and processes

Posters on display: Lagoon Plaza 0830 – 2200

Poster viewing sessions: 0940 – 1010; 1510 – 1540; 1700 – 1800; 1930 – 2200

2.PS-31 **K. Gohl, G. L. Leitchenkov, N. Parsiegla, B. M. Ehlers, C. Kopsch, D. Damaske, Y. B. Guseva & V. V. Gandyukhin:** Crustal types and continent-ocean boundaries between the Kerguelen Plateau and Prydz Bay, East Antarctica

2.PS-32 **A. V. Golynsky:** Magnetic anomalies in East Antarctica: application to definition of major tectonic provinces

2.PS-33 **D. A. Golynsky & A. V. Golynsky:** Gaussberg Rift – illusion or reality?

2.PS-34 **F. Lisker, H. Gibson, C. J. L. Wilson & A. Laeufer:** Denudation and uplift of the Mawson Escarpment (eastern Lambert Graben, Antarctica) as indicated by apatite fission track data and geomorphological observation

2.PS-35 **P. G. Fitzgerald & S. L. Baldwin:** Thermochronologic constraints on Jurassic rift flank denudation in the Thiel Mountains, Antarctica

2.PS-36 **A. V. Luttinen & P. Leat:** A revised geochemical grouping of Gondwana LIP: distinctive sources and processes at the Weddell and Limpopo triple junctions

2.PS-37 **R. Hanemann & L. Viereck-Goette:** Platinumgroup elements in sills of the Jurassic Ferrar Large Igneous Province from northern Victorialand, Antarctica

2.PS-38 **S. Saito, F. Korhonen, M. Brown & C. S. Siddoway:** Petrogenesis of granites in the Fosdick migmatite dome, Marie Byrd Land, West Antarctica

2.PS-39 **T. A. Jordan, F. Ferraccioli, P. C. Jones, J. L. Smellie, M. Ghidella, H. Corr & A. F. Zakrajsek:** High-resolution airborne gravity imaging over James Ross Island (West Antarctica)

2.PS-40 **S. H. Choi, J. I. Lee & W. H. Choe:** Mantle Heterogeneity beneath the Antarctic-Phoenix Ridge in the Drake Passage, Antarctica

2.PS-41 **A. Veit & L. Viereck-Goette:** Differentiation History of Hubert Miller Seamount Basalts, Amundsen Sea, South Pacific

2.PS-42 **E. Armadillo, F. Ferraccioli, A. Zunino, E. Bozzo, S. Rocchi & P. Armienti:** Aeromagnetic hunt for Cenozoic magmatism over the Admiralty Mountains Block (East Antarctica)

2.PS-43 **M. K. Scanlan, K. S. Panter & N. W. Dunbar:** Evidence for magma mixing/mingling in lavas from Minna Bluff, South Victoria Land

2.PS-44 **P. R. Kyle, C. Oppenheimer & E. Team:** Erebus volcano, Ross Island, Antarctica: Recent studies, forthcoming publications, on-going activity

2.PS-45 **T. Paulsen & T. J. Wilson:** Elongate summit calderas as Neogene paleostress indicators in Antarctica

2.PS-46 **D. Damaske, A. Läufer, F. Goldmann, H. D. Möller & F. Lisker:** Magnetic anomalies north-east of Cape Adare, northern Victoria Land (Antarctica), and their relation to on-shore structures

2.PS-47 **M. Barklage, D. Wiens, A. Nyblade & S. Anandakrishnan:** Upper mantle seismic anisotropy of South Victoria Land/Ross Island, Antarctica from SKS and SKKS splitting analysis

2.PS-48 **M. L. Pyle, D. A. Wiens, A. Nyblade & S. Anandakrishnan:** Short period Rayleigh wave group velocities in Antarctica determined by the cross-correlation of ambient seismic noise from the TAMSEIS array

2.PS-49 **R. W. Bialas, W. R. Buck, M. Studinger & P. G. Fitzgerald:** Plateau collapse model for the Transantarctic Mountains/West Antarctic Rift System: Insights from numerical experiments

2.PS-50 **E. Demyanick & T. Wilson:** Morphotectonic architecture of the Transantarctic Mountains rift flank between the Royal Society Range and the Churchill Mountains based on geomorphic analysis

2.PS-51 **C. Millan, T. Wilson & T. Paulsen:** Microstructural study of natural fractures in Cape Roberts Project 3 core, Western Ross Sea, Antarctica

2.PS-52 **J. Hall, T. J. Wilson & S. A. Henrys:** Structure of the Central Terror Rift, Western Ross Sea, Antarctica

2.PS-53 **J. Stock, F. Dammeier, R. Granot, R. W. Clayton, S. Cande, F. Davey & T. Ishihara:** Young faults in the Adare Basin and northern Ross Sea

2.PS-54 **T. G. Hayden, M. A. Kominz & A. MIS Science Team:** Preliminary Backstripping of the Andrill-1B Core: Perils, Pitfalls, and Progress

2.PS-55 **S. A. Konfal, T. J. Wilson & M. J. Willis:** GPS Surveys to Detect Active Faulting in the Transantarctic Mountains, Antarctica

2.PS-56 **T. J. Wilson & B. Csatho:** Airborne laser swath mapping of the Denton Hills, Transantarctic Mountains, Antarctica: Applications for structural and glacial geomorphic mapping

2.PS-57 **A. Maestro, J. López-Martínez & F. Bohoyo:** Tectonic evolution of northern Antarctic Peninsula from brittle mesostructures and earthquakes focal mechanisms

2.PS-58 **M. Berrocoso, M. E. Ramírez, A. Fernández-Ros, A. Pérez-Peña & J. M. Enríquez de Salamanca:** Tectonic deformation models for South Shetland Islands, Bransfield Sea and the Antarctic Peninsula

2.PS-59 **W. S. D. Wilcock, A. H. Barclay & J. M. Ibanez:** Tectonic and Volcanic Influences at Deception Island, South Shetland Islands

2.PS-60 **R. Pérez-López, J. L. Giner-Robles, J. J. Martínez-Díaz, M. A. Rodríguez-Pascua, M. Bejar, C. Paredes & J. M. González-Casado:** Active tectonics on Deception Island (West-Antarctica): A new approach using the fractal anisotropy of lineaments, fault slip measurements and the caldera collapse shape

2.PS-61 **S. P. Levashov, M. A. Yakymchuk, I. N. Korchagin, V. G. Bachmutov, V. D. Solovyov & D. N. Bozhezha:** Drake Passage and Bransfield Strait – new geophysical data and modeling of the crustal structure

2.PS-62 **F. Bohoyo, J. Galindo-Zaldivar, A. Jabaloy, A. Maldonado, J. Rodriguez-Fernandez, A. A. Schreider & E. Suriñach:** Development of deep extensional basins associated with the sinistral transcurrent fault zone of the Scotia-Antarctic plate boundary

2.PS-63 **F. J. Hernández-Molina, F. Bohoyo, A. C. Naveira Garabato, J. Galindo-Zaldivar, F. J. Lobo, A. Maldonado, J. Rodriguez-Fernandez, L. Somoza, D. A. V. Stow & J. T. Vázquez:** The Scan Basin evolution: oceanographic consequences of the deep connection between the Weddell and Scotia Seas (Antarctica)

2.PS-64 **Y. K. Jin, K. J. Kim, J. K. Hong, M. Park, S. H. Nam, J. Lee & Y. Kim:** Geophysical investigations of P3 segment of the Phoenix Ridge in Drake Passage, Antarctica

2.PS-65 **B. Della Vedova, F. Accaino, F. M. Loreto & U. Tinivella:** The passive subduction of the Phoenix plate remnant at the South Shetland trench

2.PS-66 **R. Greku & T. Greku:** "Deep structure of the Antarctic Plate's boundary zone by the gravimetric tomography method"

2.PS-67 **D. Zandomeneghi, A. H. Barclay, J. Almendros, J. M. Ibanez, T. Ben-Zvi & W. S. D. Wilcock:** Three-dimensional P wave tomography of Deception Island Volcano, South Shetland Islands

2.PS-68 **H. M. J. Stagg & A. M. Reading:** Crustal architecture of the oblique-slip conjugate margins of George V Land and southeastern Australia

2.PS-69 **R. C. Decesari, C. C. Sorlien, B. P. Luyendyk, D. S. Wilson, L. Bartek, J. Diebold & S. E. Hopkins:** Regional seismic stratigraphic correlations of the Ross Sea; Implications for the tectonic history of the West Antarctic Rift System

Wednesday, 29 August 2007

Corwin West

Corwin East

3.PL: Plenary Lectures

0830 **Karsten Gohl** Antarctica's continent-ocean boundaries: Consequences for tectonic reconstructions

0900 **David Sugden** Landscape evolution of Antarctica

0940 **Coffee break and poster viewing (Lagoon Plaza) 3.PS. Databases, maps and tools for exploring Antarctica**

3.A.A: Ice sheet history and dynamics: Solid-earth, subglacial, terrestrial, and marine geological records ORAL
Chairs: Erik Ivins & Kenneth Solli

3.A.B: Holocene to modern Antarctic environments and global change ORAL
Chairs: Dieter Futterer & Robert B. Dunbar

1010 **Bamber et al.**: Mass balance of Antarctica from InSAR and regional climate modeling

Dunbar et al.: A circum-Antarctic synthesis of stable carbon isotope variability in Southern Ocean sedimentary sections: Insights from the modern ocean

1030 **Shibuya et al.**: "Determination of the Antarctic coastline by InSAR, and variation estimate of Shirase Glacier flow by a SAR image correlation method"

Annett et al.: Ecological influences on delta 13-C of particulate matter in seasonally ice-covered Ryder Bay, Antarctica

1050 **Young et al.**: Subglacial Roughness of the West Antarctic Ice Sheet

Rosenheim et al.: A proposed community wide analytical network using a new approach to radiocarbon dating of Antarctic glacial marine sediments

1110 **Diehl et al.**: Locating subglacial sediments across West Antarctica with isostatic gravity anomalies

Costa et al.: Solar forcing and El Niño-Southern Oscillation (ENSO) influences on productivity cycles interpreted from a late-Holocene high-resolution marine sediment record, Adélie Drift, East Antarctic Margin

1130 **Bonaccorsi et al.**: C-14 age control of pre- and post-LGM Events using *N. pachyderma* preserved in deep-sea sediments (Ross Sea, Antarctica)

Allen et al.: A record of Holocene paleoclimatic variability from Neny Fjord, Antarctic Peninsula

1150 **Solli**: The Cosmonaut Sea Wedge

Barreira & Compagnuccci: Sea ice concentration temporal variability over the Weddell Sea and its relationship with Tropical Sea Surface Temperature

1210 **Donda et al.**: Mega debris flows deposits in the Western Wilkes Land margin (East Antarctica)

Barreira & Compagnucci: Can tropical sea surface temperature be used as a first guess for the sea ice concentration temporal variability over the Amundsen and Bellingshausen Seas?

1200 **LUNCH**

1330 **Afternoon excursions**

1800 **DINNER**

1930 **Evening poster viewing with wine & beer (Lagoon Plaza)**

Wednesday, 29 August 2007

	Multicultural Theater	Flying A
0940	**Coffee break and poster viewing (Lagoon Plaza) 3.PS. Databases, maps and tools for exploring Antarctica**	
	3.A.C: Antarctica in Rodinia, Gondwana and Pangea: In honor of the contributions of Campbell Craddock ORAL Chairs: Sam B. Mukasa & Geoffrey H. Grantham	**3.A.D: Glaciation,climate, surface processes and tectonism: The landscape record ORAL** Chairs: Cliff B. Atkins & Graeme G. Claridge
1010	**Mukasa et al.**: Lu*ƒ*-Hf systematics of the ultra-high temperature Napier Complex, East Antarctica: evidence for the early Archean differentiation of Earth's mantle	**Atkins**: Advances in understanding cold-based glaciers
1030	**Wang et al.**: U-Pb zircon age from the Ultrahigh temperature metapelites, Rauer Group, east Antarctica: Implications for Grenvillian and Pan-African events Overprint	**Strasky et al.**: Multiple Early to Mid-Pleistocene East Antarctic Ice Sheet variations in the Ricker Hills
1050	**Corvino & Wilson**: Tectonic transposition of Palaeo-Mesoproterozoic rocks at 1000 Ma in the Waller Hills area of the Mawson Escarpment, Antarctic Southern Prince Charles Mountains	**Mager et al.**: Stable isotope composition of the basal ice from Taylor Glacier, Southern Victoria Land, Antarctica
1110	**Carson et al.**: Age of boron- and phosphorus-rich paragneisses and associated orthogneisses, Larsemann Hills: New constraints from SHRIMP U-Pb zircon geochronology	**Folco**: Microtektites from northern Victoria Land Transantarctic Mountains: evidence for a new strewn field generated by a catastrophic impact on Earth
1130	**Jacobs et al.**: New age constraints for orogenic collapse and voluminous late-tectonic magmatism in the southern part of the East African-Antarctic Orogen	**Claridge & Campbell**: The "Golden Shale': An indicator of past history of the Transantarctic mountains
1150	**Grantham et al.**: Terrane Correlation between Antarctica, Mozambique & Sri Lanka: Comparisons of Geochronology, Lithology, Structure and Metamorphism	**No talk**
1200	**LUNCH**	
1330	**Afternoon excursions**	
1800	**DINNER**	
1930	**Evening poster viewing with wine & beer (Lagoon Plaza)**	

Wednesday, 29 August 2007

Poster Session 3.PS: Databases, maps and tools for exploring Antarctica

Posters on display: Lagoon Plaza 0830 – 2200

Poster viewing sessions: 0940 – 1010; 1100 – 1200; 1930 – 2200

3.PS-70 **C. A. Ricci, M. Alberti, L. Folco, J. Muller, R. Palmeri & A. Zeoli:** The Earth Science Section of the Italian Museo Nazionale dell'Antartide

3.PS-71 **N. Wardell, J. Childs & A. K. Cooper:** Advances through collaboration: Sharing seismic reflection data via the Antarctic Seismic Data Library System for Cooperative Research (SDLS)

3.PS-72 **T. J. Deen & A. J. Tate:** An overview of the geophysical data held by the British Antarctic Survey

3.PS-73 **A. J. Tate:** An overview of the geological data held by the British Antarctic Survey

3.PS-74 **S. L. Knuth, C. R. Stearns, M. A. Lazzara, G. A. Weidner, L. M. Keller & J. E. Thom:** Antarctic Meteorological Data – Collection, Archive, and Distribution

3.PS-75 **S. Gordon & M. Balks:** The Latitudinal Gradient Project (LGP): Summary of progress to date and proposed activities

3.PS-76 **B. J. Connor, P. Solomon, J. Barrett, T. Mooney & A. Parrish:** Observations of chlorine monoxide over Scott Base, Antarctica, during the ozone hole, 1996-2005

3.PS-77 **W. S. Lee, M. Park, Y. Kim & B. K. Park:** Numerical modeling of T-wave excitation using multiple scattering theory with observations from Bransfield Strait, Antarctica

3.PS-78 **C. E. G. R. Schaefer, R. M. Santana, M. L. Calijuri, F. N. B. Simas, M. R. Francelino & E. I. Fernandes Filho:** Geoenvironments in the vicinity of Arctowski Station, Admiralty Bay, King George Island, Antarctica: vulnerability and valuation

3.PS-79 **M. McLeod, J. Bockheim & M. Balks:** A fifth-order reconnaissance soil map of ice-free areas of the Transantarctic Mountains, Antarctica

3.PS-80 **S. V. Popov, G. L. Leitchenkov, M. Y. Moskalevsky, V. V. Kharitonov & V. N. Masolov:** ABRIS Project: new bedrock topography map for central Antarctica

3.PS-81 **F. O. Nitsche, S. Jacobs, R. D. Larter & K. Gohl:** New compilation of the Amundsen Sea continental shelf bathymetry

3.PS-82 **M. J. Flowerdew, T. R. Riley & P. Leat:** Draft geological map for the South Orkney Islands, Antarctica

3.PS-83 **C. Kraus:** Generation of a detailed geological map of the Antarctic Peninsula applying remote sensing methods

3.PS-84 **C. S. Siddoway & M. F. Siddoway:** Geometrical analysis of structural data collected at high South latitude: A modular arithmetic method that addresses meridional convergence

3.PS-85 **A. Golynsky, D. Blankenship, M. Chiappini, D. Damaske, F. Ferraccioli, C. Finn, D. Golynsky, A. Goncharov, S. Ivanov, T. Ishihara, W. Jokat, H. R. Kim, M. König, V. Masolov, Y. Nogi, M. Sand, M. Studinger & R. von Frese:** New magnetic anomaly map of East Antarctica and surrounding regions

3.PS-86 **F. Ferraccioli, P. C. Jones, P. Leat, T. Jordan & H. Corr:** Airborne geophysics as a tool for geoscientific research in Antarctica: some recent examples and perspectives

3.PS-87 **M. Studinger, R. E. Bell & N. P. Frearson:** Gravimeter test flights to the North Pole

3.PS-88 **T. J. Wilson, R. Dietrich & D. A. Wiens:** POLENET: Polar Earth Observing Network for the International Polar Year

3.PS-89 **T. Parker, S. White, K. Anderson, B. Beaudoin, J. Fowler & B. Johns:** Development of a Power and Communications System for Remote Autonomous Polar Observations

3.PS-90 **M. Gottwald, E. Krieg, C. von Savigny, S. Noel, P. Reichl, A. Richter, H. Bovensmann & J. P. Burrows:** SCIAMACHY's View of the Polar Atmosphere

3.PS-91 **S. Wise, M. Olney, J. M. Covington, S. Jiang, D. K. Kulhanek, H. Schrader, T. Bibby, W. Falcon & D. Harwood:** Cenozoic Antarctic DiatomWare/BugCam: An aid for research and teaching

3.PS-92 **A. M. Grunow, D. H. Elliot & J. E. Codispoti:** The United States Polar Rock Repository: A Geological Resource for the Earth Science Community

Thursday, 30 August 2007

	Corwin West	Corwin East
	4.PL: Plenary Lectures	
0830	**Christine Siddoway** Tectonic development of the West Antarctic rift system: Perspectives from the Pacific margin and eastern Ross Sea	
0900	**Jane Francis** 100 million years of Antarctic climate evolution: Evidence from fossil plants	
0940	**Coffee break and poster viewing (Lagoon Plaza) 4.PS. Early evolution of the Antarctic lithosphere**	
	4.A.A: Ice sheet history and dynamics: Solid-earth, subglacial, terrestrial, and marine geological records ORAL Chairs: Sandra Passchier & Kathy J. Licht	**4.A.B: Antarctic intraplate and plate boundary regimes ORAL** Chairs: Wilfried Jokat & Audrey D. Huerta
1010	**Licht & Palmer**: Characteristics of till transported by the Byrd and Nimrod Glaciers, Antarctica	**Harry & Anoka**: Geodynamic models of the tectonomagmatic evolution of the West Antarctic Rift System
1030	**Brecke & Goodge**: Provenance of glacially transported material near Nimrod Glacier, East Antarctica: Implications for the ice-covered East Antarctic shield	**Huerta**: Lithospheric structure across the Transantarctic Mountains constrained by analysis of gravity and thermal structure
1050	**Liu**: Records of past ice sheet fluctuation in interior East Antarctica	**Lawrence et al.**: Tectonic implications for uplift of the Transantarctic Mountains
1110	**Fang et al.**: Spores and pollen from glacial erratics in the Grove Mountains, east Antarctica	**Armadillo et al.**: Aeromagnetic anomaly patterns reveal buried faults along the eastern margin of the Wilkes Subglacial Basin (East Antarctica)
1130	**Smellie et al.**: Six million years of environmental (glacial—interglacial) conditions preserved in volcanic lithofacies of the James Ross Island Volcanic Group, northern Antarctic Peninsula	**Fitzgerald et al.**: A plateau collapse model for the formation of the West Antarctic rift system/Transantarctic Mountains
1150	**Wilch & McIntosh** Mio-Pliocene ice-volcano interactions at monogenetic volcanoes near Hobbs Coast, Marie Byrd Land, Antarctica	**Huerta**: Byrd drainage system: Evidence of a Mesozoic West Antarctic Plateau
1210	**Wilch et al.**: Late Miocene volcanism and glaciation at Minna Bluff, Antarctica	**Decesari et al.**: Cretaceous and Tertiary extension throughout the Ross Sea, Antarctica
1200	**LUNCH**	
	4.P1.A: Ice sheet history and dynamics: Solid-earth, subglacial, terrestrial, and marine geological records ORAL Chairs: F. Ferraccioli & Gabriele Uenzelmann-Neben	**4.P1.B: Antarctic intraplate and plate boundary regimes ORAL** Chairs: Christine Smith Siddoway & Lawrence A. Lawver
1330	**Ferraccioli et al.**: New aerogeophysical survey targets the extent of the West Antarctic Rift System over Ellsworth Land	**Henrys et al.**: Tectonic History of Mid-Miocene to Present Southern Victoria Land Basin, inferred from Seismic Stratigraphy, in McMurdo Sound, Antarctica
1350	**Holt et al.**: New aeromagnetic results from the Thwaites Glacier catchment, West Antarctica	**Lawver et al.**: Neotectonic and other features of the Victoria Land Basin, Antarctica, interpreted from multibeam bathymetry data
1410	**Graham et al.**: Late Quaternary ice sheet dynamics and deglaciation history of the West Antarctic Ice Sheet in the Amundsen Sea Embayment: Preliminary results from recent research cruises	**Rilling et al.**: ^{40}Ar-^{39}Ar Age Constraints on Volcanism and Tectonism in the Terror Rift of the Ross Sea, Antarctica
1430	**Uenzelmann-Neben et al.** Differences in ice retreat across Pine Island Bay, West Antarctica, since the Last Glacial Maximum: Indications from multichannel seismic reflection data	**Granot et al.**: Beyond seafloor spreading: Neogene deformation and volcanism in the Adare Basin
1450	**No talk**	**Selvans et al.**: Crustal velocity structure in the northern Ross Sea: From the Adare Basin onto the continental shelf
1510	**Coffee break and poster viewing (Lagoon Plaza) 4.PS. Early evolution of the Antarctic lithosphere**	
	4.P2.A: Seismic stratigraphy of the Ross Sea and the antarctic margin: Climate archives and tectonic history ORAL Chairs: Bruce P. Luyendyk & Christopher R. Fielding	**4.P2.B: Antarctic intraplate and plate boundary regimes ORAL** Chairs: Andrés Maldonado & Michael L. Curtis
1540	**Fielding et al.**: Seismic facies and stratigraphy of the Cenozoic succession in McMurdo Sound, Antarctica: implications for tectonic, climatic and glacial history	**Curtis**: Main Andean sinistral shear along the Cooper Bay Dislocation Zone, South Georgia?
1600	**Sauli et al.**: Coastal glacial valley system in the Wood Bay (western Ross Sea, Antarctica)	**Brix et al.**: "Thermochronologic constraints of the tectonic evolution of the western Antarctic Peninsula in late Meso- and Cenozoic times"
1620	**Pekar et al.**: Using new tools to explore undiscovered country: Understanding the stratigraphic and tectonic history of greenhouse to icehouse worlds of offshore New Harbor, Ross Sea, Antarctica	**Maldonado et al.**: Early opening of Drake Passage: regional seismic stratigraphy and paleoceanographic implications
1640	**Luyendyk et al.**: Proposed ANDRILL sites on Coulman High, Ross Sea, Antarctica	**Ben-Zvi et al.**: The P-wave velocity structure of Deception Island, Antarctica, from two-dimensional seismic tomography
1800	**DINNER - CONFERENCE BANQUET**	

Thursday, 30 August 2007

Multicultural Theater

Flying A

0940 **Coffee break and poster viewing (Lagoon Plaza) 4.PS. Early evolution of the Antarctic lithosphere**

4.A.C: The state of permafrost in a changing environment ORAL
Chairs: David Sugden & G. Vieira

4.A.D: Cretaceous and Tertiary climates of Antarctica ORAL
Chairs: Jane E. Francis & Allan C. Ashworth

1010 **Vieira et al.**: The permafrost environment of Northwest Hurd Peninsula (Livingston Island, Maritime Antarctic). Preliminary results

Ashworth et al.: The Neogene biota of the Transantarctic Mountains

1030 **Ramos et al.**: Permafrost and active layer monitoring in the Maritime Antarctic. Preliminary results from CALM sites on Livingston and Deception Islands

Lewis et al.: Major middle Miocene climate change and the extinction of tundra communities: Evidence from the Transantarctic Mountains

1050 **Simas et al.**: Organic C stocks in cryosols from Admiralty Bay, Maritime Antarctica

Grube & Mohr: Deterioration and/or cyclicity? The development of vegetation and climate during the Eocene and Oligocene in Antarctica

1110 **Kowalewski & Marchant**: Quantifying sublimation of buried glacier ice in Beacon Valley

McDonald et al.: Herbivory in Antarctic fossil forests: Evolutionary and palaeoclimatic significance

1130 **Raffi et al.**: Thermal regime, isotopic and morphological characteristics of ice wedges in northern Victoria Land, Antarctica

Thorn et al.: Terminal Cretaceous climate change and biotic response in Antarctica

1150 **No talk**

Leppe et al.: Paleobotany of Livingston Island: the first report of Upper Cretaceous fossil flora from Hannah Point

1200 **LUNCH**

4.P1.C: Evolution of antarctic lithosphere ORAL
Chairs: Bryan Storey & Guillaume Duclaux

4.P1.D: Cretaceous and Tertiary climates of Antarctica ORAL
Chairs: Vanessa Thorn & Judd A. Case

1330 **Duclaux et al.**: Superposition of Neoarchean and Paleoproterozoic tectonics in the Terre Adélie Craton (East Antarctica): evidence from Th-U-Pb ages on monazite and Ar-Ar ages

Ivany: Contributions to the Eocene climate record of the Antarctic Peninsula

1350 **Van de Flierdt et al.**: Pan-African age of the Gamburtsev Mountains?

Case: Opening of the Drake Passage: does this event correlate to climate change and biotic events from the Eocene La Meseta Formation, Seymour Island, Antarctic Peninsula?

1410 **Goodge**: Proxies of the East Antarctic shield: Composition and age of ice-covered basement from sedimentary and glacial provenance

Palma-Heldt: Palynoflora of Livingston Island, South Shetland Islands: Contribution to the understanding of the evolution of the southern pacific Gondwana margin

1430 **Riedel & Jokat**: A compilation of new airborne magnetic and gravity data across Dronning Maud Land, Antarctica

Nelson et al.: Neogene environmental history deduced from glacigenic sediments on James Ross Island, northern Antarctic Peninsula

1450 **Romu & Luttinen**: Lamproite-hosted xenoliths of Vestfjella: implications for lithospheric architecture in western Dronning Maud Land, Antarctica

No talk

1510 **Coffee break and poster viewing (Lagoon Plaza) 4.PS. Early evolution of the Antarctic lithosphere**

4.P2.C: Evolution of antarctic lithosphere ORAL
Chairs: Rudolf Greku & Masaki Kanao

4.P2.D: Instability in antarctic ice shelves ORAL
Chairs: Robert B. Dunbar & Fabrizio Zgur

1540 **Satish-Kumar et al.**: Metamorphic evolution of UHT calc-silicate rocks from Rundvågshetta, Lützow Holm Bay, East Antarctica

Domack et al.: New marine sediment core data support Holocene stability of the Larsen B Ice Shelf

1600 **Kanao et al.**: "Deep seismic reflection imaging of the Pan-African mobile belt, the Lützow-Holm Complex, East Antarctica"

Zgur et al.: Geophysical survey of the thick, expanded sedimentary filling of the new-born Crane fjord (former Larsen B Ice Shelf, Antarctica)

1620 **Usui et al.**: Upper mantle anisotropy from teleseismic SKS splitting beneath Lützow-Holm Bay region, East Antarctica

Scambos et al.: Antarctic tabular iceberg evolution during northward drift: a proxy system for studying ice shelf breakup

1640 **Greku & Greku**: “Interaction of Antarctica with other regions at different spatial scales and deep layers”

Thoma & Jenkins: Modelling seasonal and inter-annual variability of the Amundsen Sea shelf waters

1800 **DINNER - CONFERENCE BANQUET**

Thursday, 30 August 2007

Poster Session 4.PS: Early evolution of the Antarctic lithosphere

Posters on display: Lagoon Plaza 0830 – 1700

Poster viewing sessions: 0940 – 1010; 1510 – 1540; 1600 – 1700

4.PS-93 **A. K. Engvik, S. Elvevold, J. Jacobs & E. Tveten:** Pan-African granulites of central Dronning Maud Land and Mozambique - a comparison within the East-African-Antarctic Orogen

4.PS-94 **B. Bayer, C. Müller, D. W. Eaton, W. H. Geissler, A. Eckstaller & W. Jokat:** Crust and upper mantle in Dronning Maud Land/Antarctica retrieved from shear-wave splitting, receiver functions, refraction seismics and 3-D gravity modelling

4.PS-95 **V. Ravikant, J. H. Laux & M. M. Pimentel:** Sm-Nd and U-Pb isotopic constraints for Late Neoproterozoic crustal evolution from granulites of the Schirmacher Oasis, East Antarctica: geodynamic development coeval with the East African Orogeny

4.PS-96 **M. Kanao, Y. Usui, T. Inoue & A. Yamada:** Broadband Seismic Array Deployments and Crust - Upper Mantle Structure around the Lützow-Holm Bay Region, East Antarctica

4.PS-97 **B. V. Belyatsky, N. V. Rodionov, S. A. Sergeev, G. L. Leitchenkov & E. N. Kamenev:** New evidences for the early Archaean evolution of Aker Peaks, Napier Mountains, Enderby Land (East Antarctica)

4.PS-98 **T. Kawasaki:** Solubility of TiO2 in Garnet and Orthopyroxene: Ti Thermometer for Ultrahigh-Temperature Granulites

4.PS-99 **A. F. Corvino, S. D. Boger & C. J. L. Wilson:** P-T conditions during formation of a metapelitic gneiss from Clemence Massif, Antarctic Prince Charles Mountains

4.PS-100 **E. V. Mikhalsky, F. Henjes-Kunst & N. W. Roland:** Early Precambrian mantle derived rocks in the southern Prince Charles Mountains, east Antarctica: age and isotopic constraints

4.PS-101 **V. A. Maslov, D. M. Vorobiev & B. V. Belyatsky:** Geological structure and evolution of Shaw Massif, central part of the Prince Charles Mountains (East Antarctica)

4.PS-102 **A. A. Laiba, B. V. Belyatsky & N. V. Rodonov:** New findings of alkaline-ultramafic dykes in the Prince Charles Mountains: age and composition

4.PS-103 **N. A. Gongurov, A. A. Laiba & B. V. Belyatsky:** Major magmatic events in Mt Meredith, Prince Charles Mountains: first evidence for early Palaeozoic syntectonic granites

4.PS-104 **E. V. Mikhalsky, F. Henjes-Kunst, B. V. Belyatsky & N. W. Roland:** Mafic dykes in the southern Prince Charles Mountains: A tale of Pan-African amalgamation of East Antarctica questioned

4.PS-105 **P. I. Lunev, A. I. Pogorelsky & V. F. Ilyin:** "A new alternative view on the stratigraphy and the geological framework of the Permian - Triassic deposits of the Amery Group, Radok and Biaver Lake area, the northern Prince Charles Mountains, East Antarctica"

4.PS-106 **R. P. Ménot, G. Duclaux, J. J. Peucat, Y. Rolland, S. Guillot, C. M. Fanning, J. Bascou, D. Gapais & A. Pécher:** Geology of the Terre Adélie Craton (135 - 146°E)

4.PS-107 **Y. B. Guseva, G. L. Leitchenkov, V. V. Gandyukhin & S. V. Ivanov:** Basement and crustal structure of the Davis Sea region (East Antarctica): implications for tectonic setting and COB definition

4.PS-108 **G. L. Leitchenkov, V. V. Gandyukhin, Y. B. Guseva & A. Y. Kazankov:** Crustal structure and evolution of the Mawson Sea (western Wilkes Land margin, East Antarctica)

4.PS-109 **A. K. Ksienzyk, J. Jacobs, J. Kosler & K. N. Sircombe:** A comparative provenance study of the late Mesoproterozoic Maud Belt (East Antarctica) and Pinjarra Orogen (Western Australia): implications for a possible Mesoproterozoic Kalahari-Western Australia connection

4.PS-110 **L. Federico, G. Capponi, L. Crispini & J. D. Bradshaw:** The Cambrian Ross Orogeny in Northern Victoria Land (Antarctica) and New Zealand: a synthesis

4.PS-111 **S. Rocchi & T. Rocchi:** Chronologic-dynamic zoning of the Ross Orogen – a current research program of the PNRA (Italy)

4.PS-112 **R. M. Bomparola & C. Ghezzo:** Inside the Granite Harbour Intrusives of northern Victoria Land: timing and origin of the intrusive sequence

4.PS-113 **R. Palmeri, R. Chmielowski, S. Sandroni, F. Talarico & C. A. Ricci:** The eclogite facies rocks from Antarctica and Tasmania: different geodynamic settings within the Cambro-Ordovician Ross/Delamerian Orogen

4.PS-114 **L. Crispini, G. Capponi & L. Federico:** Tectonics at the Bowers - Robertson Bay Terrane boundary, northern Victoria Land (Antarctica)

4.PS-115 **L. Crispini, G. Capponi, L. Federico & F. Talarico:** Gold bearing veining linked to transcrustal fault zones in the Transantarctic Mountains (northern Victoria Land, Antarctica)

4.PS-116 **F. Ferraccioli, E. Armadillo, G. Capponi, L. Crispini, M. Gambetta, A. Zunino & E. Bozzo:** Aeromagnetic anomalies and gold occurrences in Northern Victoria Land

4.PS-117 **R. Carosi, F. Giacomini, F. Talarico & E. Stump:** Geology of the "Byrd Glacier Discontinuity" (Ross Orogen): new survey data from the Britannia Range, Antarctica

4.PS-118 **F. Rossetti, G. Vignaroli, F. Balsamo & T. Theye:** Ross aged ductile shearing in the granitic rocks of the Wilson Terrane, Deep Freeze Range area, north Victoria Land (Antarctica)

Friday, 31 August 2007

	Corwin West	Corwin East
	4.PL: Plenary Lectures	
0830	**Rupert Sutherland** The significance of Antarctica for studies of global geodynamics	
0900	**Dorte Dahl- Jensen** Antarctic Insights into the Global Climate from Deep Ice Cores	
0940	**Coffee break and poster viewing (Lagoon Plaza) 5.PS. Ice history, ice dynamics, paleoceanography, and geodetic/geophysical observations**	
	5.A.A: Geophysical and geodetic observations at the poles ORAL Chairs: Jan Müller & Antonio Meloni	**5.A.B: Supercontinent breakup history and processes ORAL** Chairs: Alan K. Cooper & P.E. O'Brien
1040	**Rülke & Dietrich**: The SCAR GPS Campaigns in the context of global reference system realization and geodynamic research	**Jokat & König**: "Gondwana Breakup: The South American, African and Indian plate movements and remaining problems"
1100	**Mancini et al.**: Vertical motions in the Northern Victoria Land inferred from GPS: A comparison with the Glacial Isostatic Adjustment models	**Martin**: Double-saloon-door seafloor spreading: a new theory for the breakup of Gondwana
1120	**Scheinert et al.**: Modelling recent airborne gravity data over the Antarctic Peninsula for regional geoid improvement	**Nogi et al.**: Japanese-German joint airborne geophysical surveys around Syowa Station, Antarctica
1140	**Müller et al.**: Regional geoid and gravity field from a combination of airborne and satellite data in Dronning Maud Land, East Antarctica	**O'Brien & Stagg**: Tectonic elements of the continental margin of East Antarctic, 38-164oE
1200	**Meloni et al.**: The Contribution of Geomagnetic Observatories and Magnetic Models to the Study of Secular Variation and Jerks in Antarctica	**Lisker & Läufer**: A Cretaceous Victoria Basin between Australia and Antarctica inferred from volcanoclastic deposits, thermal indications and thermochronological data
1200	**LUNCH**	
	5.P1.A: Solid earth-ice sheet interactions ORAL Chairs: Michael Studinger & Doug Wiens	**5.P1.B: Supercontinent breakup history and processes ORAL** Chairs: Karsten Gohl & Lawrence A. Lawver
1330	**Kanao et al.**: Characteristic seismic signals associated with ice sheet and glacier dynamics, eastern Dronning Maud Land, East Antarctica	**McFadden et al.**: Cretaceous oblique detachment tectonics in the Fosdick Mountains, Marie Byrd Land, Antarctica
1350	**Wiens & Anandakrishnan**: Teleseismic surface waves radiated by the stick-slip motion of the Whillans Ice Stream	**Gohl et al.**: Geophysical survey reveals tectonic structures in the Amundsen Sea embayment, West Antarctica
1410	**Ivins et al.**: On Geodetic Inferences of Antarctic Lithosphere, Mantle Viscosity, Past Ice History and Present-day Balance	**Ghidella et al.**: Break-up of Gondwana and opening of the South Atlantic: review of existing plate tectonic models
1430	**Studinger & Bell**: Moho topography of the West Antarctic Rift System from inversion of aerogravity data: ramifications for geothermal heat flux and ice streaming	**Flowerdew et al.**: New Rb-Sr mineral ages temporally link plume events with accretion at the margin of Gondwana
1450	**Coffee break & poster viewing (Lagoon Plaza) 5.PS. Ice history, ice dynamics, paleoceanography, and geodetic/geophysical observations**	
1530	**Closing remarks (Corwin Pavilion)**	

Friday, 31 August 2007

	Multicultural Theater	Flying A
0940	**Coffee break and poster viewing (Lagoon Plaza) 5.PS. Ice history, ice dynamics, paleoceanography, and geodetic/geophysical observations**	
	5.A.C: Climate records: Ice cores and Quaternary geological records ORAL Chairs: Nelia W. Dunbar & Robert P. Ackert Jr.	**5.A.D: Exploration beneath the ice sheets and ice shelves ORAL** Chairs: Sean Fitzsimons & Stephen E. Cox
1040	**Baker et al.**: Advanced Electron Microscopy Techniques For Studying Ice And Firn Cores	**Cox et al.**: Detrital apatite and zircon (U-Th)/He evidence for early formation and slow erosion of the Gamburtsev Mountains, East Antarctica
1100	**Dunbar et al.**: Integrated tephrochronology of the West Antarctic region- implications for a potential tephra record in the West Antarctic Ice Sheet (WAIS) Divide Ice Core	**Hemming et al.**: Evidence from detrital hornblende 40Ar/39Ar and zircon U-Pb ages for the sources of glacial deposits in the Prydz Bay region
1120	**Sletten et al.**: Possible redeposition of volcanic ashes in the Dry Valleys by glacier transport	**Ferraccioli et al.**: Exploring under the East Antarctic Ice Sheet with a new aerogeophysical survey over the Wilkes Subglacial Basin, the Transantarctic Mountains and Dome C
1140	**Ortlepp et al.**: Late Quaternary environmental history of Taylor Valley, southern Victoria Land, Antarctica, reconstructed by a multidisciplinary study of lake sediments	**Rommen et al.**: A forward scattering and propagation model for Antarctic ice sheet investigations
1200	**Ackert et al.**: Surface exposure ages of glacial erratics in the Ohio Range, Horlick Mountains	**Fitzsimons et al.** Evidence of of bed deformation beneath the Wright Lower Glacier, south Victoria Land, Antarctica
1200	**LUNCH**	
	5.P1.C: Climate records: Ice core and Quaternary geological records ORAL Chairs: Eugene W. Domack & Steven L. Goldstein	**5.P1.D: Polar databases, repositories and maps ORAL** Chairs: Carol Finn & Norbert Ott
1330	**Domack et al.**: Spatial and Temporal Distribution of Ikaite Crystals in Antarctic Glacial Marine Sediments	**Von Frese et al.**: The next generation Antarctic digital magnetic anomaly map
1350	**Wagner & Melles**: The heterogenity of Holocene climatic and environmental history along the East Antarctic coastal regions	**Carbotte et al.**: Antarctic Multibeam Bathymetry and Geophysical Data Synthesis: An On-Line Digital Data Resource for Marine Geoscience Research in the Southern Ocean
1410	**Szymcek et al.**: Holocene oceanographic and climatic variability of the Vega Drift revealed through foraminiferal interpretation	**Ott & Schenke**: GIS based data compilation of the new International Bathymetric Chart of the Southern Ocean (IBCSO)
1430	**Goldstein et al.**: Quantifying changes in the global thermohaline circulation: a Circum-Antarctic perspective	**No talk**
1450	**Coffee break & poster viewing (Lagoon Plaza) 5.PS. Ice history, ice dynamics, paleoceanography, and geodetic/geophysical observations**	
1530	**Closing remarks (Corwin Pavilion)**	

Friday, 31 August 2007

Poster Session 5.PS: Ice history, ice dynamics, paleoceanography, and geodetic/geophysical observations

Posters on display: Lagoon Plaza 0830 – 1530

Poster viewing sessions: 0940 – 1040; 1450 – 1530

5.PS-119 **D. Pollard & R. M. DeConto:** Cenozoic variations of the Antarctic Ice Sheet: a model-data mismatch?

5.PS-120 **C. F. Dawber & A. K. Tripati:** Early Cenozoic glaciation: exploring the paradigm of an 'ice-free' Middle Eocene

5.PS-121 **G. Balco:** A surprisingly large marine ice cap at Heard Island during the Last Glacial Maximum?

5.PS-122 **V. Volpi, M. Rebesco & P. Diviacco:** New insights in the evolution of Antarctic glaciation from depth conversion of well-log calibrated seismic section of Prydz Bay

5.PS-123 **M. Presti, L. Barbara, D. Denis, X. Crosta, E. De Voos, M. Lipizer, C. De Vittor, A. Acquavita, C. Kissel & L. De Santis:** Late Quaternary sediment record of six glacial/interglacial cycles off the Wilkes Land - Adelie Land Coast (East Antarctica): preliminary geochemical results

5.PS-124 **A. S. Loth, L. R. Bartek, B. P. Luyendyk, D. S. Wilson & C. C. Sorlien:** Scale of subglacial to sub-ice shelf facies variability, Eastern Basin-Ross Sea

5.PS-125 **N. Corradi, M. Ferrari, F. Giordano & R. Ivaldi:** Glacial and marine features in the recent sedimentary deposits of the Joides Basin (Antarctica)

5.PS-126 **T. J. Deen, R. D. Larter, K. Gohl, A. G. C. Graham, C. -. D. Hillenbrand, G. Kuhn & J. A. Smith:** Divergent flow of the West Antarctic Ice Sheet on the outer continental shelf of the Amundsen Sea during the late Quaternary

5.PS-127 **P. F. Barker, C. Escutia, G. Filippelli, F. Florindo, S. Funakawa & E. Thomas:** The Onset and Role of the Antarctic Circumpolar Current

5.PS-128 **F. Davey & S. S. Jacobs:** Influence of submarine morphology on bottom water flow along the western Ross Sea continental margin.

5.PS-129 **H. I. Yoon, H. S. Lim & K. C. Yoo:** Holocene glaciomarine sediment in Maxwell Bay of the South Shetland Islands, Antarctica: its paleoceanographic implication

5.PS-130 **P. L. Manley & S. Brachfeld:** Synthetic seismograms and spectral cycles on the Andvord and Schollaert Drifts: Antarctic Peninsula

5.PS-131 **V. F. Martazinova & V. E. Tymofeyev:** Interdecadal change of troposperic circulation in Southern Hemisphere extratropics during the recent warming episode at the Antarctic Peninsula region

5.PS-132 **L. W. E. Boyd, L. R. Bartek, B. P. Luyendyk & D. S. Wilson:** Contrasting sub-ice shelf, sub glacial and glacial marine deposition: implications for ice shelf stability

5.PS-133 **J. Blanco, D. Tome, M. Ramos, G. Vieira, S. Gruber, C. Hauck & M. Hidalgo:** Active layer apparent thermal diffusivity and its dependence on atmospheric temperature (Livingston Island, Maritime Antarctic)

5.PS-134 **I. Filina, V. Lukin, V. Masolov & D. Blankenship:** "Unconsolidated Sediments at the Bottom of Lake Vostok from Seismic Data"

5.PS-135 **D. Steinhage, Y. Nogi & W. Jokat:** The subglacial Bed of Shirase Glacier, Dronning Maud Land, Antarctica

5.PS-136 **L. E. Peters & S. Anandakrishnan:** Subglacial conditions at a sticky spot along Kamb Ice Stream, West Antarctica

5.PS-137 **A. Zeoli, G. Corti, A. Deponti & L. Folco:** Modelling the ice flow through an analogical and a numerical approach

5.PS-138 **G. Corti, A. Zeoli, P. Belmaggio & L. Folco:** Investigating the bedrock topography effect on the ice flow ablation using analogue modelling technique

5.PS-139 **L. Folco:** A tephra chronostratigraphic framework for the Frontier Mountain blue ice field (northern Victoria Land, Antarctica)

5.PS-140 **D. Biscaro, M. Frezzotti, M. Alberti, I. Tabacco & C. A. Ricci:** ICESat altimetry vs. radar-derived ice thickness: ice density variation in the Scott Coast (Northern Victoria Land, Antarctica)

5.PS-141 **G. Casula, S. Danesi, M. Dubbini & L. Vittuari:** Tidal forcing on David Glacier and Drygalski Ice Tongue

5.PS-142 **M. J. Willis:** The Anatomy of Continuous GPS Measurements from southern Victoria Land, Antarctica

5.PS-143 **M. E. Ramirez, M. Berrocoso, A. Fernandez-Ros & M. J. González:** GPS Time Series analysis from Deception Island Volcano (South Shetland Islands, Antarctica)

5.PS-144 **A. Fernandez-Ros, M. Berrocoso & M. E. Ramírez:** Volcanic Deformation Models for Deception Island (South Shetland Islands, Antarctica)

5.PS-145 **M. Berrocoso, J. M. Enríquez de Salamanca, M. E. Ramírez, A. Fernández-Ros & B. Jigena:** Determination of a local geoid for Deception Island

5.PS-146 **R. P. Dziak, M. Park, H. Matsumoto, D. R. Bohnenstiehl, J. H. Haxel, D. K. Mellinger, K. M. Stafford & W. S. Lee:** Hydroacoustic Monitoring of the Bransfield Strait and Drake Passage, Antarctica: A first Analysis of Seafloor Seismicity, Cryogenic Acoustic Sources, and Cetacean Vocalizations

5.PS-147 **M. Kanao, S. Tanaka, S. Tsuboi & D. Wiens:** Broadband Seismic Deployments in East Antarctica: International Collaboration & IPY Contribution to Earth's Deep Interiors

5.PS-148 **G. Reitmayr, G. Casassa, C. Iturrieta, A. Wendt & R. Zamora:** Gravity Survey along a Traverse from Patriot Hills to the South Pole

5.PS-149 **Y. Rogister, M. Amalvict, J. Hinderer, B. Luck & A. Memin:** Absolute gravity measurements in Antarctica during the International Polar Year

5.PS-150 **C. C. Sorlien, D. S. Wilson, B. P. Luyendyk, L. R. Bartek, R. C. Decesari & J. B. Diebold:** Buried Oligocene glacial topography beneath a smooth middle Miocene unconformity in the southeast Ross Sea: evolution of West Antarctic glaciation

5.PS-151 **L. Di Nicola, S. Strasky, C. Schlüchter, M. C. Salvatore, P. W. Kubik, S. Ivy-Ochs, R. Wieler, N. Akçar & C. Baroni:** Complex exposure history of pre-LGM glacial drifts in Terra Nova Bay (Victoria Land), using a multiple cosmogenic nuclide approach

5.PS-152 **G. Casula, M. Dubbini & A. Galeandro:** Modeling environmental bias and computing velocity field from data of Terra Nova Bay (TNB) GPS Network in Antarctica by means of a quasi-observation processing approach

Workshops and business meetings

Sunday, 26 August 2007

0800-1200	Antarctic Seismic Data Library Systems (SDLS) workshop	UCEN State Street
0830-1130	Geoscience modelling for novices SHORT COURSE	UCEN Flying A
0830-1530	Status of Antarctic Permafrost and Soils: Database compilation and mapping (ANTPAS) workshop	UCEN Harbor
1230-1730	Marine proxies for antarctic ice volume: Continental shelf sequence stratigraphy and ?180 records from high and low latitudes. WORKHOP	UCEN Flying A
1300-1700	Remote geodetic and geophysical observatories: Challenges, successes and emerging technologies for IPY WORKSHOP	UCEN State Street

Monday, 27 August 2007

1930-2230	ANDRILL Science Committee (ASC) meeting	UCEN Harbor
1930-2100	Association of Polar Early Career Scientists (APECS) roundtable discussion	Santa Rosa Formal Lounge
1930-2230	Towards ADMAP 2 (Session 1) meeting	UCEN State Street

Tuesday, 28 August 2007

1930-2230	McMurdo Sound-ANDRILL Science Implementation Committee (M-ASIC) meeting	UCEN Harbor
1930-2130	Antarctica's Gamburtsev Province (AGAP) IPY Project #67 meeting	UCEN Flying A
1930-2130	IPY Plates and Gates meeting	UCEN State Street
1930-2130	Women in Antarctica Social	Santa Rosa Formal Lounge

Thursday, 30 August 2007

1215-1415	Towards ADMAP 2 (Session 2) Meeting	MultiCultural Lounge

Saturday, 1 September 2007

0800-1700	Antarctic Scientific Drilling (ANDRILL) workshop	UCEN Corwin West
0800-1700	Circum-Antarctic Paleobathymetry and Stratigraphy (CAPS) workshop	UCEN Corwin East
0800-1700	Geoscience Research on Antarctic Subglacial Environments workshop	UCEN Flying A
0800-1200	International Bathymetric Chart of the Southern Ocean (IBCSO) workshop	UCEN State Street

Short summaries for all symposium talks and posters: Listed by session numbers shown in the daily schedules

1.PL: Plenary lectures

1.PL-1: Antarctic Earth System Science in the International Polar Year 2007-2008

Robin E. Bell, Lamont-Doherty Earth Observatory of Columbia University, 61 Route 9W, Palisades, NY 10964

The International Polar Year 2007-8 is the largest coordinated effort to understand the polar regions in our lifetime. This international program of science, discovery and education involves more than 50,000 scientists from 62 nations. The IPY 2007–2008 Antarctic Earth System Science themes are to determine the polar regions' present environmental status, to quantify and understand past and present polar change, to advance our understanding of the links between polar regions and the globe, and to investigate the polar frontiers of science. POLENET will capture the status of the polar lithosphere through new instrument arrays, ANDRILL and ACE will focus on past change, PLATES and GATES will advance our understanding of the tele-connections between Antarctica and the global plate circuit, AGAP and SALE-United will study unknown sub-glacial mountains and lakes. A new era of international collaboration will emerge along with a new generation of Antarctic scientists.

1.PL-2: A view of Cenozoic Antarctic glaciation from sea-level and deep-sea isotope changes

Kenneth G. Millller, **James D. Wright**, **Miriam E. Katz**, **James V. Browning** and **Bridget S. Wade**, Department of Geological Sciences, Rutgers University, Piscataway, NJ 08854

The imperfect direct glacial record has led to the progressive extension of "initiation" of a continent-sized Antarctic ice sheet from 15 Ma to 33 Ma. Sea-level and deep-sea isotope records can be used to place constraints on the size and extent of Cenozoic Antarctic glaciation. Sea-level records indicate that small to medium sized (10-15 million cubic km), ephemeral ice sheets occurred during the greenhouse Late Cretaceous to middle Eocene. Global cooling with intermediate sized ice sheets began in the middle Eocene, culminating in the major Oi1 (33.5 Ma) oxygen isotope increase associated with growth of a continent-scale Antarctic ice sheet (25 x 106km3) and a 55 m sea-level fall. This large ice sheet became a driver, not only a response to climate change, causing increased latitudinal thermal gradients and a spinning up of the oceans that dramatically reorganized ocean circulation and chemistry.

1.P1.A: Antarctica, the southern ocean, and climate evolution: Insights from drilling, coring, and geophysical surveys ORAL

1.P1.A-1: Late Neogene climate history of the Ross Embayment: Initial results from the ANDRILL McMurdo Ice Shelf Project

T. R. Naish[1], **Ross D. Powell**[2], **Stuart A. Henrys**[3], **Gary Wilson**[4], **L.A. Krissek**[5], **Frank Niessen**[6], **Massimo Pompilio**[7], **Reed Scherer**[2], **Franco Talarico**[8], **Richard H. Levy**[9] and **A. R. Pyne**[10], (1)Antarctic Research Centre,, Victoria University of Wellington, GNS Science, Wellington, New Zealand, (2)Department of Geology and Environmental Geosciences, Northern Illinois University, DeKalb, IL 60115, (3)GNS Science, 1 Fairway Drive, Avalon, Lower Hutt, New Zealand, (4)Department of Geology, University of Otago, PO Box 56, Dunedin, New Zealand, (5)School of Earth Sciences and Byrd Polar Research Center, Ohio State University, Columbus, OH 43210, (6)Alfred Wegener Institute for Polar and Marine Research, Am Alten Hafen 26, Bremerhaven, 27568, Germany, (7)Sezione di Pisa, Istituto Nazionale di Geofisica e Vulcanologia, Via della Faggiola, 32, Pisa, Italy, (8)Dipartimento di Scienze della Terra, University of Siena, via Laterina 8, Siena, Italy, (9)ANDRILL Science Management Office, University of Nebraska - Lincoln, 126 Bessey Hall, Lincoln, NE 68588-0341, (10) Antarctic Research Centre, Victoria University of Wellington, Wellington, New Zealand

The ANDRILL Program successfully recovered a 1285m-long succession of cyclic glacimarine sediment with inter-bedded volcanic deposits, in its first season of drilling from the McMurdo Ice Shelf (MIS). The MIS drillcore represents the longest and most complete (98% recovery) geological record from the Antarctic continental margin to date, and will provide a key reference record of climate and ice sheet variability through the Late Neogene. Here we present a synopsis of the Initial Results Volume (Naish et al., in press, *Terra Antartica*) with special emphasis on the potential of the record for improving our knowledge of Antarctica's influence on global climate.

1.P1.A-2: Antarctic Ice Sheet dynamics through the Neogene from evidence in the ANDRILL–McMurdo Ice Shelf Project drillcore (AND-1B)

Ross D. Powell[1], **T. R. Naish**[2], **L. A. Krissek**[3], **G. H. Browne**[4], **L. Carter**[2], **E. A. Cowan**[5], **G. B. Dunbar**[2], **R. M. McKay**[2], **T. I. Wilch**[6] and **the Andrill - MIS Science Team**[7], (1)Department of Geology and Environmental Geosciences, Northern Illinois University, DeKalb, IL 60115, (2)Antarctic Research Centre, Victoria University of Wellington, Wellington, New Zealand, (3)Department of Geosciences, The Ohio State University, Columbus, OH, (4)Geological and Nuclear Sciences, Lower Hutt, New Zealand, (5)Department of Geology, Appalachian State University, Boone, NC, (6)Department of Geological Sciences, Albion College, Albion, MI, (7)http://www.andrill.org/support/references/appendixc.html

ANDRILL completed its first season in 2006-07 drilling AND-1B through the McMurdo Ice Shelf (MIS) to a depth of 1,285m below the sea floor, a record for Antarctic margin drilling, with 99% recovery. The alternating glacial-interglacial sediment packages interbedded with volcanics provide a uniquely detailed record of Antarctic glacial and climatic change through the Neogene. This paper summarizes the initial characterization of lithofacies and syndepositional structures relevant to understanding the regime and dynamics of past Antarctic Ice Sheets based on the ANDRILL-MIS Initial Report. Results show the Antarctic Ice Sheet was massive under a cold polar glacial regime during the earlier Miocene and Pleistocene but under a more dynamic and warmer polythermal glacial regime in the later Miocene and Pliocene. More detailed research, including a modelling component, is planned in order to understand the dynamics under these different regimes.

1.P1.A-3: Comprehensive downhole and core physical-property measurements at the AND-1B Drillsite, ANDRILL McMurdo Ice Shelf Project

Frank Niessen[1], **Roger Morin**[2], **Trevor Williams**[3], **Stuart A. Henrys**[4], **Travis Crosby**[5], **Dhiresh Hansaraj**[6], **Diana Magens**[1] and **A. Catalina Gebhardt**[1], (1)Alfred Wegener Institute for Polar and Marine Research, Am Alten Hafen 26, Bremerhaven, 27568, Germany, (2)U.S. Geological Survey, Mail Stop 403, Denver Federal Center, Denver, CO 80225, (3)Lamont-Doherty Earth Observatory, Columbia University, 61 Route 9W, Palisades, NY 10964, (4)GNS Science, 1 Fairway Drive, Avalon, Lower Hutt, New Zealand, (5)Department of Geology & Geophysics, University of Utah, Salt Lake City, UT 84112-1183, (6)Antarctic Research Centre, Victoria University of Wellington, PO Box 600, Wellington, New Zealand

As part of the ANDRILL McMurdo Ice Shelf (MIS) Project two comprehensive sets of geophysical data were collected on ice at the AND-1B drillsite. Whole-core physical properties were determined with high vertical resolution to a depth of 1285 mbsf. A multi-sensor-core-logger was used to determine bulk density, sonic velocity, magnetic susceptibility and electrical resistivity. After drilling, a set of downhole measurements was collected, which consisted of caliper, temperature, fluid conductivity, induction resistivity, magnetic susceptibility, natural gamma activity, acoustic televiewer, borehole deviation, and dipmeter. In addition, three vertical seismic profiles (VSP) were obtained. Physical properties were used for initial core characterization and on-site correlation with seismic modeling. Lithology and stratigraphic units are in good agreement with changes in the pattern of the physical properties. The resulting data are amenable to studies of cyclicity and climate, cementation and compaction history, heat flux and fluid flow, and structure and stress.

1.P1.A-4: Sedimentology and stratigraphy of the ANDRILL McMurdo Ice Shelf (AND-001B) core

L.A. Krissek[1], **G. H. Browne**[2], **L. Carter**[3], **E. A. Cowan**[4], **G. B. Dunbar**[3], **R. M. McKay**[3], **T. R. Naish**[3], **Ross D. Powell**[5], **J.A. Reed**[6], **T. I. Wilch**[7] and **Andrill-Mis Science Team**[8], (1)School of Earth Sciences and Byrd Polar Research Center, Ohio State University, Columbus, OH 43210, (2)Geological and Nuclear Sciences, Lower Hutt, New Zealand, (3)Antarctic Research Centre, Victoria University of Wellington, Wellington, New Zealand, (4)Department of Geology, Appalachian State University, Boone, NC, (5)Department of Geology and Environmental Geosciences, Northern Illinois University, DeKalb, IL 60115, (6)Department of Geological and Atmospheric Sciences, Iowa State University, Ames, IA 50011, (7)Department of Geological Sciences, Albion College, Albion, MI, (8)...

During the 2006-2007 austral season, the ANDRILL McMurdo Ice Shelf Project recovered a core 1285 m long (AND-001B) from Windless Bight in the McMurdo Sound region. This core contains a range of lithologies, including both siliciclastic and volcanic diamictites, sandstones and mudstones; diatomites; and volcanic ash/tuff and one phonolitic lava flow. This sequence has been subdivided into eight lithostratigraphic units and 25 subunits, based on lithological abundances. Eleven lithofacies have been recognized, ranging from open marine diatomites and mudstones to turbidites to ice-proximal massive and stratified diamictites. More than 50 glacimarine sequences have been recognized, bounded by glacial surfaces of erosion. Three distinct stacking patterns are present, showing evidence of glacial advance/retreat/advance with varying degrees of preservation. Carbonate and pyrite are the dominant secondary phases in the core. The pyrite overprint is especially notable in volcanic sediments below ~400 mbsf, where it often obscures stratification and sediment texture.

1.P1.A-5: The volcanic record in the ANDRILL McMurdo Ice Shelf AND-1B drill core

Massimo Pompilio[1], **Phillip Kyle**[2], **Thom I. Wilch**[3] and **Nelia W. Dunbar**[4], (1)Sezione di Pisa, Istituto Nazionale di Geofisica e Vulcanologia, Via della Faggiola, 32, Pisa, Italy, (2)Department of Earth & Environmental Science, New Mexico Institute of Mining and Technology, Socorro, NM 87801, (3)Department of Geological Sciences, Albion College, Albion, MI 49224, (4)New Mexico Bureau of Geology and Mineral Resources, New Mexico Institute of Mining and Technology, Socorro, NM 87801

The 1285 m thick MIS core offers an invaluable opportunity to obtain a detailed record of volcanism in McMurdo Sound. Volcanic stratigraphy and preliminary petrologic data on volcanic rocks in the AND-1B core are reported here. Remarkable volcanic deposits include: a) a phonolitic pumice layer found at ≈85 mbsf which is not correlated to any known vent onshore; b) a black well sorted volcanic sands succession (132.83 to 146.79 mbsf) interpreted as being derived mainly from subaerial Hawaiian/Strombolian eruptions; c) a thick volcanic succession in the middle part of the core with an interbedded submarine lava flow. The flow may be derived from a nearby (≈4 km) vent on the seafloor according to average length of the lavas with similar composition; d) deeply altered tuffs and minor sandstone below 1220 mbsf. Diagenesis and intense alteration at depths >600 mbsf, hamper the interpretation of magma evolution and provenance.

1.P1.B: Subglacial lake environments ORAL

1.P1.B-1: Tectonic control of subglacial lakes and ice sheet stability

Robin E. Bell[1], **Michael Studinger**[1] and **Carol Finn**[2], (1)Lamont-Doherty Earth Observatory of Columbia University, 61 Route 9W, Palisades, NY 10025, (2)USGS, MS 964, Denver Federal Center, Denver, CO 80225

The identification of large, dynamic, subglacial lakes beneath the Antarctic ice sheets and at the onset of a major ice stream indicates that subglacial hydrology and subglacial lakes may play an important role in ice sheet stability. Here we present evidence that the large lakes most likely to influence ice sheet dynamics are coincident with major tectonic boundaries. By providing the basins that capture subglacial water, the continental-scale tectonic structure serves as a basic template for the formation of subglacial lakes. The distribution of sedimentary basins and the variability in geothermal heat flux have also been advanced as mechanisms for tectonic processes to influence ice sheet stability through the development of ice streams. Large subglacial lakes, whose distribution is controlled to a large extent by the tectonic framework, provide a new mechanism for tectonic control on ice sheet dynamics.

1.P1.B-2: Insight into geology of East Antarctic hinterland: Study of mineral inclusions from ice cores of Lake Vostok borehole

German L. Leitchenkov[1], **Boris V. Belyatsky**[1], **Nickolay V. Rodionov**[2] and **Sergey A. Sergeev**[2], (1)Antarctic geology, Institute for Geology and Mineral Resources of the World Ocean (VNIIOkeangeologia), Angliiskiy ave., 1, St.Petersburg, 190121, Russia, (2)CIR, VSEGEI, Sredniy ave., 74, St.Petersburg, 199106, Russia

The borehole drilled at the south part of subglacial Lake Vostok, entered into ice layer, refrozen from lake water. This layer contains random mineral inclusions, eight of which were studied using state-of the-art analytical equipment. Six inclusions are represented by soft aggregates consisting mainly of clay-mica minerals and micron-sized quartz grains while two others are clasts of solid fine-grained cemented rocks. The biggest rock clast consists of poorly-rounded quartz and minor amount of accessory minerals. More than twenty grains of zircon and monazite were identified in this siltstone and have been dated by SHRIMP-II. Analytical data yielded two age clusters ranging 0.8−1.2 Ga and 1.6−1.8 Ga. Composition of rock clasts suggests that the bedrock situated to the west of Lake Vostok is of sedimentary nature. Dated minerals allow us to presume that their provenance, Gamburtsev Mountains and Vostok Subglacial Highlands, is mainly represented by Paleoproterozoic cratons and Mesoproterozoic-Neoproterozoic mobile belts.

1.P1.B-3: New bathymetry model of Lake Vostok from airborne gravity data

Irina Filina[1], **Donald Blankenship**[1], **Valery Lukin**[2], **Valery N. Masolov**[3] and **Mrinal Sen**[1], (1)Institute for Geophysics, The University of Texas at Austin, 10110 Burnet Rd., Bldg. 196, Austin, TX 78759, (2)Russian Antarctic Expedition, 38 Bering Str., Saint Petersburg, Russia, (3)Polar Marine Geological Research Expedition (PMGRE), 24, Pobeda Str., St. Petersburg, Lomonosov, 188512, Russia

The new 3D bathymetry model for the largest known subglacial lake in Antarctica – Lake Vostok – was developed via inversion of airborne gravity data, constrained by 60 seismic soundings. The presented model consists of water and unconsolidated sediment layers overlying the host rock, with densities of 2.55 g/cc for host rock and 1.85 g/cc for sediment. The sediment layer was originally interpreted from seismic data as 50 m thick in the northern part of the lake, while revised seismic interpretations suggest that this layer is 350 -380 m thick. The revised thickness makes the unconsolidated sediments in Lake Vostok a significant gravity anomaly (up to 8 mGal in the northern basin). Previous gravity models (based on the same gravity dataset) are compared and contrasted with our new one. Our presented 3D bathymetry model of Lake Vostok corresponds better with seismic data (RMS of 125 m) than two previous models.

1.P1.B-4: Flow dynamics and mass balance of the ice sheet above the southern part of subglacial Lake Vostok

Reinhard Dietrich[1], **Sergey V. Popov**[2], **Andreas Richter**[1], **Valery Lukin**[3], **Mathias Fritsche**[1], **Vladimir Lipenkov**[4], **Alexander Yuskevich**[5], **Jens Wendt**[6], **Anton Senatorov**[5] and **Valery N. Masolov**[2], (1)Institut fuer Planetare Geodaesie, TU Dresden, Helmholtzstr. 10, Dresden, 01062, Germany, (2)Polar Marine Geosurvey Expedition (PMGE), 24, Pobeda Str., St. Petersburg, Lomonosov, 188512, Russia, (3)Russian Antarctic Expedition, 38 Bering Str., Saint Petersburg, Russia, (4)Arctic and Antarctic Research Institute, 38 Bering Str., Saint Petersburg, Russia, (5)Aerogeodeziya, 8 Bukharestskaya Str., Saint Petersburg, Russia, (6)Centro de Estudios Científicos, Valdivia, Chile

In the Antarctic field season 2001/2002, geodetic GPS markers were installed in and around Vostok station and first GPS observations were carried out. In the subsequent field season, these observations were repeated. During the field season 2006/2007, these markers were observed for the third time by GPS. These repeated in-situ measurements provide the basis for the precise determination of the local flow direction and velocity of the ice sheet, as well as height change rates in a global reference frame. A strain analysis of the changes of the internal geometry between the markers yields the convergence/divergence and acceleration of the ice flow around Vostok station. Here, we combine the geometrical marker displacements determined by geodetic means with precise ice thickness data based on ground-based radar-echo sounding and representative surface accumulation rates in order to conclude the mass balance state of both the floating ice sheet and the subglacial water body.

1.P1.B-5: Estimating the salinity of subglacial lakes from aerogeophysical data

Michael Studinger, Lamont-Doherty Earth Observatory of Columbia University, 61 Route 9W, Palisades, NY 10964

The widespread occurrence of more than 145 lakes underneath the Antarctic ice sheet demonstrates that these aquatic ecosystems are an important part of the subglacial hydrosphere. The recent discovery of water flux between subglacial lakes beneath the East and West Antarctic ice sheet on timescales of several years indicates interconnectedness within the subglacial hydrological network and the potential for catastrophic drainage into the ocean. Subglacial lakes are now being recognized as an integral part of the global cryosphere and the global climate system. Knowledge of the physical, chemical and biological processes operating within these features is crucial for addressing questions about the presence and functioning of life in subglacial lakes. However, little is known about the prevailing *in situ* environmental conditions. Existing airborne ice-penetrating radar and laser altimeter data over large subglacial lakes can be used to estimate the salinity without penetrating the lakes.

1.P1.C: Antarctica in Rodinia, Gondwana and Pangea: In honor of the contributions of Campbell Craddock ORAL

1.P1.C-1: Summary of Cam Craddock's contributions to Antarctic geoscience

Robert H. Rutford, Department of Geosciences, University of Texas at Dallas, 800 West Cambell, Richardson, TX 75080

John Campbell Craddock (1930-2006), best known as “Cam”, was one of first geology grantees funded by NSF for work in Antarctica following the IGY (geology was not one of the sciences in IGY). In the 1959-1960 field seasons Cam along with two students made the first of his 10 trips to the continent. During that season he joined Ed Thiel for an airborne traverse along 88º W and then joined an icebreaker cruise in the Bellingshausen Sea that included a visit to Peter I Island. Best known for the studies in the Ellsworth Mountains, Cam was also active on committees, both national and international, related to Antarctic science and mapping. Over 100 of his publications and abstracts deal with various aspects of his Antarctic studies. Field work in Alaska and Svalbard followed his Antarctic work. Craddock Massif and Mount Craddock in the Sentinel Range of the Ellsworth Mountains bear his name.

1.P1.C-2: The Ellsworth Mountains: Critical and enduringly enigmatic

Ian W. D. Dalziel, Institute for Geophysics, University of Texas at Austin, 10100 Burnet Rd., Bldg. 196 (R2200), Pickle Research Campus, Austin, TX 78758-4445

The Ellsworth Mountains, first mapped under the leadership of Campbell Craddock, pose critical geological enigmas, solved and unsolved. The isolation of the mountains, their abrupt structural terminations and Paleozoic stratigraphic affinities are explained by rotation from the cratonic margin during Gondwanaland breakup. The mechanism remains obscure. Absence of intense folding associated with the Ross orogeny can be ascribed to local extension along a subducting margin. Yet tantalizing questions regarding possible Precambrian connections to Laurentia remain, and the cause of the post-Permian folding is controversial.

The elevation (~5000m) is high for an early Mesozoic fold belt. Thermal uplift could have been initiated during Jurassic-Cretaceous block rotation and Weddell Sea opening continuing into the Cenozoic. The history of glaciation provides input for models of ice loading and unloading. Measurements of present-day uplift test these models and help assess change in the mass of the ice sheet and hence in global sea level.

1.P1.C-3: Geology and paleontology of the Ellsworth Mountains, Antarctica

Gerald F. Webers[1] and **John F. Splettstoesser**[2], (1)Geology, Macalester College, St. Paul,, MN 55105, (2)P.O. Box 515, Waconia, MN 55387

The geology of the Ellsworth Mountains has become known in detail only within the past 40-45 years, and the wealth of paleontologic information within the past 25 years. The mountains are an anomaly, structurally speaking, occurring at right angles to the Transantarctic Mountains, implying a crustal plate rotation to reach the present location. Paleontologic affinities with other parts of Gondwanaland are evident, with nearly 150 fossil species ranging in age from Early Cambrian to Permian, with the majority from the Heritage Range. Trilobites and mollusks comprise most of the fauna discovered and identified, including many new genera and species. A *Glossopteris* flora of Permian age provides a comparison with other Gondwana floras of similar age. The quartzitic rocks that form much of the Sentinel Range have been sculpted by glacial erosion into spectacular alpine topography, resulting in eight of the highest peaks in Antarctica.

1.P1.C-4: Craddock Massif and Vinson Massif remeasured

Damien Gildea[1] and **John F. Splettstoesser**[2], (1)The Omega Foundation, Incline Village, NV 89450, (2)P.O. Box 515, Waconia, MN 55387

The highest peak in Antarctica, Vinson Massif (78º35'S, 85º25'W), is at an elevation of 4892 m (16,046 ft – 2004 measurement). Measurements of the elevation have fluctuated over the years, from its earliest figure of 5140 m (16,859 ft), to its present figure. Vinson Massif and three of its near neighbors in the Sentinel Range of the Ellsworth Mountains are the highest peaks in Antarctica, making them a favorite objective of mountaineers. Well over 1,000 people have climbed Vinson since the first ascent in the 1966-67 austral summer. The spectacular topography of the range is a factor of the geologic rock type and glacial erosion. Very accurate elevations have been achieved annually by GPS mapping done by a climbing team sponsored by Omega Foundation, active in Antarctica since 1998. Craddock Massif includes Mt. Craddock (after Campbell Craddock*), the ninth highest peak in Antarctica, at 4368 m (14,327 ft).

1.P1.D: IPY and IGY: History, policy and outreach ORAL

1.P1.D-1: Earth science in the Antarctic Treaty System

Paul Arthur Berkman, Bren School of Environmental Science & Management, University of California Santa Barbara, Santa Barbara, CA 93106

Earth science has had a profound influence on the design, development and implementation of the Antarctic Treaty System (ATS) over the past half century – since the 1959 *Antarctic Treaty* was signed with insight that: *"scientific investigation in Antarctica as applied during the International Geophysical Year accords with the interests of science and the progress of all mankind."* This presentation will illustrate the extensive application of Earth science concepts in policies adopted subsequently by the Antarctic Treaty Consultative Parties, who have been so designated by *"conducting substantial research."* Digital library applications (http://aspire.nvi.net) also will be demonstrated for Antarctic scientists to easily discover and interpret the policy relevance of their own research.

1.P1.D-2: An international effort to manage and monitor Admiralty Bay (ASMA No. 1), King George Island, Antarctica

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Admiralty Bay, the largest bay of King George Island in the South Shetland Archipelago, Antarctica, was formally adopted as an Antarctic Specially Managed Area (ASMA No. 1) by the Antarctic Treaty Consultative Meeting XXIX (2006). Brazil, Ecuador, Peru, Poland, and the U.S.A. have active research programs in this Area. In summer 2007, the ASMA Management Group, with representatives from the five countries, met in Admiralty Bay to: initiate coordinated activities, undertake an *on-site* review, discuss the actions related to the Management Plan and further develop a 10-year joint monitoring program. Thirty years of continuous research carried out in the Area has revealed significant ecological changes. Increasing human local activities have also contributed to environmental changes. Coordination of activities will help to minimize potential impacts. This paper summarizes the main activities related to the implementation of a management plan for Admiralty Bay and the steps towards a joint environmental monitoring program.

1.P1.D-3: IGY to IPY, the U.S. Antarctic oversnow and airborne geophysical-glaciological research program from 1957 to 1964 from the view of a young graduate student

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When 12 countries established scientific stations in Antarctica for the 1957-58 (IGY), the Cold War was at its height, seven countries had made claims in Antarctica, and the Antarctic Treaty was in the future. The only major field project of the U.S. IGY Antarctic program was series of oversnow traverses, starting in 1957, making seismic reflection ice soundings (and other geophysical measurements) and glaciological studies. The U.S.S.R. and France made similar traverses coordinated through the IGY. Although geology and topographic mapping were not part of the IGY program because of the claims issue and the possibility of mineral resources, the oversnow traverse parties did geologic work, during which unknown mountains were discovered. The oversnow traverses continued through 1966 and resulted in an excellent first approximation of the snow surface elevation, ice thickness and bed topography of Antarctica, as well as the mean annual temperature of that era and snow accumulation.

1.P1.D-4: Glacial and permafrost exploration in the Dry Valleys during the 1957/58 IGY: The personal records of Troy L. Péwé

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The Dry Valleys of Antarctica were studied in detail for the first time by Troy L. Péwé (Glaciologist – University of Alaska) during the 1957-1958 summer field season of the International Geophysical Year (IGY). The goals of that expedition were to characterize the geomorphology and glacial history of the Dry Valleys and Ross Sea Region. Glacier movement and deposits, lake sediments, permafrost, and weathering features were studied and recorded. From this research, a unique and impressive collection of photographs, movies, rock and soil samples, and additional Antarctic archives remain in the personal collection of Troy L. Péwé (1918 to 1999). Péwé also reoccupied 20 photographic stations set up by Griffith T. Taylor in 1911, and included an additional 42 photographic stations in 1957. These archives are a unique historical record for assessing recent glacial and geomorphic change, future scientific investigations, and education during and following the International Polar Year (IPY).

1.P1.D-5: The ANDRILL ARISE educational outreach program: Educators immersed in science research in Antarctica

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This paper highlights the educational outreach activities of the ANDRILL Research Immersion for Science Educators (ARISE) Program. ARISE is a critical component for dissemination of information on the ANDRILL Program. ARISE participants share the scientific process, on-going Antarctic research, geoscience content, and educational materials which help teachers, students, informal education, and the general public focus on the International Polar Year. Six science educators representing the four countries (the United States, New Zealand, Italy, and Germany) participating in the ANDRILL McMurdo Sound Project, were involved in ARISE during the 2006-2007 Antarctic field season. Working alongside scientists in Crary Lab at McMurdo Station, Antarctica, they participated in the research and shared their experiences with a range of audiences across the globe. That sharing is far from over! Each ARISE educator has developed a comprehensive outreach plan to bring curriculum materials, educational presentations/programs, and the International Polar Year to people around the world.

1.P2.A: Antarctica, the southern ocean, and climate evolution: Insights from drilling, coring, and geophysical surveys ORAL

1.P2.A-1: The diatom record of the ANDRILL – McMurdo Ice Shelf project drillcore

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The inaugural drilling season of ANDRILL, recovered a 1,285 m core, AND-1B, with ~99% recovery. The core contains a superb record of Antarctic continental shelf sediments, providing an unparalleled record of climate change through a critical interval in Earth history. The upper c. 600m of core, reflecting Pliocene and early Pleistocene deposition, is composed of alternating glacial diamictites and diatomites, with episodic volcanic facies. The diatomites document extended periods of open marine conditions with reduced ice, in an area currently covered by a thick ice shelf. The diatomites reflect high biosiliceous productivity, and most reflect warmer than present conditions with variable sea ice and ice rafting. Many likely represent an absence of a large ice shelf, whereas diamictites reflect glacial advances. Analysis of the diatom assemblages will result in a new biostratigraphic zonation and high resolution paleoenvironmental reconstructions.

1.P2.A-2: Preliminary $^{40}Ar/^{39}Ar$ results from the AND-1B core

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Preliminary $^{40}Ar/^{39}Ar$ dating of 13 volcanic samples from four stratigraphic intervals within the AND-1B core provide key age constraints for the development of an accurate age-model. To date seven analyses have yielded statistically robust and stratigraphically meaningful ages. The four different stratigraphic intervals represented by the seven successfully dated samples are: 1) 85.53-85.85 mbsf felsic tephra (1.014±0.004 Ma), 2) ~112-145 mbsf basaltic tephra (1.65±0.05 to 1.67±0.05 Ma), 3) 646.30-649.34 mbsf basaltic lava flow (6.48±0.13 Ma), and 4) ~1280 mbsf volcanic clasts (maximum depositional age 13.57±0.13 Ma).

1.P2.A-3: Preliminary chronostratigraphy for the upper 700 m (upper Miocene–Pleistocene) of the AND-1B drillcore recovered from beneath the McMurdo Ice Shelf, Antarctica

Gary S. Wilson[1], **Richard H. Levy**[2], **Greg Browne**[3], **Fabio Florindo**[4], **Stuart A. Henrys**[3], **Ian Graham**[3], **William C. McIntosh**[5], **R. M. McKay**[6], **T. R. Naish**[6], **Christian Ohneiser**[1], **Ross D. Powell**[7], **Jake I. Ross**[5], **Leonardo Sagnotti**[4], **Reed Scherer**[7], **Charlotte Sjunneskog**[8], **C. Percy Strong**[3], **Marco Taviani**[9] and **Diane Winter**[10], (1)Department of Geology, University of Otago, PO Box 56, Dunedin, New Zealand, (2)ANDRILL Science Management Office, University of Nebraska - Lincoln, 126 Bessey Hall, Lincoln, NE 68588-0341, (3)GNS Science, 1 Fairway Drive, Avalon, Lower Hutt, New Zealand, (4)Istituto Nazionale di Geofisica e Vulcanologia, Via di Vigna Murata, 605, Rome, I-00143, Italy, (5)Department of Earth and Environmental Sciences, New Mexico Tech, 801 Leroy Pl, Socorro, NM 87801, (6)Antarctic Research Centre, Victoria University of Wellington, Wellington, New Zealand, (7)Department of Geology and Environmental Geosciences, Northern Illinois University, DeKalb, IL 60115, (8)Department of Geology and Geophysics, Louisiana State University, Baton Rouge, LA 70803, (9)ISMAR-CNR, Via Gobetti 101, Bologna, Italy, (10)University of Nebraska - Lincoln, Department of Geosciences, Lincoln, NE 68588

Chronostratigraphic data available for the preliminary age model for the upper 700 m for the AND-1B drill core include diatom biostratigraphy, magnetostratigraphy, $^{40}Ar/^{39}Ar$ ages, $^{87}Sr/^{86}Sr$ ages and surfaces of erosion identified from physical appearance in the drill core. The age data allow a relatively well-constrained age model to be constructed. ~70% of the AND-1B magnetic polarity stratigraphy can be correlated with the Geomagnetic Polarity Time Scale (GPTS). Unique correlation is not possible in several coarse diamictite intervals with closely spaced glacial surfaces of erosion and sparse microflora. However, the age model indicates relatively rapid (up to 1m / k.y.) accumulation punctuated by several half to million year hiatuses representing more than half of the last 7 m.y. in the drillcore. The mid-late Pleistocene is represented by superimposed diamictite units separated from late Pliocene alternating diamictites / diatomites by a ~ 1 m.y. hiatus.

1.P2.A-4: Future geological drilling in Antarctica – a discussion paper on ANDRILL and beyond

Peter Barrett[1], **P.N. Webb**[2], **Dieter Futterer**[3], **Claudio Ghezzo**[4], **M. R. A Thomson**[5], **A. R. Pyne**[1] and **F. Rack**[6], (1) Antarctic Research Centre, Victoria University of Wellington, Wellington, New Zealand, (2)The Ohio State University, (3)Alfred Wegener Institute, (4)Dipartimento di Scienze della Terrra, Università di Siena, Via Laterina, 8, Siena, 53100, Italy, (5)Stone House, Thornton Rust, (6)ANDRILL Science Management Office

Geological drilling technology developed over the last quarter century has provided access to critical knowledge on the climatic and tectonic history of the Victoria Land margin of Antarctica, giving us a new understanding of the history and behaviour of the Antarctic ice sheet in this region over the last 34 million years. The challenge now is to develop a framework within the Antarctic science and logistics communities and other relevant groups for further projects to extend this technology to other areas both around the Antarctic margin and into the interior. This paper reviews some of the issues and offers a way forward.

1.P2.B: Subglacial lake environments ORAL

1.P2.B-1: Modelling tracer dispersion in subglacial Lake Vostok, Antarctica

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Lake Vostok, isolated from direct exchange with the atmosphere by about 4 km of ice for millions of years, provides a unique environment. This inaccessibility raises the importance of numerical models to investigate the physical conditions within the lake. Using a three dimensional numerical model and the best available geometry, we analyse the baroclinic flow and the tracer dispersion within the lake. From our model experiments we find a different representation of the flow regime in the northern and southern basins of Lake Vostok, closely correlated to bedrock topography, ice draft, and the melting/freezing pattern. The time needed for tracers to dissipate across the whole lake is strongly dependent on the location where they are released and amounts from years to decades.

1.P2.B-2: Ice surface anomalies, hydraulic potential and subglacial lake chains in East Antarctica

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The most recent subglacial lake inventories and classification methods further demonstrate the strong correlation between subglacial lakes and flat anomalies on the ice surface. A reanalysis of older radar sounding data shows that several subglacial basins previously identified as "lake less" may actually contain multiple lakes along with other important subglacial hydraulic features. The combined use of radar sounding and satellite surface mapping is allowing unprecedented detail in the mapping of subglacial hydraulic systems in East Antarctica.

1.P2.B-3: Water budget through a series of interconnected subglacial lakes on Recovery Ice Stream, East Antarctica

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Four large subglacial lakes aligned along a large tectonic boundary in Dronning Maud Land have recently been linked to the onset of Recovery Ice Stream, the largest ice stream draining into the Filcher-Ronne Ice Shelf. While these lakes appear to be stable, new analysis of ICESat altimetry data has identified four active lakes under the fast flowing part of the ice stream and captured the movement of subglacial water through these lakes. Over the ICESat observation period (October 2003-April 2007) water appears to be migrating downstream and ponding in the lowermost lake, causing changes in surface elevation of ~7.5 m. The water origin may either be melting in the Recovery catchment resulting from basal melt of the ice sheet by geothermal heat or frictionally-induced melting beneath the ice stream. An estimate of the catchment melting at 1mm/yr may account for much of the elevation change in the downstream lake.

1.P2.B-4: Thick lacustrine sedimentary sequence in Christie Arm, Canada, suggests a dynamic subglacial paleo-lake beneath Laurentide Ice Sheet

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Sedimentary sequences deposited in subglacial paleo-lakes may be present in deep lake basins deglaciated by the retreat of Northern Hemisphere ice sheets after the Last Glacial Maximum. Such sequences represent a potential archive of ice sheet dynamics and life in subglacial environments. They may also be used as testing ground for sampling and analyses of sediments contained in Antarctic subglacial lakes. We identified the Christie Arm of Great Slave Lake as the best candidate for a paleo-subglacial lake. Seismic surveys in Christie Arm show a >150-m-thick lacustrine basin fill that is overlain by a ~20-m-thick lacustrine drape and underlain by glacial till. The continuous lacustrine drape is interpreted as postglacial sediments and the basin fill as deposits formed in a subglacial paleo-lake Christie during last glaciation. The significant thickness of the interpreted subglacial lake unit implies relatively high sedimentation rates and water inflow/outflow rates in the subglacial basin.

1.P2.C: Antarctica in Rodinia, Gondwana and Pangea: In honor of the contributions of Campbell Craddock ORAL

1.P2.C-1: Major, trace element and stable isotope geochemistry of synorogenic breccia bodies, Ellsworth Mountains, Antarctica

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Cambrian carbonates in the Hertiage Range of the Ellsworth Mountains, West Antarctica host a series of carbonate-rich breccia bodies that were contemporaneous with the Permian Gondwanide orogen. The breccia bodies had a three-stage genesis, with the older breccias containing Cambrian limestone (and marble) clasts supported by calcite, whereas the younger breccias are nearly clast-free and composed entirely of matrix calcite. Breccia clasts, calcite matrix and detrital matrix samples were analyzed using x-ray fluorescence (major and trace elements), x-ray diffraction, and stable isotopes (C, O) and suggest that the breccias formed as part of a closed geochemical system, at considerable depth, within the Cambrian limestone host as the Ellsworth Mountains deformed into a fold-and-thrust belt along the margin of Gondwana.

1.P2.C-2: Jurassic silicic volcanism in the Transantarctic Mountains: Was it related to plate margin processes or to Ferrar magmatism?

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Silicic volcanism in the Transantarctic Mountains, represented by rhyolitic tuff that mainly precedes emplacement of the Ferrar Large Igneous Province, is important in interpretation of the tectonic evolution of the Antarctic sector of Gondwana. Sr and Nd isotope data indicate that the tuffs are not directly related to Ferrar magmatism nor to melting of the underlying Ross orogen crust yet zircon gives a U-Pb age of 182.7±1.8 Ma, similar to the U/Pb age for the Ferrar. Distribution of the silicic tuffs along 1400 km of the Transantarctic Mountains suggests, alternatively, a relationship to the Gondwana plate margin. Although West Antarctica comprises Mesoproterozoic crustal terrains, few analyzed rocks are compatible isotopically with the Lower Jurassic tuffs. The source of the tuffs must lie in unexposed Early Jurassic magmatic centers in West Antarctica or an unexposed crustal terrain beneath the Transantarctic Mountains.

1.P2.C-3: History of views on the relative positions of Antarctica and South America: A 100-year tango beween Patagonia and the Antarctic Peninsula

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Discussion of continental drift around Antarctica began nearly 100 years ago. While the Gondwana connections of Antarctica to Africa and Australia are well defined since decades, the relative pre-drift position of the Antarctic Peninsula to close-lying Patagonia continues to be subject of controversial opinions. Certainly older figures, which showed a paleo-position of the Peninsula crossing over continental crust of the Falkland Plateau or even South Africa or Patagonia, are out of consideration now. But contradictory opinions remain considering the relative paleo-position of the Peninsula as a more or less straight prolongation of the Patagonian Andes, or as lying parallel to Patagonia along the Pacific coast. Geological reasons are found for both opinions, but geophysical observations on the close-lying ocean floors, particularly the evolution of the Weddell Sea crust, speak for the last-mentioned reconstruction.

1.P2.C-4: Neogene tectonic events in the West Antarctic rift system inferred from comparisons with the East African rift and other analogs

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The West Antarctic rift system (WARS) is buried beneath 1-4 km of ice, obscuring vast areas that could provide clues about the potential for active volcanism beneath the ice sheet, and whether significant tectonic extension has taken place in Cenozoic time. This study explores the consequences of viewing the ice as basin fill, and of approximating the mass equivalent of ice as unconsolidated sediment. It then compares the results with active rift systems elsewhere in the world. The results suggest (1) that the interior rift trough is relatively cool and volcanically inactive, (2) that extension and over-deepening of interior basins, has taken place beneath the ice sheet in late Cenozoic time, and (3) that dome uplift and the growth of large central volcanoes along the Marie Byrd Land coast, together with subsidence of interior basins, have significantly increased the relief within the rift system in Neogene time.

1.P2.D: Understanding Antarctic biological evolution: Molecular, biogeographic, glaciological and geological studies ORAL

1.P2.D-1: New terrestrial biological constraints for Antarctic glaciation

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Ice sheet modelling of Antarctica supports a generally accepted view that most, if not all, currently ice free ground would have been obliterated at the LGM or previous maxima. However, several recently emerged and complementary strands of biological research cannot be reconciled with this reconstruction of Antarctic glacial history, and therefore challenge the existing paradigm. In this review, we summarise and synthesise evidence across these lines of research. This evidence points to large elements of the contemporary Antarctic terrestrial biota having a long continuous, but isolated, history within the region. These examples relate to all timescales relevant to Antarctic continental evolution (Gondwana breakup to Holocene), and are spatially distributed across much of the continent.

1.P2.D-2: Molecular data can help to unveil biogeographic complexities since the Miocene: Lessons from ameronothroid mites and isotomid springtails

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The diversification of Antarctic springtails and mites is likely to have occurred as a result of the glaciation and isolation of the Antarctic continent completed by ~10 mya, and not by the sequential break-up of Gondwana (completed by ~32 mya). More recently, population level structuring is likely to have been driven by the repeated glacial cycles of the Pleistocene (<2 mya) or common circum-polar corridors. It is clear that current taxonomic designations based on morphology for these springtails and mites are in conflict with our molecular topologies. These taxonomic inconsistencies are clear given the large number of paraphyletic species presented here. Our data show clear inconsistencies between the contemporary taxonomy and molecular evidence and we propose a full taxonomic revision for the 'Cryptopygus' group, the Halozetes genus, and indeed the larger ameronothroid group where detailed morphological investigations may help to resolve "unexpected" relationships when taking traditional classifications into account.

1.P2.D-3: Evolution of the Antarctic marine fauna: What can DNA and fossils tell us?

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The opening of the Drake Passage, establishment of the Polar Front and the onset of cooling around the Eocene-Oligocene boundary have been recognised as the most significant events in shaping the recent Antarctic marine fauna. Glacial cycles leading to loss of shelf habitat during glaciations may have been integral in determining extant biodiversity, including the establishment of regional isolation and diversification. Adaptive radiation of major clades, notably icefish, molluscs and crustaceans, occurred in isolation from the rest of the world. Cooler periods may have been associated with extinction of cold-intolerant species but rapid evolution of cold-tolerant groups. These groups have radiated and there is evidence that some have invaded other parts of the world. Modern techniques utilising DNA, fossil and biogeographical evidence can be used to give robust estimates to determine the dates of divergence and molecular rate. This sheds light onto the evolutionary history of the Antarctic marine fauna.

1.P2.D-4: The rise and fall of an Antarctic cold-seep community

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Cruise LMG05-02 to the former Larsen-B Ice Shelf (LIS-B) resulted in the discovery of a cold-seep community located ~50 km from the edge of the historic extent of the ice shelf. Images revealed gross morphological features at the site strongly resembling those of other chemoautotrophic methane seeps. However, this seep is unique from others described in that (1) it is the first active polar cold-seep yet discovered, and (2) it formed in a sub-ice shelf environment with limited inputs of photosynthetic carbon. More recently, cruise ANT-XXIII/9 imaged the cold-seep ~2 years after its discovery revealing a collapse of the cold-seep megafauna. We suggest that a combination of the aphotic sub-ice shelf environment and isolation of the cold-seep basin resulted in the manifestation of the chemosynthetic community. The disappearance of the LIS-B, associated increased primary productivity and transport of glacigenic sediments may have resulted in the collapse of the chemosynthetic community.

1.PS: Antarctic climate and glacial records POSTER

1.PS-1: Recent warming at the Antarctic Peninsula and global changes

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Over the last decade, there has been growing recognition that cold-based glaciers are active geomorphic agents that interact with the substrate and modify the surrounding landscape. Recent field studies at both high and low elevations in the Dry Valleys of Antarctica have provided evidence of erosion and deposition by cold-based glaciers and their ice marginal melt water. Other empirical studies have significantly advanced understanding of the chemical composition and complex mechanical behaviour of ice at the base of cold-based glaciers and the interaction on various substrates. These insights into how cold-based glaciers interact with the landscape have led to the reinterpretation of landforms and glacial histories in areas previously covered by cold based glaciers in both the Arctic and Antarctic. Furthermore, several researchers have used the landforms now associated with cold-based glaciers to interpret similar landforms on Mars.

1.PS-2: Granulometric analysis of pebble beach ridges in Fort Williams Point, Greenwich Island, Antarctic Peninsula; elements for paleoclimate variations during the Holocene

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We present a granulometric study of pebble beach ridges from the coastal uplifted platforms in the Fort Williams Point, Antarctic Peninsula. Eight beach ridges are scaled from the shore up to 13.5 m above current sea level. Flat areas showing the rock basement or ice formed boulder pavement separate the beach ridges. The beach ridges are made of volcanic material from the surrounding relief, but also include gneiss and granodiorite pebble and cobble transported here as till. Analysis of 2100 samples in 39 locations allows identifying the granulometric distribution, providing evidences of 4 sequences of 1 to 3 ridges. Most of the material seems to be reworked from a periglaciar till. The interpretation emphasizes beach ridge construction during relatively warm climate, and shoring iceberg preventing ridge formation during cold periods. This occurs in the framework of an isostatic postglacial uplift allowing the progressive mobilization of periglaciar material.

1.PS-3: Orbital and atmospheric forcing of western Antarctic Peninsula climate in the Holocene: The TEX86 paleotemperature record of Palmer Deep

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A detailed TEX86 sea surface temperature record is presented from a well-dated hemipelagic sedimentary sequence drilled in Palmer Deep, on the western Antarctic Peninsula continental margin (ODP Hole 1098B; 1010 m). To test the regional utility of the TEX86 proxy, surface sediment samples with paired CTD casts were acquired and results show the promise of TEX86 in this region. Down core TEX86-derived temperatures at Site 1098 range between 0 and 6°C during the Holocene (0-12 ky). A long-term Holocene cooling of ~3°C is suggested and is punctuated by millennial scale temperature variability. The TEX86 temperature record from Palmer Deep is consistent with temperature trends recorded in west Antarctic ice cores and southeast Pacific marine sediments. This observation is consistent with hypotheses that favor atmospheric (via the Southern Hemisphere westerly winds), not thermohaline, control over the hydrography of Palmer Deep.

1.PS-4: Evidence for a long warm interglacial during Marine Isotope Stage 31: Comparison of two studies at proximal and distal ODP sites in the Southern Ocean

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We report here on studies of ice-rafted debris (IRD) from Marine Isotope Stages (MIS) 34-30 at distal Ocean Drilling Program (ODP) Site 177-1090 (subantarctic South Atlantic) and proximal ODP Site 188-1165 (Prydz Bay, Antarctica). The presence of the base of the Jaramillo Subchron (straddling MIS 31) facilitates correlation between sites. At the distal site, only very little IRD is present during MIS 31-33, with a small increase during MIS 32. At the proximal site in Prydz Bay, of these three stages, only MIS 31 can be identified. Here, during MIS 31, IRD is low, while foraminiferal percentages are high. This record is similar to that from Cape Roberts Project (CRP) drill site CRP-1 (Scherer et al., 2002). Therefore, MIS 31, and perhaps all of MIS 33-31, was a long, warm interval, and may have compromised the stability of the West Antarctic Ice Sheet.

1.PS-5: Stable isotopic and foraminiferal evidence of Larsen-B Ice Shelf stability throughout the Holocene

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Kasten cores collected during the NBP01-07, LMG05-02 and NBP06-03 cruises to the Larsen-B Ice Shelf region, eastern Antarctic Peninsula contain sediments recording its Holocene history. Benthic foraminiferal transfer function analyses of the kasten core samples indicate persistent ice shelf conditions throughout the Holocene. Planktonic and benthic foraminiferal $\delta^{18}O$ stable isotopic analyses also indicate persistent ice shelf conditions with gradual melting resulting in freshening of the regional oceanography, independent of global Holocene isotopic shifts.

1.PS-6: Analysis of the dinoflagellate cyst genus Impletosphaeridium as a marker of sea-ice conditions off Seymour Island: An ecomorphological approach

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A reworked palynological assemblage composed in majority of one genus, *Impletosphaeridium* spp., was found during the study of sixteen samples recovered from piston cores taken off Seymour Island, Antarctica. One of the common species, *Impletosphaeridium lorum*, was previously found in Seymour Island's La Meseta Formation. Based on this similitude, we postulate that the abundance in *Impletosphaeridium* is linked to a late Eocene species migration. To understand the ecological significance of this event, we used an ecomorphological approach by analyzing environmental sea-surface parameters of habitats in which similar morphological extant species live. We found a high correlation between these species and sea-ice cover. If this approach is correct, and if the event is indeed Eocene, this means that the abundance in *Impletosphaeridium* spp. could be the first dinoflagellate event marking an extreme cooling and the onset of ephemeral ice sheet development off Seymour Island at the end of the Eocene.

1.PS-7: Palaeoclimate reconstructions from the Antarctic Peninsula: Diatoms as indicators of Holocene environmental change

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Fossil diatom assemblages preserved in marine sediments from the Antarctic Peninsula (AP) provide information with which to determine palaeoceanographic and palaeoclimatic variability for the Holocene. The use of diatoms as a proxy is based on the response of species to limiting factors, tracking changes in surface water mass characteristics and sea-ice extent. Through detailed comparison of AP sediment cores spatially and temporally, the project aims to reconstruct changes in water mass circulation on the continental shelf, fluctuations in sea-ice extent and ice shelf collapse events. A key question is: were such events peninsula-wide and synchronous during the Holocene?

1.PS-8: New approaches and progress in the use of polar marine diatoms in reconstructing sea ice distribution

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Reconstructing the paleo-latitudinal extent of sea ice in the Southern Ocean over time can be accomplished using modern diatom data. However, it is more difficult to extend the utility of diatom proxies farther back in time, to time periods characterized by species that are now extinct, since we are uncertain of the paleoenvironmental affiliation of those species we can't observe in modern assemblages. We propose several research strategies to strengthen our ability to use diatom data to reconstruct sea ice history. These tactics include the evaluation of specific morphologic characteristics and distinct taxa, as well as the identification of specific adaptations that may have evolved following the initiation of sea ice in the Southern Ocean. In particular, we note that the evolution of resting spores and winter growth forms should be studied more thoroughly.

1.PS-9: The Scotia Sea: Reconstructing glacial climates from diatom assemblages

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We present the preliminary findings of a high-resolution palaeoceanographic record of climate variability during the last glacial cycle. These results are based on the interpretation of diatom assemblages from a sediment core located immediately south of the Polar Front in the north Scotia Sea. High-frequency fluctuations in diatom concentration and assemblage composition allude to significant variations in oceanographic conditions. Diatom assemblages at the MIS 3 – MIS 2 transition reflect high-frequency variability within the sea-ice/open ocean dynamic. Fluctuating abundances of the sea-ice indicator group *F. curta/F. cylindrus* indicate the persistent advance and retreat of sea-ice over the core site. Synchronicity of the *F. curta/F. cylindrus* group trend with that of *Chaetocerous* resting spores (CRS) is indicative of gradual spring melt back at the sea-ice edge. Reconstructing the fluctuations of the glacial climate of the Scotia Sea will aid in understanding the role the Southern Ocean played during the late Quaternary

1.PS-10: Paleocene and Maastrichtian calcareous nannofossils from clasts in Pleistocene glaciomarine muds from the Northern James Ross Basin, Western Weddell Sea, Antarctica

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Site NBP0602A-9, drilled during the SHALDRIL II cruise of the RV/IB *Nathaniel B. Palmer*, includes two holes located in the Northern James Ross Basin in the western Weddell Sea, very close to the eastern margin of the Antarctic Peninsula. Sediment from these holes consists of Pleistocene glaciomarine muds interspersed with numerous volcanic pebbles and sedimentary clasts. Analysis of eight sedimentary clasts yielded diverse Maastrichtian and Paleocene calcareous nannofossil assemblages. These assemblages represent three distinct ages: early Maastrichtian, late Maastrichtian, and early Paleocene. The Maastrichtian assemblages are similar to those found in the López de Bertodano Formation on neighboring Seymour and Snow Hill Islands, making it the likely source area for the clast material. Although no calcareous nannofossils have been reported from Paleocene formations in the area, the occurrence of calcareous foraminifers suggests other calcareous plankton may be present; thus the Paleocene clasts likely also originated from the Seymour Island area.

1.PS-11: Provenance of recycled stromatolites from the Polonez Cove Formation (Oligocene) of King George Island, West Antarctica

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Over 50 specimens of isolated, hemispherical in shape with well-marked multilayered growth stromatolite structures (up to 9 cm in diameter) were recovered from glaciomarine sediments of the Polonez Cove Formation (Oligocene) on King George Island (South Shetland Islands, West Antarctica). Their stratigraphic setting and the most probably Cambrian age suggest that they were recycled by the processes of iceberg-rafting into the sediments of the Polonez Cove Formation during the Oligocene glacial event (Polonez Glaciation). Stromatolites most probably derive from sedimentary Cambrian rocks with origins in the Ellsworth and Transantarctic Mountains. It should also be noted that until now such stromatolite structures have not been reported from Antarctica.

1.PS-12: Kerguelen Plateau benthic foraminifera as a proxy for Late Neogene water mass history and linkages to Antarctic glacial-deglacial cycles

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Past climate studies provide a context for assessing current and future climate variability. The Antarctic-Southern Ocean region is significant for paleoclimate studies because critical deep water production and extreme polar climatic conditions occur there. The Pliocene-Pleistocene represents a time during which climate oscillated between extremes of glacial-deglacial periods. This research interprets the paleoceanography and paleoclimate of the southern Kerguelen Plateau during the Late Neogene (<5 mya) using open ocean bathyal benthic foraminiferal assemblages, their population dynamics, and the record of hiatuses in the region. Ocean Drilling Program Leg 119 and 120 (Sites 747, 748, 751, and 744) materials are investigated. The major focus of this research is the responses of benthic foraminifera to a changing environment. A better understanding of the roles of water masses, bottom currents and surface water phenomena, and how they affect changes to the benthic ocean environment is achieved.

1.PS-13: Adélie Penguins colonization history and paleodiet trends document Holocene environmental changes in Victoria Land (Antarctica)

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The identification of several abandoned penguin colonies on Victoria Land coastal areas and more than 200 radiocarbon dates provide a ≈7200-yr spanning Adélie penguin history (> 8000 yr BP considering calibrated dates). These data also supply information about Holocene environmental changes, especially regarding sea-ice extension. Between 5000 and 2500 years BP, Adélie Penguin colonies were more numerous than at present and those presently occupied were more extended (*penguin optimum*). Between 2300 and 1100 penguin population dramatically decreased in southern Scott Coast and in Terra Nova Bay; sea-ice extension and persistence were reduced due to warmer-than present condition in the Ross Sea. Paleodietary studies also contribute to better define the Holocene environmental picture. Due to ecological competition, variation of fish exploitation respect to krill in Adélie penguin diet seems to reflect sea-ice extension and persistence.

1.PS-14: Microbial communities in different Antarctic mineral deposits characterised by denaturing gradient gel electrophoresis (DGGE)

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A culture-independent method was used to assess the bacterial diversity in different mineral deposits of Livingston Island, Antarctic. One transect and four separate profiles were investigated. Total carbon and nitrogen were extremely low (< 0.23 %), whereas the water content ranged from 1.4% up to 35% with variations within single profiles. In two profiles permafrost was present in the deepest part (from 20 and 35 cm, respectively) of the sediments. DNA was recovered directly from mineral deposits and used as template for the amplification of bacterial 16S rRNA gene fragments. The mixture of 16S rRNA gene fragments was separated via denaturing gradient gel electrophoresis (DGGE). The DNA fingerprints showed a high number of bands that decrease with increasing depth, except for two single profiles, where no change within the profile could be observed.

1.PS-15: A Pleistocene Warming Event at 1 Ma in Prydz Bay, East Antarctica: Evidence from ODP Site 1165

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Magnetostratigraphic and nannofossil assemblage data from ODP Site 1165 evidence an anomalous warming event of the surface waters in and around Prydz Bay during the Early Pleistocene. This results from an increase in the abundance of nannofossils at Site 1165, that occurred at 1 Ma. High-resolution sampling permits a new bio-magnetostratigraphic interpretation for ODP Site 1165. A decrease in $\delta^{18}O$ values at Sites 1165 and 1167 also occurs at this time, supporting the presence of warming conditions in the Prydz Bay area. A return to colder surface waters, indicated by the absence or rare occurrence of nannofossils in the upper cores from Site 1165, suggests that more stable glacial conditions existed in the Prydz Bay basin for the last 900 ka. These new evidences call for a re-evaluation of the notion that the East Antarctic Ice Sheet has experienced stable conditions similar to today since the late Neogene.

1.PS-16: Early Pliocene circum-Antarctic warming between 3.5 and 3.7Ma recorded in sediments from ODP Sites 1165 (Prydz Bay) and 1095 and 1096 (Antarctic Peninsula)

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Preliminary results from diatom sedimentological and biostratigraphic analyses conducted in cores recovered from the continental rise during Ocean Drilling Program (ODP) Legs 178 (Antarctic Peninsula) and 188 (Prydz Bay) show evidence for warming intervals between 3.6 and 3.8 Ma. Our preliminary results confirm the warming event previously reported from Prydz Bay at 3.7 Ma and show evidence for the same event in the Antarctic Peninsula, which implies the event was of continent-wide significance. Results from ongoing analyses of opal, clay mineralogy and elemental analysis, will likely give us a further insight into the nature of this warming event.

1.PS-17: Petrographic analyses of lonestones from ODP Drill Sites Leg 188, Prydz Bay, Antarctica

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ODP Leg 188, drilled in 2000, sampled the first advances of the Antarctic ice sheet. Continental shelf Site 1166 documented early glaciation during the Eocene-Oligocene; continental slope Site 1167 documented the Pliocene-Pleistocene debris flow deposition, and continental rise Site 1165 documented the transition of wet- to dry-based glaciers between the lower to upper Miocene. One-hundred and seventeen thin sections were prepared from Site 1166, 1167, and 116 lonestones. The results of this study support a hypothesis proposed in 2001 that as time elapsed, the source area for Site 1167 lonestones shifted from a sandstone to a granitic source. We hypothesize that easily eroded sandstone outcrops were planed off first while ubiquitous gneiss and granite outcrops provided the source material for the younger debris flows at Site 1167 in the Pliocene-Pleistocene. None of the available lonestones suggest sources other than the drainage area of the Lambert Glacier-Amery Ice Shelf complex.

1.PS-18: Integrated provenance characteristics of glacial-marine sediment from the East Antarctic Margin

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A combination of provenance tracers has been applied to nearshore glacial-marine diamict samples from the East Antarctic margin. The George V Coast has several distinctive characteristics, including abundant metamorphic lithic clasts, old $^{40}Ar/^{39}Ar$ ages and high concentrations of Mn and Cr relative to Prydz Bay and Mac.Robertson Land. Mac.Robertson Land also displays high metamorphic content and high garnet content relative to Ross Sea tills (Licht et al., 2005). The East Antarctic margin samples have strongly negative e_{Nd} values and old $^{40}Ar/^{39}Ar$ ages relative to West Antarctica. These characteristics may provide a means of identifying ice rafted debris and fine-grained sediment that was supplied to the Southern Ocean by the East Antarctic Ice Sheet. A more comprehensive survey is in progress in order to discern in detail the regional contributions from different flow lines within Antarctica's ice sheets.

1.PS-19: Environmental magnetic records of Mid-Late Pleistocene drift sedimentary sequences from the Antarctic Peninsula, Pacific Margin

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The Pacific Continental Margin of the Antarctic Peninsula was the area of interest of the Sediment Drift of The Antarctic Offshore Project (SEDANO Project). A paleomagnetic and environmental study was carried out on four Pleistocene sequences from Drift 7. High resolution measurements were performed on u-channels and about forty-three discrete samples. This work focus on the definition of the mineralogy of the main magnetic carriers which is still matter of debate and on the study of the short time variability of magnetite grain-size which results particularly evident during the last glaciation. ARM/k magnetic parameter resulted to be a good record of such variability and reflects changes in the sedimentation on the rise when the ice sheet was probably closer to the continental shelf edge. An integrated age model has been provided for cores SED-12 and -13, which have the higher sedimentation rates.

1.PS-20: Mineralogy of late Quaternary marine sediments from central Ross Sea: A provenance study

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The mineralogy of late-Quaternary sediments from seven cores collected in the Glomar Challenger Basin (central Ross Sea continental shelf) were determined to establish the sediment provenance and to reconstruct the ice stream paleo-flows and their possible variations from the Last Glacial Maximum (LGM) to present. These cores were collected along directions longitudinal to the basin axis and parallel to the shelf break. The sedimentary successions are constituted by sub-glacial to glacio-marine sediment. Illite, smectites, chlorite are the main clay minerals; quartz, feldspars, pyroxenes and amphiboles are the main sand fraction components. Spatial and temporal variation in mineralogy of the clay and sand fractions allows us to understand possible variations of the source areas. Sediments probably have an East Antarctica provenance in the southern and western part of the basin; a West Antarctica provenance is supposed for northern-eastern sediments.

1.PS-21: Sand petrography and U/Pb detrital zircon geochronology of late Quaternary tills from the Byrd Glacier and central/western Ross Sea, Antarctica

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Petrography of the sand fraction and detrital zircon U/Pb isotope data were collected from Byrd Glacier moraines and central/western Ross Sea till in order to trace material transported from the Byrd Glacier into the Ross embayment. Petrographic analysis of Byrd Glacier samples show a wide variety of mineral and lithic fragments. Quartz, feldspar, greywacke, igneous (mafic, intermediate, and felsic), and metamorphic fragments were observed in different percentages among the sites. The U/Pb ages of zircons from Byrd Glacier show a dominant population of Ross to Pan-African ages with varying populations of older (Grenville to Archean) zircons. The Ross Sea samples have a variety of mineral and lithic fragments as well and include a dominant population of greywacke lithic fragments. Whereas most Ross Sea till samples contain a complex mix of mineral and lithic fragments, one depth interval from each of the three cores is dominated (>85%) by greywacke.

1.PS-22: Clast provenance and variability in MIS (AND-1B) core and their implications for the paleoclimatic evolution recorded in the Windless Bight - southern McMurdo Sound area (Antarctica)

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Granule- to cobble-grade clasts in the uppermost 575 m of the MIS drill-core (AND-1B) highlight significant downcore modal and compositional variations, which provide direct information about the potential source regions and evidence of an evolving provenance, most likely as results of variable ice conditions and ice-flow directions during the deposition of recovered diamictites. In addition to a significant contribution from the McMurdo Volcanic Group, the dataset indicates a compositionally varied clast assemblage including several basement rock types which are comparable to the main geological units exposed in the area SW of the drillsite, between the Skelton and Byrd Glaciers. Based on these provenance inferences and sedimentological constraints, the deposition of the diamictite units in the upper 575 m section recovered by the AND-1B drillcore would imply several oscillations of a grounded Ross Ice Shelf, possibly coupled with major phases of expansion of the West Antarctic Ice Sheet.

1.PS-23: Weathered Eocene basalt (Mazurek Point Formation) overlain by Early Oligocene glacigenic diamictites (Krakowiak Member, Polonez Cove Formation): Record of change from mild to glacial conditions in West Antarctica

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Recession of the Wyspianski glacier margin (Wesele Cove, King George Island) of > 60 m, since 1993, exposed a thick (over 60 m), tilted (25º to SE) terrestrial succession of well preserved >13 lava flows of the Mazurek Point Formation (Eocene), and an extensive outcrop (>150,000 m2) of diamictites and sandstones from the Krakowiak Glacier Member. Each flow (2-7m thick) is made up of a lower, fresh, compact basalt zone (1-6 m thick), that grades to an upper weathered, massive, clay-rich interval (1-1.5 m thick), bearing relict basalt clasts. At one point the diamictites rest erosively on top of basalt. Features of the diamictites point to subglacial deposition in glacial-marine and possibly also in terrestrial settings. Thin sections and geochemical analyses indicate that zoning of the predominantly tholeiitic basalt flows may be assigned to weathering processes under mild climatic conditions that preceded the onset of Oligocene glaciation.

1.PS-24: Distribution and origin of authigenic smectite clays in Cape Roberts Project Core 3, Victoria Land Basin, Antarctica

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Of some 800 m of lower Oligocene marine sediments cored continuously from the seafloor in the Victoria Land Basin of Antarctica at Cape Roberts Site CRP-3, the lower 500 m exhibit authigenic smectite clay coats on shallow-water sandstone grains. An scanning electron microscope/microprobe study of 46 fracture sections confirms that the distribution of the clay coats through the unit is not uniform or evenly distributed, but rather varies with depth, original porosity, and the kinds and abundance of source materials. Our results suggest that smectite emplacement resulted from in-situ, low-temperature burial diagenesis rather than hydrothermal or fault-focused thermobaric fluids.

1.PS-25: Authigenic clay minerals in rock matrices and fractures from CRP-2 and CRP-3 cores (Antarctica)

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Authigenic clay minerals have been identified through a scanning and transmission electron microscopy study in Oligocene sediments from CRP-2 and CRP-3 cores and in Devonian sandstones and in Jurassic dolerites in CRP-3 core (Ross Sea, Antarctica). Authigenic clay minerals in rock matrices and faults/veins in the Oligocene sediments in both cores consist mostly of dioctahedral smectites, rarely of berthierine/chlorite intergrowths, and illite. Al, K-rich smectites and kaolinite occur in the Devonian sandstones; trioctahedral smectites, berthierine/chlorite intergrowths, and Fe-hydroxides develop in the altered dolerites. These data indicate that the composition of the secondary phases depends on the geochemistry of the rock they grow in. Within each sample, the same authigenic minerals form in the matrix and in the vein/fault. Textures indicate that clays precipitated from fluids which circulated in the system during contemporaneous diagenetic and faulting events that affected the sedimentary sequences recovered in CRP-2 and -3 cores.

1.PS-26: Geochemical variations detected with continuous XRF measurements on ANDRILL AND-1B core - preliminary results

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Antarctica and especially its ice sheets play a major role in the global ocean current system and climate. The ANDRILL (Antarctic Geological Drilling) MIS deep drilling project (McMurdo Sound, NE Ross Ice Shelf, drilled core AND-1B during austral summer 2006/2007) is located in a flexural moat basin filled with sediments of different origins. For the first time, sediments beneath an ice shelf were drilled, which provides a unique opportunity to investigate the Ross Ice Shelf variability. During the drilling phase, major and minor elements were measured using a non-destructive X-Ray Fluorescence Core Scanner. The core covers a time period much longer than any Antarctic ice core record. The high-resolution data set of XRF-core scans allows estimating climate changes on small time scales. This report covers the early stage of the project, focus mainly on data preparation and correction and gives a first rough interpretation of the measured data.

1.PS-27: Determination of and preliminary results from the high-resolution physical properties record of the AND-1-1B sediment core from beneath Ross Ice Shelf, Antarctica

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A more than 1200 m long sediment core was drilled beneath McMurdo Ice Shelf near Ross Island (Antarctica) in austral summer 2006/07 (ANDRILL-MIS Project). High-resolution whole-core physical properties were determined as one set of parameters to describe changes in the depositional system over the sedimentation period of about 12 myrs incorporated in the core. Four parameters were measured using a multi-sensor core logger: acoustic velocity, wet-bulk density, non-contact electrical resistivity and magnetic susceptibility. Data quality was routinely controlled by measurement of standards. Deviations from the reference values are minimal with regard to the whole spectrum of sediment data points and no offsets between core diameter intervals are obvious. Almost all boundaries between lithostratigraphic units are in good agreement with changes in the physical properties record. For the depth interval between 140-300 mbsf the physical properties indicate rhythmic changes in the environmental system with alternations of diatomite and diamictite sequences.

1.PS-28: McMurdo Ice Shelf seismic reflection data and correlation to the AND-1B drillhole

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Surface seismic reflection data from ANDRILL site surveys are integrated with a regionally extensive McMurdo Sound seismic stratigraphic framework. In addition, these seismic data are correlated to the AND-1B drill hole using vertical seismic profiles acquired during drilling operations (December/January 2006/7). Six regionally interpreted reflectors are identified in core as distinct lithostratigraphic boundaries.

1.PS-29: A high resolution aeromagnetic survey over the Cape Roberts Rift Basin: Correlations with seismic reflection and magnetic susceptibility log data

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A high resolution aeromagnetic survey (altitude 125 m asl, spacing 500 m , area 800 km^2) was carried out in 1994 offshore of Cape Roberts by the GITARA (German ITalian Aeromagnetic Research in Antarctica) Group. The availability from drilling of whole-core physical properties logs for magnetic susceptibility, P-wave velocity and density/porosity data allows new insights to be inferred from reprocessed and reviewed HRAM aeromagnetic data. Aeromagnetic data have been reprocessed to image with greater detail the structural framework along the western flank of the Victoria Land Basin. New processing includes 2D Werner and 3D Euler deconvolution, the production of maps of the maximum horizontal gradient of pseudo-gravity, and 2D and 3D modelling. Magnetic trends and anomalies are discussed in conjunction with now available drilling results from the CRP, existing bathymetric data and recently published interpretations of a multichannel seismic reflection survey.

1.PS-30: ROSSMAP: Ross Sea Digital Geophysical and Geological Maps

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ROSSMAP is an IPY project to map paleo-climate and tectonic interactions on the Ross Sea continental shelf. ROSSMAP addresses basic questions relating to the behaviour of Antarctic ice sheets and the geological evolution of this sector of the Antarctic margin. The ACE ROSSMAP project was established for IPY to bring together researchers motivated to explore the geological history of the Ross Sea region. The Ross Sea basins are unique in preserving a record of environmental and tectonic forces at the engine room of global climate. ROSSMAP will test what interactions there are between tectonics, landscape and climate. This will involve developing a regional geological model based on available digital seismic reflection and bathymetric data, interpreted using a common framework. We anticipate ROSSMAP will define targets for future drilling initiatives in the region, and provide a legacy of web-based electronic databases that will be available to other researchers and the public.

2.PL: Plenary lectures

2.PL-1: Antarctica and global paleogeography: From Rodinia, through Gondwanaland and Pangea, to the opening of gateways and the birth of the Southern Ocean

Trond H. Torsvik, **Carmen Gaina** and **Thomas F. Redfield**, Center for Geodynamics, Geological Survey of Norway, Leiv Erikssons vei 39, Trondheim, Norway

Most Neoproterozoic Rodinia reconstructions associate East Antarctica (EANT) with Western Australia. By further linking EANT to both Gondwana and Pangea via relative plate circuits a Synthetic Apparent Polar Wander (SAPW) path is calculated. This path predicts that EANT was located at tropical/subtropical southerly latitudes from 1 Ga to 420 Ma. Around 400 Ma and again at 320 Ma, EANT underwent southward drift. Circa 250 Ma Antarctica voyaged briefly north, but headed south again ca. 200 Ma. Since 75 Ma Antarctica became surrounded by spreading centers, and has remained extremely stable.

Although paleomagnetic data of West Antarctic blocks is sparse, we attempt to model their complex kinematics since the Mesozoic. Together with our new EANT SAPW path and circum-Antarctic seafloor spreading history we construct a series of paleogeographic maps from Cambrian to Early Tertiary. Major regional tectonic events are related to SAPW cusps, providing a new view on Austral geotectonics.

2.PL-2: Four billion years of change: Earth's Precambrian glacial record

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Despite a 30% increase in Solar luminosity, Earth's glacial record appears to become more frequent over geological time. At least two of the three major Precambrian glacial intervals were exceptionally intense, with solid evidence for widespread sea ice on or near the equator, well within the “Snowball Earth” zone produced by ice-albedo runaway. The first low-latitude glaciation in the early Paleoproterozoic (the Makganyene in South Africa) is associated intimately with the first solid evidence of global oxygenation, including the world's largest sedimentary manganese deposit. Subsequent low-latitude glaciations during the Cryogenian period of the Neoproterozoic are also associated with progressive oxygenation, and these young Precambrian ice ages coincide with the time when basal animal phyla were diversifying. However, specifically testing hypotheses of cause-and-effect between Earth's Neoproterozoic biosphere and glaciation is complicated because large and rapid True Polar Wander events punctuated Neoproterozoic time and even may have extended sporadically into the Cretaceous.

2.A.A: Antarctica, the southern ocean, and climate evolution: Insights from drilling, coring, and geophysical surveys ORAL

2.A.A-1: Seismic and chronostratigraphic results from SHALDRIL II, northwestern Weddell Sea

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Summary The 2006 SHALDRIL II cruise was conducted in the northwestern Weddell Sea, with primary drilling targets in the James Ross Basin. A site drilled along the northern edge of the James Ross Basin sampled either latest Eocene or earliest Oligocene deposits, providing a lower chronostratigraphic benchmark for our seismic stratigraphic age model. Severe sea ice conditions forced abandonment of several of the James Ross Basin sites. Three alternate sites were drilled along the southern flank of the Joinville Plateau. Seismic data from the area show a thick, southward dipping stratigraphic succession with no conspicuous gaps. Three drill sites sampled this succession and recovered Oligocene, middle Miocene, and early Pliocene strata overlain by a thin drape of Pleistocene deposits. The Pliocene-Miocene boundary appears to be represented by a disconformity within the cored interval. Otherwise, this is one of the most complete post-Eocene successions anywhere on Antarctica and its adjacent margins.

2.A.A-2: Glacial dynamics of the West Antarctic Ice Sheet in the southern Bellingshausen Sea during the last glacial cycle

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A major glacial trough ("Belgica Trough") on the continental shelf in the southern Bellingshausen Sea acted as an important outlet for ice draining the West Antarctic Ice Sheet during the Last Glacial Maximum (LGM). Mega-scale glacial lineations, drumlins and grounding-zone wedges indicate that Belgica Trough represents the former pathway of a grounded ice stream, which advanced to the shelf break during the LGM and was fed by ice draining through Eltanin Bay and Ronne Entrance. Here we present the preliminary results of sedimentological investigations carried out on 26 sediment cores recovered from the shelf and slope. This unique dataset allows the identification of various facies types that reflect the different phases of grounded ice advance, retreat, and post-glacial onset of seasonal open-water conditions. We will reconstruct the complex processes of erosion, transport and (re-)deposition controlling sedimentation on the margin and the timing of ice-sheet retreat from the shelf.

2.A.A-3: A glacial to interglacial sediment model and retreat history for the Ross Ice (Sheet) Shelf in Western Ross Sea since the Last Glacial Maximum

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Sediment cores from beneath the McMurdo Ice Shelf and north of Ross Island, display a succession of facies that document the retreat of the grounded Ross Ice Sheet during the LGM to the present-day open-marine and ice-shelf environments. The succession comprises in ascending stratigraphic order: (1) clast-rich muddy diamict interpreted as basal glacial debris melt-out proximal to a retreating grounding zone; (2) sparsely-fossiliferous, non-bioturbated mud lacking lonestones, interpreted as a sub-ice shelf facies; and (3) diatom-bearing mud and diatom ooze with IRD indicative of open water conditions. Our chronology implies lift-off of grounded ice in the 900 m-deep marine basins surrounding Ross Island by ~10,100 ^{14}C yr BP. However, an ice shelf remained north of Ross Island until ~8,900 ^{14}C yr BP. About that time, the calving line was pinned to Ross Island while the grounding line hundreds of kilomteres to the south, marked the present-day ice shelf mode.

2.A.A-4: Does the Late Pliocene change in the architecture of the Antarctic margin correspond to the transition to the modern Antarctic Ice Sheet?

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In six widely-spaced key sectors of the Antarctic continental margin (Antarctic Peninsula; Prydz Bay; Weddell Sea; Wilkes Land; east and west Ross Sea), we observe a change in the geometry of the sedimentary deposits which is characterized by: margin-wide erosion and subsequent progradation on the continental shelf; downlap on the continental slope; and major mass-wasting deposits on the continental rise. The change occurs in the late Neogene in all sectors, although there are minor variations in this timing, and the stratigraphic position on the margin is not always obvious. The change is dated at about 3 Ma in the Antarctic Peninsula and Prydz Bay sectors and is broadly concomitant in the other sectors. This suggests a common driving force, which we suggest was the transition of the Antarctic ice sheet regime from polythermal conditions to the present polar cold, dry-based conditions.

2.A.A-5: East Antarctic ice-sheet dynamics 5.2-0 Ma from a high-resolution terrigenous particle size record, ODP Site 1165, Prydz Bay-Cooperation Sea

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This paper discusses a 5.2-0 Ma high-resolution terrigenous particle size record in a sediment drift off East Antarctica. The particle size properties of Hole 1165B are interpreted in the context of previously acquired data on a continental shelf to slope transect drilled by ODP Leg 188 in Prydz Bay and the Cooperation Sea. The new data indicate that the ice sheet stayed predominantly landward of the shelf break in the early Pliocene (5.2-3.5 Ma) with periods of ice sheet recession on land. The middle Pliocene (3.5-3.1 Ma) is characterized as major ice-sheet expansion with deposition of meltwater plumites on the continental rise. By 2.5 Ma the ice-sheet had become stable and dry-based with ice flow in a glacial trough extending to the shelf break. Pulses of coarse-grained glacigenic debris after ~ 1 Ma are interpreted as extensive calving in response to Northern Hemisphere deglaciations and subsequent sea level rise.

2.A.A-6: Insights into the East Antarctic Ice Sheet, 3.5 to 19 Ma, inferred from iceberg provenance

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ODP Site 1165, 400 km offshore of Prydz Bay, Antarctica, is well located to record changes in ice-rafted debris (IRD) and iceberg provenance. The potential sources of IRD, Prydz Bay and the coast to the east, have distinct neodymium and argon isotopic signatures. Eight IRD-bearing layers from Site 1165 were analyzed; they record snapshots of ice and ocean conditions from 3.5 to 19 Ma. Based on argon analyses of individual hornblende IRD grains, a major provenance change is observed: before 14 Ma, IRD is locally sourced from the Prydz Bay sector, whereas after 7 Ma, roughly half the IRD probably comes from Wilkes Land, Adelie Land, and as far as George V Land. This is likely associated with ice expansion on East Antarctica after the mid-Miocene. Additionally, an iceberg drift model has been developed to assess the ocean and climate conditions required to produce the IRD provenance observations.

2.A.A-7: Antarctic ice-rafted detritus in the South Atlantic: Indicators of iceshelf dynamics or ocean surface conditions?

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Piston core TN057-13 from the Atlantic sector of the Southern Ocean contains layers of ice-rafted detritus deposited during the last glacial period that mainly consist of volcanic glass and ash (Kanfoush et al. (2000, 2002)). Most of the ash layers have equivalents in Antarctic ice cores, providing a potential means of correlation between South Atlantic marine sediment and Antarctic ice cores. Our analysis of clear mineral grains indicates South Sandwich Islands as the predominant source, similar to that inferred for the volcanic glass (Nielsen et al. submitted). In addition, quartz and feldspar with possible Antarctic origin occur in conjunction with postulated episodes of Antarctic deglaciation. We conclude that while sea ice was the dominant ice rafting agent in the Polar Frontal Zone of the South Atlantic during the last glacial period, a minor component of the South Atlantic IRD also reflects East Antarctic ice sheet dynamics.

2.A.B: Technologies and tools for exploring the antarctic environment ORAL

2.A.B-1: Methods for determining topography in data sparse regions of East Antarctica

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Large regions of East Antarctica lack a reasonable topographic model because, until recently, only a few observations of ice thickness have been available to constrain the bedrock elevation. The acquisition of GRACE satellite gravity data has created a new opportunity to model the sub-ice topography. Here we have applied two methods for predicting topography based on the satellite data. Gravity inversion is a classical geophysical technique that predicts topography based on the physics relating it to gravity. Cokriging is a statistical method that uses the spatial covariance between datasets to predict one in the absence of the other. The geophysical and statistical solutions are compared to the best-known topography model (BEDMAP) in an area that is relatively well constrained by the BEDMAP data coverage.

2.A.B-2: Airborne and spaceborne ice sounding of Antarctica, Mars and Europa

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Satellite-based radio echo sounding technique is of interest to the Earth science community over Antarctica and Greenland, as well as to the planetary science community for exploring subsurface structures of Mars and Europa. Pioneered by the Mars exploration community using MARSIS radar on board the Mars Express mission, such a technique has demonstrated ice sounding capability down to a few kilometers. This paper presents an overview of ESA's activities in the areas of Earth Observation and Planetary Exploration for preparing future satellite-based sounding missions. These activities include: (a) establishing observational requirements; (b) understanding VHF/UHF wave, propagation and scattering within the subsurface medium; (c) designing radar payloads and satellite systems; (d) developing data processing algorithms for enhancing resolution and sensitivity. The BIOMASS P-band Synthetic Aperture Radar (SAR) mission, a candidate among the ESA's future Earth Explorer missions, represents a unique opportunity for exploring ice-sheet sounding of Antarctica and Greenland from space.

2.A.B-3: The applicability of topographic mapping in Antarctica with the Advanced Land Observing Satellite (ALOS)

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Antarctica is not completely covered with topographic maps and the majority of the existing ones are small scale maps produced 20 or more years ago. Successfully launched on January 24, 2006, the Advanced Land Observing Satellite (ALOS) has three sensors. One in particular, the Panchromatic Remote-Sensing Instrument for Stereo Mapping (PRISM) at 2.5-meter spatial resolution, has the potential of collecting stereo imagery for topographic mapping at scales up to 1:25,000 with little or no image identifiable ground control points because of an advanced attitude and orbit control subsystem supported by an on-board dual-frequency Global Positioning System (GPS). A crucial issue to the ALOS stereo mapping capability is the accuracy, scale, consistency, and speed achievable. To address these questions, ALOS data of Ellsworth Mountain Range and other selected Antarctic regions are examined to assess its potential for topographic mapping.

2.A.B-4: Global polar geospatial information service retrieval based on search engine and ontology reasoning

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In order to improve the accessing precision of polar geospatial information service on web, a new methodology for retrieving global spatial information services based on geospatial service search and ontology reasoning is put forward, which includes distributed geospatial web service , geospatial service search engine, extended UDDI register center and multi protocol geospatial information service client. Some key technologies including service discovery based on search engine, service ontology modeling and reasoning, and service register based on extended UDDI are presented. Finally, the prototype is described.

2.A.B-5: Estimation of snow accumulation in Antarctica using automated acoustic depth gauge measurements

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Measurements of Antarctic precipitation are important to further the understanding of climate change, mass balance of ice sheets, and the global water cycle. Currently, Antarctic precipitation measurements are largely absent due to the many complexities of measuring precipitation in high latitudes. While many of these issues have yet to be overcome, measurements of snow accumulation and partitioning the causes of these changes are an important beginning. With the use of automatic weather stations and acoustic depth gauges along with visual stratigraphy and snow density observations, preliminary measurements and causes of snow depth change across the Ross Ice Shelf were taken during a period of 2003-2006. The effects of topography as well as maritime influences were also considered. A net accumulation was found at all sites, and precipitation was shown to be the primary cause of positive snow depth change. Topographical influences were found to be more significant than maritime influences.

2.A.B-6: Recent advances in low-power real time comms using new Iridium data capabilities

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Recent advances in low-power communications using the new Iridium data capabilities now available (SBD, SMS) has allowed the development of systems that can stream transmit data (and receive commands) reliably in real time from very remote locations. This has allowed the development of sites or systems where one can put up instruments (cameras, gps, weather monitors, etc.) to collect data and not need to return to the site for data download. This has then expanded the possibilities where sites can be located by either removing the logistical costs of returning or being able to put sites where it would be too dangerous to return (tip of surging glaciers, crevasse locations, moulins, volcanoes, etc.).

2.A.B-7: Proposed Subglacial Antarctic Lake Environment access methodology

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In oil well drilling, there is a concept referred to as “Drilling with Casing”; a process where the tubular that is utilized to drill the hole is also used to case the resultant borehole without the removal of the tubular from the borehole. This method is proposed for SALE access, where coiled tubing would be used to drill through the ice with hot water to a point close to SALE. The size of the borehole would only be of sufficient clearance to allow passage of the tubular downward. When the tubular was in position, then the hot water inside the tubular would be displaced with a non-freezing fluid. The water around the tubular would gradually freeze, but the incompressibility of the fluid inside would prevent the tubular from collapsing as the water froze. This tubular could be placed quickly and used as a permanent conduit to the lake.

2.A.C: Antarctica in Rodinia, Gondwana and Pangea: In honor of the contributions of Campbell Craddock ORAL

2.A.C-1: Continental transform faults – Break-up examples from the Antarctic and the Arctic

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Continental transform faults (for example, the San Andreas Fault or Dead Sea transform) link plate boundaries by traversing continental crust. Other continental transforms existed in the past, but were later modified into oceanic spreading features. The sinistral Balleny transform system between Tasmania and the Ross Sea is such a complex in the Antarctic. In the Arctic, the comparable dextral de Geer fault system separated Spitsbergen from Greenland. Cenozoic fold-and-thrust-belts were taken as related onshore features. This relation, however could be ruled out later in corresponding North Greenland. Therefore no clear onshore effects of the transform remain today. In the Antarctic on the contrary, there is a possibly related set of faults in northern Victoria Land. However, these faults are dextral in character and differ therefore from the “cumulative” sinistral offset between Tasmania and Victoria Land.

2.A.C-2: The Ross Orogen and Lachlan Fold Belt in Marie Byrd Land and New Zealand: Implication for the tectonic setting of the Lachlan Fold Belt in Antarctica

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Correlation of the Cambrian Delamerian Orogen of Australia and Ross Orogen of the Transantarctic Mountains is accepted but the extension of the adjacent Lachlan Orogen into Antarctica is controversial. Outside the main Ross-Delamerian belt, evidence of this orogeny is also preserved at Mt Murphy in Marie Byrd Land and the in Takaka Terrane of New Zealand. In pre-break configurations of the SW Pacific, these two areas are far removed from the Ross-Delamerian belt. Evidence from Cambrian conglomerates in the Takaka Terrane, however, shows that in Late Cambrian times it was adjacent to the Ross Orogen. These data indicate tectonic displacements within Gondwana after the Cambrian and before Gondwana break-up. The Lachlan Orogen formed in an extensional basin in a supra-subduction zone setting and the Cambrian rocks of Marie Byrd Land and New Zealand are interpreted as parts of a rifted continental ribbon on the outboard side of the Lachlan belt.

2.A.C-3: Nature and timing of lower crust of the Robertson Bay terrane (northern Victoria Land, Antarctica)

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This study is aimed to increase the knowledge on the nature and age of the crust of the Robertson Bay terrane through the study of crustal xenoliths brought to the surface by alkaline Cenozoic lavas. Petrographic and geochemical data allow to distinguish three different types of xenoliths: (A) K–feldspar-rich with alkaline geochemical affinity, thought to represent cumulates linked to the Cenozoic igneous activity; (M) lower crustal mafic granulites, with geochemical affinity variable from island-arc tholeiite to calc-alkaline; (F) lower crustal felsic granulites found as both (F1) K-rich, with euhedral microcline, and (F2) low-K types, with geochemical composition varying from granite- to metasedimentary-like. Furthermore, U–Pb dating of zircons by laser-ablation ICP-MS from the F2 sub-type (concordant ages clustering at ~490 and 360Ma) suggests the formation of juvenile crust during the Ross convergence process. These results reveal the composite nature of the lower crust of the Robertson Bay terrane.

2.A.C-4: Constraints from detrital zircon geochronology on the early deformation of the Ross orogen, Transantarctic Mountains, Antarctica

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New ages of detrital zircons constrain the timing of the onset of deformation in the Ross orogen. In the Skelton Glacier area, Skelton Group was deformed before cross-cutting intrusion at 551 Ma. The youngest, significant, age-probability peaks from three samples of Skelton Group are 649 Ma, 684 Ma, and 691 Ma. The 649 Ma peak may be considered the maximum depositional age of Skelton Group, constraining the period of deformation to between 649 Ma and 551 Ma. In the upper Scott Glacier area, La Gorce Formation was deformed prior to cross-cutting intrusion at 526 Ma. The youngest, significant, age-probability peaks from two samples of La Gorce Formation are 581 Ma and 619 Ma. The 581 Ma peak may be considered the maximum depositional age of La Gorce Formation, constraining the period of deformation to between 581 Ma and 526 Ma.

2.A.C-5: Postcollisional magmatism of the Ross Orogeny (Victoria Land, Antarctica): A granite-lamprophyre genetic link

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The central Victoria Land crustal sector of the early Paleozoic Ross Orogen is characterized by the widespread occurrence of pink granite plutons and dikes (Irizar unit) and lamprophyric dikes (Vegetation unit). Structural evidence indicates these intrusions were emplaced in a tensional regime during late stages of the Ross Orogeny. Geochronological U-Pb and 40Ar-39Ar data indicate emplacement age for both units within a restricted time interval around 490 Ma. This, coupled with emplacement style, implies a fast, block-like exhumation during this postcollisional stage. The Irizar granites-dikes and the Vegetation lamprophyres are both potassic, with overlapping initial Sr-Nd isotope ratios. The Vegetation melts derived from enriched subcontinental lithospheric mantle further metasomatised by a Ross subduction component, while the Irizar melts derived from remelting of Vegetation-like underplated material. Comparison with coeval postcollisional igneous activity in Australia-Tasmania suggests similar scenarios with slab roll-back in the Antarctic sector evolving to slab break-up in Australia-Tasmania.

2.A.C-6: Provenance connections between Late Neoproterozoic and Early Paleozoic sedimentary basins of the Ross Sea region, Antarctica, southeast Australia and southern Zealandia

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U-Pb detrital zircon age patterns are reported for latest Neoproterozoic, Cambrian and Ordovician greywackes in tectonostratigraphic terranes, formerly contiguous in the present-day Ross Sea region: southern Zealandia, Marie Byrd Land, West Antarctica, Northern Victoria Land, East Antarctica. The youngest age components are commonly coincident with depositional ages. Latest Neoproterozoic-early Paleozoic recycled zircons have major component(s), at about 525, 550, and 595 Ma, about 40-80 million years older than depositional ages, suggesting active-margin depocentres with minor, contemporary volcanic sources, and older, exhumed plutonic equivalents, becoming volumetrically more important in the Ordovician. Late Mesoproterozoic age components, at 1030 and 1070 Ma, probably originate from igneous/metamorphic complexes in the Gondwanaland hinterland, and evolve into more polymodal patterns in the early Ordovician. The detrital zircon provenances reflect the evolution of plutonic/metamorphic complexes of the Ross Fold Belt, Transantarctic Mountains, and Delamerian Fold Belt, South Australia, as sediment sources to depocentres at the Gondwanaland margin.

2.A.C-7: The Morozumi Range Intrusive Complex (northern Victoria Land, Antarctica)

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Northern Victoria Land, the region located at the Pacific termination of the Transantarctic Mountains, is made up of three main lithotectonic units assembled during the Early Paleozoic Ross Orogeny. To better constrain the emplacement mechanisms and origin of orogenic magmatism, it is particularly valuable the study of intrusions close to major crustal boundaries, such as that cropping out in the Morozumi Range (Wilson terrane). Preliminary studies in the area were carried out in the 1970's by New Zealand geologists and by the German GANOVEX teams in the 1980's. Our recent field and petrochemical investigations of the Morozumi Range Intrusive Complex allowed to recognize different lithologic units (Morozumi granite, Jupiter Granite, Morozumi Granodiorite, Morozumi Diorite and Morozumi tabular intrusions). These units, characterized by complex evolutionary genetic relationships, possibly derived from different crustal and subcrustal sources and emplaced in a rather short time interval.

2.A.D: Active and ancient surface processes ORAL

2.A.D-1: Sensitivity of ice-cemented Antarctic slopes to increases in summer thaw

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We employed a Mohr-Coulomb safety factor equation to assess the response of ice-cemented slopes in the stable upland zone of the McMurdo Dry Valleys (MDV) to artificial increases in mean summertime soil surface temperatures (MSSST). Results show that ice-rich, silty tills on slopes ≥20° could fail by planar sliding with an increase in MSSST of ~5º to 9ºC. This change corresponds to an atmospheric increase of ~5º to 9ºC, which lies just outside the envelope of warming predicted to occur in this region over the next century. If we assume that current soil-moisture conditions can be applied to slope deposits in the distant past, and that these slope deposits have re-mained physically stable for millions of years, then our results suggest that MSSST in the upland zone did not increase by more than ~5º to 9ºC since deposition of most deposits, perhaps as much as 10 million years ago.

2.A.D-2: Regolith transport in the Dry Valleys of Antarctica

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The stability of ground surface and preservation of landforms that record past events and environments is of great importance as the geologic and climatic history is evaluated in the Dry Valleys of Antarctica. Currently little is known about the past and present regolith transportation that tends to eradicate and confound such record and is an indicator of the environment of itself. Based on analyses of repeat photographs, soil traps, and pebble transport distances it was found that there is a large spatial variation in topographic diffusivities at least in the annual basis and that counter intuitively the highest topographic diffusivities are found in the alpine valleys that are located further inland from the lowest values near the coast. An average topographic diffusivity for the Dry Valleys was determined to be 10^{-5}–10^{-4} m^2/yr. This average topographic diffusivity is surprisingly large equaling or bordering the smallest values from elsewhere on Earth.

2.A.D-3: Trends in discharge and flow season timing of the Onyx River, Wright Valley, Antarctica since 1969

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Flow records at the two stream gauges on the Onyx River represent the longest actively collected environmental records in the McMurdo Dry Valleys, Antarctica. The downstream gauge, near Lake Vanda, has been collecting data since 1969, and the upstream gauge, at Lower Wright Glacier (LWRT), has collected data since 1972. We analyzed these records to assess the long-term trends in annual discharge, flow season length, flow season start, and flow season end. Our results indicate overall decreasing trends in annual discharge (0.4×10^6 m^3/decade at LWRT, 0.8×10^6 m^3/decade at Vanda), and increasing flow season lengths (by 7 d/decade at LWRT, and 2.7 d/decade at Vanda), influenced by earlier start and later end dates (5.2 and 0.8 d/decade, respectively at LWRT; 4.8, 1.4 d/decade, respectively at Vanda). This suggests that flow season climate patterns in the Dry Valleys are decreasing glacier melt intensity overall, but extending the period of meltwater generation.

2.A.D-4: Establishing a chronology for the world's oldest glacier ice

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A cold-based, debris-covered alpine glacier in Mullins Valley, a tributary to upper Beacon Valley, contains ancient glacier ice. Four independent dating techniques confirm that the glacier age ranges from ~10 ka near the valley head, to >8 Ma at its diffuse terminus in central Beacon Valley (where it abuts opposing buried ice that originated from Taylor Glacier; e.g., Sugden et al., 1995). The dating methods include 1) cosmogenic-nuclide analyses of boulders from a sublimation till that caps the ice; 2) numerical ice-flow modeling of the glacier system; 3) 40Ar/39Ar analyses of in-situ ash fall from relict polygon troughs at the till surface; and, 4) modern horizontal ice-flow velocities as determined from synthetic aperture radar interferometry (InSar, from Rignot et al., 2002). Multi-channel seismic surveys demonstrate that the ancient ice is ~45 to ~100 m thick in Mullins Valley and ~150 m thick in upper Beacon Valley.

2.A.D-5: Slope streaks in the Antarctic Dry Valleys: Characteristics, candidate formation mechanisms, and implications for slope streak formation in the Martian environment

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Slope streaks on Mars are typically dark, extend downslope for up to ~2 km, are <200 m in width, show no detectable relief, and have been observed to form/change over less than decadal time periods. Mars streaks occur exclusively in regions of low thermal inertia, steep slopes, and only where peak temperatures >275 K; changes are observed only if the interval includes the warm season. Mechanisms proposed for Mars slope streaks include dry dust avalanches, wet debris flows, and erosive fluvial processes from spring discharge. We investigated very similar slope streaks in upper Wright Valley of the Antarctic Dry Valleys and interpret their formation to be due to snowpack and near-surface melting-derived saline water traveling downslope along the top of the ice table, wicking and dampening the surface to cause the streak, a new mechanism that should be seriously considered for the origin of slope streaks on Mars.

2.A.D-6: Transient streams and gullies in the Antarctic Dry Valleys: Geological setting, processes and analogs to Mars

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In the Antarctic Dry Valleys gullies and streams form primarily from top-down melting of cold-based glacial ice and/or annual/perennial surface snow and ice accumulations. Significant water transport and storage occurs in the hyporheic zone. Surface water flow in Dry Valley gullies and streams varies widely in occurrence and flux, based on local microenvironments and daily, intra-seasonal and inter-annual variations in insolation. Between periods of melting and flow, channel water commonly freezes to produce a veneer of surface ice; salts are also deposited. Flow in channels can be maintained beyond the period of active channel carving by topographic trapping of windblown snow and its subsequent melting, producing local ice and sediment deposits in the gully system. These characteristics provide important insight into the formation of geologically recent and perhaps currently active gullies on Mars, and candidate microbiological habitats.

2.P1.A: Antarctica, the southern ocean, and climate evolution: Insights from drilling, coring, and geophysical surveys ORAL

2.P1.A-1: New insights into submarine geomorphology and depositional processes along the George V Land continental slope and upper rise (East Antarctica)

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The PNRA/MOGAM (MOrphology and Geology of Antarctic Margins) project collected swath bathymetric and subbottom acoustic data from the slope and rise of the George Vth Land in 2006 from R/V OGS Explora. Previous studies demonstrated that thick shelf margin prograding sedimentary wedge buried rugged glacial morphology, as in most of the Antarctic margin. The new survey shows that the continental slope and rise is actually incised by a complex network of converging submarine canyons, some of which directly connected to main shelf depressions. Along the slope, canyon erosion by turbiditic flows and by cold dense bottom currents likely prevented the burial of, or exhumed, relict features of the previous glacial topography Further coordinated multidisciplinary investigations of this margin are planned for the International Polar Year, and include multiyear oceanographic measurement of bottom currents, and sedimentological and biological sampling to constraint the present and recent past environment and ecosystems.

2.P1.A-2: Extensive debris flows on the eastern Wilkes Land margin: A key to changing glacial regimes

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Glacial sequences deposited on the base-of-slope and upper continental rise off the eastern Wilkes Land margin show significant variation of the dominant depositional systems with time. Extensive debris flow deposits dominate during the early Oligocene to middle-late Miocene times. During these times large volumes of melt-water production by a dynamic EAIS glacial regime led to high sediment discharge onto the continental margin causing extensive sediment failures. In contrast, during the late Miocene-Pliocene there was an evolution to a more persistent colder base EAIS that produced less melt-water resulting in mixed turbidite and mass transport deposition.

2.P1.A-3: Cenozoic environmental changes along the East Antarctic continental margin inferred from regional seismic stratigraphy

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We interpret ~40 000 km of multichannel seismic reflection data collected by the Russian Antarctic Expedition along the East Antarctic continental margin from 30º–115ºE and present a revised seismic stratigraphy model for the regional depositional paleoenvironments. Variations in acoustic facies observed across major unconformities are correlated with paleoenvironmental changes deciphered from Antarctic drilling data and deep-sea "proxy" records. As with other studies, our results indicate that the East Antarctic margin was glaciated at different times, with the ice sheet first reaching the western Wilkes Land margin in the Middle Eocene and then advancing onto most parts of the East Antarctic continental shelf in the earliest Oligocene. In the Neogene, bottom currents deposited a variety of drift deposits along the margin.

2.P1.A-4: East Antarctic Ice Sheet fluctuations during the Middle Miocene Climatic Transition inferred from faunal and biogeochemical data on planktonic foraminifera (Kerguelen Plateau)

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This research focuses on a detailed study of faunal and biogeochemical changes that occurred in the Kerguelen Plateau region from 14.8 to 11.8 Ma. Abundance fluctuations of different planktonic foraminiferal taxa, $d^{18}O$ and Mg/Ca data have been integrated to feature the East Antarctic Ice Sheet (EAIS) growth modality and fluctuations during the Middle Miocene Climatic Transition. A 7°C lowering in seawater temperature, an abrupt turnover in the foraminiferal fauna, a 1.5‰ shift in $d^{18}O$ and a shift in seawater $d^{18}O$ around 13.9-13.7 Ma, are interpreted to reflect surface water cooling and EAIS expansion. Hole 747A data suggest a major change in the variability of the climate system: ice sheet fluctuations were greater before 13.9 Ma compared with those from 13.7 Ma, when the EAIS was more stable. The middle Miocene episode of Antarctic ice sheet expansion represents a first step towards the development of the modern permanent ice sheet.

2.P1.A-5: Abrupt turnover in calcareous-nannoplankton assemblages across the Paleocene/Eocene Thermal Maximum: Implications for surface-water oligotrophy over the Kerguelen Plateau, Southern Indian Ocean

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Ocean Drilling Program (ODP) Core 183-1135A-25R-4 from the Kerguelen Plateau in the Southern Ocean represents only the second complete, expanded section of the Paleocene/Eocene Thermal Maximum (PETM; ~55 Ma) recovered from Antarctic waters. Calcareous nannoplankton underwent an abrupt turnover across the PETM. Although *Chiasmolithus*, *Discoaster*, and *Fasciculithus* exponentially increase in abundance at the onset, the former abruptly drops but then rapidly recovers, whereas the latter two taxa show opposite trends due to surface-water oligotrophy. These observations confirm previous results from ODP Site 690 on Maud Rise. The rapid ocean acidification caused intensive dissolution of susceptible holococcoliths and poorly preserved assemblages. Similarities and contrasts between the results of this study and previous work from open-ocean sites and shelf margins further demonstrate that the response to the PETM was consistent in open oceans, but could be localized on continental shelves where nutrient regimes depend on the local geologic setting and oceanographic conditions.

2.P1.B: Biotic evolution and radiation of life: Before and after Gondwana breakup ORAL

2.P1.B-1: The Paleoenvironmental significance of trace fossils in Devonian sediments (Taylor Group), Darwin Mountains to the Dry Valleys, southern Victoria Land

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A review of trace fossils in the Taylor Group from the Britannia Range to the MacKay Glacier indicates they varied significantly both spatially and temporarily within the Devonian basin. New studies in the south provide a better understanding of ichnofaunas in the Junction Sandstone (570m) and Hatherton Sandstone (450m), with new information on very large burrows in the well-dated Aztec Siltstone. The burrow *Heimdallia chatwini* occurs in dense populations only in the northern part of the basin (Dry Valleys), but are not found above the Heimdall Erosion Surface. This surface is followed by thick horizons of dense *Skolithos linearis* burrows that indicate a change of environment. The *Skolithos* zone can be traced into the southern part of the basin (Darwin Glacier region) beyond the extent of the erosion surface. The *Skolithos* burrows suggest that the Devonian basin was subjected to a widespread marine incursion during the Early to Middle Devonian.

2.P1.B-2: Silicified wood from the Permian and Triassic of Antarctica: Tree rings from polar paleolatitudes

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Permian and Triassic tree ring analysis provides some of the first data on plant response to the environment across a global transition from icehouse to greenhouse. Extensive growth is observed from both periods in an environment for which there is no modern analog. Warm temperatures and the presence of adequate water suggest that ring formation and wood growth is mediated by a parameter not observed in modern tree ring formation. Ring structure, especially the proportion of earlywood and latewood in each ring, suggests that light availability was most likely controlling wood production and tree ring formation in Late Permian and Middle Triassic forests in the central Transantarctic Mountains. The extreme seasonal light and dark cycles in this polar environment were no doubt also a major factor contributing to the deciduous nature of both Permian glossopterid and Triassic corystosperm seed ferns in these forests.

2.P1.B-3: Abrupt (how abrupt?) Permian – Triassic changes in southern polar ecosystems

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Biogenic structures and poorly preserved plant materials elucidate Permian to Triassic changes in plant productivity, hydrology, and climate at polar latitudes. In situ stumps within the Buckley Formation (Beardmore Glacier area) reflect forests extant < 1 m.y. before the end of the Permian. Trees were tall, tree density and basal area/ha comparable to those of modern forests, and productivity high. *Glossopteris* leaves accumulated in abundant ponds in the Permian, but plants are absent from the Triassic. Triassic fluvial channel-fill sandstones contain three trace fossils, including *Skolithos*. that were all made by one animal, probably an immature insect. The same trace fossils occur in Permian floodplain deposits, but not in Permian channel-fill sandstones. The difference in trace facies-distribution in Permian vs. Triassic deposits reflects differences in hydrologic regime. Extended periods of low flow during the Triassic allowed immature insects to colonize, whereas constant water flow in Permian channels precluded settlement.

2.P1.B-4: Ovule-bearing reproductive organs of the glossopterid seed ferns from the Late Permian of the Beardmore Glacier Region, Antarctica

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The glossopterid seed ferns dominated Antarctica and Gondwana during the Permian, which was an important period of transition in seed plant evolution from more archaic Paleozoic forms to those appearing in the Mesozoic. Anatomically preserved ovule-bearing organs of the Glossopteridales occur in a permineralized peat deposit on Skaar Ridge, in the central Transantarctic Mountains. Although multiovulate reproductive structures have been found previously in peat from the Bowen Basin of Australia and from Skaar Ridge, this represents the first report of the cupulate type of reproductive organ, as well as the first evidence of ovules found within the cupules. The presence of two different types of seed-bearing organs in this group of plants indicates that the group is more diverse than the single leaf morphotype, *Glossopteris*, would suggest. These data are important in understanding seed plant phylogeny, as well as the relationships within the glossopterids.

2.P1.B-5: Exceptionally well-preserved Triassic and Early Jurassic floras from North Victoria Land, Antarctica

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This extended abstract gives an overview about newly discovered fossil floras from the Triassic and Lower Jurassic of North Victoria Land, Antarctica. The most important finds comprise a cuticle-bearing *Dicroidium*-flora and cuticle-bearing bennettitalean-dominated floras as well a deposit with structurally preserved dipterid ferns and cycadophytes. Highly remarkable is the excellent state of preservation of these floras which is rarely found elsewhere in the Lower Mesozoic of Gondwana.

2.P1.C: Antarctica in Rodinia, Gondwana and Pangea: In honor of the contributions of Campbell Craddock ORAL

2.P1.C-1: Petrologic and geochronological constraints on the polymetamorphic evolution of the Fosdick migmatite dome, Marie Byrd Land, West Antarctica

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Microstructures and monazite geochronology suggest that the peak metamorphic assemblage of sillimanite+biotite+quartz+plagioclase+ilmenite+melt±garnet±magnetite in the metasedimentary rocks from the Fosdick migmatite dome correspond to Carboniferous metamorphism. Constraints on the conditions of peak metamorphism are hindered by reequilibration of mineral compositions, but preliminary estimates based on mineral equilibria modeling suggest peak temperatures of 700-860°C and pressures of 5-10 kbar. Presence of coexisting garnet+magnetite is a function of bulk composition and constrains peak temperatures to 720-800°C using an assumed peak pressure of 8 kbar. Evidence for Cretaceous decompression includes cordierite replacing sillimanite and biotite, and cordierite rimming garnet. Estimates for Cretaceous metamorphism are P = 5.3-5.5 kbar and T = 700-740°C (Siddoway et al., 2004). Future studies will consider the effects of melting and melt loss, and localized compositional domains on the mineral equilibria, and the use of average thermobarometry and trace element thermometers.

2.P1.C-2: Magnetic susceptibility of West Antarctic rocks

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An ensemble of geophysical techniques: airborne radio echo sounding, magnetic and gravity measurements, and surface seismic refraction shooting provide high levels of resolution of the sub-ice surface and its material properties and hence geological inferences. Residual magnetic anomaly fields are produced by variations in the distribution of magnetised material in the uppermost crustal layers. To model possible structures and geological units from magnetic surveys magnetic susceptibilities are required. During long-range airborne geophysical missions in the late1970s by the Scott Polar Research Institute in conjunction with National Science Foundation and Technical University of Denmark magnetic data were collected over West Antarctica and have been previously reported by Jankowski. To assist their interpretation magnetic susceptibility measurements were made, and here reported, of rocks specimens from West Antarctic outcrops collected or assembled by Cam Craddock. Examples of their use in the modelling the geophysical architecture of West Antarctica are given.

2.P1.C-3: One hundred negative magnetic anomalies over the West Antarctic Ice Sheet (WAIS), in particular Mt. Resnik, a subaerially erupted volcanic peak, indicate eruption through at least one field reversal

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Mt. Resnik is one of 18 subglacial, subaerially-erupted volcanoes which have high elevation and high bed relief beneath the West Antarctic Ice Sheet (WAIS) in the Central West Antarctica (CWA) aerogeophysical survey. Mt. Resnik, 300 m below the surface of the WAIS, has 1.6 km topographic relief. It has an associated complex negative magnetic anomaly. We calculated and interpreted magnetic models fit to the Mt. Resnik anomaly as a volcanic source comprising both reversely and normally magnetizedÂ 0.5-2.5-km thick flows subaerially during a time of magnetic field reversal. The Mt. Resnik model may represent the reversal at 780 Ka (or earlier). There are ~100 short-wavelength, steep-gradient, negative magnetic anomalies observed over the WAIS, or about 10% of the approximately 1000 short-wavelength, shallow-source, high-amplitude (50->1000 nT) "volcanic" magnetic anomalies in the CWA survey. These negative anomalies also indicate volcanic activity during a period of magnetic reversal >780 Ka.

2.P1.C-4: The history of Antarctic Peninsula glaciation

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As co-chief scientist on DSDP Leg 35 in 1973, Cam Craddock (1930-2006) produced the first useful information on Cenozoic Antarctic Peninsula glaciation - an early middle Miocene (15-17 Ma) glacial onset. Subsequent work, onshore and offshore, has greatly extended our knowledge but that early conclusion stands today. Initial glacial onset was within the Eocene-Oligocene boundary interval (although earlier, short-lived glaciations have been proposed, from indirect measurements) and the peninsula probably became deglaciated in the earliest Miocene (ca. 24 Ma). The renewed middle Miocene glaciation probably continued to the present and, for the last 9 Myr at least, has persisted through glacial (orbital) cycles, with grounded ice advance to the shelf edge during maxima. Although orbital cyclicity affected earlier AP palaeoclimate also, the level of glaciation through a complete cycle is uncertain.

2.P1.C-5: Jones Mountains, Antarctica: Evidence for Tertiary glaciation revisited

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The Jones Mountains, Antarctica, were first sighted in January, 1960. In late 1960 they were visited by a team led by Cam Craddock. The mountains consist of a Mesozoic basement complex truncated by a major erosion surface which is overlain by a sequence of basaltic volcanoclastics. The erosion surface is striated and grooved, and immediately above the surface is a tillite (diamictite) with a matrix of palagonite and containing exotic clasts of rock types unknown locally. Examination of the surface and the overlying basal unit of the volcanics led to the conclusion that this represented a subglacial eruption. Age determinations on the basalts initially were difficult to interpret. Samples collected more systematically in 1968-69 indicated an age of 7-10 Ma. More recent duplicate Ar/Ar ages on these samples provide support for the Miocene age assigned to the glaciation.

2.P1.D: Mesozoic-Cenozoic magmatic processes within the antarctic plate ORAL

2.P1.D-1: Triassic-Jurassic epiclastic and volcaniclastic deposits in North Victoria Land, Antarctica: A revised stratigraphic model

Robert Schöner[1], **Lothar Viereck-Götte**[1], **Jörg Schneider**[2] and **Benjamin Bomfleur**[3], (1)Institut für Geowissenschaften, Friedrich-Schiller-Universität Jena, Burgweg 11, Jena, 07749, Germany, (2)Institut für Geologie, TU Bergakademie Freiberg, Bernhard-von-Cotta Str. 2, Feiberg, 09596, Germany, (3)Geologisch-Paläontologisches Institut, Westfälische Wilhelms-Universität Münster, Hindenburgplatz 57, Münster, 48143, Germany

Field investigations in North Victoria Land, Antarctica during GANOVEX IX (2005/2006) allow the revision of the Triassic-Jurassic stratigraphy of ~300 m thick continental deposits in between the crystalline basement and the Kirkpatrick lava flows of the Ferrar Group. The lower stratigraphic unit (Section Peak Formation) is characterised by braided river-type quartzose sandstone deposits with intercalations of shale and coal occurring at the top. It is overlain by a homogeneous unit of reworked silicic tuffs (new informal name: "Shafer Peak Formation"). These deposits can be correlated with parts of the Hanson Formation in the Central Transantarctic Mountains. Clastic products of mafic volcanic eruptions, formerly described as a separate stratigraphic formation (Exposure Hill Formation), occur within local diatreme structures as well as intercalated in multiple stratigraphic levels within the sedimentary succession. These dominantly hydroclastic eruptions are the first subaerial expression of Ferrar magmatism.

2.P1.D-2: Multiple shallow level sill intrusions coupled with hydromagmatic explosive eruptions mark the initial phase of Ferrar magmatism in North Victoria Land, Antarctica

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Field data gathered during GANOVEX IX (2005/2006) in North Victoria Land, Antarctica, indicate that volcaniclastics of phreatomagmatic eruptions (so-called Exposure Hill Type events) are intercalated into fluvial deposits of Triassic-Jurassic age at two stratigraphic levels. Abundant scoriaceous spatter (locally welded) indicates a hawaiian/strombolian component. Breccia filled diatremes, from which the volcaniclastics were erupted, are rooted in sills which intrude wet sediments. The sediments are thus subaerial expressions of initial Ferrar magmatism as multiple shallow level sills. Due to magma-sediment interaction abundant clastic dikes are developed that intrude the sediments and sills. All igneous components in the volcaniclastic sediments are andesitic in composition as are the chilled margins of the sills. They are more differentiated than the basaltic andesites of the younger effusive section of Kirkpatrick plateau lavas which start with pillow lavas and small volume lava flows from volcanic necks.

2.P1.D-3: Jurassic magmatism in Dronning Maud Land: Synthesis of results of the MAMOG project

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The Jurassic Karoo large igneous province (LIP) of Antarctica, and its conjugate margin in southern Africa, is critical for investigating important questions about the relationship of basaltic LIPs to mantle plumes. Detailed aerogeophysical, structural, anisotropy of magnetic susceptibility, geochronological and geochemical investigations completed under the British Antarctic Survey's MAMOG project have provided some of the answers. Magma volumes were small compared to those in Africa. Jurassic dikes intruding the Archean craton are sparse and the Jutulstraumen trough, a Jurassic rift, is largely amagmatic. Dikes were emplaced by both vertical and horizontal flow, but overwhelmingly magmas were locally derived, and not emplaced laterally from distant sources. Basaltic magmatism was protracted, and the small magma volumes resulted in diverse compositions, including ferro-picrites interpreted to have been derived from a hot mantle plume. The protracted magmatism before the local flood eruptions favor a model of mantle plume incubation for 20-30 million years.

2.P1.D-4: Ferropicritic dikes of Vestfjella, western Dronning Maud Land: Fe-enriched mantle source for late-stage Karoo magmas

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Ferropicritic dikes (MgO = 12-18 wt. %, FeO_T > 14 wt. %) and their differentiates are found cross-cutting Jurassic continental flood basalts of the Karoo large igneous province (LIP) at Vestfjella, western Dronning Maud Land. The dikes show geochemical divergence: (1) Depleted ferropicritic types (D-FP) have $(La/Sm)_N$ 1.1-1.3, $(Sm/Yb)_N$ 3.2-4.5, and they show relative enrichment in Sr, Ti, and V, and depletion in P; (2) Enriched ferropicritic types (E-FP) have $(La/Sm)_N$ 1.5-1.7, $(Sm/Yb)_N$ 4.9-5.4, and they show overall enrichment in incompatible trace elements. The Vestfjella ferropicrites are geochemically unique among the Karoo LIP. Primarily high Fe contents of D-FP and E-FP may have been inherited from anomalously Fe-rich eclogite component entrained in a pyroxenitic mantle source. Low-degree melting at high pressures may also have contributed to the high Fe contents. In contrast to other known ferropicrite successions, the Vestfjella ferropicrites represent a quite late stage of plume-related volcanic activity.

2.P1.D-5: Evolution of low-Ti and high-Ti rocks of the Jurassic Ferrar Large Igneous Province, Antarctica: Constraints from crystallisation experiments

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The Jurassic Ferrar large Igneous Province comprises two compositionally distinct magma series. In order to describe the differentiation history of these low-Ti and high-Ti series, equilibrium crystallisation experiments have been performed at 1100 deg C and 2 kbar in internally heated pressure vessels. The experiments were conducted under variable redox conditions and water activities using a chilled margin sample from a low-Ti sill in northern Victoria Land as starting material. The phase relations and phase compositions of the experimental products exhibit systematic variations with changing run conditions. Based on the comparison of the experimental results with the compositional differences analysed in the natural low-Ti and high-Ti rocks, a model is proposed after which the high-Ti magmas differentiated under lower oxygen fugacity and water activity at lower pressures compared to the low-Ti magmas.

2.P2.A: Climate transitions: Greenhouse-refrigerator-freezer ORAL

2.P2.A-1: Evidence for synchronous glaciation of Antarctica and the Northern Hemisphere during the Eocene and Oligocene: Insights from Pacific records of the oxygen isotopic composition of seawater

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Constraints on Earth's glacial history come from the deep-sea oxygen isotope ($d^{18}O$) record. The growth of Antarctic ice during the early Cenozoic is modelled to have driven changes in seawater $d^{18}O$ of up to 0.5‰ (DeConto & Pollard, 2003). Larger shifts in the mean $d^{18}O$ of seawater therefore require some storage of ice in both hemispheres. In order to study the evolution of the cryosphere, we developed high-resolution records of seawater $d^{18}O$ for three Pacific sites. The seawater $d^{18}O$ reconstructions show that several large (>0.65‰) shifts in seawater $d^{18}O$ occurred throughout the middle Eocene to early Oligocene. Our records of seawater $d^{18}O$ indicate there was ice stored on Antarctica and in the Northern Hemisphere at about 44.5 Ma, 42 Ma, 38 Ma, and after 34 Ma.

2.P2.A-2: Sediment accumulation rates from the Ross Sea continental shelf and deepwater sites, Antarctica: A physical proxy for the onset of polar conditions

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During the Cenozoic, the climate progressed from global warmth into an icehouse world. The present day cold Antarctic ice sheet produces little basalt melt water, in contrast to temperate glaciers. Therefore, the transition from temperate to polar conditions should have resulted in marked decrease in sediment delivery to adjacent margins. In this study, sediment accumulation rates were calculated from the Ross Sea outer continental shelf and proximal deepwater Ocean Drilling Program and Deep Sea Drilling Project sites. The compilation of sedimentation rates showed that most sites experienced a significant decrease following the middle Miocene cooling and again in the early Pliocene. The abrupt shifts in sediment accumulation rate may represent transitions to largely dry-based conditions for the Antarctic ice sheet at these times, separated by an intervening return to warmer conditions in the Pliocene.

2.P2.A-3: High resolution stable isotope and carbonate variability during the early Oligocene climate transition: Walvis Ridge (ODP Site 1263)

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The rapid enrichment of benthic $d^{18}O$ in the early Oligocene (~33.6 Ma) has been taken to imply the first appearance of large ice sheets on Antarctica. This transition is accompanied by a reorganization of the global carbon cycle, identified by a $d^{13}C$ enrichment that slightly lags the glacially-mediated $d^{18}O$ transition. Here, we present a new record of the early Oligocene climate transition from the subtropical South Atlantic Ocean. To investigate climatic and carbon cycle variability in the transition from the early Paleogene “greenhouse” into the Oligocene “icehouse” world, we have developed carbonate content, coarse fraction, and benthic foraminiferal carbon and oxygen stable isotope records for the earliest Oligocene at Ocean Drilling Program Site 1263. These records represent the highest-resolution reconstruction of the Eocene/Oligocene from the Atlantic basin to date, and provide us with a unique opportunity to investigate the fine-scale interplay of glaciation and the global carbon cycle.

2.P2.A-4: Showing a strong link between climatic and *p* CO_2 changes: Resolving discrepancies between oceanographic and Antarctic climate records for the Oligocene and early Miocene (34-16 Ma)

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An apparent mismatch between published oxygen isotope data and other paleoclimate proxies for the span from 26-16 Ma is resolved by calibration against eustatic estimates obtained from backstripped continental margin stratigraphy. Ice-volume estimates from calibrated oxygen isotope data compare favorably with stratigraphic and palynological data from Antarctica, and with estimates of atmospheric carbon dioxide for the early Oligocene through early Miocene (34-16 Ma). These isotopic data suggest that the East Antarctic Ice Sheet grew to as much as 30% greater than the present-day ice volume at glacial maxima. This conclusion is corroborated by seismic reflection and stratigraphic data from the Antarctic margin that suggest that the ice sheet may have covered much of the continental shelf at Oligocene and early Miocene glacial maxima. Palynological data suggest long-term cooling during the Oligocene, with near tundra environments developing along the coast at glacial minima by the late Oligocene.

2.P2.B: Biotic evolution and radiation of life: Before and after Gondwana breakup ORAL

2.P2.B-1: Migration of Triassic tetrapods to Antarcica

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The earliest known tetrapods in Antarctica occur in fluvial deposits just above the Permian-Triassic boundary in the central Transantarctic Mountains. These fossils belong to the Lystrosaurus Zone fauna that is best known from the Karoo basin in South Africa. The Antarctic fauna is less diverse because of fewer collecting opportunities and a higher paleolatitude (65º vs. 41º). Many species are in common. Lystrosaurus maccaigi, which is found near the base of the Triassic in Antarctica, has been reported only from the Upper Permian in the Karoo. Two other species of Lystrosaurus in Antarctica are also likely to have originated in the Permian. We hypothesize that tetrapods expanded their range into higher latitudes during global warming at the Permian-Triassic boundary. The migration route of tetrapods into Antarctica was most likely along the foreland basin that stretched from South Africa to the central Transantarctic Mountains along the Panthalassan margin of Gondwana.

2.P2.B-2: The dinosaurs of the Early Jurassic Hanson Formation of the central Transantarctic Mountains: Phylogenetic review and synthesis

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Recent and ongoing research on the dinosaurs of the Early Jurassic Hanson Formation of the central Transantarctic Mountains is summarized here. Cryolophosaurus ellioti belongs to a geographically widespread clade of medium-bodied, Early Jurassic theropods, while the Antarctic sauropodomorph represents a new taxon that is a member of the similarly diverse and widespread Massospondylidae. The phylogenetic relationships of the Antarctic dinosaurs are consistent with a pattern of extreme faunal homogeneity between Early Jurassic continental biotas. Furthermore, these analyses support a “ladder-like” arrangement for basal theropod and basal sauropodomorph phylogeny, suggesting that these groups passed through “coelophysoid” and “prosauropod” stages of morphological organization early in their respective evolutionary histories. Future exploration and collection in the Hanson Formation and underlying Falla Formation will be critical to testing phylogenetic and biogeographic patterns involving the Antarctic dinosaurs, and the Antarctic fauna as a whole.

2.P2.B-3: Occurrence of a young Elasmosaurid plesiosaur skeleton from the Late Cretaceous (Maastrichtian) of Antarctica

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The most completely articulated fossil skeleton found from Antarctica is a juvenile plesiosaur found in the Sandwich Bluff area of Vega Island east of the Antarctic Peninsula from Late Cretaceous (Maastrichtian) marine deposits from the upper Snow Hill Island Formation. The skeleton is represented by a nearly complete torso, partial paddles, and neck and tail sections. Along the ventral margin of the torso are articulated gastralia, some that are unusual in being forked. Numerous small gastroliths are associated within the trunk cavity, indicating that even juveniles ingest gastroliths. Coupled with isolated specimens, the skeleton indicates the shallow marine environment may have been an area where marine reptiles had their young, and the young remained until reaching maturity prior to facing open marine environments. The morphology suggests the skeleton represents a juvenile *Mauisaurus*, an elasmosaurid plesiosaur originally described from New Zealand and endemic to the Weddellian Province of the austral region.

2.P2.B-4: A Dromaeosaur from the Maastrichtian of James Ross Island and the Late Cretaceous Antarctic Dinosaur Fauna

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2.P2.C: Antarctica in Rodinia, Gondwana and Pangea: In honor of the contributions of Campbell Craddock ORAL

2.P2.C-1: Pieces of Laurentia in East Antarctica

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Geologic, age and isotopic data from the central Transantarctic Mountains provide a unique test of the Rodinia fit between East Antarctica and Laurentia. Evidence supporting a SWEAT-type fit includes: (1) similar Nd-isotope crustal age provinces; (2) similarity of ~1.7 Ga crustal events; (3) provenance link between ~1.4 Ga detrital zircons in Antarctic rift-margin strata and Mesoproterozoic A-type granites in Laurentia; (4) associated 1.8-1.6 Ga detrital zircons in these strata; and (5) similarity in ages of rift-margin formation. New isotopic and age data include: (6) ~1.4 Ga Antarctic-margin detrital zircons have Hf-isotopic compositions matching the A-type Laurentian granites; and (7) a newly discovered A-type rapakivi granite boulder in glacial till at Nimrod Glacier has a U-Pb zircon age of ~1440 Ma, indicating the presence of Mesoproterozoic granites beneath the East Antarctic ice sheet. We suggest that these detrital-mineral and rock clasts represent distinctive pieces of Laurentia in East Antarctica.

2.P2.C-2: New airborne magnetic data evaluate SWEAT reconstruction

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Airborne magnetic data provide a means for guiding reconstructions of Precambrian continents, in particular the hotly debated western continuations of Laurentia, in that the magnetic data tie existing isolated interpretations of geologic units through continuous data coverage, provide plate scale views of geology and tectonics and extend interpretations of units buried beneath cover. The aim of this paper is to demonstrate the approach of using reconstructed magnetic data to evaluate the SWEAT plate reconstruction. The first step is to identify key piercing points in the SWEAT plate reconstruction model, determine the sources of magnetic anomalies associated with those piercing points and then match anomalies across continental boundaries.

2.P2.C-3: The Pan-African Nappe Tectonics in the Shackleton Range

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In memory of Campbell Craddock. When J. Campbell Craddock (1972) published his famous 1:5 000 000 map of the Geology of Antarctica, he established major units such as the East Antarctic Craton, the early Palaeozoic Ross, the Mesozoic Ellsworth, and the Cenozoic Andean orogens. It is already evident from this map, that the strike of the Ellsworth Mountains and the Shackleton Range is perpendicular to palaeo-Pacific and modern Pacific margins. While the Ellsworth-Whitmore block is classified as a rotated terrane, the Ross-aged orogen of the Shackleton Range requires another interpretation. The discovery of extended tectonic nappes with south directed transport in the southern Shackleton Range and west transport in the north established a plate tectonic scenery with a subduction dominated Ross Orogen in the Transantarctic Mountains and a transpressive tectonic regime in the Shackleton Range during the final closing of the Mozambique Ocean.

2.P2.C-4: Sub-glacial Geology of Antarctica – A preliminary investigation and results in the Grove Mountains and Vestfold Hills, East Antarctica, and its tectonic implication

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In this paper we present our recent investigation and preliminary results of erratic rocks in the Grove Mountains and the Vestfold Hills to understand the sub-glacial geology of Antarctica. Four high-pressure mafic granulite erratics from the Grove Mountains give peak metamorphism of 12.9-15.8 kb and 810-910°C at 545-542 Ma by a conventional thermometer and barometer with SHRIMP U-Pb zircon dating. It is the first report of a Pan-African high-pressure granulite facies record from inland Antarctica, key evidence for a Pan-African suture beneath the ice sheet near the Grove Mountains. Investigation and statistics of erratics in the southeast Vestfold Hills show that low-grade rocks are the majority at some localities. Analyses of the erratic rocks by ongoing zircon SHRIMP U-Pb dating and their Hf isotope as well as mineral Ar-Ar ages can enrich our knowledge of the sub-glacial geology of Antarctica, combined with glacier dynamics, sub-glacier morphology and geophysics.

2.P2.D: Mesozoic-Cenozoic magmatic processes within the antarctic plate ORAL

2.P2.D-1: New Ar/Ar and K/Ar ages of dykes in the South Shetland Islands (Antarctic Peninsula)

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Eighteen new plagioclase $^{40}Ar/^{39}Ar$ and 7 whole rock K/Ar ages from magmatic dykes in the South Shetland Islands (Antarctic Peninsula) suggest they are Paleocene to Eocene in age. Intrusion began earlier and lasted longer on Hurd Peninsula (Livingston Island) than on King George Island and probably also Nelson Island. The oldest dykes from Hurd Peninsula did not yield $^{40}Ar/^{39}Ar$ plateau ages, but best estimates indicate intrusion at about the Cretaceous/Paleogene boundary, probably Danian. A Campanian age of the host and the inferred Early Danian age for the oldest dykes leaves a time gap of 5-10 m.y. for the deformation of the metasedimentary host. The main phase of dyke intrusion in the South Shetland Islands took place from Thanetian to Lutetian, culminating between 47 and 45 Ma and terminating during the Priabonian, with the youngest dykes restricted to Hurd Peninsula.

2.P2.D-2: Basal Adare Volcanics, Robertson Bay, North Victoria Land, Antarctica: Late Miocene intraplate basalts of probable subglacial origin

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Late Cenozoic lavas and associated hyaloclastite breccias of the Adare volcanics (Hallett volcanic province) in Robertson Bay, northern Victoria Land rest unconformably on Paleozoic greywackes. Abundant hyaloclastite breccias confined to a paleovalley are consistent with a subglacial eruptive origin. In contrast, the lavas which stratigraphically overlie the hyaloclastite probably were erupted subaerially. K-Ar dating of six lavas and two dikes from this basal sequence all have Late Miocene ages. This further confirms that the oldest Hallett volcanic province rocks are Miocene. Geochemical analyses show the rocks are a typical alkalic petrologic suite similar to ocean island basalt suites.

2.P2.D-3: Petrogenesis and source of lavas from seamounts in the Adare Basin, Western Ross Sea: Implications for the origin of Cenozoic magmatism in Antarctica

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The Adare Basin Seamounts (ABS) consist of 100's of relatively small eruptive centers that are randomly distributed over an area of ~20,000 km^2 in the Adare Basin and on the adjacent continental shelf of the western Ross Sea, north Victoria Land. Preliminary interpretations based on the geochemistry of dredged lavas indicate that the ABS are intimately related to intraplate alkaline volcanism in the west Antarctic rift system. Models for the origin and cause of volcanism in west Antarctica often disagree and are based almost exclusively on volcanic rocks erupted through continental lithosphere. The study of ABS lavas offers a more pristine view of sources for magma and differentiation processes unfettered by continental crust.

2.P2.D-4: Heterogeneous sources for Pleistocene lavas of Marie Byrd Land, Antarctica: New data from the SW Pacific diffuse alkaline magmatic province

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Here we report new major and trace element and Sr-Nd-Pb isotope data for Pleistocene basaltic lavas from the Fosdick Mountains, Ford Ranges in west Marie Byrd Land. The studied lavas erupted from three volcanic centers: Mt. Avers (basanites), Mt. Perkins (basalts) and Recess Nunatak (basanites). The lavas are geochemically homogeneous within each volcanic center, but vary in composition among the centers. Although the studied lavas have incompatible element enrichment patterns that are similar to other lavas from central and east Marie Byrd Land volcanoes, they have isotopic compositions that are not represented by other Marie Byrd Land volcanoes. This indicates that the mantle source regions feeding Marie Byrd Land volcanism are more heterogeneous than previously indicated. The geochemistry of these magmas provides a means to evaluate competing hypotheses for the origin of these magmas: plume-related, rift-related, or related to sinking of subducted slabs.

2.PS: Mesozoic-Cenozoic tectonic and magmatic history and processes POSTER

2.PS-31: Crustal types and continent-ocean boundaries between the Kerguelen Plateau and Prydz Bay, East Antarctica

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Cretaceous Gondwana breakup between East Antarctica and India was accompanied or followed by emplacement of the Kerguelen Plateau Large Igneous Province (LIP), north of Prydz Bay. In 2007, deep crustal seismic and helicopter-magnetic surveys were conducted along a corridor between the southern Kerguelen Plateau and the outermost Prydz Bay. These surveys were designed to investigate breakup processes and the effect that the igneous activity had on the formation of the passive margin of East Antarctica and also the apparent oceanic crust between the plateau and the Antarctic margin in the Princess Elizabeth Trough (PET). Preliminary data analysis and modeling reveal a wide zone of highly extended continental crust on the margin of Mac.Robertson Land and that the southernmost Kerguelen Plateau is generally of continental affinity. Seismic velocities and magnetic data indicate an oceanic-type crust beneath the PET. Magmatic accretion to this crust from the Kerguelen LIP is widely observed.

2.PS-32: Magnetic anomalies in East Antarctica: Application to definition of major tectonic provinces

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Analysis of the aeromagnetic data compiled within the Antarctic Digital Magnetic Anomaly Project (ADMAP) and all available geologic information allow to determine boundaries between major tectonic provinces of East Antarctica and to recognize several previously unknown crustal blocks in the deep interior of the continent, which considered as cratonic nuclei. These cratons are fringed by a large and continuous orogen that identified between Coats Land and Princess Elizabeth Land with branches in deep interior. Most of the crustal provinces and boundaries identified in this study are only in part exposed, therefore the outline of these crustal provinces in detail, successive refinement of their sub-ice structures and boundaries require the acquisition of additional high-resolution magnetic data, because at present the ADMAP database is largely inadequate to address many of Antarctica's immediate concerns to know more about our planet's crust.

2.PS-33: Gaussberg Rift – Illusion or reality?

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Radio-echosounding and RADARSAT mosaic data provide new evidence for rifted crust in Princess Elizabeth Land, East Antarctica. The arcuate Gaussberg Rift consists of two sub-parallel depressions separated by segmented horst-like escarpments. The rift is about 500 km long and its width varies from 60 km in the south-western part to 150 km near the West Ice Shelf. The Gaussberg Rift, part of the Lambert rift system, was probably initiated in the Permian at the same time as the Lambert sub-meridional rift zone with deposition of coal-bearing Permian rocks. The Gaussberg Rift probably exploited a weak zone between the Proterozoic mobile belt and Vestfold-Rauer cratonic block.

2.PS-34: Denudation and uplift of the Mawson Escarpment (eastern Lambert Graben, Antarctica) as indicated by apatite fission track data and geomorphological observation

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Analysis of three vertical profiles from the southern Mawson Escarpment (Lambert Graben,) reveals apatite fission track (AFT) ages ranging from 102±20 to 287±23 Ma and mean lengths of 12.2 to 13.0 µm. Quantitative thermal histories derived from these data consistently indicate onset of slow cooling below 110°C began sometime prior to 300 Ma, and a second stage of rapid cooling from paleotemperatures up to ≤100°C to surface temperatures occurred in the Late Cretaceous – Paleocene. The first cooling phase refers to Carboniferous – Jurassic basement denudation up to up to 5 km associated with the initial rifting of the Lambert Graben. The presence of the ancient East Antarctic Erosion Surface and rapid Late Cretaceous – Paleocene cooling request a second denudational episode during which up to 4.5 km of sedimentary cover rocks were removed, and that is likely linked to the Cretaceous Gondwana breakup between Antarctica and India.

2.PS-35: Thermochronologic constraints on Jurassic rift flank denudation in the Thiel Mountains, Antarctica

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The Thiel Mountains are part of the Transantarctic Mountains (TAM) and occupy a strategic position close to the East-West Antarctic boundary. They occur in a region of relatively subdued topography distal from high topography and high relief of most of the TAM adjacent to the West Antarctic rift system. Low-temperature thermochronology on samples collected from the Reed Ridge granite on the north flank of the Thiel Mountains constrain the thermal and hence tectonic history. Apatite fission track data plus thermal models indicate cooling from ca. 165-150 Ma. In conjunction with 40Ar/39Ar K-feldspar data, the results indicate cooling was due to relatively slow erosional denudation, and not thermal relaxation following Jurassic tholeiitic magmatism. Denudation was most likely associated with the formation of the Jurassic rift system across Antarctica that marked the initial breakup of Gondwana. This is the oldest episode of denudation associated with formation of the present day TAM.

2.PS-36: A revised geochemical grouping of Gondwana LIP: distinctive sources and processes at the Weddell and Limpopo triple junctions

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The magma types of the Gondwana LIP can be divided into two categories based on, respectively, their low and high Sm/Yb and Sr/Zr values, different Sr and Nd isotopic trends, and geographic affinity to the Weddell and Limpopo triple junctions. The Ferrar magmas, the Karoo Central Area magmas, and the Kirwanveggen-Sembberget magmas from Dronning Maud Land are viewed as three major magmatic lineages generated at the Weddell triple junction. These Weddell group magmas were produced by low-pressure partial melting of possibly subduction-modified upper mantle and tended to be laterally transported over long distances. The Limpopo group magmas include the Karoo high-Ti magma types and low-Ti types from Lebombo, Vestfjella, and Heimefrontfjella. They represent magmas that were produced at high pressure from an eclogite-bearing mantle source below the Kaapvaal craton. The distribution of the Limpopo group magmas was mainly confined within the rift valleys of the Limpopo triple junction.

2.PS-37: Platinumgroup elements in sills of the Jurassic Ferrar Large Igneous Province from northern Victoria Land, Antarctica

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Platinum group element (PGE) abundances were analyzed in basaltic andesites and andesites from sills of the Ferrar Large Igneous Province (FLIP) from northern Victoria Land. The strongly fractionated primitive mantle-normalised PGE-patterns show enrichment of the Pt-PGE over the Ir-PGE. The single element abundances exhibit good correlations with the degree of differentiation of the distinctly evolved samples and are interpreted to result mainly from low-pressure in-situ differentiation after upper-crustal magma emplacement. Compared to tholeiitic rocks from other magmatic provinces, only the FLIP rocks exhibit coupled enrichment of Pd, Pt and Cu even in most evolved samples. The decrease of Pt and Pd in some of the more evolved samples does not necessarily signify sulphide fractionation, but may indicate the formation of other PGE-compounds. The inferred sulphur-undersaturated conditions during differentiation are in agreement with the elevated melting degrees as well as the refractory nature of the proposed subcontinental lithospheric mantle source.

2.PS-38: Petrogenesis of granites in the Fosdick migmatite dome, Marie Byrd Land, West Antarctica

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The Fosdick migmatite dome is composed of migmatitic paragneiss and orthogneiss, likely derived from the Swanson Formation and the Devonian Ford Granodiorite, respectively, and various granites. The granites are silicic (71-75 wt% SiO2) and slightly peraluminous (1.0-1.2 A.S.I.), and may be grouped into K-rich and K-poor types. For the K-rich type, preliminary Nd isotope data permit partial melting of Ford Granodiorite as the source, which is supported by comparison between the whole-rock chemistry of the granites and glass compositions in melting experiments with an appropriate protolith. For the K-poor type, the particular source is not clearly defined at present, and these granites might be derived from either the Swanson Formation or the Ford Granodiorite by disequilibrium melting.

2.PS-39: High-resolution airborne gravity imaging over James Ross Island (West Antarctica)

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James Ross Island (JRI) exposes a Miocene-Recent alkaline basaltic volcanic complex that developed in a back-arc region, east of the northern Antarctic Peninsula. JRI has been the focus of several recent geological studies because it provides a window on Neogene magmatic processes and paleoenvironments. However, little is known about the internal structure of JRI. Our study presents new airborne gravity data collected as part of the first high-resolution aerogeophysical survey flown over the island. The data unexpectedly revealed a prominent negative Bouguer gravity anomaly over Mt Haddington. This is intriguing as basaltic volcanoes are typically associated with positive Bouguer anomalies, linked to mafic intrusions beneath them. The negative Bouguer anomaly over JRI may be associated with a hitherto unrecognised low-density sub-surface body, such as a breccia-filled subglacial caldera, or even a partially molten magma chamber.

2.PS-40: Mantle heterogeneity beneath the Antarctic-Phoenix Ridge in the Drake Passage, Antarctica

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We determined Sr, Nd and Pb isotopic compositions for basalts recovered from the fossilized Antarctic-Phoenix Ridge (APR) in the Drake Passage, Antarctica, to understand the nature of a sub-ridge mantle source. Enriched (E-type) mid-ocean ridge basalts (MORB) coexist with the normal (N-type) MORBs in the axial region of the APR. There are no known hotspots in close proximity to the site. The E-type basalts are relatively young compared to the N-type samples and were erupted after the extinction of the APR. E-type melts have been generated by low-degree of partial melting of an enriched mantle source. Extinction of the APR is likely to cause the extent of partial melting in this region to decrease. We interpret that geochemically enriched mantle might exist as a form of highly localized spots or veins in ambient depleted mantle of this region, and were the first fraction to melt to form the E-type basalts.

2.PS-41: Differentiation history of Hubert Miller Seamount Basalts, Amundsen Sea, South Pacific

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Rock samples from Marie Byrd Seamounts were dredged for the first time during R/V Polarstern expedition ANT-XXXIII/4 in spring 2006. The seamounts form a group of 8 submarine volcanic edifices located in the southern Amundsen Sea between 68°-72°S and 112°-132°W off the shelf of Marie Byrd Land. Basalts dredged at the flanks of the Hubert-Miller-Seamount belong to the alkali basalt – trachybasalt differentiation series. Cumulates including Ti-augites are proof for an additional more Si-undersaturated phase of magmatism, xenocrysts of oligoclase indicate shallow magma plumbing of higher degrees of differentiation. Igneous clasts with sub-greenshist metamorphic overprint are indications for flank collapses. However, samples of yet uncertain origin are (1) Si-saturated coarse crystalline igneous clasts (dykes including lamprophyric texture) some with metamorphic overprint and (2) quartz sandstones and litharenites with grains of deformed quartz as well as light mica which require continental crust as source rocks.

2.PS-42: Aeromagnetic hunt for Cenozoic magmatism over the Admiralty Mountains Block (East Antarctica)

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Cenozoic magmatic rocks of the Transantarctic Mountains provide an important window on the tectonic and magmatic processes of the West Antarctic Rift System. Previous aeromagnetic investigations in northern Victoria Land have delineated Cenozoic volcanic and intrusive complexes assigned to the McMurdo Volcanic Group and Meander Intrusives over the Transantarctic Mountains. We present a new aeromagnetic anomaly map for the region north of the Mariner Glacier to study the extent and spatial distribution of these Cenozoic rocks over the previously unexplored Admiralty Mountains. The new map shows that the Meander Intrusives are restricted to the coastal region between the Malta Plateau and the Daniell Peninsula. However, the McMurdo Volcanic Group rocks extend further inland, and may delineate a hitherto unrecognised volcano-tectonic rift zone, extending as far north as the Trafalgar Glacier.

2.PS-43: Evidence for magma mixing/mingling in lavas from Minna Bluff, South Victoria Land

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This work consists of a detailed petrologic study of inclusion-rich lavas that are found near the southeastern tip of Minna Bluff; a ~50 km-long volcanic peninsula located in the southern Ross Sea. This newly discovered deposit, informally named Xeno-Ridge, forms a narrow 0.5 km-long ridge located stratigraphically on top of a thick interbedded sequence (~1000 m) of lavas and volcaniclastic deposits. The lavas at Xeno-Ridge are gray in color, strongly flow banded, and contain abundant inclusions of light-colored feldspathoid-rich plutonic rocks, reddish cognate xenoliths of anorthoclase-bearing lavas, black amphibole megacrysts and dark-gray, highly vesiculated, amphibole-rich inclusions that display fluidal and irregular boundaries with the host-lava. Phenocrysts in the dark-gray inclusions and the host-lava show abundant disequilibrium textures, including complex zoning and reaction coronas of clinopyroxene after amphibole, skeletal olivine, and embayed and sieved feldspars. The textures indicate that the lavas experienced multiple episodes of magma mixing/mingling prior to eruption.

2.PS-44: Erebus volcano, Ross Island, Antarctica: Recent studies, forthcoming publications, on-going activity

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The 3794 m high Erebus volcano is the most active in Antarctica and contains a unique convecting lake of anorthoclase-bearing phonolite magma first discovered in 1972. The persistent lake is the source of sporadic strombolian eruptions, and Erebus is proving to be the perfect volcano to understand the mechanisms behind this mild explosive behavior and other aspects of magma chamber and conduit processes. Easy access and logistical support from McMurdo Station aids in the studies. Over the past decade, a team of investigators has examined many aspects of the volcanology, petrology, geochronology and geophysics of Erebus volcano and the results of some of these studies are being published in a Special Issue of the Journal of Volcanology and Geothermal Research expected in 2008. As of 1 July 2007, 11 manuscripts have been submitted and a further 4 submissions are planned. This poster will provide an overview of this on-going research.

2.PS-45: Elongate summit calderas as Neogene paleostress indicators in Antarctica

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The orientations and ages of elongate summit calderas on major polygenetic volcanoes were compiled to document Miocene to Pleistocene Shmin (minimum horizontal stress) directions on the western and northern flanks of the West Antarctic rift system. Miocene to Pleistocene summit calderas along the western Ross Sea show relatively consistent ENE long axis trends at a high angle to the Transantarctic Mountain Front and parallel to the N77ºE Shmin direction at Cape Roberts. Elongation directions of many Miocene to Pleistocene summit calderas in Marie Byrd Land parallel the alignment of polygenetic volcanoes in which they occur, except several Pleistocene calderas with ~NE-SW trends. The overall pattern of elongate calderas in Marie Byrd Land is probably due to radial stresses caused by thermal doming of the province and the rift-related stress regime. Some Antarctic calderas may have collapsed due to Neogene stress field changes caused, for example, by glacial loading and unloading.

2.PS-46: Magnetic anomalies north-east of Cape Adare, northern Victoria Land (Antarctica), and their relation to on-shore structures

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An aeromagnetic survey was flown in the off-shore region NE of Cape Adare and the anomaly trends compared to on-shore structures between Pennell Coast and Tucker Glacier. The magnetic anomalies show two nearly orthogonal major trends. NNW-SSE trending anomalies NE of Cape Adare represent seafloor spreading within the Adare Trough. A connection of these anomalies to those in the Northern Basin of the Ross Sea is not clear. On both sides of the Adare Trough, NE-SW oriented ocean floor anomalies are probably related to structures causing the Hallett volcanics. On-shore faults are well aligned with off-shore anomalies. The main trends are NW-SE to NNW-SSE and NE-SW to NNE-SSW. NNW-SSE oriented dextral-transtensional to extensional faults parallel the Adare Peninsula and Adare Trough anomalies. NE-SW trending normal faults segmenting the main Hallett volcanic bodies are likely related to the aforementioned NE-SW anomalies.

2.PS-47: Upper mantle seismic anisotropy of South Victoria Land/Ross Island, Antarctica from SKS and SKKS splitting analysis

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We determine shear wave splitting parameters of teleseismic SKS/SKKS phases at stations in Antarctica as part of the TAMSEIS experiment. Our data indicate that the anisotropy is fairly uniform from the Transantarctic Mountains into the interior of East Antarctica with a slight change of fast direction near the Vostok Highlands. The data show fairly consistent fast direction of anisotropy oriented approximately N60E with splitting times of about 1 second for stations in the vicinity of the Transantarctic Mountains, along the coast, and into East Antarctica. However, stations in the vicinity of the Vostok Highlands show a small rotation of approximately 20 degrees of the fast direction of anisotropy as well as a decrease in magnitude of the splitting time of about 0.5 second.

2.PS-48: Short period Rayleigh wave group velocities in Antarctica determined by the cross-correlation of ambient seismic noise from the TAMSEIS array

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We cross-correlate ambient seismic noise from the TAMSEIS experiment to obtain estimates of the Rayleigh wave green's function and measure group velocity dispersion curves. Preliminary results demonstrate that good quality green's functions can be obtained using this technique in Antarctica and that they can be used to examine shorter period Rayleigh waves and the structure of the crust and uppermost mantle in the region of the Transantarctic mountains in more detail than previous studies. Dispersion curves measured in East Antarctica show good agreement and no indication of a thick sediment layer. Velocities measured from other station pairs suggest the fastest velocities at short periods occur in East Antarctica while the fastest velocities at periods longer than 15 seconds occur beneath the Ross Sea. The study will continue by extending this technique to all station pairs and then examining Rayleigh wave group velocities in the region using seismic tomography.

2.PS-49: Plateau collapse model for the Transantarctic Mountains/West Antarctic Rift System: Insights from numerical experiments

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We propose that the West Antarctic Rift System / Transantarctic Mountain region was a high elevation plateau with thicker than normal crust before the onset of continental extension. With major Cretaceous extension, the rift underwent a topographic reversal, and a plateau edge with thickened crust, representing the ancestral Transantarctics, remained. In the Cenozoic minor extension and major denudation reduce the crustal root while simultaneously uplifting peak heights in the mountains. The Cretaceous stage of this concept is investigated using two-dimensional numerical models to determine under what conditions plateau collapse is plausible. Moho temperatures of 675 °C to 850 °C are needed to retain the plateau edge and exhibit wide rifting in the middle of the plateau. We conclude this concept is possible using these numerical experiments, and that application of this idea to the West Antarctic Rift System / Transantarctic Mountain system is also supported by geological and geophysical evidence.

2.PS-50: Morphotectonic architecture of the Transantarctic Mountains rift flank between the Royal Society Range and the Churchill Mountains based on geomorphic analysis

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Extensional forces within the Antarctic Plate have produced the Transantarctic Mountains rift-flank uplift along the West Antarctic rift margin. This study employed the Antarctic Digital Database digital elevation model to obtain slope steepness and aspect maps of the Transantarctic Mountains (TAM) between the Royal Society Range and the Churchill Mountains, allowing definition of the position and orientation of the morphological axis of the rift-flank. The TAM axis, interpreted as a fault-controlled escarpment formed by coast-parallel retreat, provides a marker for the orientation of the faulted boundary between the TAM and the rift system. Changes in position and orientation of the TAM axis suggests the rift flank is segmented into tectonic blocks bounded by relay ramps and transverse accommodation zones. The transverse boundaries coincide with major outlet glaciers, supporting interpretation of rift structures between them. The pronounced change across Byrd Glacier points to control by structures inherited from the Ross orogen.

2.PS-51: Microstructural study of natural fractures in Cape Roberts Project 3 core, Western Ross Sea, Antarctica

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Microstructures in natural fractures in core recovered offshore from Cape Roberts, Ross Sea, Antarctica, provide new constraints on the relative timing of faulting and sedimentation in the Victoria Land Basin along the Transantarctic Mountain rift flank. This study characterizes the textures, fabrics and grain-scale structures from thin section analysis of samples of microfaults, veins, and clastic dikes. Microfaults are abundant and display two different types of textures, interpreted to record two different deformation modes: pre-lithification shearing and brittle faulting of cohesive sediment. Both clastic dikes and calcite veins commonly follow fault planes, indicating that injections of liquefied sediment and circulating fluids used pre-existing faults as conduits. The close association of clastic injections, diagenetic mineralization, and faulting indicates that faulting was synchronous with deposition in the rift basin.

2.PS-52: Structure of the Central Terror Rift, Western Ross Sea, Antarctica

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The Terror Rift, located within the Western Ross Sea, has the most recent fault activity within the West Antarctic Rift System (Cooper et al., 1987). New seismic data over the central Terror Rift better resolves the architecture and timing of rift activity. Evidence from our new analysis shows the Terror Rift to be composed of segmented, offset sub-basins, bounded by transverse structures coeval with the onset of rifting. The central Terror Rift underwent east-west rifting, without a significant transtensional component. Rift-related volcanism, including feeder dikes and subvolcanic intrusions, post-date the main phase of rift development in the central Terror Rift. All rift deformation post-dates 17 Ma. There were multiple phases of faulting, and faults cutting the seafloor surface suggest possible modern activity.

2.PS-53: Young faults in the Adare Basin and northern Ross Sea

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The Adare basin, northern Ross Sea, formed by seafloor spreading between East and West Antarctica along a NNW-trending ridge from 43 - 26 Ma. On seismic cruise NBP0701, young faults were identified by (1) offset seismic stratigraphic layers on MCS and chirp profiles and (2) seafloor morphological features visible in multibeam bathymetry. Two classes of young or active normal faults were recognized. Faults linked at depth with buried volcanic bodies may be related to differential compaction or adjustment of sediments. Young faults in non-volcanic regions are regionally more correlative, with NNW to NNE strikes. The NNE faults are oblique to the NNW trend of the northern and central Adare Trough, postdate the seafloor spreading, and are found in a broad area within and surrounding the southern Adare Trough. Evidence for growth faulting in the seismic sections indicates a prolonged period of activity.

2.PS-54: Preliminary backstripping of the Andrill-1B Core: Perils, pitfalls, and progress

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A model for the subsidence history recorded in the Andrill-1B corehole was constructed by backstripping preliminary lithologic, chronologic and paleo-environmental data. These results suggest a fairly typical passive margin sequence including both the rift phase (31-24 Ma) and drift phase (34 – 0 Ma). Numerous small-scale events are superimposed, particularly in the Plio-Pleistocene, where the data is better constrained. This preliminary result was produced using standard backstripping techniques and assumptions. However, conditions at the Andrill-1B corehole were not consistant with standard backstripping techniques and approaches. Most notably, compaction due to ice loading during grounding periods, sediment erosion by ice, and rebound subsequent to ice grounding are not taken into consideration. We provide a qualitative discussion of the impact of these effects on our preliminary results and an outline of the quantitative methods that we plan to develop in order to modify the traditional backstripping technique for application in this region.

2.PS-55: GPS surveys to detect active faulting in the Transantarctic Mountains, Antarctica

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The Transantarctic Mountains Deformation (TAMDEF) network is a GPS array deployed on bedrock throughout the Victoria Land region of Antarctica, aimed at investigating modern vertical and horizontal crustal motions. Embedded within this network are three local GPS arrays established around known or potential neotectonic faults to test for modern fault displacements. These local fault arrays were surveyed a minimum of three times between the 1996-97 and 2005-06 austral summer field seasons. Preliminary analysis of baseline length changes is consistent with active extension, suggesting there may be modern tectonic activity in the West Antarctic Rift System.

2.PS-56: Airborne laser swath mapping of the Denton Hills, Transantarctic Mountains, Antarctica: Applications for structural and glacial geomorphic mapping

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High-resolution digital elevation data acquired by airborne laser scanning (ALS) for the Denton Hills, along the coastal foothills of the Royal Society Range, Transantarctic Mountains, are examined for applications to bedrock and glacial mapping. Digital elevation models (DEMs), displayed as shaded-relief images and slope maps, portray geomorphic landscape features in unprecedented detail across the region. Structures of both ductile and brittle origin, ranging in age from the Paleozoic to the Quaternary, can be mapped from the DEMs. Glacial features, providing a record of the limits of grounded ice, of lake paleoshorelines, and of proglacial lake-ice conveyor deposits, are also prominent on the DEMs. The ALS-derived topographic data have great potential for a range of mapping applications in regions of ice-free terrain in Antarctica.

2.PS-57: Tectonic evolution of northern Antarctic Peninsula from brittle mesostructures and earthquakes focal mechanisms

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Paleostress results derived from brittle mesoscopic structures at locations on the South Shetland Islands, Antarctic Peninsula and Seymour Island and from focal mechanism analysis show a stress field characterized by both extensional and compressional regimes. The scattering of orientations of maximum horizontal stress (σ_1) about NW–SE to N–S and NE–SW trends and of minimum horizontal stress (σ_3) with two main NE–SW and NW–SE modes suggests that two stress sources have been responsible for the dominant directions of maximum and minimum horizontal stress in this area. Compresional structures are related to former Phoenix Plate subduction under the Antarctic Plate in Jurassic to present time and to Quaternary isostatic uplift. Stress states with NW–SE trends of σ_3 are compatible with subduction-related back-arc extension in the eastern Antarctic Peninsula. NE–SW σ_3 orientations are associated with continental fragmentation of the northern Antarctic Peninsula during the Cenozoic.

2.PS-58: Tectonic deformation models for South Shetland Islands, Bransfield Sea and the Antarctic Peninsula

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This abstract presents the last tectonic displacement models estimated for the area defined by the South Shetlands Islands, the Bransfield Sea and the Antarctic Peninsula. This environment constitutes one of the most interesting geodynamical areas in the Antarctica due to the convergence of several tectonic plates. The limits of some of these plates are still uncertain, especially those ones related to the plates bounding Deception Island Volcano. After the 1998 volcanic crisis on Deception Island, it was observed an extensional radial process around the island. After this period, the displacement for this island seems to migrate trending to the modulus and direction of the Antarctic Plate, and revealing different patterns of displacement for Deception Island and the rest of the islands in the archipelago, what has motivated the extension of the RGAE geodetic network. Nowadays it consists of 12 stations distributed along the South Shetland Archipelago and the Antarctic Peninsula.

2.PS-59: Tectonic and volcanic influences at Deception Island, South Shetland Islands

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Deception Island is the largest volcano in Bransfield Strait, a marginal basin situated behind the extinct South Shetland Islands arc. The surface of Deception Island has been well studied but its submerged flanks have not. A multibeam bathymetry survey was conducted around Deception Island during the TOMODEC seismic project in 2005. The seafloor morphology is dominated by extensional faults and volcanic and sedimentary features. The northern end of Deception Island is transected by the bounding fault of the Central Bransfield Basin, the volcano's eastern flank is characterized by slump deposits, normal fault scarps, seamounts and volcanic ridges, and the main features of the western flank are two extensional basins, separated by a ridge connecting Deception Island to Sail Rock, an andesitic seamount. There is a strong correspondence between extensional faulting and volcanism across the island. Data from the flooded interior do not require recent resurgence of the caldera floor.

2.PS-60: Active tectonics on Deception Island (West-Antarctica): A new approach using the fractal anisotropy of lineaments, fault slip measurements and the caldera collapse shape

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This work shows the caldera boundary of Deception Island (South Shetlands, West Antarctica) from structural and fractal analyses. The strain field is determined from two different analyses: field measurement of faults and by the fractal geometry of the spatial distribution of lineaments. In both cases, the strain field is defined as a regional strike-slip with the maximum shortening (ey) NE-SW trending and a local uniaxial extension with the maximum extension NW-SE trending. The local strain field is controlled by the caldera collapse event, overlapping a fracture pattern to the regional fracture set. The elliptical caldera of Deception Island is determined from geology field map, Quickbird high-resolution satellite image, vent alignment and fissure eruptions located at the inner shoreline of Port Foster (inner bay). This ellipse agrees with the tectonic regime proposed, where the maximum axis NW-SE trending is perpendicular to the regional maximum compression (ey), NE-SW.

2.PS-61: Drake Passage and Bransfield Strait – new geophysical data and modeling of the crustal structure

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The 2004 and 2006 Ukrainian Antarctic programs acquired new geoelectrical data ("short-impulse electromagnetic field formation" – FSPEF, and "vertical electric-resonance sounding" – VERS) along profiles across Drake Passage and along Bransfield Strait, Antarctic Peninsula, with the aim of studying the crustal structure of these features down to depths of >30 km. Beneath the Drake Passage, Moho is interpreted at extremely shallow depths of 8–12 km; the origin of a deeper anomalous layer at 15–20 km is unknown at this stage. Both Moho and the deeper layer show strong relief in the vicinity of the Shackleton Fracture Zone. Moho in the Bransfield Strait profile is interpreted at depths of 12–28 km, while the lower crustal layers and crust–mantle transition zone show radical variations in depth and thickness. These variations likely reflect the complex geological history and the current tectonic setting as an incipient oceanic back-arc basin.

2.PS-62: Development of deep extensional basins associated with the sinistral transcurrent fault zone of the Scotia-Antarctic plate boundary

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The Scotia–Antarctic plate boundary is a very complex tectonic zone involving both oceanic and continental elements. The main active structures observed in the area include releasing and restraining bends, with related deep transtensional and probable pull-apart basins. The western sector of the plate boundary crosses fragmented continental crust of the western South Scotia Ridge (SSR), with wide development of pull-apart basins and releasing bends deeper than 5000m. The eastern sector of the SSR is located within the continental Discovery Bank. On its southern border, strike-slip and normal faults produce a 5500 m deep trough that may be interpreted as a pull-apart basin. In both the eastern and western SSR, despite extreme continental crustal thinning, the basins show no development of oceanic crust. This geometry is conditioned by the distinctive rheological behaviour of the involved crusts, with the bulk concentration of deformation occurring within the rheologically weaker continental blocks.

2.PS-63: The Scan Basin evolution: oceanographic consequences of the deep connection between the Weddell and Scotia Seas (Antarctica)

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The Scan Basin is a small oceanic basin located in the southern central Scotia Sea, north of the Bruce Passage (BP), which represents the main gateway between the Weddell Sea and the Scotia Sea. A seismic stratigraphic analysis has been carried out on multichannel seismic reflection profiles to determine the Miocene to present evolution of the basin. Five seismic units are identified. The oldest unit (Sc5) was deposited during seafloor spreading in the Scan Basin. The upper four units represent the post-spreading deposits and show three major evolutionary stages: A) pre-BP opening (unit Sc-4); B) BP opening (units Sc3 and Sc2) and C) post-BP opening (unit Sc1). Stage B occurred once the BP was deep enough to allow Weddell Sea Deep Water (WSDW) into the Scotia Sea. This led to the development of large, northwards-migrating contourite drifts. Stage C developed during the present-day sinistral transcurrent compressive regime

2.PS-64: Geophysical investigations of P3 segment of the Phoenix Ridge in Drake Passage, Antarctica

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New swath bathymetry, gravity, and magnetic data were obtained in the P3 segment of the Phoenix Ridge in Drake Passage, Antarctica. The detailed bathymetry (including a deep valley, a 2500 m-high seamount, seabed faults and depressions) suggests that spreading rates in P3 varied with time, from an intermediate rate off the ridge axis to a slow rate when spreading ceased. Mantle Bouger anomalies reveal that several gravity lows are associated with the seamount and both flanks of the P3 axial valley, and that highs are found at the junction of the ridge axis and the Hero Fracture Zone . A synthetic magnetic model indicates that the positive anomaly on the axial seamount probably results from the seamount eruption and that it post-dates spreading. By removing the seamount effect, the cessation of P3 spreading is interpreted at about 3.6 Ma, earlier than the 3.3 Ma of previous studies.

2.PS-65: The passive subduction of the Phoenix plate remnant at the South Shetland trench

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We present multibeam bathymetry, Chirp profiles and seismic data acquired in the South Shetland Trench during the Antarctic summer 2003-2004 (R/V OGS-Explora cruise), to study the differential passive subduction of the Phoenix Plate remnant, subdivided into three main segments by the "D" and "E" Fracture Zones. The investigated area (160 x 60 km) includes parts of the trench, incoming oceanic plate and outer front of the Antarctic Peninsula accretionary prism. The integrated dataset displays an interesting faults pattern deforming the seafloor and oceanic crust with variable orientation, controlled by the slab pull down and by the fracture zones which act as effective mechanical discontinuities. The differential mechanical coupling across the Hero, Shackleton, "E" and "D" Fracture Zones influences the regional stress field distribution and the sinking of the oceanic segments, during passive subduction and roll-back.

2.PS-66: Deep structure of the Antarctic Plate's boundary zone by the gravimetric tomography method

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3D vertical structure of the Antarctic Plate's boundary along longitudinal cross-sections and lateral slices at different depths is displayed through a distribution of density anomalies relative to Preliminary Reference Earth Model (PREM) using the harmonic coefficients of the EGM96 geoid model. Features of interaction between the Antarctic Plate and other plates are shown with our gravimetric tomography data over more than 40,000 km along the palte boundary. Two bodies (plumes) dominate in the mantle. Less dense masses ascend from depth of 2800 km and then split up at the depth of 200 km as three branches to the Australian-Antarctic Discordance (AAD), the Ross Sea and the Nazca plate. Dense masses descend from a surface as subducted slabs and collect at depths of 60 km and 280 km. It was discovered in the AAD area and the Nazca Ridge that thinning hot masses penetrate into the colder crust and lithosphere.

2.PS-67: Three-dimensional P wave tomography of Deception Island Volcano, South Shetland Islands

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Deception Island is an active volcano located in Bransfield Strait between the Antarctic Peninsula and the South Shetland Islands. In January 2005 a seismic P wave tomography experiment took place in and around the island using 66 land and 14 ocean-bottom seismometers and more than 5000 airgun shots. A preliminary three-dimensional inversion of the travel times resolves strong velocity contrasts to 5 km depth. The most striking feature is the low seismic velocity beneath the caldera floor which represents an extensive region of magma beneath a sediment-filled basin. A low velocity zone to the east of the volcano corresponds to seafloor sediments, and high velocities to the northwest are attributed to crystalline basement of the South Shetland Islands platform. NE-SW and NW-SE trends in the tomographic image are compatible with the regional tectonic directions and we suggest that the volcanic evolution of Deception Island is conditioned by Bransfield Basin geodynamics.

2.PS-68: Crustal architecture of the oblique-slip conjugate margins of George V Land and southeastern Australia

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A structural interpretation of the conjugate, oblique-slip margins of George V Land, East Antarctica, and southeast Australia, has been constructed based on seismic and sample data. This interpretation is characterised by pronounced asymmetry in width and thickness and depth-dependent crustal extension at breakup in the latest Maastrichtian. The Antarctic margin is broad (>300 km) and developed on thick crust (~42 km) of the Antarctic craton, whereas the Otway margin of southeast Australia is narrower (<200 km) and developed on the thin crust (~31 km) of the Ross–Delamerian orogen or Lachlan Fold Belt. The seismic data indicate that the upper basement (velocities ~5.5 $km.s^{-1}$) and the deep continental crustal layers (velocities >6.4 $km.s^{-1}$) appear to be largely removed across most of the rift between the rift bounding faults, whereas the mid-crustal, probably granitic layer (velocities ~6 $km.s^{-1}$) is largely still present.

2.PS-69: Regional seismic stratigraphic correlations of the Ross Sea; Implications for the tectonic history of the West Antarctic Rift System

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Using existing and new seismic reflection data, correlations of late Oligocene-early Miocene stratigraphy were made between the southern parts of Ross Sea basins. These interpretations suggest late Oligocene-early Miocene RSS-2 strata can be correlated between basins, and major problems with earlier correlations were limited to southern Victoria Land Basin in the southwest corner of Ross Sea. Previous work documented Cretaceous extension across much of Ross Sea. We interpret that Cenozoic extension also occurred throughout central and western Ross Sea, and subsidence during and following this extension deepened existing basins, and may have initiated basins in the west. Ridges between basins locally subsided below sea level during late Oligocene time. The thickness of little-deformed pre-Oligocene strata reflects Late Cretaceous cessation of major extension in easternmost Ross Sea. Successively younger Cenozoic extension occurred from east to west across the rest of Ross Sea.

3.PL: Plenary lectures

3.PL-1: Antarctica's continent-ocean boundaries - consequences for tectonic reconstructions

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Antarctica was a centerpiece of the Gondwana supercontinent. About 85 percent of Antarctica's 10000 km long continental margins are of a rifted divergent type, and about 1200 km have been converted from a subduction-type to a passive margin after ridge-trench collision along the Pacific side of the Antarctic Peninsula. In recent years, the amount of geophysical data along the continental margin of Antarctica has increased substantially, which allows us to differentiate the crustal characteristics of its continent-ocean boundaries and transitional zones (COB/COT). The data and geodynamic modeling indicate that the cause, style and process of breakup and separation were quite different along the Antarctic margin. A circum-Antarctic map will show the crustal styles of the margin and the location and geophysical characteristics of the COT. Definitions of the COT and understanding its process of formation have consequences for plate-kinematic reconstructions and geodynamic syntheses.

3.PL-2: Landscape evolution of Antarctica

David Sugden, **Stewart Jamieson** and **Nick Hulton**, School of GeoSciences, University of Edinburgh, Drummond Street, Edinburgh, United Kingdom

We build a synthesis of landscape evolution based on the geomorphology of passive continental margins and former mid-latitude Pleistocene ice sheets. In common with other continental fragments of Gondwana, there is a fluvial signature to the landscape in the form of the coastal erosion surfaces and escarpments, incised river valleys and a continent-wide network of river basins. A selective glacial signature reflects the presence or absence of ice at the pressure melting point. Early phases of local, often warm-based glaciation centred on mountain massifs began around 34 Ma. The ice sheet expanded to its maximum at ~14 Ma and eroded a radial array of troughs through the coastal mountains and deepened the continental shelf, before retreating to its present dimensions. Subsequent changes in ice extent are forced mainly by sea-level change. Weathering rates of exposed bedrock have been remarkably slow under the hyper-arid polar climate of the last ~13.5 Ma.

3.A.A: Ice sheet history and dynamics: Solid-earth, subglacial, terrestrial, and marine geological records ORAL

3.A.A-1: Mass balance of Antarctica from InSAR and regional climate modeling

Jonathan Bamber[1], **Michiel Van den Broeke**[2], **Curt Davis**[3] and **Eric Rignot**[4], (1)University of Bristol, Bristol, United Kingdom, (2)University of Utrecht, Utrecht, Netherlands, (3)University of Missouri, Columbia, (4)Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, CA 91109

Large uncertainties remain in estimating and predicting Antarctica's contribution to global sea level. Climate warming may enhance snowfall in the interior but increase glacier discharge at the coast as warmer air and ocean temperatures erode buttressing ice shelves and reduce backforce resistance to grounded ice flow. Recent work suggests that changes in integrated snowfall over continental Antarctica are insignificant. We use satellite interferometric synthetic-aperture radar observations from 1992 to 2006 to calculate total ice sheet discharge into the ocean, and compare it with interior snow accumulation from a regional atmospheric climate model. We deduce a net ice sheet loss of 141+/-59 Gt/yr, equivalent to 0.4+/-0.2 mm/yr sea level rise. The loss is concentrated in the Bellingshausen and Amundsen seas sector of West Antarctica and the northern tip of the Antarctic Peninsula. Adding satellite radar altimeter data, we attribute almost all loss to glacier acceleration conditioned by thinning of ice shelves.

3.A.A-2: Determination of the Antarctic coastline by InSAR, and variation estimate of Shirase Glacier flow by a SAR image correlation method

Kazuo Shibuya[1], **Koichiro Doi**[1], **Tsutomu Yamanokuchi**[2] and **Kazuki Nakamura**[3], (1)National Institute of Polar Research, Kaga 1-9-10, Itabashi-ku, Tokyo, Japan, (2)RESTEC, Roppongi 1-9-9, Minato-ku, Tokyo, Japan, (3)Remote Sensing Group, AIST, Higashi 1-1-1, Tsukuba, Ibaraki, Japan

We applied InSAR analysis to the ERS-1/ERS-2 SAR data, and estimated the grounding lines for East Antarctica (25¢ªW-40¢ªE) and West Antarctica (85¢ªW-165¢ªW). The InSAR detected grounding lines delineated more precise (7000 m bias correction) and more detailed coastline features than the ADD coastlines. We also applied SAR image correlation method to the JERS-1 SAR data over the Shirase Glacier region to estimate seasonal and spatial variations of the ice flow velocities. From the grounding line towards 30 km downstream, seasonal and annual variations of the ice flow velocities were detected. The western streamline has systematically larger ice flow velocity than the eastern streamline, and Shirase Glacier deflects toward east by a total of 38¢ª. This may partly be related with 60m systematic deepening of bedrock topography in the eastern side, and partly with inflow of small ice streams from west.

3.A.A-3: Subglacial roughness of the West Antarctic Ice Sheet

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We use basal roughness, a property accessible to airborne ice penetrating radar, to examine the dynamics of the West Antarctic Ice Sheet. We examine roughness through analysis of the along track variability of basal elevation profiles collected over the Siple Coast and the Thwaites Glacier catchment, at length scales between 400 meters and 4 kilometers. There are significant differences in the patterns of roughness between catchments. A one-to-one correlation between roughness and proposed sedimentary basins identified in potential fields data in the Siple Coast is not apparent. However, roughness does systematically decrease downstream, likely reflecting the effect of mobile tills. Under Thwaites Glacier, smooth areas are more localized, and restricted to the interior. In addition, we find that in the Siple Coast region, the plateaus underlying the major interstream ice ridges are remarkably smooth at all length scales, while flat bedrock platforms do not exist near Thwaites Glacier.

3.A.A-4: Locating subglacial sediments across West Antarctica with isostatic gravity anomalies

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Subglacial sediments are an important control on fast flowing ice in West Antarctica but their spatial distribution over catchment-wide areas is still largely unknown. Previously, airborne gravity anomalies could not clearly image sedimentary basins beneath the ice because broad, crustal-scale gravity signals masked the near-surface anomalies. We show here that it is possible to use additional processing to produce an isostatic gravity anomaly, which is sensitive to the locations of sedimentary basins. Our results reveal that the inferred major basin beneath Thwaites Glacier is confined to the Byrd Subglacial Basin, but that there are also basins underlying the onset of tributary fast flow. In the Ross Sea Embayment, known sedimentary basins coincide with negative isostatic anomalies. The sedimentary basins beneath the Ross Sea Embayment ice streams are more widespread and likely have a greater sediment thickness than the basins beneath Thwaites Glacier in the Amundsen Sea Embayment.

3.A.A-5: C-14 age control of pre- and post-LGM events using *N. pachyderma* preserved in deep-sea sediments (Ross Sea, Antarctica)

Rosalba Bonaccorsi[1], **Tullio Quaia**[2], **Lloyd H. Burckle**[3], **Robert F. Anderson**[3], **Romana Melis**[2] and **Antonio Brambati**[2], (1)MS. 245-3, NASA Ames Research Center, Moffett Field, CA 94035, (2)Department of Geological, Environmental, and Marine Science, University of Trieste, Via E. Weiss, 2, Trieste, 34127, Italy, (3)Lamont-Doherty Earth Observatory, Columbia University, P.O Box 1000, Palisades, NY 10964

Biogenic carbonates in Antarctic marine sequences are critical to constrain reliable chronologies for Late Quaternary glacial/interglacial events. Increased amounts of iceberg rafted debris (IBRD) in ice-proximal sediments are proxies for climate-induced disruption of the Ross Ice Shelf system. However, ice rafting events seen in deep-sea sediments from this region lack of age control because they are typically barren of calcareous microfossils.

We document here evidence of carbonate preservation in three out of eight cores collected from the Ross Sea continental slope (2058-3360 m-depth). AMS-C14 dates from N. pachyderma-rich IBRD range between 28.2ka and 17.2ka BP, and between ~19ka and 14.4 ka BP suggesting that deep Ross Sea sediments can retain a reliable record of Pre- and post-LGM events involving massive destabilization of the Ross Ice shelf-sea ice system. These events occurred at a regional scale and were possibly linked to global sea-level rise from meltwater pulse (MWP) events e.g., 19-kyr-MWP.

3.A.A-6: The Cosmonaut Sea Wedge

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In the Cosmonaut Sea margin of East Antarctica (35º–55ºE), we recognize a regional sediment lens below the upper part of the continental rise. The lens, herein termed the Cosmonaut Sea Wedge, is positioned stratigraphically underneath the inferred glaciomarine section and extends for at least 1200 km along the continental margin with a width that ranges from about 80 to 250 km. Lateral variations in the growth pattern of the wedge indicate several overlapping depocentres, which are flanked by elongated mounded drifts and contourite sheets at their distal northern ends. The internal stratification of the mounded drift deposits suggests that westward-flowing bottom currents reworked the margin deposits. The action of these currents, together with sea-level changes, is considered to have controlled the growth of the wedge. We interpret the Cosmonaut Sea Wedge as a composite feature comprising several fan systems reworked by bottom currents.

3.A.A-7: Mega debris flows deposits in the Western Wilkes Land margin (East Antarctica)

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Multichannel seismic data collected off Western Wilkes Land (East Antarctica) reveal the occurrence of mega debris flow on the lower slope and rise deposited throughout the Miocene. They appear mostly coeval with widespread slides on the upper slope, that occur above a Bottom Simulating Reflector (BSR), possibly related to the silica diagenetic front. In some areas, debris flow units are separated by thin deposits of well-stratified facies, interpreted as dominant glaciomarine mixed contouritic and distal turbidite deposits. These units would represent weakened layers and could then played a major role in the slope instability. High sedimentation rates, due to large amounts of sediment delivered from a temperate, wet-based ice sheet, constituted a key factor in the sediment failures. The main trigger mechanism would probably have been earthquakes enhanced by isostatic rebound following major ice sheet retreats.

3.A.B: Holocene to modern antarctic environments and global change ORAL

3.A.B-1: A circum-Antarctic synthesis of stable carbon isotope variability in Southern Ocean sedimentary sections: Insights from the modern ocean

Robert B. Dunbar[1], **David A. Mucciarone**[1], **Luna Federici**[2], **David Munro**[1], **Lauren Rogers**[1], **Matthew Long**[1], **Eduard Costa**[1], **Jennifer Villinski**[3], **John Hayes**[4], **Amy Leventer**[5], **Eugene W. Domack**[6], **Christina Riesselman**[1], **Chris Moy**[1], **Kevin Thiessen**[1] and **Michael Lutz**[1], (1)Department of Geological and Environmental Sciences, Stanford University, 325 Braun Hall, Stanford, CA 94305, (2)Earth Systems Program, Stanford University, Stanford, CA 94305, (3)Department of Geological Sciences, Indiana University, Bloomington, IN 47405, (4)Woods Hole Oceanographic Institution, Woods Hole, MA 02543, (5)Geology Department, Colgate University, 13 Oak Drive, Hamilton, NY 13346, (6)Geosciences, Hamilton College, 198 College Hill Road, Clinton, NY 13323

The stable carbon isotopic composition of marine organic matter in Antarctic sediments has been proposed as a tracer of past variability in water temperature, sea ice extent, aqueous CO_2 partial pressure, phytoplankton community composition, phytoplankton growth rates, and terrestrial sediment provenance. This diverse array of attributions has lead to uncertainty regarding when and how to use carbon isotopic data from Antarctic sedimentary organic matter in studies of past environmental change. Since 1983, we have amassed a large data set on carbon isotopic variations in Antarctic sedimentary organic matter, suspended particulate organic matter, dissolved CO_2 $^{13}C/^{12}C$, sea ice organic matter, and sinking particulate matter $^{13}C/^{12}C$. The study areas include the Ross Sea, the west coast of the Antarctic Peninsula, the Drake Passage, and about 1/3 of the east Antarctic continental margin. In this paper we summarize the major findings of a new multi-site synthesis of the data set.

3.A.B-2: Ecological influences on $\delta^{13}C$ of particulate matter in seasonally ice-covered Ryder Bay, Antarctica

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Carbon isotopes may be a useful paleoceanographic tool for reconstructing past *p*CO2 of surface water, but isotopic composition of particulate organic carbon has been shown in both field and laboratory studies to be affected by *p*CO2, growth rate, cell size, cell geometry, light availability, carbon metabolism and species composition. To date, field studies have not constrained the dominant factors controlling surface water $\delta^{13}C_{POC}$. We present high-resolution time series data from a study in Ryder Bay, Antarctica, which compares seasonal fluctuations in mixed-layer $\delta^{13}C_{POC}$ with detailed ecological and morphological analysis of phytoplankton communities, community productivity, $\delta^{13}C_{DIC}$, nutrient dynamics, and hydrographic parameters. Preliminary results indicate that physical processes such as ocean-atmosphere gas exchange and upwelling do not significantly affect $\delta^{13}C_{POC}$ signatures. In contrast, speciation shifts of diatom assemblages show strong correlation with changes in $\delta^{13}C_{POC}$ signals, supporting recent suggestions that taxonomic data are necessary for confident interpretation of sedimentary $\delta^{13}C$ records.

3.A.B-3: A proposed community wide analytical network using a new approach to radiocarbon dating of Antarctic glacial marine sediments

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Dependence upon bulk acid insoluble organic material (AIOM) for sediment chronology has led to long standing ambiguity in correlating sedimentary events across the Antarctic continental margin. We have developed a novel system that exploits the differences in thermal stabilities of organic compounds in AIOM to separate autochthonous carbon from the allochthonous, pre-aged carbon which leads to ambiguously old AIOM ages. Although complete separation of the AIOM components is difficult to achieve, our results offer a significant improvement to sedimentary chronology from the climatically important sedimentary sequences including those from: Antarctic Peninsula, NW Weddell Sea, and the Ross Sea. We outline a plan to establish a community wide submission process via two analytical labs linked to NOSAMS/WHOI enabling key marine sequences to be evaluated in a standard way to advance our understanding of Late Quaternary ice volume and relative sea level changes along the Antarctic margin.

3.A.B-4: Solar forcing and El Niño-Southern Oscillation (ENSO) influences on productivity cycles interpreted from a late-Holocene high-resolution marine sediment record, Adélie Drift, East Antarctic Margin

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JPC17B-core (26-meters long) was collected from the Adélie-Drift at 140ºE along the Pacific-sector of the Antarctic continental shelf. Sediments are laminated at scales ranging from a few millimetres to 2cm in thickness with accumulation rates on the order of 18-19 m kyr^{-1} based on 10-radiocarbon age-dates. Seismic data suggests the presence of up to 230 m of Holocene sediments in the drift. Opal content ranges from 45-70% by weight. Measurements of bulk sedimentary organic matter show an overall downcore enrichment of $^{13}C_{org}$. Ti-Ba were measured by core-scanner-XRF. Strong decadal to century-scale variability is present in all tracers. Spectral-analyses of Opal and Ti-time series show strong variance at periods of 11,22 and 110-years, that are suggestive of solar forcing as has previously been suggested for Holocene sediment sequences from the Antarctic Peninsula. Besides, Ba-time series exhibits strong variance at a period of 3-3.6-yr, consistent with possible El Niño-Southern-Oscillation (ENSO) forcing.

3.A.B-5: A record of Holocene paleoclimatic variability from Neny Fjord, Antarctic Peninsula

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Comprehensive analyses of marine sediments recovered from Neny Fjord, Marguerite Bay, yield a high-resolution record of Holocene climate variability. The ~12 m jumbo piston core was collected aboard the Nathanial B Palmer in 2002. The chronostratigraphy for the core is derived from radiocarbon-dated foraminifera and shell fragments. The base of the core, dated to 8060 ^{14}C, reveals an ice-distal facies consistent with an early Holocene warm period, with deglaciation of the fjord having already occurred. Between ~6000 and ~4500 ^{14}C yrs climate cooling is indicated by reduced sedimentation rates and increasingly coarse terrigenous flux. A ~1500 ^{14}C yrs hiatus follows, inferred to be a period of ice-shelf or glacial advance over the site. The upper core (2000 ^{14}C yrs to present) is characterised by a coarsening grain size and a sea ice diatom assemblage.

3.A.B-6: Sea ice concentration temporal variability over the Weddell Sea and its relationship with Tropical Sea Surface Temperature

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Principal Components Analysis in S-Mode was performed on monthly sea ice concentration anomalies (SICA) series. Five temporal patterns represent the SICA temporal variability in the Weddell between 1979 and 2000. The 1st temporal pattern series has its homogeneous area located at the north of Weddell Sea. The 2nd region is centered in 30°W, southeast of the Weddell. The 3rd is localized east of 30°W and north of 60°S. The 4th PC series has its homogenous region at the west of the Weddell Sea. The 5th area is centered at 0° W and south of 60°S. Correlation charts between the five Principal Components (PC) series and SST were performed. Positive correlations over the Tropical Pacific Ocean were found for the five PCs when SST series preceded SICA PC series. This correlation sign relates the occurrence of ENSO warm (cold) event with posterior positive (negative) anomalies of SICA over the Weddell Sea.

3.A.B-7: Can tropical sea surface temperature be used as a first guess for the sea ice concentration temporal variability over the Amundsen and Bellingshausen Seas?

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Principal Components Analysis in S-Mode was performed on monthly sea ice concentration anomalies (SICA) series. Four temporal patterns represent the SICA temporal variability over the Amundsen and Bellingshausen Seas between 1979 and 2000. The 1st, 2nd and 3rd temporal pattern series have their homogeneous areas located at the northern region of the Amundsen and Bellingshausen Seas. Negative correlations with the Surface Sea Temperature (SST) over the Tropical Pacific were found for the first three PCs when SST series preceded SICA PC series. This correlation sign relates the occurrence of ENSO warm (cold) event with posterior negative (positive) SICA anomalies over these areas that are covered by sea ice during winter and spring. The 4th PC series has its homogenous region at the coastal region of the Amundsen and Bellingshausen Seas (summer and autumn). Occurrence of sea ice in the coastal area is not related to the temperature at the Pacific.

3.A.C: Antarctica in Rodinia, Gondwana and Pangea: In honor of the contributions of Campbell Craddock ORAL

3.A.C-1: Lu*f*-Hf systematics of the ultra-high temperature Napier Complex, East Antarctica: evidence for the early Archean differentiation of Earth's mantle

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The Napier Complex comprises some of the oldest rocks on earth (~3.8 billion years old), overprinted by an ultra-high temperature (UHT) metamorphic event near the Archean-Proterozoic boundary. Garnet, orthopyroxene, sapphirine, osumilite, rutile and a whole rock representing an equilibrated assemblage from this belt yield a Lu-Hf isochron age of 2,403 ± 43 Ma. Preservation of the UHT mineral assemblage in the rock analyzed suggests rapid cooling with closure likely to have occurred for the Lu-Hf system at post-peak UHT conditions near a temperature of ~800°C. Zircon ε_{Hf} values measured “see through” the UHT metamorphism and show that the source of magmas that formed the Napier Complex was extremely depleted (> +5.6 ε_{Hf} at 3.85 Ga) relative to the chondritic uniform reservoir (CHUR). These results suggest significant depletion of the early Archean mantle, in agreement with the early differentiation of the earth that the latest core formation models require.

3.A.C-2: U-Pb zircon age from the ultrahigh temperature metapelites, Rauer Group, east Antarctica: Implications for Grenvillian and Pan-African events overprint

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SHRIMP U-Pb dating on zircons in an ultrahigh temperature (UHT, ~1000 °C) granulite-facies metapelite from Mather Peninsula, Rauer Group, east Antarctica, yielded two episodes zircon growth ages at ~1000 Ma, and ~530 Ma. Two episodes emplacement ages for the magmatic precursor rocks of ca. 2530 Ma and ca. 2650 Ma were derived from zircon cores. Successive zircon growth at ca. 1000 Ma to 530 Ma records a sequence of distinct, widely spaced high-temperature metamorphic and/or anatectic events related to Grenvillian and Pan-African orogenesis. This study presents the first robust geochronological evidence and new constraints on the timing of UHT metamorphic event on the Rauer Group, supporting that peak UHT metamorphic event occurred at ~1000 Ma and overprinted by the separate high-grade event at ~530 Ma. This is critical in understanding the role of the eastern Prydz Bay during the assembly of east Gondwana supercontinent.

3.A.C-3: Tectonic transposition of Palaeo-Mesoproterozoic rocks at 1000 Ma in the Waller Hills area of the Mawson Escarpment, Antarctic Southern Prince Charles Mountains

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Structures indicative of progressive deformation by ductile transpression in the middle to lower crust are described from the Waller Hills area of the Mawson Escarpment, situated in the Antarctic Southern Prince Charles Mountains. Lithodemic components within the Waller Hills, including grey gneiss and supracrustals, reflect a Palaeo-Mesoproterozoic basement and cover sequence that was inverted at ~1000 Ma, synchronous with the production of high-grade transposition fabrics and folds in a presumably collisional tectonic setting. We infer that the Waller Hills represent the continuation of a Grenville-age East Antarctic orogen (the Rayner Complex) into the Southern Prince Charles Mountains. Evidence of any significant reworking at ~500 Ma is inconclusive.

3.A.C-4: Age of boron- and phosphorus-rich paragneisses and associated orthogneisses, Larsemann Hills: New constraints from SHRIMP U-Pb zircon geochronology

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SHRIMP U-Pb detrital zircon geochronology of a phosphate-rich metaquartzite from the Larsemann Hills, southern Prydz Bay, suggests that the maximum constraint on deposition was latest Neoproterozoic, possibly as young as ca. 550 Ma. The metaquartzite, together with metapelite, metapsammite and boron-rich units, collectively the 'Brattstrand Paragneiss', were deposited on composite ca. 1125 Ma and ca. 940-990 Ma felsic orthogneiss basement, which was subsequently interleaved with the metasediments during ca. 515-530 Ma regional high-grade tectonism. The presence of ca. 550-870 Ma rims indicates detrital contribution from sources characteristic of the East African orogen and adjacent regions. The unusual boron and phosphate enrichment in the Neoproterozoic Brattstrand Paragneiss of the Larsemann Hills could have resulted from subseafloor alteration of clastic sediments related to an exhalative-synsedimentary hydrothermal system that mobilised boron from underlying non-marine evaporite borate, suggesting deposition of the Brattstrand Paragneiss in a deepening continental back-arc rift or basin.

3.A.C-5: New age constraints for orogenic collapse and voluminous late-tectonic magmatism in the southern part of the East African-Antarctic Orogen

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The southern third of the more than 8000 km long, Late Neoproterozoic/Early Paleozoic East African-Antarctic Orogen is characterised by tectonic escape, extensive late extensional tectonism and large volumes of late tectonic igneous rocks. We provide new SHRIMP dates that give tight time constraints for extensional tectonics and the timing of late-tectonic igneous activity. Two large granitoids intrusions were dated at c. 502 and 499 Ma, whilst metamorphism along a significant extensional shear zone was dated at c. 510 Ma. The two granitoids are part of a > 15,000 km2 large igneous province that can be traced into Northern Mozambique to the Lurio Belt. The granitoids have A2-type geochemistry and are thought to represent lower crustal partial melting, that probably resulted from asthenosphere influx after part of the orogen root had delaminated. The northern margin of the partially delaminated root might be represented by the Lurio Belt in Northern Mozambique.

3.A.C-6: Terrane correlation between Antarctica, Mozambique & Sri Lanka: Comparisons of geochronology, lithology, structure and metamorphism

Geoffrey H. Grantham[1], **Paul H. Macey**[2], **Bernard A. Ingram**[1], **Malcolm P. Roberts**[3], **Richard A. Armstrong**[4], **Tomokazu Hokada**[5], **Kazuyuki Shiraishi**[5], **Avinash Bisnath**[6] and **Vladimiro J. Manhica**[7], (1)Central Regions Unit, Council for Geoscience, 280 Pretoria Rd, Silverton, P/Bag X112, Pretoria, South Africa, (2)Council for Geoscience, Bellville, South Africa, (3)MSSP-Geomap Project, c/o Geological Survey of Papua New Guinea, Port Moresby, Papua New Guinea, (4)RSES, Australian National University, Canberra, Australia, (5)NIPR, Itabashi, Tokyo, Japan, (6)Council for Geoscience, Pietermaritzburg, South Africa, (7)Direcao Nacional Geologia, Maputo, Mozambique

Analysis of lithological, structural, metamorphic and geochronological data from mapping in Mozambique permits recognition of two crustal blocks separated by the Lurio Belt. Comparison of the data, with data from Sri Lanka and Dronning Maud Land (DML) permits recognition of similar blocks in Sri Lanka and DML. Data interpretation suggests they once formed a mega-nappe, comprising part of northern Gondwana, emplaced ~600 km over southern Gondwana during Gondwana amalgamation at ~590-550 Ma. The data suggest deeper levels of erosion in southern Africa compared to Antarctica. It is possible this event extends westwards to the Namibian Damara orogeny with the similar age Naukluft nappes fitting the mega-nappe pattern. Erosional products of the mountain belt are now represented by detrital zircons of 400-700Ma age, seen in sandstone formations of the Transantarctic Mountains, their correlatives in Australia, the Urfjell Group (western DML), the Natal Group and possibly the Cape Supergroup, South Africa.

3.A.D: Glaciation, climate, surface processes and tectonism: The landscape record ORAL

3.A.D-1: Advances in understanding cold-based glaciers

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Over the last decade, there has been growing recognition that cold-based glaciers are active geomorphic agents that interact with the substrate and modify the surrounding landscape. Recent field studies at both high and low elevations in the Dry Valleys of Antarctica have provided evidence of erosion and deposition by cold-based glaciers and their ice marginal melt water. Other empirical studies have significantly advanced understanding of the chemical composition and complex mechanical behaviour of ice at the base of cold-based glaciers and the interaction on various substrates. These insights into how cold-based glaciers interact with the landscape have led to the reinterpretation of landforms and glacial histories in areas previously covered by cold based glaciers in both the Arctic and Antarctic. Furthermore, several researchers have used the landforms now associated with cold-based glaciers to interpret similar landforms on Mars.

3.A.D-2: Multiple Early to Mid-Pleistocene East Antarctic Ice Sheet variations in the Ricker Hills

Stefan Strasky[1], **Luigia Di Nicola**[2], **Carlo Baroni**[3], **Maria C. Salvatore**[4], **Heinrich Baur**[1], **Peter W. Kubik**[5], **Christian Schlüchter**[6] and **Rainer Wieler**[1], (1)Institute of Isotope Geochemistry and Mineral Resources, ETH Zurich, Zürich, Switzerland, (2)Dipartimento di Scienze della Terra, Università di Siena, Siena, Italy, (3)Dipartimento di Scienze della Terra, Università di Pisa, Pisa, Italy, (4)Dipartimento di Scienze della Terra, Università La Sapienza, Roma, Italy, (5)Paul Scherrer-Institute, c/o Institute of Particle Physics, ETH Zurich, Zürich, Switzerland, (6)Institute of Geological Sciences, University of Bern, Bern, Switzerland

Timing and amplitude of Antarctic ice level changes as response to past climate fluctuations are a major issue in paleoclimatology. In this study, we determined surface exposure ages with in situ produced cosmogenic nuclides (^{10}Be, ^{21}Ne) of four erratic boulders from a pre-last glacial deposit in the Ricker Hills, southern Victoria Land, located at the boundary of the East Antarctic Ice Sheet. The investigated area is not affected by alpine glaciers. Thus its glacial features and deposits are a direct proof of past ice sheet variations. Consistent neon and beryllium exposure ages indicate two major ice advances, one at about 1.4 Ma and another one around 1.0 Ma before present. Evidence for a third glacial event comes from an erratic boulder that was intermittently buried by cold-based ice. From our data we infer an upper age limit for this third event at around 665 ka.

3.A.D-3: Stable isotope composition of the basal ice from Taylor Glacier, Southern Victoria Land, Antarctica

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A tunnel excavated into the margin of Taylor Glacier revealed a basal sequence containing a thick sequence of layers of clean clear ice and debris-rich ice which contained strong deformation features, as well as units of clean bubbly ice. Analysis of the isotopic composition of the basal ice shows a strong linear relationship that plots on a slope of 8, which is usually interpreted as meteoric in origin. However, the physical appearance of the laminated ice is inconsistent with a meteoric-origin interpretation and has the outward appearance of ice usually inferred as the product of basal melt-refreeze processes like regelation. We consider this apparent tension between physical appearance and isotopic composition of the Taylor Glacier basal ice to be a limitation of the stable isotope approach, and that the technique employed here is unable to diagnose small-scale processes like regelation.

3.A.D-4: Microtektites from northern Victoria Land Transantarctic Mountains: Evidence for a new strewn field generated by a catastrophic impact on Earth

Luigi Folco, Museo NAzionale Antartide, via Laterino 8, Siena, Italy

Tektites are natural silicate glasses produced by the melting associated with hypervelocity impacts of extraterrestrial bodies on Earth. They are found only in certain areas of the Earth known as strewn fields, the material being mostly projected melt from target rocks at the site of impact. Microtektites are distal ejecta which are found up to several thousands km from their source crater. Microtektite strewn fields documented in literature include the North American (35 Ma), Ivory Coast (1.1 Ma) and Australasian (0.8 Ma). We report here on the discovery of microtektites from several summit plateaus (~2700 m) of the Transantarctic Mountains in northern Victoria Land. They have a Late Miocene ^{40}Ar/^{39}Ar age and identify a new microtektite strewn field associated with an impact crater yet to be located. This finding has important implications for both the collisional history of our planet and for the denudation history of the Antarctic bedrock.

3.A.D-5: The "Golden Shale": An indicator of past history of the Transantarctic mountains

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A small sedimentary deposit near Gneiss Point on the western side of McMurdo Sound, previously identified as shale, is described. The deposit is phillipsite, a zeolite that is believed to have formed from the deposition and alteration of volcanic ash in a small ice-marginal saline lake. Other previously recorded occurrences of phillipsite in the dry valleys are believed to be several million years old. A similar age for this deposit is suggested for the Gneiss Point deposit. This is consistent with other weathering and landscape features found in the immediate area, including traces of halloysite in soils. The deposit is very close to sea level but could not have formed if the site had been below sea level, indicating that there has been very little uplift following that which caused the sea to retreat from the Wright Fiord.

3.PS: Databases, maps, and tools for exploring Antarctica POSTER

3.PS-70: The Earth Science Section of the Italian Museo Nazionale dell'Antartide

Carlo Alberto Ricci[1], **Mauro Alberti**[2], **Luigi Folco**[2], **Jacqueline Muller**[2], **Rosaria Palmeri**[2] and **Antonio Zeoli**[2], (1)Dipartimento di Scienze della Terra, University of Siena, via Laterina 8, Siena, 53100, Italy, (2)Sezione Scienze della Terra, Museo Nazionale dell'Antartide, Via del Laterino 8, Siena, 53100, Italy

Over the last decade, there has been growing recognition that cold-based glaciers are active geomorphic agents that interact with the substrate and modify the surrounding landscape. Recent field studies at both high and low elevations in the Dry Valleys of Antarctica have provided evidence of erosion and deposition by cold-based glaciers and their ice marginal melt water. Other empirical studies have significantly advanced understanding of the chemical composition and complex mechanical behaviour of ice at the base of cold-based glaciers and the interaction on various substrates. These insights into how cold-based glaciers interact with the landscape have led to the reinterpretation of landforms and glacial histories in areas previously covered by cold-based glaciers in both the Arctic and Antarctic. Furthermore, several researchers have used the landforms now associated with cold-based glaciers to interpret similar landforms on Mars.

3.PS-71: Advances through collaboration: Sharing seismic reflection data via the Antarctic Seismic Data Library System for Cooperative Research (SDLS)

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Since 1991, the SDLS has served under the auspices of the Antarctic Treaty (ATCM Recommendation XVI-12) as a role model for collaboration and equitable sharing of Antarctic multichannel seismic reflection (MCS) data for geoscience studies. During this period, collaboration in MCS studies has more rapidly advanced the deciphering of the seismic stratigraphy and structure of Antarctica's continental margin than previously. SDLS successes come from cooperation of National Antarctic Programs and individual investigators in on-time submissions of their MCS data. Most do, but some do not. The SDLS community has an International Polar Year (IPY) goal of all overdue MCS data being sent to the SDLS by end of IPY. The community science objective is to compile all Antarctic MCS data to derive a unified seismic stratigraphy for the continental margin, a stratigraphy to be used with drilling data to derive Cenozoic circum-Antarctic paleobathymetry maps and local-to-regional scale paleoenvironmental histories.

3.PS-72: An overview of the geophysical data held by the British Antarctic Survey

T.J. Deen[1] and **Alexander J. Tate**[2], (1)British Antarctic Survey, High Cross, Madingley Road, Cambridge, CB3 0ET, United Kingdom, (2)Geological Sciences Division, British Antarctic Survey, High Cross, Madingley Road, Cambridge, United Kingdom

The British Antarctic Survey (BAS) has, since its inception, collected geophysical measurements as part of its geological exploration activities. These georeferenced data are held in a variety of digital archives and include the following types.

Marine cruise data: Gravity, magnetic, bathymetric and seismic data have been collected from around the Antarctic Peninsula and Scotia Arc since the mid 1960s. These data are used for a range of science programs and international collaborations.

Airborne data: BAS has acquired considerable gravity, magnetic and radar data sets covering the Antarctic Peninsula, Ronne Ice Shelf, Wilkes Land, Pine Island Bay and adjacent areas. These data are changing our knowledge of continental and ice sheet dynamics.

This presentation will give an overview of the geophysical data held at BAS and show how they are organised and how we are making them more accessible to the scientific community.

3.PS-73: An overview of the geological data held by the British Antarctic Survey

Alexander J. Tate, Geological Sciences Division, British Antarctic Survey, High Cross, Madingley Road, Cambridge, United Kingdom

The Geological Sciences Division of the British Antarctic Survey (BAS) holds a variety of geological data collected over the last 60 years. These are predominately from the Antarctic Peninsula region and Scotia Arc, although there is also important material from areas such as the Ellsworth Mountains, Marie Byrd Land and the Transantarctic Mountains. We currently have information relating to 150,000 field samples often with associated analysis data such as geochemistry. Additionally we hold a variety of data for nearly 500 marine cores. The metadata and data are stored within a number of Oracle 10g database tables and for some datasets such as the type and figured fossil collection there is external access through a web interface.

This presentation will give an overview of the geological data held at BAS and show how the data is organised, searched and visualized and how they are being used for current research projects.

3.PS-74: Antarctic Meteorological Data – Collection, Archive, and Distribution

Shelley L. Knuth, **Charles R. Stearns**, **Matthew A. Lazzara**, **George A. Weidner**, **Linda M. Keller** and **Jonathan E. Thom**, University of Wisconsin-Madison, Antarctic Automatic Weather Stations Project, 1225 W. Dayton St., Madison, WI 53706

Antarctic geophysical data is important for research and logistical needs including studies of localized weather, operational weather forecasting, climate monitoring, and the movement of ice sheets. The Antarctic Meteorological Research Center (AMRC) houses various types of geophysical data for the Antarctic, and in particular, meteorological data. This database is the premier weather data collection system for the United States Antarctic program. Within this database, satellite imagery, weather station observations, model output, climatological data, and pilot reports are just some of the data available. All data is available to the public and scientific community free of charge, as long as it is used for educational or scientific purposes. The purpose of this presentation is to introduce the full extent of the AMRC collection to the Antarctic community.

3.PS-75: The Latitudinal Gradient Project (LGP): Summary of progress to date and proposed activities

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The Latitudinal Gradient Project (LGP) is a framework for interdisciplinary and international work towards the common goals of understanding the complex marine, terrestrial, and freshwater ecosystems that exist along the Antarctic latitudinal gradient, and determining the effects of environmental change on Antarctic ecosystems. Development of the LGP framework was prompted by Antarctic scientists who identified the need for co-ordinated research along the latitudinal gradient. The LGP is currently working towards study of five sites along the Victoria Land coast. The information gained will increase our understanding of polar ecosystems and help create a predictive knowledge of the effects of environmental change on these ecosystems. The LGP's success is dependent on the interdisciplinary aspects of the project and the interaction of researchers at each site. Researchers are welcome to join LGP and contribute to extension of the LGP to other regions of the Antarctic continent. Further information is available at www.lgp.aq.

3.PS-76: Observations of chlorine monoxide over Scott Base, Antarctica, during the ozone hole, 1996-2005

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We report observations of chlorine monoxide, ClO, in the lower stratosphere, made from Scott Base (77.85º S, 166.77º E) in springtime during each year, 1996-2005. The ClO amounts in the atmosphere are retrieved from remote measurements of microwave emission spectra. ClO column densities of up to about 2.5×10^{15} cm^{-2} are recorded during September. Maximum mixing ratios of ClO are approximately 2 ppbv. The annual average of ClO column density during late winter/early spring is anticorrelated with similar averages of ozone column measured at nearby Arrival Heights, with correlation coefficient of –0.81, and with averages of ozone mass integrated over the entire polar region, with similar correlation coefficients. There was a substantial decrease in ClO amounts during 2002-2004. There has been no systematic change in the timing of chlorine deactivation attributable to secular change in the Antarctic vortex.

3.PS-77: Numerical modeling of T-wave excitation using multiple scattering theory with observations from Bransfield Strait, Antarctica

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Tertiary (T-) waves are seismically generated acoustic waves that propagate over great distances in the oceanic sound channel with little loss in signal strength even at relatively high (>1Hz) seismic frequencies. Although they were first identified almost fifty years ago, their excitation mechanism has not been clearly resolved. In this study, we address the effect of multiple anisotropic scattering on and below the seafloor in an attempt to explain quantitatively the generation of T-waves. We first apply a Monte Carlo simulation method based on the radiative transfer theory to deal with anisotropic multiple scattering on the seafloor and in the lithosphere. We then systematically compute the excitation of propagating acoustic modes using modal scattering. Lastly, we compare synthetic T-waves with those observed from data collected by seven Autonomous Underwater Hydrophones moored in the Bransfield Strait, Antarctica from November 2005 to November 2006.

3.PS-78: Geoenvironments in the vicinity of Arctowski Station, Admiralty Bay, King George Island, Antarctica: Vulnerability and valuation

Carlos Ernesto G. R. Schaefer[1], **Rogério Mercandelle Santana**[1], **Maria Lúcia Calijuri**[2], **Felipe Nogueira Bello Simas**[3], **Márcio Rocha Francelino**[4] and **Elpídio Inácio Fernandes Filho**[1], (1)Departamento de Solos, Universidade Federal de Viçosa, Av. PH Rolfs s/n, Viçosa, Brazil, (2) Departamento de Engenharia Civil, Universidade Federal de Viçosa, Av. PH Rolfs s/n, Viçosa, Brazil, (3)Centro Universitário de Caratinga, BR-116, KM-526, Caratinga, Brazil, (4)Instituto de Florestas, Universidade Federal Rural do Rio de Janeiro, BR 465 km 7, Rio de Janeiro, Brazil

The use of a geographic information system (GIS) allows the mapping and quantification of biotic and physical features of importance to the environmental planning of Antarctic areas. In this paper we examine the geoenvironments of Arctowski Station vicinity (Admiralty bay, Maritime Antartica), by means of a photointerpretation of a ortomosaic at 1:6000 scale, produced by non-conventional aerial photographs obtained by the Cryosols project, aiming to undertake a preliminary environmental valuation and vulnerability assessment of the area. The geoenvironments were classified and ranked according with their biological valuation and vulnerability (fragility), mapping 20 units covering an approximate 150 ha. The most fragile geoenvrionmental units were penguin rookeries and various vegetation covers, very prone to degradation by trampling and human perturbations. The relationships between each geoenvironment were also explored, emphasizing the ecological aspects and their valuation. There, ornithogenic input is an important factor favoring the vegetation development.

3.PS-79: A fifth-order reconnaissance soil map of ice-free areas of the Transantarctic Mountains, Antarctica

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A 5th order reconnaissance soil map of ice-free areas of the Transantarctic Mountains from Northern Victoria Land to the Shackleton Range has been compiled. Soils were classified to Subgroup level using USDA Soil Taxonomy. Soils in relatively moist coastal areas of the Transantarctic mountains are dominated by Haplorthels as precipitation recharges soil moisture lost through evaporation. As a consequence ice-cemented permafrost occurs at a depth of <70 cm. In contrast, in drier inland areas ice-cemented permafrost is not recharged and depth to ice-cemented permafrost increases with age, leading to Anhyorthels where depth to ice-cement exceeds 70 cm. Lithic Subgroups occur predominantly on steeper land or where high wind speed facilitates removal of shattered rock material. The electronic version of the map can be considered to be work in progress that can be updated whenever researchers have improved soil information covering a significant area.

3.PS-80: ABRIS Project: New bedrock topography map for central Antarctica

Sergey V. Popov[1], **German L. Leitchenkov**[2], **Maxim Yu. Moskalevsky**[3], **Victor V. Kharitonov**[1] and **Valery N. Masolov**[1], (1)Polar Marine Geosurvey Expedition (PMGE), 24, Pobeda Str., St. Petersburg, Lomonosov, 188512, Russia, (2)Antarctic geology, Institute for Geology and Mineral Resources of the World Ocean (VNIIOkeangeologia), Angliiskiy ave., 1, St.Petersburg, 190121, Russia, (3)Institute of Geography, Russian Academy of Sciences (IGRAN), 29, Staromonetny lane, Moscow, Russia

The new bedrock topography map has been compiled for the central region of East Antarctica using ice thickness data available in the BEDMAP Project data base and new information obtained after 2000 by the Russian Antarctic Expedition (when the BEDMAP product finished). Moreover, airborne radio-echo sounding data acquired during the Soviet Antarctic Expeditions (before 1992) between Enderby Land and the Gamburtsev Subglacial Mountains and recorded on films have been revised and reinterpreted. This work allowed imaging of the improved bedrock topography for this area. Unlike the previously published bedrock topography map produced by the BEDMAP Project, the new map shows real bathymetry of Lake Vostok and some earlier not recognized morphological features of the Gamburtsev Subglacial Mountains and area to the north of them.

3.PS-81: New compilation of the Amundsen Sea continental shelf bathymetry

Frank O. Nitsche[1], **Stanley Jacobs**[1], **Robert D. Larter**[2] and **Karsten Gohl**[3], (1)Lamont Doherty Earth Observatory, Columbia University, 61 Route 9W, Palisades, NY 10964, (2)British Antarctic Survey, Madingley, High Cross, Cambridge CB3 0ET, United Kingdom, (3)Dept. of Geosciences, Alfred Wegener Institute for Polar and Marine Research, Columbusstrasse, Bremerhaven, 27568, Germany

The Amundsen Sea continental shelf is one of the remotest areas of coastal Antarctica, and was relatively unexplored until the 1980s. Over the last two decades, however, oceanographic and geological interest has led to several cruises, one result of which is that there is now sufficient bathymetric data to compile a fairly detailed regional map of the Amundsen continental shelf. We have combined the available multibeam and single beam bathymetry data from this region and created a new regional bathymetric map of the Amundsen Sea continental shelf and slope. After editing the individual data sets we used a natural neighbor algorithm to interpolate between the existing data and create a grid at 5 km raster resolution. The most prominent regional feature is a series of separate trough systems along the inner shelf, which are aligned with present glaciers, separated by shallower ridges, and shoaling seaward.

3.PS-82: Draft geological map for the South Orkney Islands, Antarctica

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Geological work carried out under the long-term monitoring and surveying programme at the British Antarctic Survey, includes targeted new field programmes and data acquisition, together with the collation and conversion of a variety of existing geological data for digitally generating geological maps. As a result of recent fieldwork on Signy Island a new geological map of the South Orkney Islands, a key component in the tectonic development of the Scotia Sea, is being prepared. A draft version of this map will be presented and it is hoped that during the course of the meeting any suggestions, errors and omissions that are highlighted can be taken on board towards a final version.

3.PS-83: Generation of a detailed geological map of the Antarctic Peninsula applying remote sensing methods

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Antarctica is one of the most difficult continents to work on geologic aspects because of its permanent ice shield covering over 98%. This project concentrating on the Antarctic Peninsula and adjacent islands tries to solve this constitutional problem in applying a new methodology to gain the same results as a traditional geological mapping in unapproachable areas. Therefor satellite images from optical and radar sensors are used as well as aerial photograph. The technique of using remote sensing data to discover geological features is already widely-used but has not been applied to any parts of the Antarctic continent because of difficulties in finding suitable datasets. For example high cloud coverage is a hindering factor in applying known methodologies on this area. For that reason this project concentrates on discovering the best possible solution of a data combination leading to a detailed geological map of the Antarctic Peninsula and adjoining islands.

3.PS-84: Geometrical analysis of structural data collected at high South latitude: A modular arithmetic method that addresses meridional convergence

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The convergence of meridians of longitude toward the South Pole causes problems for direct geometrical comparison of structural geological and geophysical datasets in Antarctica. Rotation of data to a common reference direction can be performed using a modular arithmetic function, in order to carry out geometrical analysis of faults, dike arrays, and tectonic or ice lineaments for tectonic interpretations. Performed as a spreadsheet calculation, the function Sc = MOD [(Sm + dL), 360] is demonstrated for structural datasets from latitude >80°S in the southern Transantarctic Mountains, Ellsworth, and Pensacola Mountains. Sc is converted strike; Sm, measured strike; dL, angle in degrees longitude between reference site and study site; and 360 (the divisor), the number of degrees for the circumference of a sphere. The paper proposes a protocol for geometrical and kinematic comparison of structural and geophysical data from high South latitude in Antarctica.

3.PS-85: New magnetic anomaly map of East Antarctica and surrounding regions

Alexander Golynsky[1], **Don Blankenship**[2], **Massimo Chiappini**[3], **Detlef Damaske**[4], **Fausto Ferraccioli**[5], **Carol Finn**[6], **Dmitry Golynsky**[7], **Alexey Goncharov**[8], **Sergey Ivanov**[9], **Takemi Ishihara**[10], **Wilfried Jokat**[11], **Hyung Rae Kim**[12], **Matthias König**[11], **Valery Masolov**[9], **Yoshifumi Nogi**[13], **Morten Sand**[14], **Michael Studinger**[15] and **Ralph von Frese**[16], (1)VNIIOkeangeologia, St. Petersburg, Russia, (2)The University of Texas at Austin, (3)INGV, Italy, (4)BGR, Germany, (5)BAS, United Kingdom, (6)USGS, (7)The Saint-Petersburg State University, VNIIOkeangeologia, Russia, (8)Geoscience Australia, Australia, (9)PMGRE, Russia, (10)GSJ, Japan, (11)AWI, Germany, (12)UMBC/GEST at NASA Goddard Space Flight Center, (13)NIPR, Japan, (14)NPD, Norway, (15)LDEO of Columbia University, (16)The Ohio State University

More than 500,000 line-km of new airborne and shipborne data recently acquired by the international community over East Antarctica and surrounding regions significantly upgrade the ADMAP compilation, and provide substantial improvements in outlining magnetic anomaly patterns. New data have been matched in one inverse operation by minimizing the data differences for the areas of overlap. Aeromagnetic data over the continent allow recognizing many unknown magnetic patterns, lineaments and trends and help determine spatial extent of Ferrar volcanics and plutonic Granite Harbour Intrusives in the Transantarctic Mountains and previously unknown tectonic trends of the East Antarctic craton. Regional aeromagnetic investigations have been successful in delineating Early Paleozoic inherited crustal features along the flanks of the West Antarctic Rift System and in defining the southern boundary of the Archean Ruker Terrane in the Prince Charles Mountains. Magnetic records along the East Antarctic continental margin provide new constraints on the breakup of Gondwana.

3.PS-86: Airborne geophysics as a tool for geoscientific research in Antarctica: Some recent examples and perspectives

F. Ferraccioli, **P.C. Jones**, **P. Leat**, **T. Jordan** and **H. Corr**, Geological Sciences Division, British Antarctic Survey, High Cross, Madingley Road, Cambridge, CB3 0ET, United Kingdom

The polar regions play an important role in Earth's geodynamic and climatic systems. Modern airborne geophysical surveys combine radio-echo sounding, aeromagnetic and aerogravity methods to explore these regions. This paper reviews some recent aerogeophysical investigations undertaken by the British Antarctic Survey to: 1) Image subglacial rifts associated with early Gondwana break-up; 2) Investigate crustal growth by arc magmatism and terrane accretion at the paleo-Pacific margin of Gondwana; 3) Analyse geologic controls on enhanced ice flow. Our current aerogeophysical research centres on processing and interpreting new data acquired over the West and the East Antarctic Ice Sheet and aims to provide new geological boundary conditions for ice sheet modelling. We also plan to participate in new collaborative IPY surveys to explore the enigmatic Gamburtsev Subglacial Mountains in East Antarctica.

3.PS-87: Gravimeter test flights to the North Pole

Michael Studinger, **Robin E. Bell** and **Nicholas P. Frearson**, Lamont-Doherty Earth Observatory, Columbia University, 61 Rt. 9W, Palisades, NY 10964

We are currently developing an aerogeophysical imaging system for polar applications during the IPY and beyond. The complete system will include an ice-penetrating radar, a laser altimeter, a magnetometer and a gravimeter. The purpose of a major flight testing program in Spring 2007 was to install and fly two different airborne gravimeters on a single Twin Otter aircraft for side-by-side testing first over a known test range in Calgary and secondly at higher latitude, out of Eureka, Ellesmere Island (80°N) to the North Pole. Either of these systems provides the academic community with a tremendous increase in accuracy and horizontal resolution that will enable major advances in understanding of the subglacial environment. The new systems are capable of draped flying of airborne gravity – broadening potential applications. The performance of the new gravimeter systems under various test conditions will be presented at the symposium.

3.PS-88: POLENET: Polar Earth Observing Network for the International Polar Year

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The Polar Earth Observing Network (POLENET) multinational consortium will implement a network of in situ sensors across Antarctica and the Arctic during the International Polar Year (IPY). Activities will be focused on deployment of autonomous observatories at remote sites on the continents and offshore, coordinated with measurements made at permanent station observatories and by satellite campaigns. Measurements (in situ, satellite and airborne) will include GPS (w/ GLONASS, Galileo; GPS occultation/met sensors), seismic, gravity, geomagnetic, tide gauges and ocean bottom sensors, oceanographic (in situ and altimetry) and chemical (at offshore sites). Multidisciplinary deep sea observatories on the polar seafloor will perform continuous collection of geophysical, oceanographic and geochemical data. The POLENET initiative is designed to provide a legacy in in situ observational infrastructure in the polar regions and in the technological capability to overcome the challenges of autonomous operations in extreme environments.

3.PS-89: Development of a power and communications system for remote autonomous polar observations

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The National Science Foundation has awarded a Major Research Initiative (MRI) grant to UNAVCO and the Incorporated Research Institutions for Seismology to develop a power and communications system that will improve remote autonomous geophysical observations in the polar environments. Our goal is to provide a standardized approach to scaling infrastructure support designs to the seismological and geodetic community's particular experimental designs. Through testing in each facility's cold chambers and through field trials at test-beds located in Antarctica, the MRI project will investigate optimal battery designs (both rechargeable and non-rechargeable), power systems (solar, wind), environmental conditioning, and telemetry systems appropriate for these extreme conditions. The aim of this collaborative project is to not only take best advantage of the field engineering experiences of the two consortia, but to also create a means of incorporating expert design contributions and exchanging ideas, designs and experiences with the entire polar research community.

3.PS-90: SCIAMACHY's view of the polar atmosphere

Manfred Gottwald[1], **Eckhart Krieg**[1], **Christian von Savigny**[2], **Stefan Noel**[2], **Philipp Reichl**[2], **Andreas Richter**[2], **Heinrich Bovensmann**[2] and **John P. Burrows**[2], (1)Remote Sensing Technology Institute (IMF), German Aerospace Center (DLR), Oberpfaffenhofen, D-82234 Wessling, Germany, (2)Institute of Environmental Physics (IUP), University of Bremen, Otto-Hahn-Allee 1, D-28359 Bremen, Germany

SCIAMACHY observed the polar atmosphere in the past 5 years in great detail. We present several examples of geophysical parameters retrieved from these measurements. Starting in the troposphere we discuss interactions between the arctic ocean and tropospheric trace gases. One layer up in the stratosphere catalytic ozone depletion is still a major concern with several participating key species being monitored continuously. During the ozone hole episodes PSCs are detected and yield insight into the underlying chemical processes. Finally the mesosphere hosts NLCs which are considered to be an early indicator of global change. SCIAMACHY’s measurements allow not only identification of NLCs but also of their particle sizes. The polar atmosphere is considered to be highly sensitive to anthropogenic impacts on the Earth system and thus to climate change. SCIAMACHY’s measurements contribute significantly to the understanding of the underlying atmospheric chemistry and transport processes.

3.PS-91: Cenozoic Antarctic DiatomWare/BugCam: An aid for research and teaching

Sherwood Wise Jr.[1], **Matt Olney**[1], **J. Mitchener Covington**[2], **Shijun Jiang**[1], **Denise K. Kulhanek**[1], **Hans Schrader**[3], **Ted Bibby**[1], **William Falcon**[1] and **David Harwood**[4], (1)Geological Sciences, Florida State University, Department of Geological Sciences,4100,, Florida State University, Tallahassee, FL 32306-4100, (2)BugWare, Inc., 4027 Bobbin Brook East, Tallahassee, FL 32312, (3)Landrat-Seifert Strasse 4, D-27283 Verden (Aller), Germany, (4)Department of Geosciences, University of Nebraska--Lincoln, 214 Bessey Hall, Lincoln, NE, NE 68588-0340

Cenozoic Antarctic DiatomWare/BugCam© is an interactive, icon-driven digital image database/software package that displays over 500 illustrated Cenozoic Antarctic diatom taxa along with original descriptions (including over 100 generic and 20 family-group descriptions). This digital catalog is designed primarily for use by micropaleontologists working in the field (at sea or on the Antarctic continent) where hard-copy literature resources are limited. This new package will also be useful for classroom/lab teaching as well as for any paleontologists making or refining taxonomic identifications at the microscope. The database (*Cenozoic Antarctic DiatomWare*) is displayed via a custom software program (*BugCam*) written in Visual Basic for use on PCs running Windows 95 or later operating systems. *BugCam* is a flexible image display program that utilizes an intuitive thumbnail "tree" structure for navigation through the database. The data are stored on Micrsosoft EXCEL spread sheets, hence no separate relational database program is necessary.

3.PS-92: The United States Polar Rock Repository: A geological resource for the Earth science community

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The United States Polar Rock Repository is a national facility designed for the permanent curatorial preservation of rock samples, unconsolidated material, dredges and terrestrial cores, along with associated metadata. The facility was established by the Office of Polar Programs at the National Science Foundation (NSF), because the extreme cold and hazardous field conditions make field work costly and difficult. The repository provides, along with an on-line database of sample information, an essential resource for proposal preparation, pilot studies and other sample-based research that should make fieldwork more efficient and effective. This latter aspect should reduce the environmental impact of field work in sensitive polar regions. The USPRR also provides material samples for educational outreach. Rock samples may be borrowed or used for research, educational or museum use.

4.PL: Plenary lectures

4.PL-1: 100 million years of Antarctic climate evolution: Evidence from fossil plants

Jane E. Francis[1], **Allan C. Ashworth**[2], **David J. Cantrill**[3], **Jodie Howe**[1], **Vanessa Thorn**[1], **Anne-Marie Tosolini**[1] and **Rosemary Stephens**[1], (1)School of Earth and Environment, University of Leeds, Leeds, LS2 9JT, United Kingdom, (2)Department of Geosciences, North Dakota State University, Fargo, ND 58105-5517, (3)Plant Sciences and Biodiversity, Royal Botanic Gardens Melbourne, Victoria, 3141, Australia

The evolution of Antarctic climate from a Cretaceous greenhouse into the Neogene icehouse is captured within a rich record of fossil leaves, wood, pollen and flowers from the Antarctica Peninsula and the Transantarctic Mountains. About 85 million years ago, during the mid-Late Cretaceous, flowering plants thrived in sub-tropical climates in Antarctica. Analysis of their leaves and flowers, many of which were ancestors of plants that live in the tropics today, indicates that summer temperatures averaged 20°C during this global thermal maximum. During the Palaeogene (~50Ma) warmth-loving plants gradually lost their place in the vegetation and were replaced by floras dominated by araucarian conifers (monkey puzzle) and the southern beech Nothofagus, which tolerated freezing winters. Plants hung on tenaciously in high latitudes, even after ice sheets covered the land and during periods of interglacial warmth in the Neogene small dwarf plants survived in tundra-like conditions within 500km of the South Pole.

4.PL-2: Tectonic development of the West Antarctic rift system: Perspectives from the Pacific margin and eastern Ross Sea

Christine Smith Siddoway, Department of Geology, The Colorado College, 14 E. Cache la Poudre, Colorado Springs, CO 80903

The Pacific sector of Antarctica consists of tectonic terranes amalgamated along the convergent margin of Gondwana, intruded by arc plutons, and affected by transcurrent plate interactions in Cretaceous (Marie Byrd Land, Antarctic Peninsula) and Tertiary (north Victoria Land) time. The region has distinctive geophysical characteristics, including freeboard position of its thinned continental crust since Cretaceous time, thermal structure, and the inverted gravity signature of Ross Sea basins. Its subsidence and sedimentation history is unusual in light of the two-stage Cretaceous extension recorded in the Ross Sea and Marie Byrd Land. Inherited crustal structures and thermal perturbations influence the Miocene to present volcanism that coincided with growth of the Antarctic ice sheet, and they affect ice flow patterns today. This paper explores these factors in order to gain perspective on evolution of the West Antarctic rift system and to discover linkages between the discrete geological entities of West and East Antarctica.

4.A.A: Ice sheet history and dynamics: Solid-earth, subglacial, terrestrial, and marine geological records ORAL

4.A.A-1: Characteristics of till transported by the Byrd and Nimrod Glaciers, Antarctica

Kathy Licht and **Emerson Palmer**, Department of Earth Sciences, IUPUI, 723 W. Michigan St., Room SL118, Indianapolis, IN 46202

Particle size distributions were measured from till samples collected at seventeen moraines along the Byrd and Nimrod Glaciers. Approximately 2 g of material was separated from till samples, treated with 35% H2O2, and measured 3 – 5 times on a Malvern Mastersizer 2000. All sites are dominated by sand- and gravel-sized material with distinct spatial patterns in the silt and clay content. Till from the north side of Byrd Glacier and along the trunk of Nimrod Glacier have variable modes in the sand fraction and <5% clay. The tills are primarily derived from locally eroded bedrock. Moraines found at the head of both glaciers contain 15% -70% fines (silt plus clay) and are interpreted to contain subglacially-derived sediment. Till deposited in the Ross Sea from outlet glaciers likely contains a mixture basal debris derived from the East Antarctic craton and material eroded as glaciers cross the Transatarctic Mountains.

4.A.A-2: Provenance of glacially transported material near Nimrod Glacier, East Antarctica: Implications for the ice-covered East Antarctic shield

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Study of glacial-clast petrography, igneous whole-rock geochemistry, metamorphic mineral composition, and magnetic susceptibility of glacially eroded, transported, and deposited material near Nimrod Glacier, East Antarctica provides information on the composition of the ice-covered East Antarctic shield. Over 100 igneous and metamorphic rocks collected from moraines near Nimrod Glacier show both local and transported material. Most metamorphic rocks collected show intense deformation fabrics, high-grade mineral assemblages, and high-grade P-T conditions, which are similar to the Archean and Paleoproterozoic Nimrod Group. Many igneous rocks may originate from either the Nimrod Group or from the syn-tectonic and post-tectonic Cambrian-Ordovician Granite Harbour Intrusive series, and some come from nearby Ferrar dolerite (Jurassic). Although many of the clasts can be explained by local derivation, others appear exotic and may represent more distal origins in the shield interior. Future geochronology will help to refine the relative contributions of local and distal sources to test these conclusions.

4.A.A-3: Records of past ice sheet fluctuation in interior East Antarctica

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Land-based multi-disciplinary study of the past ice surface fluctuation in the Grove Mountains, interior East Antarctica support a dynamic evolution. Based on geomorphic evidence, ages of soil formation, lithologic analyses of sedimentary boulders, spore pollen assemblages, coupled with in-situ cosmogenic nuclide exposure ages, we suggest that:

1. The margin of the EAIS once lay beyond of the GMs region, some 450 km south from its present coastal position, before the Late Pliocene. This retreat testifies to the Middle Pliocene warmth.
2. The elevation of ice surface in the GMs region subsequently rose to more than at least 450m higher than today, before 2.3 Ma.
3. The ice surface then progressively descended from 2.3 Ma to 1.6 Ma, and it suffered small turbulent fluctuation since the Early Pleistocene. However, the highest level it reached never exceeded ~100 m above recent level.

4.A.A-4: Spores and pollen from glacial erratics in the Grove Mountains, East Antarctica

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Glacial erratics containing sparse spores and pollen derived from a suite of glaciogene strata hidden beneath the Antarctic Ice Sheet have been found in the Grove Mountains, east of the Lambert Glacier drainage system, Antarctica. The assemblage includes angiosperm and gymnosperm taxa of possible Neogene age with a minor recycled component. The miospores differ from those described from several other Cenozoic Antarctic localities, but include some similar taxa to the Pliocene Meyer Desert Formation.

4.A.A-5: Six million years of environmental (glacial—interglacial) conditions preserved in volcanic lithofacies of the James Ross Island Volcanic Group, northern Antarctic Peninsula

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The Neogene geological record in the James Ross Island region is dominated by persistent basaltic volcanism. At least 50 mainly effusive basaltic volcanic eruptions constructed an extensive volcanic field over a 6 million year period. Interpretation of the volcanic units has enabled critical parameters of the palaeo-ice cover to be deduced for the first time, for multiple time slices. Most eruptions took place within a relatively thin glacier cover, typically just 200-350 m, with fewer periods of thicker ice, c. 600-750 m. The glacier cover increased in thickness toward the present, but there is no evidence for a “giant” ice sheet. It was probably sub-polar (polythermal) with a low profile dominated by a local ice cap on James Ross Island. These results are the first evidence for the morphology, thickness and thermal regime of the glacier cover in the northern Antarctic Peninsula region for the late Neogene period.

4.A.A-6: Mio-Pliocene ice-volcano interactions at monogenetic volcanoes near Hobbs Coast, Marie Byrd Land, Antarctica

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Paleoenvironmental reconstructions and $^{40}Ar/^{39}Ar$ geochronology of seven eroded monogenetic volcanoes near the Hobbs Coast, Marie Byrd Land, West Antarctica provide proxy records of WAIS paleo-ice-levels in Mio-Pliocene times. Interpretations, based on lithofacies analysis, indicate whether the volcanoes erupted below, near, or above the level of the ice sheet. Our interpretations differ significantly from previous interpretations and suggest that there is abundant evidence for ice-volcano interactions at emergent paleoenvironments but limited evidence of higher-than-present syn-eruptive ice-levels. Evidence for subglacial volcanic paleoenvironments is limited to Kennel Peak, a ~8 Ma volcano where a pillow lava sequence extending 25 m above current ice level overlies an inferred glacial till and unconformity.

A major complication in the Hobbs Coast region is that the volcanism occurred on interfluves between regions fast-flowing ice. Such a setting precludes establishing precise regional paleo-ice-levels although the presence or absence of ice at times of eruptions can be inferred.

4.A.A-7: Late Miocene volcanism and glaciation at Minna Bluff, Antarctica

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Well-exposed stratigraphic sections at Minna Bluff in the Ross Embayment provide records of ~11-7 Ma volcanism, glacial erosion, and glacial deposition. Stratigraphic alternations between rocks erupted in subaerial and subaqueous conditions are interpreted as syneruptive interactions between lava flows and a local ice cap. Widespread, undulating unconformities mantled by glacial and fluvial sediments exposed near the base of the sequences may indicate broader scale Ross Ice Sheet events. Ongoing geochronology, geochemistry, and lithofacies analysis will provide a more detailed glacial and volcanic record.

Minna Bluff is a significant topographic barrier that has effectively blocked the Ross Ice Shelf and the former Ross Sea Ice Sheet from flowing southward into McMurdo Sound. Documenting the timing of blockage of ice flow is critical for reconstructing past behavior of the Ross Ice Shelf/Ice Sheet and for interpreting the ANDRILL cores.

4.A.B: Antarctic intraplate and plate boundary regimes ORAL

4.A.B-1: Geodynamic models of the tectonomagmatic evolution of the West Antarctic Rift System

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Finite element geodynamic models of the West Antarctic Rift System reproduce the transition from prolonged diffuse extension throughout the rift system during the Cretaceous and early Cenozoic to later focused extension in the Victoria Land Basin during the middle Paleogene. The change in the style of rifting is due to intraplate processes, and does not require changes in plate motions or impingement of a mantle plume. The models are consistent with the Paleogene onset of magmatism in the West Antarctic Rift System under normal mantle thermal conditions. However, the preliminary models indicate that spatially widespread magmatism may require mantle temperatures elevated approximately 100 °C above normal, supporting arguments favoring the presence of a plume.

4.A.B-2: Lithospheric structure across the Transantarctic Mountains constrained by analysis of gravity and thermal structure

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Results of gravity modeling based on realistic density distribution provide constraints on the lithospheric structure of Transantarctic Mountains (TAM) and adjacent regions. Model results yield a lithospheric thickness of 60 km for the Ross Sea region of the West Antarctic Rift System, and a lithospehric thickness of ~250 km for the East Antarctic craton. These thicknesses are consistent with the tectonic setting of an extended region of West Antarctica and the cratonic lithosphere of East Antarctica. In addition, model results suggest that the necessary additional bouyant support of the TAM comes from radiogenic heat of the TAM crust.

4.A.B-3: Tectonic implications for uplift of the Transantarctic Mountains

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The Transantarctic Mountains are a non-compressional belt located on the boundary between cratonic East Antarctica and non-cratonic West Antarctica. Here we present a time-evolving model for mountain uplift, formation of a small crustal root, depression of the hinterland Wilkes Basin, and formation of the West Antarctic Rift system (WAR). Using 2D thermo-mechanical models to study deformation of the tectonic boundary, we find that convergence of crustal material at the craton edge during extension results in formation of a small crustal root and surface uplift, consistent with observations. We suggest that the WAR formed adjacent to the craton, the weakest location in the region. The hinterland basin is a flexural depression; thermo-mechanical models yield no rifting in the hinterland as the craton is too strong. Our models indicate that uplift of the Transantarctic Mountains is related to formation of the WAR and flexural depression of the Wilkes Basin.

4.A.B-4: Aeromagnetic anomaly patterns reveal buried faults along the eastern margin of the Wilkes Subglacial Basin (East Antarctica)

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The Wilkes Subglacial Basin (WSB) is the major morphological feature recognized in the hinterland of the Transantarctic Mountains. The origin of this basin is still contentious and relatively poorly understood due to the lack of extensive geophysical exploration. We present a new aeromagnetic anomaly map over the transition between the Transantarctic Mountains and the WSB for an area adjacent to northern Victoria Land. The aeromagnetic map reveals the existence of subglacial faults along the eastern margin of the WSB. These inferred faults connect previously proposed fault zones over Oates Land with those mapped along the Ross Sea Coast. Specifically we suggest a link between the Matusevich Frature Zone and the Priestley Fault. The new evidence for structural control on the eastern margin of the WSB implies that a purely flexural origin for the basin is unlikely.

4.A.B-5: A plateau collapse model for the formation of the West Antarctic rift system/Transantarctic Mountains

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A recent model (Bialas et al., 2007) proposes that the Transantarctic Mountains (TAM) are the remnant edge of a collapsed plateau. In this model, the West Antarctic rift system/TAM region was a plateau (the "West Antarctic Plateau") with thicker than normal crust before undergoing a topographic reversal. Plateau collapse was due to continental extension and concomitant denudation beginning in the Jurassic when widespread tholeiitic magmatism marked initial rifting between East and West Antarctica. This was followed by the major period of West Antarctic extension in the Cretaceous and then more localized extension in the western Ross Embayment in the Paleogene and Neogene. The West Antarctic plateau formed inboard of subduction zone that existed along the Pacific margin of Gondwana throughout the Paleozoic until the late Mesozoic. The remnant plateau edge, now supported by slightly thickened crust, represents the ancestral TAM that remained following plateau collapse.

4.A.B-6: Byrd drainage system: Evidence of a Mesozoic West Antarctic Plateau

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Recent geomorphic and thermochronologic studies in the Byrd drainage system present a paradoxical suite of data that are difficult to interpret under the current paradigm that the Transantarctic Mountains are an Eocene rift flank uplift. Specifically, recent studies indicate 1) the Byrd outlet originated prior to development of the TAM (Huerta & Reusch, 2005; Huerta, 2006; in revision), 2) the Byrd drainage system once flowed from West Antarctica to East Antarctica (Huerta & Reusch, 2005; Huerta, 2006), and 3) rapid crustal cooling at ~120 Ma in the Byrd glacier region, (Huerta & Winberry, submitted). These data, however, are readily understood in the context of recent geodynamic studies that indicate that the West Antarctic region would have been a high-elevation plateau prior to the onset of extension at ~105 Ma, and that the Transantarctic Mountains may be the abandoned margin of the collapsed plateau (Huerta and Harry, 2007; Bialas, in press).

4.A.B-7: Cretaceous and Tertiary extension throughout the Ross Sea, Antarctica

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Analyses of marine geophysical data from the Adare Trough and Basin in the deep sea adjacent to the Ross Sea, Antarctica suggest that there has been 170 km of extension between East and West Antarctica during 46 to 21 Ma with 95 km of this extension in the Northern and Victoria Land Basins in the western Ross Sea adjacent to the Transantarctic Mountains. There are several kilometers of Oligocene sediments in the Central Trough and Eastern Basin in the eastern Ross Sea. Subsidence modeling accounts for these accumulations with about 40 km of extension in each basin centered on 35 Ma; therefore southern Ross Sea extension was comparable to extension in the Adare system. The early Tertiary geometry was of one oceanic rift that branched into at least three rifts in the continental lithosphere.

4.A.C: The state of permafrost in a changing environment ORAL

4.A.C-1: The permafrost environment of Northwest Hurd Peninsula (Livingston Island, Maritime Antarctic). Preliminary results

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The permafrost spatial distribution in Hurd Peninsula (Livingston Island, Antarctic) and its thermal state are the focus of the ongoing research. A multidisciplinary approach that includes meteorological and ground temperature monitoring, geomorphological mapping and geophysical surveying has been used. The results from this research indicate that ice-cored moraines and active rockglaciers are present down to sea-level. Permafrost in bedrock is more difficult to assess. It is present at 275m ASL in Reina Sofia Hill, with an active layer ca. 1m deep. At 100m the Electrical Tomography Resistivity data suggests that permafrost is present, at least under snow patches. At 35m ASL in bedrock permafrost hasn't been found. However, more research is needed for assessing the spatial distribution of permafrost. Drilling and borehole temperature monitoring are the main objectives of the next Antarctic campaigns.

4.A.C-2: Permafrost and active layer monitoring in the Maritime Antarctic. Preliminary results from CALM sites on Livingston and Deception Islands

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The focus of this paper is to describe the results obtained from the scientific work and experiments performed on Livingston and Deception Islands. Located in the South Shetland archipelago, these islands are one of the most sensitive regions with respect to climate change over the last 50 years. Three CALM sites were installed to record the thermal regime and the behaviour of the active layer in different places with similar climatology but which have different soil composition, porosity, and water content. The influence of the climate change on permafrost degradation will be the focus of this paper's objectives. Preliminary results on the maximum active layer thickness, the active layer temperature evolution, snow thickness, and air temperatures obtained in 2006 allow an early characterization of the energy exchange mechanism between the ground and the atmosphere in the CALM-S sites to be made.

4.A.C-3: Organic C stocks in cryosols from Admiralty Bay, Maritime Antarctica

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Recent studies show that organic matter accumulation in soils from coastal Antarctica is higher than previously expected. The objective of the present work was to estimate the organic C stocks for soils from Maritime Antarctica. Cryosols from subpolar desert landscapes presented the lowest organic C stocks. Cryptogamic plant communities increase soil C stocks, although these are lower than that reported for most soils from polar areas. Ornithogenic soils are the most important C reservoirs in terrestrial ecosystems in this part of Antarctica. Although these soils correspond to only 2.5 % of the ice-free areas at Admiralty Bay, they contain approximately 20 % of the estimated C stock. Most of the organic C in the studied soils is stored in the active layer but in some cases the C is also stored in the permafrost

4.A.C-4: Quantifying sublimation of buried glacier ice in Beacon Valley

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A remnant of Taylor Glacier ice rests beneath a 40-to-80-cm-thick layer of sublimation till in central Beacon Valley, Antarctica. Our 1-D vapor diffusion model, with input from micrometeorological data collected during the 2004 austral summer, shows that vapor flows into and out of sublimation till at rates dependent on the non-linear variation of vapor concentration with depth. Although measured meteorological conditions during the study interval favored a net loss of buried glacier ice (~0.017 mm over 42 days), an average rate of ice sublimation that is consistent with a loss of 400 m of ice over 8.1 Ma (an amount suggested by Potter et al., 2003) is permissible if local temperatures decrease by ~3ºC; relative humidity increases by 15%; or snowmelt infiltration equals ~0.001 mm/day. Our model results are consistent with the potential for long-term survival of buried glacier ice in the hyper-arid upland zone of the Dry Valleys.

4.A.C-5: Thermal regime, isotopic and morphological characteristics of ice wedges in northern Victoria Land, Antarctica

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The preliminary results of the research carried out on six ice wedges located in the vicinity of Terra Nova Bay, in northern Victoria Land utilized co-isotope analyses to show that sublimation processes contribute to the formation of the ice-wedge ice. Analysis of the thermal regime of one ice wedge over a period of one year shows that extreme gradients between the ground surface and the top of the ice wedge temperatures may trigger ice-wedge cracking.

4.A.D: Cretaceous and Tertiary climates of Antarctica ORAL

4.A.D-1: The Neogene biota of the Transantarctic Mountains

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Neogene fossil assemblages are described from the Transantarctic Mountains. The plant fossils, include diatoms and algal spores, megaspores of *Isoetes*, pollen of angiosperms and gymnosperms, wood and leaves of *Nothofagus*, cushion growth forms of a vascular plant and a moss species, mats of exceptionally well-preserved moss species with delicate leaves attached to stems, and achenes and fruits of vascular plant species including *Ranunculus*. The invertebrate fossils include disarticulated chitinous parts of beetles and flies, cypridoidean ostracods and the shells of freshwater molluscs. The only vertebrate fossil is that of a fish. The fossil assemblages require considerably warmer temperatures than are available within the Transantarctic Mountains today; estimated to be at least two to three summer months annually with mean temperatures of 4-5°C. Early interpretations allowed for the extinction of this terrestrial biota to have occurred as late as the Pliocene but a Miocene age now seems more probable.

4.A.D-2: Major middle Miocene climate change and the extinction of tundra communities: Evidence from the Transantarctic Mountains

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We present a glacial record from the western Olympus Range, East Antarctica, that documents a permanent shift in the thermal regime of local glaciers, from wet to cold based, between 14.11 and 13.94 million years ago (Ma). The record includes classic wet-based tills interbedded with fossil-rich glaciolacustrine deposits overlain by a series of cold-based drifts. Chronologic control comes from $^{40}Ar/^{39}Ar$ analyses of six in-situ volcanic ash deposits. The shift from wet- to cold-based glaciation reflects a drop in mean annual temperature of 20 to 30 °C and is shown to precede one or more major episodes of ice-sheet expansion across the region sometime between 13.62 and 12.44 Ma. Major implications are 1) that atmospheric cooling preceded, and thus may have triggered, maximum overriding of the polar East Antarctic Ice Sheet and 2) that complex terrestrial communities became extinct in this sector of the Transantarctic Mountains at ~14 Ma.

4.A.D-3: Deterioration and/or cyclicity? The development of vegetation and climate during the Eocene and Oligocene in Antarctica

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The late Eocene to early Oligocene is a time interval in earth history with major changes in both the global environment and the biota. To understand the vegetation history of this time, ODP and “Islas Orcadas“ core samples from the Antarctic Peninsula area and the Tasman Sea were analysed using qualitative and quantitative palynological methods. Both floras represent a *Nothofagus*-Podocarpaceae forest association with a high percentage of ferns. The mid-Eocene flora of the Antarctic Peninsula region is an indicator of a warm-temperate, humid climate. The younger Tasman Sea flora shows a similar *Nothofagus*-Podocarpaceae forest association, but with a different composition of Nothofagaceae as well as a smaller percentage and diversity of ferns and the presence of *Casuarina*, a dryness indicator. Cryptogams, gymnosperms and angiosperms show tectonically or orbitally forced temperature changes in the time period examined.

4.A.D-4: Herbivory in Antarctic fossil forests: Evolutionary and palaeoclimatic significance

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Many collections of Eocene Fossil leaves from Antarctica contain a rich store of insect trace fossils, indicating that insects were an important component of the unique forests that grew in polar regions. However, insect body fossils themselves are rare and so insect traces provide an excellent opportunity to examine both the palaeoentomology and the palaeoclimate of Antarctica. Trace fossils of insect activity on fossil leaves from King George Island and Seymour Island, Antarctica have been studied in order to determine the range of insect activity in Eocene Antarctica forests and their use for palaeoclimate information. Three types of insect traces have been observed: leaf chewing, mines and galls. They indicate the presence of species of Coleoptera, Hymenoptera, Diptera and Lepidoptera that were eating or living in these Antarctic forests. Comparable living insects and the traces they make in living forest vegetation in Chile are being studied at present.

4.A.D-5: Terminal Cretaceous climate change and biotic response in Antarctica

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Latest Cretaceous to early Palaeogene climates in Antarctica are being investigated from an exceptional sedimentary sequence on Seymour Island (James Ross Basin, Antarctic Peninsula) to determine the nature of climate change at the end of the Cretaceous. It has been suggested that, following peak Cretaceous warmth, cooling during the Maastrichtian (~71-65 Ma) may have been severe enough for short-term glaciations at high latitudes, challenging the current view of an ice-free, Cretaceous greenhouse world. High resolution records of palaeontological, sedimentological, and geochemical signals are being obtained to investigate the climate and environmental context at the Antarctic margin prior to the Cretaceous/Tertiary extinctions, the biotic response in the marine and terrestrial realm, and to test the hypothesis of the presence of ice in conjunction with climate/ice sheet model simulations.

4.A.D-6: Paleobotany of Livingston Island: The first report of Upper Cretaceous fossil flora from Hannah Point

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This is the first report of fossil flora from Hannah Point, Livingston Island, South Shetland Islands, Antarctica. The fossiliferous content of an outcrop located between two igneous rock units of upper Cretaceous age consists of leaf imprints and fossil trunks. The leaf assemblage contains 18 taxa of Pteridophyta, Pinophyta and one angiosperm. The plant assemblage is similar to that known from the lower Cretaceous of the South Shetland Islands, but several taxa are upper Cretaceous in age. The most probable age for this fossil flora is Coniacian-Santonian, supported by previous K/Ar isotope studies of the basalts over and underlying the fossiliferous sequence.

4.P1.A: Ice sheet history and dynamics: Solid-earth, subglacial, terrestrial, and marine geological records ORAL

4.P1.A-1: New aerogeophysical survey targets the extent of the West Antarctic Rift System over Ellsworth Land

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The West Antarctic Ice Sheet is currently undergoing rapid change in particular over the Amundsen Sea Embayment (ASE). Previous aerogeophysical investigations over the Ross Sea Embayment reveal that the underlying geology may modulate ice sheet dynamics and hence stability. But what are the interplays between sub-ice geology and the apparently thinning and retreating glaciers of the ASE region? We will present new aerogeophysical data to provide a window on the “lithospheric cradle” for this part of the West Antarctic Ice Sheet, thereby contributing towards studying the largest glaciated continental rift system on Earth, the West Antarctic Rift System.

4.P1.A-2: New aeromagnetic results from the Thwaites Glacier catchment, West Antarctica

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The Amundsen Sea Embayment (ASE) of the West Antarctic Ice Sheet (WAIS) is a recent focus of attention due to observed changes indicating a negative mass balance associated with glacial thinning and grounding line retreat. These changes are likely driven by oceanic and/or atmospheric processes, but the future response of the ice sheet to changes at the margins will be dictated in large part to the ice sheet's underlying geological character including bed slope, roughness, heat flux, and both sediment and water distribution. A large-scale multi-instrumented airborne survey of this region conducted in 2004-05 provides important new information on these conditions. We will present new aeromagnetic data resulting from this survey to reveal constraints on the subglacial geology in this important region and potential controls on ice dynamics.

4.P1.A-3: Late Quaternary ice sheet dynamics and deglaciation history of the West Antarctic Ice Sheet in the Amundsen Sea Embayment: Preliminary results from recent research cruises

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The threat, in terms of sea level rise, posed by the potential rapid deglaciation of West Antarctica means there is an urgent need to know more about the speed and style of marine ice sheet retreat. Quaternary deglacial events recorded in marine sediments provide an opportunity to understand the future of the modern-day ice sheet. In this context, we examine the glacial history of a particularly poorly understood sector of the West Antarctic continental shelf – the Amundsen Sea Embayment –using new data from two recent research cruises. This extended abstract describes how marine geological and geophysical data are being used alongside terrestrial dating methods to understand the full extents, dynamics and retreat pattern of the West Antarctic Ice Sheet in the Amundsen Sea region during the last glacial cycle. These data hold significance for understanding and accurately modelling the stability and climate sensitivity of the West Antarctic Ice Sheet.

4.P1.A-4: Differences in ice retreat across Pine Island Bay, West Antarctica, since the Last Glacial Maximum: Indications from multichannel seismic reflection data

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An understanding of the glacial history of Pine Island Bay (PIB) is essential for refining models of the future development of the West Antarctic Ice Sheet (WAIS). New multichannel seismic reflection data from inner PIB are interpreted in context of previously published reconstructions for the retreat history in this area since the Last Glacial Maximum. Differences in the behavior of the ice sheet during deglaciation are shown to exist for the western and eastern parts of PIB. While we can identify only a thin veneer of sedimentary deposits in western PIB, eastern PIB shows sedimentary layers $\leq$ 400 msTWT. This is interpreted as a result of differences in ice retreat: a fast ice retreat in western PIB accompanied by rapid basal melting led to production of large meltwater streams, a slower ice retreat in eastern PIB is most probably the result of smaller drainage basins resulting in less meltwater production.

4.P1.B: Antarctic intraplate and plate boundary regimes ORAL

4.P1.B-1: Tectonic history of Mid-Miocene to present Southern Victoria Land Basin, inferred from seismic stratigraphy, in McMurdo Sound, Antarctica

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New and existing seismic reflection data in southern McMurdo Sound have been used to investigate Neogene tectonic history of the Terror Rift adjacent to the Transantarctic Mountains and the western margin of the West Antarctic Rift System. Seismic data image a young rifting episode that is largely unsampled by CRP and CIROS drill holes. Data reveal up to 3.5 km of post middle Miocene strata deposited in this part of the NNW-SSE trending Terror Rift basin. Mapped fault trends in the Terror Rift parallel the axis of the basin and are prominent in a 40 km zone north of Ross Island. Displacement on individual faults in this zone can exceed 100 m and faults collectively accommodate approximately 10-15 km of middle Miocene to Recent extension.

4.P1.B-2: Neotectonic and other features of the Victoria Land Basin, Antarctica, interpreted from multibeam bathymetry data

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NBP0401 surveyed the Terror Rift and southern half of the Victoria Land Basin (VLB). Approximately 3000 km2 of continuous multibeam bathymetry were collected in McMurdo Sound between 77?S and 77?40'S and from 164?40'W to Ross Island. Additional coverage was collected in the VLB, north of Franklin Island and in a 15 by 40 km area near 76?N, 176?E. The data revealed numerous features indicative of significant neotectonism. Northwest of Franklin Island is a distributed field of pockmarks, up to 500 m in diameter and 30 m deep. West of Franklin Island, are eight nearly circular features up to 4 km in diameter and 100+ m high. Their circular shapes suggest a magmatic origin but without a magnetic signature, they may in fact be glacial in origin. The new bathymetric data, although limited, show that there are still many seafloor features in the western Ross Sea to be found.

4.P1.B-3: ^{40}Ar-^{39}Ar age constraints on volcanism and tectonism in the Terror Rift of the Ross Sea, Antarctica

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The Terror Rift appears to be active or was active until very recently as shown by the crosscutting nature of young volcanic rocks. Seamounts as young as 122 Ka represent volcanic rocks cutting the entire Terror Rift section up to the seafloor, and unsampled areas may be even younger. If volcanic activity is coeval with rifting, then we can deduce that extension continued at least until the latest Pliocene and possibly even to more recent times. Improved understanding of the geochronology of these seafloor volcanic rocks not only aids in models of magmatic evolution, but will assist in seismic interpretations and neotectonic studies by providing absolute and precise time constraints for Terror Rift basin strata and structures.

4.P1.B-4: Beyond seafloor spreading: Neogene deformation and volcanism in the Adare Basin

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Seafloor spreading at the Adare spreading axis, lasting from the Middle Eocene until the Late Oligocene (43 – 26 Ma), constrains the motion between East and West Antarctica throughout that period of time. Subsequent faulting in the Adare and Northern Basins from Late Oligocene until present-day (26 - 0 Ma) is poorly resolved and might provide a key constraint on the motion between the two plates. Here we present preliminary results of new seismic reflection and seafloor mapping data acquired on geophysical cruise 07-01 aboard the R/VIB Nathaniel Palmer. Our results suggest that the style of deformation has changed from spreading-related faulting into a diffuse normal faulting (tilted blocks) that trend NE-SW with little resultant E-W extension. Recent volcanic activity is distributed throughout but tends to align with the NE-SW trend. Formation of the Terror Rift within the same time frame suggests that the pole of rotation might have drifted northward.

4.P1.B-5: Crustal velocity structure in the northern Ross Sea: From the Adare Basin onto the continental shelf

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Two episodes of extension in the West Antarctic Rift System produced the Transantarctic Mountains, deep sedimentary basins in the Ross Sea, and the Adare Trough spreading center. The Adare Basin and Northern Basin are located at the northwesternmost extent of this region of deformation, and are formed in oceanic and continental crust respectively. Their boundary therefore provides an ideal study area for determining the style of extension in these two types of crust, and for understanding the continuity of deformation between portions of crust in the Ross Sea. Sonobuoy data collected during research cruise NBP0701 are processed to provide a crustal velocity structure along seismic lines trending southeast from the Adare Basin to the Northern Basin. Shallow velocities are determined using reflection data. Processing of all nineteen seismic lines will provide a 3D velocity structure for the Adare Basin.

4.P1.C: Evolution of antarctic lithosphere ORAL

4.P1.C-1: Superposition of Neoarchean and Paleoproterozoic tectonics in the Terre Adélie Craton (East Antarctica): evidence from Th-U-Pb ages on monazite and Ar-Ar ages

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In order to emphasize the tectonic behaviour of stabilized continental crust during latter tectonic activity, we investigated the composite metamorphic basement of the Terre Adélie Craton (TAC). Two domains are recognized: (1) a Neoarchean basement, made of a deep granulitic crust to the East, and an amphibolitic crust to the West, and (2) two Paleoproterozoic basins overlying the Neoarchean amphibolitic crust and extending further West. New geochronological data from the TAC reveal a tectonic evolution with two major events. Monazites ages from the Neoarchean granulitic crust illustrate a main tectono-metamorphic event around 2.45Ga. Localized resetting of monazites geochronometer occurred around 1.7Ga within small fluid bearing shear zones. New $^{40}Ar/^{39}Ar$ ages from amphibole, and micas from both Neoarchean basement and Paleoproterozoic basins illustrate their differential evolution during a major 1.69Ga event. Finally, 1.55-1.5Ga ages are only recognized close to the Mertz Shear Zone along the Eastern craton boundary.

4.P1.C-2: Pan-African age of the Gamburtsev Mountains?

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We present new data on downcore sediments from ODP Site 1166 (Prydz Bay), taken in order to identify the age of the crust that makes up the subglacial Gamburtsev Mountains. Combined U-Pb dating of zircons, $^{40}Ar/^{39}Ar$ dating of hornblendes, and bulk Nd isotopic compositions reveal no major provenance change from pre-glacial erosional deposits (alluvial and deltaic sands) to glacial deposits (diamicts). Assuming that the alluvial and deltaic samples at Site 1166 with Eocene depositional ages comprise a significant fraction of material eroded from the Gamburtsev Mountains, the predominant pan-African population in U-Pb dated zircons indicates an age of ~500 Ma for the crust that makes up the Gamburtsev Mountains. Potential tectonic scenarios for a pan-African origin and the uplift history of the Gamburtsev Mountains, taking into account the remarkable present-day elevation, remain to be identified.

4.P1.C-3: Proxies of the East Antarctic shield: Composition and age of ice-covered basement from sedimentary and glacial provenance

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The Precambrian East Antarctic shield is the last geological frontier on the planet. Because of its thick ice-sheet cover, very limited exposure, continental scale and extreme challenge in obtaining sub-ice samples, little is known about the composition and structure of its interior. A potentially rich body of information can be obtained, however, from sedimentary and glacial deposits found along the shield margin. Here I discuss several approaches to using such sedimentary and glacial proxies from two sections of the East Antarctic shield adjacent to the central Transantarctic Mountains and the Wilkes Land margin near Terre Adélie. In each area, transported rock clasts and sediment can be used for petrographic study, geochemical analysis, clast geochronology and detrital-zircon geochronology. Together, integration of data from petrologically-distinctive individual clasts and large detrital zircon populations provides a good first-order representation of the hidden East Antarctic shield terrains underlying different sections of the ice sheet.

4.P1.C-4: A compilation of new airborne magnetic and gravity data across Dronning Maud Land, Antarctica

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The evolution of the South Atlantic region including the Weddell Sea and its adjacent areas is of crucial importance for understanding the processes of the structure and tectonics of the Antarctic lithosphere, its relation to geodynamic processes, especially to the timing and geometry of initial stages of the Mesozoic break-up between Africa, Antarctica and South America. For unravelling the geological evolution of Antarctica prior to the break-up of Gondwana, the sub-glacial geology is of utmost importance. Understanding the sub-ice geology allows reconstruction of ancient mountain chains (collision zones) across continents, which are separated by large ocean basins in the present world. Since only the peaks of the Dronning Maud Land (DML) mountains can be geologically sampled, geophysical methods are required to uncover the geological structure beneath the ice. Therefore, extensive airborne surveys were conducted across DML between 2001 and 2005 to close data gaps and to improve existing data sets.

4.P1.C-5: Lamproite-hosted xenoliths of Vestfjella: Implications for lithospheric architecture in western Dronning Maud Land, Antarctica

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Lamproite-hosted xenoliths from Kjakebeinet (73º47’ S, 14º53’ W), southern Vestfjella, represent unique samples of the unexposed continental crust at the rifted margin of western Dronning Maud Land. The exposed bedrock of the study area comprises Jurassic tholeiites and minor Permian sedimentary rocks. The xenoliths comprise mainly granulite facies metamorphosed igneous and sedimentary rock types; sediments of shallower origin and cognate phlogopitite and silicocarbonatite inclusions are also found. Two leucocratic gneissic tonalites, which probably represent middle crustal levels, yielded U-Pb SHRIMP zircon ages of ~1.0–1.3 Ga. The granoblastic mafic granulites probably represent lower parts of the continental crust: Mineral–whole-rock Sm-Nd isotope results imply compositional affinity to Proterozoic lower crustal xenoliths from Lesotho, South Africa, and equilibration of the Sm-Nd system during Grenvillean and Jurassic magmatic events. Highest pressures, 11-17 kbars, were recorded by mafic garnet granulites. Overall, these lamproite-hosted crustal xenoliths indicate extension of the Proterozoic Maud Belt crust to Vestfjella.

4.P1.D: Cretaceous and Tertiary climates of Antarctica ORAL

4.P1.D-1: Contributions to the Eocene climate record of the Antarctic Peninsula

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Paleotemperatures derived from the $\delta^{18}O$ values of bivalve shell from the La Meseta Formation on Seymour Island, Antarctic Peninsula, indicate ~10°C of cooling during the Eocene, much of which took place in two comparatively short intervals (~52 Ma and ~41 Ma). A short-term excursion to significantly more negative $\delta^{18}O$ values appears to correlate with the middle Eocene climatic optimum of Bohaty and Zachos, and a rapid ensuing shift to much more positive values may reflect cooling associated with a proposed short-lived glacial advance. Late middle-late Eocene temperatures are universally cooler than lower in the section, but average values do not suggest freezing conditions. High-resolution records indicate a decrease in seasonality through the section, with significantly cooler summers in the late Eocene. Pebbly mudstone containing early Oligocene dinoflagellates immediately overlies La Meseta Formation sands, suggesting the potential for glacio-marine deposition at or near the Eocene-Oligocene boundary.

4.P1.D-2: Opening of the Drake Passage: Does this event correlate to climate change and biotic events from the Eocene La Meseta Formation, Seymour Island, Antarctic Peninsula?

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The time frame for opening of the Drake Passage, which resulted in the onset of Antarctic climatic cooling and then to the development of ice sheets on the Antarctic Peninsula, is hypothesized to be an early Oligocene event. Rock units from the topmost levels of the La Meseta Formation on Seymour Island, Antarctic Peninsula exhibit evidence of ice sheet formation. The date for ice sheet development is at the Eocene-Oligocene boundary. Thus the opening of the Drake Passage is hypothesized to be at Eocene-Oligocene boundary. However, fish teeth extracted from deep-sea cores were analyzed to provide data on a deepwater opening of the Drake Passage correlated to the Late Eocene (ca. 41 Ma). The data from vertebrate paleofaunas and associated paleofloras from the La Meseta Formation can be used to relate the opening of the Drake Passage to climatic indicators from these fossil remains.

4.P1.D-3: Palynoflora of Livingston Island, South Shetland Islands: Contribution to the understanding of the evolution of the southern pacific Gondwana margin

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Palynoflora are reported from morainic deposits at several localities on Livingston Island, South Shetland Islands. The palynomorphs observed include Pteridophyta, Pinophyta, Magnoliophyta and fungal spores. It is possible to distinguish two different palynological assemblages from the moraine deposits of Shirreff Cape, arbitrarily called Type A and B. Pteridophyta and Podocarpaceae dominate in the Type A association and in the Byers Peninsula palynoflora. Warm and humid conditions and an Early Cretaceous age are attributed to it. The Type B assemblage is characterized by a subantarctic flora with Pteridophyta, Pinophyta and *Nothofagidites* spp., a cold-temperate and humid climate, and a probable Late Cretaceous-Paleogene age. The palynological associations from Williams Point and Hannah Point are characterized by Pteridophyta, Pinophyta and Magnoliophyta with a probable Late Cretaceous age and temperate-humid climate. The palynomorph assemblage of Hannah Point is later than the one observed from Williams Point.

4.P1.D-4: Neogene environmental history deduced from glacigenic sediments on James Ross Island, northern Antarctic Peninsula

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The parameters of the Cenozoic Antarctic Ice Sheet (AIS) are poorly known and contentious. Our investigation of late Neogene glacial and interglacial sediments from James Ross Island will inform this debate by providing critical new data from a part of the AIS that is particularly sensitive to climatic variability. Our sedimentological analyses of the lithofacies reveal a combination of basal tills, remobilised debris flow deposits, and glaciomarine sequences. The influence of two scales of ice masses is recognised: a regional-scale Antarctic Peninsula ice sheet and a local ice cap. The contact relationships between the glacial sediment and overlying volcanic rocks indicate that glaciation and volcanism were essentially contemporaneous, and the volcanic units have provided an excellent chronology for the glaciations. A polythermal glacial regime is suggested for the Neogene glacial cover on James Ross Island, with conditions similar to the high Arctic today.

4.P2.A: Seismic stratigraphy of the Ross Sea and the antarctic margin: Climate archives and tectonic history ORAL

4.P2.A-1: Seismic facies and stratigraphy of the Cenozoic succession in McMurdo Sound, Antarctica: Implications for tectonic, climatic and glacial history

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A new stratigraphic model for the Cenozoic Victoria Land Basin of the West Antarctic Rift is presented. The Early Rift phase comprises wedges of strata confined by early extensional faults, consistent with drainage into discrete, actively subsiding grabens and half-grabens. The Main Rift phase comprises a more extensive lens of strata that thickens symmetrically from the basin margins into a central depocenter. The Passive Thermal Subsidence phase comprises an evenly distributed sheet of strata that does not thicken appreciably into the depocentre. The Renewed Rifting phase has been further divided into 1, a lower interval, in which the section thickens passively towards a central depocentre, and 2. an upper interval, in which more dramatic thickening patterns are complicated by magmatic activity and associated flexural loading. A major decrease in sediment supply at c. 2 Ma suggests environmental reorganization.

4.P2.A-2: Coastal glacial valley system in the Wood Bay (western Ross Sea, Antarctica)

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In the context of the reinterpretation of seismic data in the Ross Sea made for the Vilmap PNRA project, the availability of newly acquired higher resolution single channel seismic lines has allowed to investigate the Cenozoic glacial features that are present in the Wood Bay, the coastal area of the western Ross Sea between the Cape Washington and the Mariner and Borchgrevink Glaciers. The investigation focuses on the dynamics of the East Antarctic Ice Sheet, and, in particular, the local coastal glaciers that extend into the sea as ice tongues, contributing to drainage the Ice Sheet through the Transantarctic Mountains. The dynamics of these glaciers, mainly valley and outlet glaciers, the Tinker Glacier, Aviator Glacier and Parker Glacier, is shown in the investigated depositional features that include subglacial and proglacial progradational deposits, grounding zone wedges, a possible morainal bank complex, and in the erosional evidence of glacial unconformities and troughs.

4.P2.A-3: Using new tools to explore undiscovered country: Understanding the stratigraphic and tectonic history of greenhouse to icehouse worlds of offshore New Harbor, Ross Sea, Antarctica

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The Offshore New Harbor Project will investigate the stratigraphic and tectonic history of westernmost Southern McMurdo Sound. This will be used to address two widely recognized but unresolved issues regarding Antarctica's history: 1) the mid-Paleogene cryospheric development on Antarctica; and 2) the abrupt climate shift across Eocene/Oligocene transition. The first step for this project is to collect the requisite seismic and gravity data for identifying future drilling targets for the ANDRILL Program. ANDRILL is a multinational program, with the aim to recover stratigraphic intervals for interpreting Antarctica's climate and glacial history over the past 50 million years. Offshore New Harbor is an ideal locale to tackle these questions because existing data suggest substantial strata deposited during Eocene time, across the Eocene/Oligocene boundary, and into the "mid" Oligocene are preserved updip of current seismic profiles and borehole locations.

4.P2.A-4: Proposed ANDRILL sites on Coulman High, Ross Sea, Antarctica

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We conducted a seismic survey at the front of the Ross Ice Shelf under the premise that the advancing ice sheet will in time cover the survey thereby allowing targeted drilling into the seabed from the ice shelf. We propose sites on the Coulman High (~77.46 S; 171.23 – 171.68 E) to sample earliest Miocene and older section to address themes on evolution and stability of the cryosphere, warm climate periods in the Early Tertiary, orbital variability controls on climate, and tectonics within the West Antarctic Rift System and the Transantarctic Mountains. The sites are located in the C-19 iceberg calving site east of Ross Island, 125 km overland in a straight line NE from McMurdo Station, on the Coulman High between the Victoria Land Basin and the Central Trough. The water depth here is 834-871 m and the Ross Ice Shelf is 229-251 m thick.

4.P2.B: Antarctic intraplate and plate boundary regimes ORAL

4.P2.B-1: Main Andean sinistral shear along the Cooper Bay Dislocation Zone, South Georgia?

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The Cooper Bay Dislocation Zone (CBDZ) represents a major NW-SE trending tectonic boundary within South Georgia that juxtaposes components of a Middle Jurassic to mid-Cretaceous island-arc and back-arc-basin system. New structural data from the southern end of the CBDZ indicates that its earliest displacement was associated with dip-slip reverse shear, characterised by heterogeneously mylonitised granitic rocks exposed along the southwest margin of the shear zone. Along the northeast margin, mylonitised and sheared metasedimentary rocks reveal sinistral strike-slip kinematics. Sinistral strike-slip deformation continued during uplift into the brittle deformation regime suggesting it postdated the reverse shear event. Comparison with the tectonic history of the Rocas Verdas Marginal Basin, in the Fuegian Andes, suggests that the sinistral shear event preserved along the CBDZ maybe be related to Late Cretaceous, main Andean orogenic transpression, although a Cenozoic event cannot be ruled out then.

4.P2.B-2: Thermochronologic constraints of the tectonic evolution of the western Antarctic Peninsula in late Meso- and Cenozoic times

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West of the Antarctic Peninsula, oceanic lithosphere of the Phoenix plate is being subducted below the Antarctic plate. Subduction ceased successively from south to north over the last 65 Myr. An influence of this evolution on the segmentation of the crust in the Antarctic plate is disputed. Opposing scenarios consider effects of ridge crest – trench interactions with the subduction zone or differences in slip along a basal detachment plane in the overriding plate. Fission track analyses on apatites and zircons may detect thermochronologic patterns to test these hypotheses. The first results show zircon fission track ages between 80 and 90 Ma from different geological units over wide areas of the Antarctic Peninsula. They indicate a uniform regional cooling episode. Apatite fission track ages obtained so far show considerable regional variability.

4.P2.B-3: Early opening of Drake Passage: Regional seismic stratigraphy and paleoceanographic implications

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The tectonics and distribution of seismic units of the central and southern Scotia Sea are described based on multichannel seismic profiles and magnetic anomalies. Recently acquired profiles suggest that spreading in the Drake Passage was active prior to 30.9 Ma, although the tectonics of the area suggest that rifting of the margins and shallow gateways existed well before that time. After breakup, the Scotia Sea developed from several spreading centers that produced deep ocean basins. Five main seismic units are identified in the Cenozoic sedimentary section. The three youngest units exhibit similar seismic facies and are correlated at regional scale. They contain a variety of contourite drifts resulting from the interplay between the northeastward flow of the Weddell Sea Deep Water, the Antarctic Circumpolar Current and the complex bathymetry. These units were deposited after the Middle Miocene connection between the Scotia Sea and the Weddell Sea was established.

4.P2.B-4: The P-wave velocity structure of Deception Island, Antarctica, from two-dimensional seismic tomography

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Deception Island is a volcanic island with a flooded caldera that has a complex geological setting in Bransfield Strait, Antarctica. We use P-wave arrivals recorded on land and seafloor seismometers from airgun shots within the caldera and around the island to invert for the P-wave velocity structure along two orthogonal profiles. The results reveal a low-velocity anomaly beneath the caldera with a maximum anomaly of ~-1 km/s extending from the seafloor to ~5 km depth. Refracted arrivals suggest a >1-km-thick layer of sediments and unconsolidated lavas infilling the caldera. Synthetic inversions show that this layer accounts for only a small portion of the velocity anomaly, implying that there is a significant region of low velocities at greater depths. Further synthetic inversions and melt fraction calculations suggest that the caldera is underlain by an extensive region of magma that extends downwards from <2 km beneath the seafloor.

4.P2.C: Evolution of antarctic lithosphere ORAL

4.P2.C-1: Metamorphic evolution of UHT calc-silicate rocks from Rundvågshetta, Lützow Holm Bay, East Antarctica

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Calc-silicate boudins within the pyroxene gneiss at Rundvågashetta, Lützow-Holm Bay, East Antarctica preserve petrologic signatures of ultra-high temperature metamorphism and microstructures that gave insights to the regional metamorphic evolution. Three mineralogical zones of varying modal proportion of an assemblage of grandite-garnet + scapolite + clinopyroxene + plagioclase + titanite +/- wollastonite +/- calcite +/- quartz are observed. Meionitic scapolite coexists with anorthite suggesting a minimum peak metamorphic temperature of ~830ºC. Several generations of chemically distinct garnet corona and breakdown reactions involving garnet, scapolite clinopyroxene and wollastonite are observed. Activity corrected partial petrogentic grids, constructed in the CAFSV system, helped in constraining the P-T-X-f_{O2} evolution during peak and retrograde metamorphism. These results were then supplemented with titanite SHRIMP geochronology to consider the exhumation history of the region. Taking into account of the existing models on P-T-t evolution, a geodynamic evolution of the Rundvågshetta granulites within the Lützow-Holm Complex was formulated.

4.P2.C-2: Deep seismic reflection imaging of the Pan-African mobile belt, the Lützow-Holm Complex, East Antarctica

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Deep structure and evolution of the crust and upper mantle were demonstrated by Deep Seismic Surveys (DSS) in Pan-African terrain of the Lützow-Holm Complex (LHC), Dronning Maud Land, East Antarctica. DSS were conducted on the continental ice-sheet of the LHC in austral summers in 2000 and 2002, by the "Structure and Evolution of the East Antarctic Lithosphere (SEAL)" program. Processing of the DSS data, using NMO correction and CDP stacking procedures extracted clearer image of reflections of the crust-mantle boundary, together with several crustal reflections. A layered structure around the crust-mantle boundary was clarified by coherency enhancement processing after applying NMO to very far offset data. Crustal structure of the LHC imaged by seismic reflection imaging suggests a tectonic influence of compression stress in NE-SW during the Pan-African, in the last stage of formation of a broad mobile belt between East and West Gondwana super-terrains.

4.P2.C-3: Upper mantle anisotropy from teleseismic SKS splitting beneath Lützow-Holm Bay region, East Antarctica

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Investigations of digital seismograph records from eight stations around the Lützow-Holm Bay region have improved our understanding of the evolution of the Antarctic plate through the analysis of SKS wave splitting from teleseismic events. The observed delay times are around 1.2 s and are equal to the global average of SKS splitting. The observed fast polarization directions are mainly oriented NE–SW in the region. This direction is consistent with the paleo-compressional stress during the Pan-African age (~500 Ma). We consider that the origin of mantle anisotropy is the lattice-preferred orientation which was caused by Gondwana assembly, rather than the present asthenospheric flow that is parallel to the absolute plate motion. The anisotropy is assumed to have been produced during the Pan-African orogeny and the pre-existing structure may also influence the formation of the anisotropy during Gondwana break-up.

4.P2.C-4: Interaction of Antarctica with other regions at different spatial scales and deep layers

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Structure, intraplate and interplate processes of the Antarctic region are interpreted down to a depth of 5300 km using a gravimetric tomography technique. The lateral and radial variability of four global-scale dense structures is displayed at depths of 5300 km and 2800 km and the relationship of these structures to Antarctica is outlined. It is then shown that the technique can be applied at more regional scales by providing interpretations of the gravity tomography in the areas of the Ross Sea / Scotia Plate and the Antarctic Peninsula at depth scales of a few kilometres down to>2000 km. Beneath the Scotia Plate, the thick transition layer above the ‘Ross plume’ is interpreted between depths of 620–1400 km. In the case of the Antarctic Peninsula, tomographic models display links between the Bransfield Basin and the Weddell Sea structures of the Powel basin and ‘West Weddell Trench’.

4.P2.D: Instability in antarctic ice shelves ORAL

4.P2.D-1: New marine sediment core data support Holocene stability of the Larsen B Ice Shelf

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A multi-proxy data set, including sedimentologic, geochemical, and micropaleontologic analyses, has been developed for kasten cores collected from the Larsen B embayment during two research cruises, LMG0502 and NBP0603. Chronologies for the cores are constrained through a combination of radiocarbon and ^{210}Pb analyses. These records add to those previously published (Domack et al., 2005) and conclusively demonstrate that the Larsen B Ice Shelf was a persistent presence throughout the Holocene, until its most recent collapse in March 2002. This observation is significant, indicating that modern climate perturbations in the region have had a greater impact on the Larsen B Ice Shelf than natural variability of the Holocene.

4.P2.D-2: Geophysical survey of the thick, expanded sedimentary filling of the new-born Crane Fjord (former Larsen B Ice Shelf, Antarctica)

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Integrated geophysical data recorded during the NBP0603 research cruise revealed the setting and the infill history of the newly-created Crane Glacier Fjord (Exasperation Inlet, Eastern Antarctic Peninsula). Originated by the 15 km retreat of the Crane Glacier after the Larsen B ice shelf collapse, the fjord shows at its floor three ponded basins, detailly imaged by multibeam echosounder. In the lowest one, sub bottom profiling and single channel seismic evidenced a 40 m thick, well-layered and unconsolidated filling: its upper part, as confirmed by a 2.7 m core collected in the area, was interpreted as the result of the accelerated ice discharge from the glacier during the ice shelf break-up; the rest of the filling was instead regarded as the result of 30 years long sub-glacial lake sedimentation, suggesting that the glacier behaviour was affected not only by the ice shelf collapse, but also by the regional ice shelves dynamics.

4.P2.D-3: Antarctic tabular iceberg evolution during northward drift: A proxy system for studying ice shelf breakup

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Drifting tabular icebergs in the Southern Ocean just east of the Antarctic Peninsula undergo a rapid 'climate change' as they move into warmer air and ocean temperatures. Using a combination of satellite sensors and satellite-uplinked automated observing stations on two bergs during 2006-2007, we examine these changes for clues to ice shelf and ice tongue breakup processes. Icebergs evolve slowly while south of the sea ice edge, but undergo rapid changes as they move north towards South Georgia Island. Surface melt and firn compaction dominate the early evolution (inferred from automated photos of accumulation stakes) but basal melting steadily increases. Edge-wasting of icebergs in warm (sea-ice-free) water suggests a mechanism for ice tongue retreat in the absence of firn saturation and melt ponding. However, in several cases (in situ and satellite-based) we observe rapid calving begins once the firn is saturated with water, and surface or near-surface ponding occurs.

4.P2.D-4: Modelling seasonal and inter-annual variability of the Amundsen Sea shelf waters

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Using a three dimensional coupled ice-ocean model, we have simulated the circulation in the Amundsen Sea sector of Antarctica over the period 1980 to 2005. The model is forced with daily sea surface temperatures and sea level pressures taken from the NCEP reanalyses. We focus on the flow of Circumpolar Deep Water (CDW) onto the continental shelf. Our results show that CDW intrusions occur at specific locations and at specific times of year. Variability in the strength of the inflows gives rise to interannual changes in the heat content of the waters on shelf. Preliminary analyses suggest that the seasonal input of CDW is related to changes in the position and depth of a low pressure trough, located close to the shelf break. Thus interannual variability in the behaviour of this pressure trough could be the source of the observed changes in the ice shelves of the Amundsen Sea.

4.PS: Early evolution of the antarctic lithosphere POSTER

4.PS-93: Pan-African granulites of central Dronning Maud Land and Mozambique – A comparison within the East-African-Antarctic Orogen

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Granulite-facies metamorphism is reported extensively in Late Neoproterozoic/Early Palaeozoic time during formation of the East-African-Antarctic-Orogen (EAAO). Metamorphic data acquired from the Pan-African orogen of central Dronning Maud Land (cDML) are compared with data from northern Mozambique. The metamorphic rocks of cDML are characterised by Opx±Grt-bearing gneisses and Sil-bearing metapelites which indicate medium-pressure granulite-facies metamorphism. Peak conditions are estimated to 800-900 ºC at pressures up to 1.0 GPa. Peak metamorphism in cDML was followed by near-isothermal decompression during late-Pan-African extension and exhumation. In northern Mozambique, Grt+Cpx-bearing assemblages indicate high-pressure granulite-facies conditions during the Pan-African orogen with PT reaching 1.55 GPa and 900ºC. Garnet is replaced by symplectites of Pl+Opx+Mag indicating isothermal decompression, and the subsequent formation of Pl+amphibole-coronas suggests cooling into amphibolite facies. It is concluded that high-temperature metamorphism was pervasive in EAAO in Late Neoproterozoic/Early Paleozoic time, strongly overprinting any evidence of earlier metamorphic assemblages.

4.PS-94: Crust and upper mantle in Dronning Maud Land/Antarctica retrieved from shear-wave splitting, receiver functions, refraction seismics and 3-D gravity modelling

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The crust and upper mantle of Dronning Maud Land (DML), Antarctica, have been investigated using teleseismic data from broadband seismograph stations deployed at temporary and permanent locations and recordings from a seismic refraction experiment. For shear-wave splitting analyses the observed anisotropy can in most cases be related to major tectonic events that formed the geological features of the present-day Antarctic continent. We rule out an anisotropic contribution from recent asthenospheric flow. An abrupt change in the fast axis direction of the shear-waves and a remarkable Moho jump beneath the Kottas mountains appears to mark a suture between the Grunehogna craton, a fragment of the Kalahari-Kaapvaal craton in southern Africa, and the Mesoproterozoic Namaqua-Natal belt. In general, the Moho increases from the coast towards the mountain ranges of Wohlthatmassif and Kottas, where thick crust between 45-53 km is found. The Vp/Vs-ratio are similar within geological units but different throughout DML.

4.PS-95: Sm-Nd and U-Pb isotopic constraints for Late Neoproterozoic crustal evolution from granulites of the Schirmacher Oasis, East Antarctica: geodynamic development coeval with the East African Orogeny

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Formation of Neoproterozic granulites, remnants of which are exposed in coastal Antarctica and SE Africa, is controversial; dating of high-grade metamorphism was performed to correlate these granulite-facies remnants. The results of this Sm-Nd garnet and U-Pb monazite and titanite geochronological study from metasedimentary rocks, melanocratic gabbronorite and websterite, indicate peak granulite-facies metamorphism to have occurred between 660 and 630 Ma followed by cooling lasting between 630-580 Ma. The ages are older than those determined earlier on zircon at ~ 624-626 to 615 Ma. This supports a short time span for the medium-pressure granulite-facies metamorphism by increased geothermal gradient due to crustal stacking and inflation, due to intrusion of quartz-diorite and tonalite (protoliths to the enderbitic gneiss), at an active continental margin. A collision between the ~1.1 Ga orogenic Maud Belt with a northerly Mesoproterozoic arc-defined Lurio-Nampula block was responsible for formation of this Neoproterozic orogen and the Kalahari peninsula.

4.PS-96: Broadband seismic array deployments and crust - upper mantle structure around the Lützow-Holm Bay Region, East Antarctica

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Broadband seismic array deployments have been carried out from 1996 on the coastal outcrops in the Lützow-Holm Bay Region (LHB), East Antarctica. The recorded teleseismic and local seismic signals have sufficient quality for the various analyses to clarify the dynamics and heterogeneous structure of the crust and upper mantle. Conventional passive source studies such as receiver functions and shear wave splitting were carried out; indicating heterogeneous structure from the north to the south along the coast in LHB.Data obtained may be applied not only to lithospheric studies, but to study of the Earths deep interior by integration with large span arrays from Eastern Dronning Maud Land. The broadband array deployments in LHB could make effective contributions to the 'Global Alliance of Regional Networks;GARNET', principle international Antarctic Array programs, together with 'POLEr observation NETwork; POLENET' during IPY 2007-2008.

4.PS-97: New evidences for the early Archaean evolution of Aker Peaks, Napier Mountains, Enderby Land (East Antarctica)

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Zircons from charnockite-enderbite rocks (Aker Peaks, Napier Mountains), which we have dated by SHRIMP-II, were analyzed earlier by conventional multigrain U-Pb ID-TIMS methods (Belyatsky et al., 1990) but gave equivocal ages. Our study demonstrates that the most optimal way to evaluate geologic events in such rocks is by ion-probe analysis of complex zircons (CL, BSE, REE composition). We have obtained, for the first time, reliable ages of magmatic crystallization for studied charnockite-enderbites (3620 ± 30 Ma) and the age of the primary enderbite's protolith origin (3950-3970 Ma). Moreover, in all dated zircons a metamorphic event of 2450-2480 Ma is clearly recorded and is in agreement with the granulite-facies metamorphism described by many authors. These conclusions coincide well with Sm-Nd isotope data for these enderbite-charnockite gneisses.

4.PS-98: Solubility of TiO_2 in garnet and orthopyroxene: Ti thermometer for ultrahigh-temperature granulites

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We report the TiO_2 solubility in garnet and orthopyroxene coexisting with rutile obtained from the experimental data at pressures 7-20 kbar and temperatures 850-1300C. The TiO_2 content of garnet should increase with temperature and rather decreases with pressure. In orthopyroxene Ti substitutes for the atoms in the tetrahedral and octahedral sites. The Ti content of orthopyroxene increases with temperature and rather increases with pressure. The Ti solubility in garnet and orthopyroxene is sensitive to temperature change, but insensitive to pressure change. Using the Ti thermometers, we obtain the peak and retrograde metamorphic temperatures of McIntyre granulite as 798 and 1079C, respectively, and the retrograde temperature of Rundvågshetta granulite as 884-921C. These data are consistent with those of our previous estimates. We conclude the Ti-solubility in garnet and orthopyroxene is the useful geothermometer to evaluate the metamorphic temperature of Antarctic granulites with high precision.

4.PS-99: P-T conditions during formation of a metapelitic gneiss from Clemence Massif, Antarctic Prince Charles Mountains

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The pressure (*P*) and temperature (*T*) conditions during metamorphism of a metapelitic sillimanite-garnet gneiss from Clemence Massif are estimated using mineral abundance information and petrogenetic pseudosections computed in the chemical system $MnO\text{-}N_2O\text{-}CaO\text{-}K_2O\text{-}FeO\text{-}MgO\text{-}Al_2O_3\text{-}SiO_2\text{-}H_2O\text{-}TiO_2\text{-}Fe_2O_3$ (MnNCKFMASHTO). Calculated mineral equilibria for the appropriate bulk composition predict that the observed assemblage, of K-feldspar-garnet-quartz-sillimanite-biotite-ilmenite-rutile, stabilised at approximately 8-9 kbar and 760-790ºC. Reaction microstructures are rare, but the preservation of relic spinel inclusions in garnet indicates an earlier low-*P*, high-*T* component and possible anticlockwise path resembling the Northern Prince Charles Mountains. On the basis of radiogenic age data, the metamorphism of Clemence Massif may be related to either of the ~1000 Ma or ~500 Ma episodes in East Antarctica and the possible superimposition of these episodes is an unresolved matter of concern.

4.PS-100: Early Precambrian mantle derived rocks in the southern Prince Charles Mountains, east Antarctica: Age and isotopic constraints

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Mafic and ultramafic rocks occurring as lenses, boudins, and tectonic slabs within metamorphic units in the southern Mawson Escarpment display mantle characteristics of highly enriched, or highly depleted nature. Fractionation of these mantle rocks from their sources may be as old as Eoarchaean (ca 3850 Ma) while their tectonic emplacement probably occurred prior to 2550 Ma (U-Pb SHRIMP data). For the first time, these results provide evidence for Archaean suturing within East Antarctica. Similar upper mantle sources are likely present in the northern Mawson Escarpment. A younger age limit of these rocks is 2200 Ma, as indicated by presumably metamorphic zircon ages while their magmatic age may be constrained by single zircon dates at 2450–2250 Ma. The area of the northern Mawson Escarpment is most likely of ensimatic origin and includes mafic rocks which were derived from distinct mantle source(s) in Palaeoproterozoic times.

4.PS-101: Geological structure and evolution of Shaw Massif, central part of the Prince Charles Mountains (East Antarctica)

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Shaw massif is situated in the central part of the Prince Charles Mountains and represents a complex with complicated fold structure and composition which include biotite leucogneisses, garnet-biotite gneisses and plagiogneises (Lambert gneisses); amphibole-biotite melanogneisses, garnet-biotite plagiogneisses (Shaw melanogneisses). Also, there are poorly developed garnet-sillimanite-biotite gneisses (Isabelle paragneisses) which are met in the form of xenolith bodies among the Lambert gneisses and could be the fragments of the ancient sedimentary layer. The obtained U-Pb data reflect the two main geological events with the ages 900-1100 Ma and 450-550 Ma corresponding to Rayner and Pan-African tectonothermal events. The Shaw Massif terrane has been affected by at least 5 deformation events and three stages of metamorphic reworking. The structural geological position of the Shaw Massif region could be interpreted as a younger, high grade metamorphic region framing the Fisher Province.

4.PS-102: New findings of alkaline-ultramafic dykes in the Prince Charles Mountains: Age and composition

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Dikes of phlogopite-bearing alkaline picrites discovered in 2004 in the southern part of Mt. Meredith based on their mineralogical and geochemical composition are comparable to typical mica kimberlites and differ considerably from the well-known alkaline-ultramafic bodies in Jetty Peninsula and along the shores of Radok Lake. However, temperature and pressure estimations of their crystallization (990Â°C and 18-26 kbar), their age (122 Ma), and primary isotope signatures (87Sr/86Sri = 0.7048-0.7051, ÎµNd = -1.0 to -0.6) indicate that conditions of their formation are similar to those of the Beaver Lake province. Considering these relations and that their formation may be connected with development of the Lambert-Amery rift in Mesozoic time due to mantle-plume activity (Kerguelen plume?) and Gondwana disintegration, we interpret these alkaline-ultramafic bodies to be a single magmatic province, comparable in their age, conditions and composition with the alkaline-ultramafic carbonatite Shillong province in India.

4.PS-103: Major magmatic events in Mt Meredith, Prince Charles Mountains: first evidence for early Palaeozoic syntectonic granites

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Precambrian rocks at Mt Meredith underwent granulite-facies metamorphism M_1. Zircon isotope dating for two orthogneisses revealed the following age signatures: 1294±3 and 957±4Ma; 1105±5 and 887±2Ma. The oldest ages could reflect the time of orthogneiss protolith crystallization and the latest age determinations date Grenvillian metamorphism. The metamorphic rocks were intruded by two-mica and garnet-biotite granites. The granites and host rocks underwent amphibolite-facies metamorphism M_2. Zircon isotope analysis of the two-mica granites showed age estimation within 550-510Ma and zircon dating of the garnet-biotite granites revealed the ages of 1107±5, 953±8, and 551±4Ma. As Pan-African age signatures were obtained from only the granite samples, it is possible to suggest that the granites were formed at the time of 510-550Ma and the zircons with greater age values were captured by granites from the host rocks.

4.PS-104: Mafic dykes in the southern Prince Charles Mountains: A tale of Pan-African amalgamation of East Antarctica questioned

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We present new geochemical and U–Pb zircon data on mafic dykes from the southern Prince Charles Mountains. The dykes crystallised at ca 1700 Ma and 1300–1350 Ma. Apparently the oldest (ca 2400 Ma) are high-Mg orthopyroxene-bearing dykes which are also known from the Enderby Land and the Vestfold Hills. Abundant younger dykes are variously enriched in the LILE and comprise low- and high-LILE geochemical groups, as do the dykes in the abovementioned areas. The dykes in the southern Prince Charles Mountains are roughly co-eval and compositionally identical to those reported from the Enderby Land and the Vestfold Hills and were derived from the same or quite similar mantle source(s). This suggests that these parts of East Antarctica were conjugated and behaved as a single continental landmass since the early Palaeoprotrozoic and questions a widely accepted model of Pan-African amalgamation of these blocks.

4.PS-105: A new alternative view on the stratigraphy and the geological framework of the Permian — Triassic deposits of the Amery Group, Radok and Biaver Lake area, the northern Prince Charles Mountains, East Antarctica

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In spite of the long-term research, sedimentary rocks of the Amery Group are still not properly examined which causes existence of various views on the geological framework and stratigraphy of sedimentary rocks today. This article contains basic concepts of the stratigraphy of sedimentary rocks of the Amery Group based on the new data discovered during the field seasons of the 48, 49, 50 and 51 Russian Antarctic Expeditions in 2002 - 2006. The conducted research allowed us to find out new information about the stratigraphy and the character of the relations between the stratons of the Amery Group. The criteria for determination of the local stratons are based on the structural and material features reflecting the peculiarities of the stratons formation. The total thickness of the investigated deposits of the Amery Group is 2865 – 3015m.

4.PS-106: Geology of the Terre Adélie Craton (135 - 146°E)

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The present paper states the actual knowledge of the Terre Adélie Craton (TAC) geology. Three geological maps review some 15 years of field investigations in Terre Adélie and George Vth Land. A general map illustrates large-scale features of the TAC including the main lithotectonic domains described after their structuration ages and the major tectonic boundaries. A second map focuses on the easternmost domain of the craton, i.e. the Neoarchaean polycyclic basement and the overlying Cape Hunter phyllites basin. Finally the third map concerns the western domain of the TAC, i.e. the highly strained and metamorphosed Paleoproterozoic Dumont D'Urville basin. Furthermore, the western boundary of the TAC is discussed. The TAC represents a key piece for Rodinia and Circum Polar Ocean reconstructions between Australia and Antarctica. Detailed investigations would help a better understanding of the Neoarchaean and Paleoproterozoic continents behaviour during orogenic *s.l.* processes.

4.PS-107: Basement and crustal structure of the Davis Sea region (East Antarctica): implications for tectonic setting and COB definition

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This study is based on about 8400 km of multi-channel seismic (MCS), magnetic and gravity data as well as 20 sonobuoys collected by the Russian Antarctic Expedition in the Davis Sea and adjacent areas between 80°E and 102°E. The major tectonic provinces and features are identified and mapped in the study region including: 1) A marginal rift with a an extended continental crust ranging between 130 and more than 200 km in width; 2) The volcanic plateau named the Bruce Bank with early Cretaceous igneous rocks; 3) early Cretaceous and late Cretaceous-Paleogene oceanic basins; and 4) The early Cretaceous igneous province of the Kerguelen Plateau. Four major unconformities identified in the sedimentary cover of the Davis Sea region are interpreted to correspond with fundamental tectonic events and/or paleoenvironmental changes.

4.PS-108: Crustal structure and evolution of the Mawson Sea (western Wilkes Land margin, East Antarctica)

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This study is based on about 4000 km of multi-channel seismic (MCS), magnetic and gravity data and 10 sonobuoys collected by the Russian Antarctic Expedition in the Mawson Sea and adjacent Australian-Antarctic basin between 102°E and 115°E. Major identified tectonic provinces and features of the study region include: 1) A marginal rift about 300 km wide which developed as a result extreme crustal extension and unroofing of the upper mantle, and 2) An oceanic basin with crust of not older than 81 Ma (anomaly 33) which is characterized by ultra-slow sea-floor spreading rates ranging from 3 to 11 mm/yr. Three major unconformities identified in the sedimentary cover of the Mawson Sea are interpreted to be caused by break-up between Australia and Antarctica at about 81 Ma ago (WL1), the first arrival of the ice sheet to the Mawson Sea (WL3) and continental scale glaciation at about 34 Ma ago (WL4).

4.PS-109: A comparative provenance study of the late Mesoproterozoic Maud Belt (East Antarctica) and Pinjarra Orogen (Western Australia): Implications for a possible Mesoproterozoic Kalahari-Western Australia connection

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The Maud Belt (East Antarctica) and the Pinjarra Orogen (Western Australia) are both late Mesoproterozoic orogens which formed during continent-continent collision. Based on paleomagnetic data, recent Rodinia models suggest a collision between Kalahari and Western Australia along a combined Maud Belt/Pinjarra Orogen. Although attempts have been made to support this model with geochronological data, the size of the available data sets is as yet insufficient to allow statistically sound conclusions. In this contribution, we present new ca. 950 detrital zircon ages (LA-ICPMS and SHRIMP) from the Maud Belt and Pinjarra Orogen. Whereas samples from the Maud Belt show a clear Kalahari signature, metasediments of the Northampton Complex (Pinjarra Orogen) were probably derived from sources within Australia and the adjacent Mawson Craton. A direct comparison between both regions shows significantly different age distributions and no clear evidence for a Kalahari-Western Australia connection.

4.PS-110: The Cambrian Ross Orogeny in Northern Victoria Land (Antarctica) and New Zealand: A synthesis

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In the Cambrian, the paleo-Pacific margin of the Gondwana supercontinent included East Antarctica, Australia, Tasmania and New Zealand and was affected by the major Ross-Delamerian Orogeny. In Antarctica, evidence suggests that this resulted from oblique subduction and that in northern Victoria Land it was accompanied by the opening and subsequent closure of a back-arc basin. Comparison of the type and timing of sedimentary, magmatic and metamorphic events in areas noted above shows strong similarities between northern Victoria Land and New Zealand. In both regions Middle Cambrian volcanites are interpreted as arc/back-arc assemblages produced by west-directed subduction; sediments interbedded with the volcanites show provenance both from the arc and from the Gondwana margin and therefore point to a basin originally close to the continent. Back-arc closure in the Late Cambrian was likely accomplished through a second subduction system.

4.PS-111: Chronologic-dynamic zoning of the Ross Orogen – A current research program of the PNRA (Italy)

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In the frame of the Antarctic Research Program of Italy (PNRA), the studies on the Early Paleozoic Ross Orogeny are coordinated in a mainframe project named "Chronologic-dynamic zoning of the Ross Orogen", including seven research units. The research work is focused on two main geographical-conceptual themes: (A) the reconstruction of the igneous-metamorphic history of the margin active in Victoria Land, carrying evidence for long-lasting igneous activity of variable chemical affinity and emplacement style, and (B) the role of the transition between fault-bounded lithotectonic units, which have been the reference frame for the interpretation of the Ross Orogeny in northern Victoria Land for two decades. At ISAES X, several preliminary and mature products of this research program are presented.

4.PS-112: Inside the Granite Harbour Intrusives of northern Victoria Land: Timing and origin of the intrusive sequence

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Cambro-Ordovician Granite Harbour Intrusives define, in northern Victoria Land, a complex intrusive sequence composed of metaluminous and peraluminous granitoids, and minor ultramafic and mafic rocks, with variable K-enrichment and magmatic arc affinity. The main intrusive units cropping out in the Wilson Terrane between the Prince Albert Mountains and the Mountaineer Range have been dated by means of in-situ U-Pb LA-ICPMS analyses of zircons. The obtained results constrain the timing of emplacement of major crustal-derived anatectic melts in this area between 521 and 481 Ma, a time interval of 40 Ma. The mantle-derived mafic-ultramafic rocks, associated to the main high-K granitoids in the Deep Freeze Range-Northern Foothills, cover a time interval between 521 and 487 Ma. The long-lasting intrusive mafic and felsic magmatism caused the slow cooling of the basement responsible, together with local deformation and fluid circulation, of the common young reset ages observed in some of the studied intrusions.

4.PS-113: The eclogite facies rocks from Antarctica and Tasmania: Different geodynamic settings within the Cambro-Ordovician Ross/Delamerian Orogen

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Eclogite facies rocks have been described from northern Victoria Land, Antarctica and from NW Tasmania as part of the Cambro-Ordovician Ross-Delamerian orogen. New petrological data yield lower P and T (625-750 °C; 1.3-1.7 GPa) and lower dP/dT of Tasmanian eclogites compared with the UHP mafic, ultramafic and felsic rocks of the Lanterman Range (764-820 °C; 3.2-3.3 GPa). The different P-T conditions and regimes suggest different tectono-metamorphic evolution of the two complexes possibly reflecting different geodynamic settings along the same convergent belt developed at the paleo-Pacific margin of Gondwana.

4.PS-114: Tectonics at the Bowers - Robertson Bay Terrane boundary, northern Victoria Land (Antarctica)

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In northern Victoria Land, the boundary between Bowers and Robertson Bay terranes is characterized by the Millen Schist, that are a high strain belt, costituted by two superposed elements. The upper element is made up of mafic metavolcanites that strongly recall the Glasgow Volcanics. The underlying element comprises filladic schist and minor metagraywacke that recall those of the Robertson Bay arenaceous sequence. The two elements of the MS are in contact by a thrust surface: detaild structural analysis revealed a consistent top to NE sense of shear. The southwestern boundary between Millen Schist and Bowers Terrane is known as the Leap Year Fault, but the fieldwork indicates that this boundary has transitional features and that the Leap Year Fault cut a pre-existing tectonic situation.

4.PS-115: Gold bearing veining linked to transcrustal fault zones in the Transantarctic Mountains (northern Victoria Land, Antarctica)

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Gold mineralization is associated to the paleo-Pacific margin of Gondwana and is related to processes of subduction/accretion and magmatism. Northern Victoria Land (Antarctica) was part of this margin during the Paleozoic, nevertheless no occurrence of gold has been reported up to now in the Transantarctic Mountains.

Here we describe for the first time gold-bearing quartz veins in northern Victoria Land. The veins are hosted primarily by metabasalts and occur in a brittle-ductile high strain zone with curved geometry and reverse kinematic. Veins are extensional and shear veins; they often have ribbon/banded texture typical of crack and seal processes. Preliminary petrographic investigations point to strong hydrothermal alteration with growth of chlorite + quartz and then of sericite + carbonates + sulphides approaching the vein. Available data are discussed with the aim to understand the origin of the gold deposit and to frame it in the regional tectonic evolution.

4.PS-116: Aeromagnetic anomalies and gold occurrences in Northern Victoria Land

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High resolution aerogeophysical surveys including electromagnetic and aeromagnetic methods are often carried out to image the structural setting and lithological variations associated with major commercially viable mineral provinces (e.g. in Canada and Australia). Reconnaissance aeromagnetic surveys (typically with line spacing of 4.4 km) have been performed over the last two decades in Northern Victoria Land for geological exploration. These survey data have been compiled to produce a regional magnetic anomaly map. We present a set of new enhanced and filtered magnetic anomaly images coupled with depth to source calculations. Our aim is to re-investigate major glaciated tectonic structures and to delineate possible buried intrusions in the Bowers Mountains area of northern Victoria Land where recent gold occurrences have been found.

4.PS-117: Geology of the "Byrd Glacier Discontinuity" (Ross Orogen): New survey data from the Britannia Range, Antarctica

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Field activities in the Britannia Range (Transantarctic Mountains, Antarctica) highlighted new geological features around the so called Byrd Glacier discontinuity. Recent field surveys revealed the occurrence of significant amounts of medium- to high-grade metamorphic rocks, intruded by abundant coarse-grained porphyritic granitoids. Most of the granitoids are deformed, with foliation parallel to the regional foliation in the metamorphics. Two main episodes of deformation are observed. Tight to isoclinal folds and penetrative axial plane foliation are related to the D1 phase, open folds to the D2. The main foliation (D1) trends nearly E-W in agreement with the trend in the southern portion of the Byrd Glacier. In most ouctrops granitic dykes are folded and stretched by the D2 deformation, which shows similar characteristics with the D2 deformation south of the Byrd Glacier. This suggests the occurrence in the Ross orogen of an orogen-normal structure south and north of the Byrd Glacier.

4.PS-118: Ross aged ductile shearing in the granitic rocks of the Wilson Terrane, Deep Freeze Range area, north Victoria Land (Antarctica)

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The Deep Freeze Range of north Victoria Land, Antarctica, consists of high-grade metamorphic and igneous rocks belonging to the Wilson Terrane, primarily structured during the Cambrian-Ordovician Ross-Delamerian Orogeny. In this contribution we present a systematic study of the spatial distribution and of the kinematic and petrological characteristics of the major ductile shear zones that cross-cut the granitoid rocks of the Deep Freeze Range. The shear zones range in grade from greenschist to amphibolite facies and record compressional (?) transport directed towards the NE. Field relationships constrain the shearing event to the waning stage of the Ross-Delamerian Orogeny, due to the overprinting relationships with the emplacement of texturally-late leucocratic dykes in the region. We use these results to define the significance of these shear zones in the framework of the Ross orogenic cycle and to constrain the tectonic history of the region.

5.PL: Plenary lectures

5.PL-1: The significance of Antarctica for studies of global geodynamics

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Antarctica has geometric significance for global plate kinematic studies, because it links seafloor spreading systems of the African hemisphere (Indian and Atlantic oceans) with those of the Pacific. The South Pacific plate-motion circuit is closed (observations are internally consistent) for times younger than 33 Ma. Inferences of plate motions back to 43 Ma, around the onset of rapid spreading south of Australia and western New Zealand, are consistent with Antarctic rifting and formation of the Adare Basin. The time period 52-43 Ma represents a profound global and South Pacific tectonic change, and significant details remain unresolved. For 74 Ma, a significant non-closure of the South Pacific plate-motion circuit is identified. Alternate inferences of motion through Antarctica during the interval 83-43 Ma imply significantly different subduction volumes and directions around the Pacific, and imply different relative motions between hotspots.

5.PL-2: Antarctic insights into the global climate from deep ice cores

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Several ice cores have been drilled though the Antarctic Ice Sheet revealing palaeoclimate histories that reach nearly one million years back in time. The ice cores records show in detail how climate has cycled between warm interglacial and cold glacial periods in accordance with astronomical theory. Concentrations of the greenhouses gasses in the past atmospheres, found in the air bubbles trapped in the ice, give unique information about the behaviour of the climate system in the past. Finally, when the climate and greenhouse records from Antarctic and Greenland ice cores are compared, we see the different roles of climate in the two hemispheres, where the south mainly consists of ocean and the north of the continents. The ocean conveyor belt plays a major role in redistribution of energy in the two hemispheres and this is discussed in relation to the records from north and south.

5.PS: Ice history, ice dynamics, paleoceanography, and geodetic/geophysical observations

5.PS-119: Cenozoic variations of the Antarctic Ice Sheet: A model-data mismatch?

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Cenozoic variations of global ice volume deduced from $\delta^{18}O$ deep-sea-core records are compared with results from 3-D ice sheet-climate models. After the initial growth of major Antarctic ice at the Eocene-Oligocene boundary ~34 Ma, $\delta^{18}O$ records indicate numerous excursions throughout the Oligocene and early Miocene with timescales of $\sim10^5$ to 10^6 years and amplitudes of ~20 to 80 meters of sea level. During most of this period, proxy atmospheric CO_2 levels in proxy records were low, around 1x pre-industrial. These observations conflict with coupled model results that once a large East Antarctic ice sheet formed at 34 Ma, CO_2 levels must have been in the ~3x to 4x range to induce significant retreat and re-growth. Several mechanisms are discussed that could possibly have caused large ice-volume fluctuations, all of which are highly speculative.

5.PS-120: Early Cenozoic glaciation: Exploring the paradigm of an 'ice-free' Middle Eocene

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The onset of the Cenozoic 'greenhouse-icehouse' transition is poorly constrained, with most benthic foraminiferal oxygen isotope ($\delta^{18}O$) reconstructions assuming 'ice-free' conditions during this period. However, the occurrence of high-frequency sea-level change of tens of meters in the sequence stratigraphic record, is best explained by glacio-eustacy (e.g. Browning et al., 1996). To explore the paradigm of an 'ice-free' Middle Eocene, we discuss a high-resolution record of seawater $\delta^{18}O$ from Ocean Drilling Project (ODP) Site 1209 in the northern tropical Pacific Ocean. The new seawater $\delta^{18}O$ record for Site 1209 indicates two major glacial episodes occurred at ~44.8 and 42.7Ma. We also evaluate the seawater $\delta^{18}O$-sea-level calibration accounting for potential biases arising from carbonate ion concentration, Cenozoic ice $\delta^{18}O$ composition and additional ice storage as a result of glacio-eustatic sea level fall.

5.PS-121: A surprisingly large marine ice cap at Heard Island during the last glacial maximum?

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A new compilation of bathymetric surveys surrounding Heard Island, near 53°00' S, 73°30' E, appears to show geomorphic evidence that the island and surrounding submarine plateau were covered by a 100-km-wide tidewater ice cap at some time in the past. If this ice cap existed, it presumably did so at the last glacial maximum when relative sea level was lower than present. Even so, it would have been grounded in at least 180 m of water and therefore must have been several hundred meters thick.

5.PS-122: New insights in the evolution of Antarctic glaciation from depth conversion of well-log calibrated seismic section of Prydz Bay

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The understanding of the evolution of the Antarctic Ice Sheet is crucial. An evident change in the geometry of the depositional systems of the Prydz Bay continental margin demarked the initiation of the Prydz Channel Fan which has been inferred corresponding to the transition to a modern polar regime intended as a relatively cold-and dry based ice-sheet with respect to previous polythermal conditions.

We propose geophysical methods (multi-attribute analysis, seismic depth conversion) to correlate the existing litho-and bio-stratigraphic information among three important Ocean Drilling Program drill holes on the Antarctic shelf in Prydz Bay. The revised stratigraphy that we obtained better constrains the Neogene glacial history of the Prydz Bay region, assigning an early late to late early Pliocene age to the transition to a modern polar condition. This age, younger than previously proposed, is consistent with the age inferred for similar geometric changes identified in different Antarctic margins.

5.PS-123: Late Quaternary sediment record of six glacial/interglacial cycles off the Wilkes Land - Adelie Land Coast (East Antarctica): Preliminary geochemical results

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A multidisciplinary CADO-IMAGES X research cruise targeted in 2003 the Adelie Land Coast off East Antarctica (136°-140° E), laying at the seaward termination of the largest, marine-based sector of the East Antarctic Ice Sheet (Wilkes Basin) and therefore being ideal to seek for proxies of duration and mechanism of past climatic changes. A complete dataset has been acquired on core MD03-2603, a ~32 m long piston core collected on a mound along the rise, with the aim of investigating the late-Quaternary depositional environment in relation to paleoceanographic conditions. Geochemical/compositional information have been compared to isotopic, biostratigraphic and paleomagnetic data, leading to the identification of six glacial/interglacial climatic cycles. Preliminary data suggest that interglacial cycles are characterised by hemipelagic biogenic muds, deposited in sub-oxic environment. Glacial periods display instead a sequence of turbiditic and contouritic deposits, in which lateral focussing is predominant and the detrital fraction more abundant.

5.PS-124: Scale of subglacial to sub-ice shelf facies variability, Eastern Basin-Ross Sea

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The Eastern Basin within the Ross Sea records changes in the volume of the West Antarctic Ice Sheet (WAIS). Examination of multibeam data revealed four acoustic facies that vary from west to east in a 900 km2 area. It is hypothesized that these facies, that formed nearly contemporaneously, are the result of differences in proximity to the grounding line and its relationship with the seafloor. The four facies are 1. Mega-Scale Lineation, 2. Slightly-Lineated Ridge Crest, 3. Discontinuous Ridges, 4. Irregular Mounds. These trends were also seen in SCS data, distinctively on the seafloor and mutedly at depth. Through determining the extent of fluctuation in these facies and their distribution in the Ross Sea it will be possible to apply this scale to the core record to determine if facies were generated via global processes or were local in origin.

5.PS-125: Glacial and marine features in the recent sedimentary deposits of the Joides Basin (Antarctica)

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During 2004-2005 *Programma Nazionale di Ricerche in Antartide* (PNRA) Oceanographic Cruise high resolution seismic profiles were collected from the Joides basin (western Ross Sea). This basin is a tectonic depression modelled by glacial erosion, located in a key area, where the different Late Quaternary glacial fluctuations are recorded in sediment deposits. The analysis of these new high resolution seismic data (circa 600 miles of profiles using, simultaneously, a 120 Tip Sparker array 400-900 J and a Sub Bottom Profiler 3.5 kHz) provided precious information on sub surface units and seafloor morphology. In particular we present a detailed seismic stratigraphy characterization of recent sedimentary deposits. On the basis of the pattern of features observed and the analysis of the seismic facies, a reconstruction of the evolution of different environments (glacial, glacial marine, marine) is proposed.

5.PS-126: Divergent flow of the West Antarctic Ice Sheet on the outer continental shelf of the Amundsen Sea during the late Quaternary

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Understanding the past glacial history of regions undergoing potential rapid deglaciation is essential in order to estimate the possible threat of sea level rise. Recently acquired data have given new images of mega-scale glacial lineations on the sea floor of the Amundsen Sea, which provide us a new understanding of the direction of glacial flow on the continental shelf of the Amundsen Sea region. Two adjacent areas of seafloor on the outer shelf of the Amundsen Sea embayment exhibit remarkably different styles of glacial lineations, and allow the interpretation of a divergent glacial trough for the Pine Island Glacier during the last glacial maximum, whereas ice flow from the Abbot Ice Shelf probably converged with that from the PIG to the north of the grounding zone wedge.

5.PS-127: The onset and role of the Antarctic Circumpolar Current

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A causal relationship between onsets of the Antarctic Circumpolar Current (ACC) and of Antarctic glaciation, as hypothesised 30 years ago, can no longer be supported. New data have changed perceptions of the ACC, other causal mechanisms for glaciation have arisen, some geological indicators of ACC action are now discounted and a wide range of ACC onset times (middle Eocene to late Miocene) has been proposed. Over the same period, the onset of stable Antarctic glaciation has become much better known. Here we describe these changes and put forward a plan for determining the time of ACC onset, that could also greatly assist in understanding its role in climate change.

5.PS-128: Influence of submarine morphology on bottom water flow along the western Ross Sea continental margin

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Multibeam bathymetry documents a lack of any significant channels crossing the western Ross Sea outer continental shelf and slope, indicating that movement of bottom water across the shelf break and into the deep ocean in this area is mainly by laminar or sheet flow. Subtle, ~20 m deep and 1000 m wide channels extend down the continental slope and into dendritic style drainage patterns on the upper rise, and then into major erosional submarine canyons. These downslope channels may have been formed by episodic pulses of rapid water flow, some recorded on bottom current meters. Narrow, mostly linear channels on the continental shelf thought to be caused by iceberg scouring are randomly oriented, have widths generally less than 400 m and depths less than 30m, and extend to water depths in excess of 600m.

5.PS-129: Holocene glaciomarine sediment in Maxwell Bay of the South Shetland Islands, Antarctica: Its paleoceanographic implication

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The glaciomarine sediment record of Maxwell Bay, South Shetland Islands, is composed of cyclic deposits. Each glaciomarine couplet forms alternating clast-rich massive diamicton deposited in cold climate conditions by iceberg rafting detached from coastal fast ice in which algal plants as well as sand and/or gravel were entrained and, in warmer climate conditions, meltwater deposits of weakly laminated mud with clast-poor stratified diamicton deposited by iceberg rafting coming from the tidewater glaciers depleted in sand and algal components. Although iceberg rafting occurs throughout the deposition of the whole cores, organic matter is deposited in high concentration and forms organic-rich massive diamicton only during cold conditions because of minimal dilution of siliciclastic particles by meltwater influx in Maxwell Bay.

5.PS-130: Synthetic seismograms and spectral cycles on the Andvord and Schollaert Drifts: Antarctic Peninsula

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The geological significance of seismic reflectors within large sediment deposits of the Gerlache Strait (Schollaert Drift) and the mouth of Andvord Bay (Andvord Drift) has been examined using synthetic seismograms. The seismograms generated from the physical properties in jumbo piston cores taken at each of these drifts (28JPC and 18JPC respectively) show good agreement with the field seismic profiles when core disturbance is taken into consideration. Both cores suggest an under-sampling of up to 30% (or compaction) during coring. This leads to inaccuracy in the evaluation of past sedimentation rates and thus interpretations based on these rates may be biased. In particular we show how spectral results may be modified by coring disturbances.

5.PS-131: Interdecadal change of tropospheric circulation in Southern Hemisphere extratropics during the recent warming episode at the Antarctic Peninsula region

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Main features of atmospheric circulation are specified in austral extratropics with main purpose to explain reasons of recent intensive near-surface warming at the Antarctic Peninsula (AP) region. Results were compared with conclusions obtained early for the North Atlantic-European sector. Average mean sea level pressure fields as well as so-called etalon weather patterns have been analyzed. Typical positions of main barometric formations were specified for 1990s, close to Antarctic Peninsula. Area of cyclogenesis has widened at western Antarctic sector along with eastward shift of wedge close to AP. Present-day circulation at this region can be described as more stable and predictable than in mid-XX century maintaining warmer conditions in the region.

5.PS-132: Contrasting sub-ice shelf, sub glacial and glacial marine deposition: Implications for ice shelf stability

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Data from cores collected from sites that were beneath the Ross Ice Shelf until 2000 and 2002 indicate that sub-ice shelf lithofacies are distinguishable from sub-glacial and glacial marine facies. Glacial marine sediment is characterized by diatom-rich, low-density, olive-green, sandy-muds, whereas sub-ice shelf sediment is defined by a lack of diatoms and muds that are enriched in silt and fine sand. Sub-glacial sediment is composed of diatom-poor, high density, coarse grained sandy-mud, rich in fine to coarse sized pebbles. Repetitive, fining-up packages, composed of fine-sand/silty-mud (distal sub ice-shelf deposits), grading into coarse pebbly-mud (sub ice-shelf proximal to the grounding line), suggest cyclicity in the movement of the grounding line over the last 11,000 yrs in the eastern Ross Sea. This research may facilitate a new understanding of ice-shelf dynamics, and possibly refine the current models for the Ross Ice Shelf's recent glacial history.

5.PS-133: Active layer apparent thermal diffusivity and its dependence on atmospheric temperature (Livingston Island, Maritime Antarctic)

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Antarctica is one of the most sensitive areas in the world to global climate change making it a privileged observatory for the study of this change. Nevertheless, its geographic location and its extreme climate make it very difficult to collect a continuous series of measurements. These adverse factors can be circumvented using boreholes since ground temperature measurements are a reliable and adequate method of detecting climatic trends. Since January 2000, our team has monitored the evolution of the active layer with a 2.4 m deep borehole called Incinerador. It is located near the Spanish Antarctic Base on Livingston Island (62º39'S, 60º21'W) in the Maritime Antarctic. In this paper, the apparent thermal diffusivity has been estimated in Incinerador observing a seasonal dependence. Moreover, the evolution of the temperature signal in the active layer shows two different periodic behaviours, a one-day period in the summer and a 6-to-10-day period in the winter.

5.PS-134: Unconsolidated sediments at the bottom of Lake Vostok from seismic data

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Four seismograms acquired in different parts of Lake Vostok were analyzed. Three different hypotheses were tested for the origin of secondary seismic reflections at the bottom of Lake Vostok. The results show that some of the reflections, but not all of them, are consistent with the hypothesis of a gently sloping (< 2 degrees) non-flat lake bottom. The rest of the reflections were tested as side echoes, but this was rejected because of unreasonably steep slopes (at least 8 degrees) at the lake bottom. The hypothesis that is the most compatible with all seismograms is the presence of a layer of unconsolidated sediments at the bottom of Lake Vostok. The modeling suggests the presence of a two hundred meters thick sedimentary layer with the seismic velocity of 1700 -1900 m/sec in the southern and middle parts of the lake. The sedimentary layer thickens to ~350 m in the northern basin.

5.PS-135: The subglacial bed of Shirase Glacier, Dronning Maud Land, Antarctica

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In austral summer 2005/06 the Alfred Wegener Institute for Polar and Marine Research (AWI) and the National Institute for Polar Research (NIPR) Tokyo carried out the joint aerogeophysical programme WEGAS. Ice thickness, magnetics and gravity of the Shirase Glacier drainage basin and the adjacent ocean have been mapped using the ski equipped AWI aircraft POLAR2 operated from the NIPR camp S17 near Syowa. Aim of this joint survey is to reveal the tectonic structure on- and off-shore to investigate the Gondwana break-up. This contribution focuses on the subglacial bed of Shirase Glacier, covering an area of roughly 160.000km², as revealed by airborne RES. A remarkable feature of the Shirase Glacier revealed by this survey is its flat bed. This in contrast to other glaciers in DML, which exhibit deep depressions. Results of the magnetics and gravity are subject of further presentations given at the symposium by the respective investigators.

5.PS-136: Subglacial conditions at a sticky spot along Kamb Ice Stream, West Antarctica

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<>We present the results of a seismic reflection experiment performed along the trunk of Kamb Ice Stream where we image a basal high surrounded by a bed with variable subglacial conditions. This high rises ~100 m above the surrounding bed, acting as a major sticking point that resists fast ice flow. Application of the amplitude variation with offset (AVO) seismic technique has detected a region of frozen sediments along the profile, suggesting that the ice stream is experiencing basal freeze-on in this region. The bedrock high appears to be at least partially draped in frozen sediment cover, with a concentrated area of basal water flanking one edge. Dilatant till is also present along our profile, though this till does not possess enough continuity to maintain streaming ice conditions. These results support the hypothesis that the ongoing shutdown of Kamb Ice Stream is due to a loss in continuous basal lubrication.

5.PS-137: Modelling the ice flow through an analogical and a numerical approach

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One of the main goals of present glaciological studies is the investigation of ice flow in the presence of bedrock obstacles using numerical and analogue modelling. Analogue modelling aims to analyse geological or geomorphological processes through physical models built in the laboratory at a reduced geometrical scale and deformed at reasonable scales of time, whereas numerical modelling aims to describe ice flow through physical equations discretized by means of numerical techniques and solved with calculators. The comparison between physical and numerical modelling can improve knowledge of the investigated phenomena. Numerical investigation can provide information about the optimal experimental design, whereas physical modelling can be used to check numerical results. We here present the results of the application of the two modelling techniques to theoretical domains. In particular, attention is focused on flow over bedrock disturbances such as submerged obstacles.

5.PS-138: Investigating the bedrock topography effect on the ice flow ablation using analogue modelling technique

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Three-dimensional laboratory physical experiments have been used to investigate the influence of bedrock topography and ablation on ice flow. Different models were tested in a Plexiglas box, where a transparent silicone simulating ice in nature was allowed to flow. Experimental results show how the flow field and variations in the topography of the free surface and internal layers of the ice are strongly influenced by the presence and height of bedrock obstacles. In particular, the buttressing effect forces the ice to slow down, rise up and avoid the obstacle; the higher the bedrock barrier, the more pronounced the process. In order to exhume deep material embedded in the ice, ablation must be included in the physical models. In this case, the analogue ice replenishes the area of material removal, thereby allowing deep layers to move vertically to the surface and severely altering the local ice flow pattern.

5.PS-139: A tephra chronostratigraphic framework for the Frontier Mountain blue ice field (northern Victoria Land, Antarctica)

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Englacial tephra are chronostratigraphic markers of the Antarctic ice sheet. Structural, mineralogical, geochemical and geochronological data on selected samples allowed the reconstruction of a chronostratigraphic framework for the Frontier Mountain blue ice field – an important meteorite trap on the southeastern flank of Talos Dome in Victoria Land. The stratigraphic thickness of the ice succession is ~1150 m. The 40Ar-39Ar age of one layer close to the stratigraphic bottom is 100±5 ka and constrains the maximum age of the bulk of Frontier Mountain blue ice. This work lays the foundations for a detailed investigation of ~100 ka of explosive volcanism in Victoria Land. Furthermore, in light of the ongoing ice core drilling project at Talos Dome, the Frontier Mountain ice succession may become important for establishing regional correlations, for sampling and dating key tephra layers, and for selecting ice successions for high-resolution studies of past atmospheric chemistry and fall out.

5.PS-140: ICESat altimetry vs. radar-derived ice thickness: Ice density variation in the Scott Coast (Northern Victoria Land, Antarctica)

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Calculating ice discharge at the land-sea interface relies on the correct estimation of ice thicknesses along the grounding line. This parameter can derive from radar sounding results or measured knowing the surface elevation, the mean ice and water densities and assuming the floating ice in hydrostatic equilibrium. To provide a localized estimation of the mean ice densities and a more detailed mapping of ice thicknesses at and seaward of the grounding line, we integrate ICESat elevation data with radar-derived ice thicknesses. We analyse the glaciers both spatially and statistically using GIS technologies, to check the possible influence of geomorphological and glaciological factors on the empirical relationships between ice elevation and thickness. The main conclusion is that ice densities differ locally as a function of the ice types, allowing to detect three major glaciological regions in the Nansen Ice Sheet characterised by firn-covered glacier ice, blue ice and mixed marine-meteoric ice.

5.PS-141: Tidal forcing on David Glacier and Drygalski Ice Tongue

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During the 2005-06 Austral Summer, we carried out a joint observational campaign in the area of the David Glacier, South Victoria Land, with the aim of collecting simultaneous time series of geodetic and seismological data. We installed 7 temporary seismographic stations on rock outcrops surrounding the glacier and 3 temporary geodetic stations both on flowing ice and on rock. The seismic network registered a significant low-energy seismic activity, principally originated by ice creeping and basal stress at the interface between the ice and the bedrock. The geodetic stations allowed us to survey the glacier kinematics forced by the Ross Sea tides, and to infer the grounding line location. Here we show some details about data analysis and preliminary results.

5.PS-142: The anatomy of continuous GPS measurements from southern Victoria Land, Antarctica

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Continuous GPS observations have been made at several remote sites in southern Victoria Land, Antarctica. Filtered time series from two representative remote sites are examined in order to ascertain the effects on vertical positions of expected regional geophysical loads such as hydrological loading, ocean tide loading and atmospheric pressure loading (APL). The time series is relatively insensitive to ocean loading as 24-hour data sets are used. Trends in APL calculated using the European Center for Medium Range Weather Forecasting standard model coupled to a simple elastic Earth model are correlated to site position. APL magnitudes however, cannot simply be removed from our time series without increasing the noise in the time series. Future tuning of atmospheric and ocean loading models and creation of suitable multipath maps for individual stations should allow hydrological loads such as snow melt or glacier changes to be reliably resolved.

5.PS-143: GPS time series analysis from Deception Island Volcano (South Shetland Islands, Antarctica)

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We present the preliminary results from the analysis of GPS time series data from Deception Island Volcano for the period December 2001 to January 2005. The geodetic network, REGID, has been episodically surveyed during every Austral summer since 1998 to monitor the volcanic activity on the island and to determine its crustal deformation. The deformational models show a continuation of the compressive process detected in the previous years. GPS data were processed using 30 min length observational windows, providing the local horizontal deformation between and within each surveying campaign. Wavelet analysis was applied to the data in order to detect the existence of short period components. The wavelet scalegram of the data reveals the presence of seasonal fluctuations that are not detectable with the usual 24 hours session processing approach. Their sources are still not well determined, which motivates the study of other geophysical phenomena that can affect the data.

5.PS-144: Volcanic deformation models for Deception Island (South Shetland Islands, Antarctica)

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GPS observations from a Deception Island Volcano geodetic network (South Shetland Islands, Antarctica) during 1991/1992 to 2002/2003 campaigns have characterized the deformation of the island resulting from its volcanic activity. From January 1992 to December 1999, radial extension together with an uplift episode was detected. During this period two important episodes of seismic activity took place, in particular, during the campaigns 1991/92 and 1998/99. From 2000 until 2003, no large displacements were detected, although the stations seem to converge in a radially compressive manner together with a subsidence, reflecting a change in the geodynamics of the island. Two clear alignments are observed on the contour maps that characterize the deformation, one in the NW-SE direction until 2000 and another on in the NE-SW direction from 2000 to 2003, coinciding with the principal directions of the tectonic features of the region, the Hero Fracture Zone and the Bransfield Rift.

5.PS-145: Determination of a local geoid for Deception Island

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Deception Island (63ºS, 60ºW) is one of the few volcanoes in Antarctica presenting an active volcanism. Its last eruptions took place in 1842, 1967,1969 and 1970, with unconfirmed ones in 1912 and 1917. The tectonics and volcanism in the area make necessary the establishment of a local physical reference frame: a geoid. To determine this experimental geoid, ellipsoid and orthometric heights for several points were collected: geodetic heights were obtained from GPS observations whereas the orthometric ones were obtained from absolute gravimetric and levelling measurements. In order to calculate this surface, three different techniques have been applied: remove-restore, GPS/levelling and collocation methods.

5.PS-146: Hydroacoustic monitoring of the Bransfield Strait and Drake Passage, Antarctica: A first analysis of seafloor seismicity, cryogenic acoustic sources, and cetacean vocalizations

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In November 2005, our research consortium deployed an Autonomous Underwater Hydrophone (AUH) array to begin long-term hydroacoustic monitoring of the waters in the Bransfield Strait and the Drake Passage. The array takes advantage of the efficient propagation of sound in the oceans to detect, locate and analyze the distribution of small to moderate-size earthquakes along the South Shetland Islands, Bransfield Strait, and Scotia Sea. All the hydrophones were recovered and redeployed in November of 2006, and we have now begun processing the 155GB of acoustic data. Preliminary review indicates the hydrophones recorded hundreds of earthquakes from the seafloor spreading centers and submarine volcanoes within the Bransfield Strait, as well as events from the subduction zone off the South Shetland Islands and from throughout the Scotia Sea. Moreover, we have observed harmonic tremor produced by the movement of large icebergs, and have detected the vocalizations of several critically endangered cetacean species.

5.PS-147: Broadband seismic deployments in East Antarctica: International collaboration & IPY contribution to Earth's deep interiors

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Deployment of Broadband Seismic Stations on the Antarctica Continent" is an ambitious project to improve the special resolution of seismic data across the Antarctic Plate. The project has several components, including 1) process-oriented experiments such as 3D-arrays; 2) evolving regional arrays; and 3) a permanent backbone network. Temporary broadband stations deployed on outcrops and continental ice sheet around Eastern Dronning Maud Land - Enderby Land areas will contribute strongly to IPY related major programs such as the 'POLEr observation NETwork (POLENET) (IPY project #185)'. The observed data during IPY will be available from Japanese library servers (ex., POLARIS of NIPR), and sent to world data centres (IRIS/DMS, PACIFIC21), and to AMD/JCADM of the SCAR/ANTEC. In addition to lithospheric studies, data from the large span arrays of broadband stations will allow more detailed investigations of the Earth's deep interior under high southern latitudes.

5.PS-148: Gravity survey along a traverse from Patriot Hills to the South Pole

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Gravity and GPS measurement as well as accompanying ice thickness determinations were performed along a tractor traverse from Patriot Hills to the South Pole, covering a distance of more than 1100 km. Special considerations were necessary to reasonably calculate the drift of the gravimeter used. Bouguer and ice layer corrections were accomplished by two-dimensional model calculations. The resulting complete Bouguer anomaly oscillates around zero along the northern section of the profile and starts to decrease 200 to 300 km before entering the East-Antarctic craton where it stabilizes at about -130 mGal. Isostatic modelling yields a positive residual anomaly of about 70 mGal over East-Antarctica which can be explained by additional masses in the crust, e.g. assuming an increased density in the lower crust. Alternative models which incorporate lighter sediments in West-Antarctica or which are isostatically unbalanced are possible.

5.PS-149: Absolute gravity measurements in Antarctica during the International Polar Year

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Gravity measurements, combined with precise positioning measurements and satellite gravity measurements, are necessary to separate the effects of past and present deglaciations on the variation of the Earth's gravity field. During the International Polar Year, we will make absolute gravity measurements at 6 stations in Antarctica. This program is the follow-up of measurements made at the Dumont D'Urville station, in Terre Adlie, in 2000 and 2006. It will be followed by another measurement at Dumont D'Urville station in 2010.

5.PS-150: Buried Oligocene glacial topography beneath a smooth middle Miocene unconformity in the southeast Ross Sea: Evolution of West Antarctic glaciation

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Buried U-shaped troughs as much as 20 km-wide and flat-topped ridges adjacent to western Marie Byrd Land have recently been proposed as the result of late Oligocene West Antarctic glaciation. Here, additional evidence for pre-25 Ma glaciation is presented for the southeast Ross Sea, together with a different stratigraphic correlation path that establishes age constraints. Rough Oligocene buried glacial topography contrasts with a buried smooth and planar middle Miocene “Red” angular unconformity. The Red unconformity extends east-west 160 km near the ice shelf edge, and is 700 m-deep. Part of a 2 km section of Oligocene to middle Miocene strata was removed by erosion. Any smooth post-rift subsidence profile requires that the Red unconformity was carved in water depths of several hundred meters. Several major early through Middle Miocene sequence boundaries merge to form this unconformity, suggesting multiple advances of thick grounded ice.

5.PS-151: Complex exposure history of pre-LGM glacial drifts in Terra Nova Bay (Victoria Land), using a multiple cosmogenic nuclide approach

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Glacially scoured morphology characterizes coastal piedmonts in the Terra Nova Bay area. Rounded mountain tops occur below the highest erosional trimlines on the flanks of glacial troughs draining the East Antarctic Ice Sheet (EAIS) and in intervening reliefs. Complex older drifts rest on deglaciated areas above the younger late Pleistocene glacial drift. The authors use geomorphological and glacial geological surveys and surface exposure dating to reconstruct a local chronology of pre-Last Glacial Maximum (LGM) variations of the EAIS and related outlet glaciers. Glacially transported erratics, as well as bedrock surfaces were sampled for cosmogenic-nuclide analysis (^{10}Be and ^{21}Ne). Bedrock samples show consistent ^{10}Be and ^{21}Ne exposure ages indicating exposure since at least 4 Ma with an erosion rate of about 17 cm/Ma; the erratic boulders show an excess of cosmogenic neon over cosmogenic beryllium that is interpretated as complex exposure histories with substantial periods of burial by cold-based ice.

5.PS-152: Modeling environmental bias and computing velocity field from data of Terra Nova Bay (TNB) GPS Network in Antarctica by means of a quasi-observation processing approach

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A semi-permanent GPS network of about 30 vertices has been installed at Terra Nova Bay (TNB) near Ross Sea in Antarctica. A permanent GPS station TNB1 based on an Ashtech Z-XII dual frequency P-code GPS receiver with ASH700936D_M Choke Ring Antenna has been mounted on a reinforced concrete pillar built on bedrock since October 1998 and has recorded continuously up to the present (Capra et al., 2004, 2007). The semi-permanent network has been routinely surveyed every summer using modern high quality dual frequency GPS receivers with 24 hours sessions at 15 sec rate; data, metadata and solutions have made available to the scientific community. We present the results of a distributed session approach applied to processing GPS data of the TNB GPS network, and based on Gamit/Globk 10.2-3 GPS analysis software. The results are in good agreement with other authors' computations and with many of the theoretical models.

5.A.A: Geophysical and geodetic observations at the poles ORAL

5.A.A-1: The SCAR GPS Campaigns in the context of global reference system realization and geodynamic research

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The SCAR GPS Campaigns have been carried out under the umbrella of the Scientific Committee on Antarctic Research (SCAR) annually since 1995. In an advanced analysis concept we combine the regional solution from the SCAR network with a homogeneously reprocessed global solution. This combination minimizes inconsistencies in the realization of the global reference system in Antarctica. The station coordinates and velocities obtained provide an excellent reference for a broad variety of geoscientific applications. In addition, the results contain valuable information for geoscientific investigations, such as plate kinematics, the stability of the Antarctic Plate or vertical deformations due to glacial isostatic processes. We present the status, introduce an advanced analysis concept of the SCAR GPS network and evaluate the derived accuracies. We discuss in detail the geoscientific implications of the obtained results. We provide an outlook on the contribution of the SCAR GPS Campaigns to the IPY project POLENET in Antarctica.

5.A.A-2: Vertical motions in the Northern Victoria Land inferred from GPS: A comparison with the Glacial Isostatic Adjustment models

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Following the densification of GPS stations in Antarctica, geodetic observations are playing an increasing role in geodynamics research and the study of the Glacial Isostatic Adjustment (GIA). It is, therefore, of fundamental importance to have a deeper knowledge on the sensitivity of GPS data to motions related to long-term ice mass changes. In order to investigate the geodynamic phenomena in the Northern Victoria Land (NVL), GPS observations were made during the last decade within the VLNDEF (Victoria Land Network for Deformation control) project. The processed data provide a picture of the motions occurring in the NVL, depicting a well defined vertical pattern of deformation. The comparison between geodetic vertical motions and GIA is addressed, showing a good agreement and highlighting the possible use of GPS geodetic constraints in GIA models. In spite of this agreement, the sensitivity of GPS vertical rates to non-GIA vertical motions has to be carefully evaluated.

5.A.A-3: Modelling recent airborne gravity data over the Antarctic Peninsula for regional geoid improvement

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There is a strong link between SCAR and IAG bodies in promoting long-term efforts to close the continental-wide data gaps that still remain in terrestrial gravity coverage over Antarctica. Airborne gravimetry provides the only feasible technique to survey large areas. A variety of aerogravity surveys have been accomplished, and several new ones are planned within the framework of the International Polar Year 2007/2008. In the Antarctic Peninsula region, the British Antarctic Survey has carried out a number of airborne and terrestrial gravity surveys. We have determined the regional geoid for Palmer Land, since a recent aerogeophysical survey provideshigh-quality and homogeneous gravity data. To improve the regional geoid the Remove-Compute-Restore technique is applied, where long-wavelength information from a global satellite-derived gravity field model and short-wavelength information from topography are utilized. Our regional geoid improvement adds a threshold of about 5m to the global model and shows several new details.

5.A.A-4: Regional geoid and gravity field from a combination of airborne and satellite data in Dronning Maud Land, East Antarctica

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A variety of gravity observations in Antarctica has recently become available through extensive efforts of airborne surveys. Aircraft serving as multi-instrumentation platforms provide measurements on gravity, bedrock topography, ice surface topography and ice thickness. Collected datasets are valuable in terms of resolution and homogeneity, which make them suitable for studying regional geoid determination in selected Antarctic regions. Within this context the German joint project VISA provided an excellent database for improving the regional geoid by combining gravity and topographic data from aerogeophysical observations with long-wavelength information from global gravity field models. Using the remove-compute-restore technique in conjunction with least-squares collocation, a regional geoid for Dronning Maud Land, East Antarctica, has been derived. A signal threshold of up to 6~m added to the global model that was used as a basis can be expected. The accuracy of the regional geoid will be estimated to be at the level of 15~cm.

5.A.A-5: The contribution of geomagnetic observatories and magnetic models to the study of secular variation and jerks in Antarctica

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Some of the most interesting features of the geomagnetic field and of its time variations are displayed in polar areas. Observatory monthly means usually provide an excellent opportunity to study the temporal changes of the magnetic field at a given location. Unfortunately, on the Antarctic continent the distribution of the permanent ground-based observatories does not permit a uniform coverage of the examined area. Furthermore, the magnetic records are characterized by intensive external disturbances and noise that make the analysis of the magnetic field difficult. To improve our knowledge on secular variation and detect the presence of secular variation impulses (geomagnetic jerks) in Antarctica, we use both observatory data and the CM4 quiet time magnetic field model. In particular the CM4 improves our knowledge of the geomagnetic jerks over Antarctica through the study of the sign changes of the secular acceleration maps.

5.A.B: Supercontinent breakup history and processes ORAL

5.A.B-1: Gondwana breakup: The South American, African and Indian plate movements and remaining problems

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The reconstruction of Gondwana deals to a great extent with the geological history of Antarctica's rifted margins. All continents on the southern hemisphere had common boundaries with what is today Antarctica. Geophysical investigations of the last decades have discovered the first order geophysical and geological features, which are important to reconstruct the pre-breakup Gondwana plate positions back to 160 Ma. Continuous geoscientific research provided solid constraints on the movements of the major plates. In this contribution the current knowledge will be reviewed and the remaining problems will be highlighted. New marine magnetic investigations in the Mozambique Basin and across the Mozambique Ridge shelf allow to better constrain the movements between Africa and Antarctica. Furthermore, the new data allow to interpret the Mozambique Ridge as volcanic construct, which formed during the separation of both plates. Finally, first results from investigation of the Indian-Antarctic sector will be presented and discussed

5.A.B-2: Double-saloon-door seafloor spreading: A new theory for the breakup of Gondwana

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The double-saloon-door seafloor spreading model was developed in the Western Mediterranean. During subduction rollback, opposite rotational torques are driven by the central pull of a sinking slab relative to two lateral areas where no subduction rollback occurs. This propels simultaneous opposite rotations of terranes in a backarc environment. The process also occurred in the Pannonian, Aegean, Caribbean and Japan Sea basins. Unlike previous models, this novel theory, when applied to Gondwana breakup, explains clockwise and counterclockwise rotations of the Falkland Islands Block and the Ellsworth Whitmore Terrane, the separation of these terranes in a northwest southeast direction, and their eventual accretion to South America and East Antarctica respectively. As in other cases, the Gondwana terranes comprise parts of a pre-existing retroarc fold / thrust belt (the Permo-Triassic Gondwanide Orogeny). Extension and microplate rotations in the backarc are accomodated by simultaneous crustal shortening at the adjacent subduction zone / accretionary wedge.

5.A.B-3: Japanese-German joint airborne geophysical surveys around Syowa Station, Antarctica

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The area around Syowa Station, the Japanese Antarctic wintering Station in Lützow- Holm Bay, is considered to be a junction of Africa, India, Madagascar, and Antarctic continents from the reconstruction model of Gondwana. Therefore this area is a key to investigate the formation and fragmentation of Gondwana. To reveal the tectonic evolution related to Gondwana formation and breakup in this area, joint Japanese-German airborne geophysical surveys around Syowa Station had been conducted in January 2006 during the 47th Japanese Antarctic Research Expedition. Ice radar, magnetic, and gravity data are obtained onshore and offshore areas using the AWI owned, Dornier aircraft (Polar-2) and the outline of the results are presented. Several characteristic features possibly related to the tectonic evolution of Gondwana are inferred from magnetic and gravity anomaly maps. The tectonic evolution in this area is discussed.

5.A.B-4: Tectonic elements of the continental margin of East Antarctic, 38-164ºE

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The East Antarctic continental margin from 38–164ºE is divided into western and eastern provinces that developed during the separation of India from Australia–Antarctica (Early Cretaceous) and Australia from Antarctica (Late Cretaceous). In the overlap between these provinces the geology is complex and bears the imprint of both extension/spreading episodes, with an overprinting of volcanism. The main rift-bounding faults appear to approximately coincide with the outer edge of the continental shelf. Inboard of these faults, the sedimentary cover thins above shallowing basement towards the coast where crystalline basement generally crops out. The continental slope and the landward flanks of the ocean basins, are blanketed by up to 9–10 km of mainly post-rift sediments in margin-parallel basins, except in the Bruce Rise area. Beneath this blanket, extensive rift basins are identified off Enderby and Wilkes Land/Terre Adélie; however, their extent and detailed structures are difficult to determine.

5.A.B-5: A Cretaceous Victoria Basin between Australia and Antarctica inferred from volcanoclastic deposits, thermal indications and thermochronological data

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The analysis of numerous apatite fission track (AFT) data sets throughout the Transantarctic Mountains reveals three episodes of upper crustal cooling since the Cretaceous. Traditional thinking presumes that this cooling was produced by uplift and denudation stages occurring in the Early Cretaceous, the Late Cretaceous, and the Cenozoic. However, diachronous paleotemperatures up to 400°C determined on Jurassic superficial rocks require substantial burial and thermal activity before a stable geothermal gradient was established during the Late Cretaceous. Therefore, an extensive sedimentary basin between Antarctica and Australia must have existed, likely due to continental rifting processes leading to Gondwana breakup and passive margin formation. Denudation-dominated cooling occurred only with the formation of the Cenozoic West Antarctic Rift System and the related uplift of the Transantarctic Mountains since ca. 55 Ma.

5.A.C: Climate records: Ice cores and Quaternary geological records ORAL

5.A.C-1: Advanced electron microscopy techniques for studying ice and firn cores

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Typical microstructural characterization of ice and firn utilizes optical microscopy often involving examination of thin sections between crossed polarizers. However, such an approach, in addition to being of low resolution, does not provide complete information on the microstructure. In this paper, we show the utility of using scanning electron microscope-based techniques for examining ice cores and firn cores. We show that, compared to “traditional” methods, not only may additional information, such as a-axis orientations be obtained, which enables more sophisticated analyses of the orientation relationships between grains to be performed, but that some traditional methods, e.g. the pore-infiltration optical thin-section technique for examining firn, may give incorrect results (for grain size). In addition, we show how scanning electron microscopy can be used to determine the internal surface area and porosity in firn.

5.A.C-2: Integrated tephrochronology of the West Antarctic region – Implications for a potential tephra record in the West Antarctic Ice Sheet (WAIS) Divide ice core

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Mount Berlin and Mt. Takahe, two polygenetic volcanoes in West Antarctica have produced a number of explosive, ashfall generating eruptions over the past 500,000 yrs. These eruptions dispersed volcanic ash over large areas of the West Antarctic Ice Sheet. Evidence of these eruptions is observed at two blue ice sites (Mt. Waesche and Mt. Moulton) as well as in the Siple Dome and Byrd (Palais et al., 1988) ice cores. Geochemical correlations between tephra sampled at the source volcanoes, at blue ice sites, and in the Siple Dome ice core suggest that at least some of the eruptions covered large areas of the ice sheet with volcanic ash, and $^{40}Ar/^{39}Ar$ dating of volcanic material provides precise timing when these events occurred. Volcanic ash from some of these events is expected to be found in the WAIS Divide ice core, providing chronology and inter-site correlation.

5.A.C-3: Possible redeposition of volcanic ashes in the Dry Valleys by glacier transport

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Debate continues whether Antarctica has been in a stable deep freeze since the Miocene or experienced major fluctuations in climate and glacier extent through the Pliocene. Volcanic ashes are key chronostratigraphic markers in the Dry Valleys, and there is now evidence that some of them have been reworked from older deposits. This evidence comes from three sources. First, we found blocks of glacially-transported ash in Beacon Valley. After disintegrating, these erratics leave localized deposits of relatively pure volcanic ash much older than the surfaces they overlie. Second, most surface-age estimates older than 2 Ma in the Dry Valleys are based on the eruption (Ar-Ar) ages of these reputed *in situ* tephras. In contrast, the majority of cosmogenic exposure ages are younger. Third, geomorphic and weathering processes are active today in Dry Valleys, indicating a younger landscape than Miocene age implied by the ancient tephra eruption ages.

5.A.C-4: Late Quaternary environmental history of Taylor Valley, southern Victoria Land, Antarctica, reconstructed by a multidisciplinary study of lake sediments

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Sedimentological, biogeochemical, mineralogical, and chronological investigations were conducted on sediment sequences recovered from lakes Hoare and Fryxell in eastern Taylor Valley, southern Victoria Land, Antarctica. The sediment sequences provide crucial information to the environmental history of Taylor Valley back into the Middle Weichselian. At that time, eastern Taylor Valley was occupied by the large proglacial Lake Washburn, since the advanced Ross Sea Ice Sheet dammed the valley outlet. Lake Washburn was mainly fed by meltwater and had an oscillating lake level probably depending on climatic variations. Cold and dry climatic conditions during the Last Glacial Maximum likely led to a pronounced lake-level lowering due to evaporation. With the final retreat of the Ross Sea Ice Sheet during the Holocene, Taylor Valley was occupied by remnants of Lake Washburn. Environmental conditions comparable to those of today, with an advanced Canada Glacier separating lakes Hoare and Fryxell, established during the late Holocene.

5.A.C-5: Surface exposure ages of glacial erratics in the Ohio Range, Horlick Mountains

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In the interior of the West Antarctic Ice Sheet (WAIS), mountains that project through the ice sheet serve as dipsticks that gauge past ice sheet elevations. Thickening of the WAIS is recorded by moraines, erratics, and trimlines on mountain slopes. In the Ohio Range, near the WAIS divide, such features indicate that the last highstand was ~ 120 m higher than present. The youngest exposure ages of erratics near the trimline indicate that the last highstand occurred ~12.5 ka. However, most erratics have older exposure ages. Prominent clusters of exposure ages occur around 30 and 70 ka, periods corresponding to the onset of glacial stages in the d18O record. 21Ne exposure ages of cavernously weathered bedrock below the trimline indicate > 3.5 Ma of cumulative exposure. In contrast, nominal 10Be exposure ages of the same samples are ~1.1 Ma indicating that the bedrock was ice-covered for a minimum of 1Ma.

5.A.D: Exploration beneath the ice sheets and ice shelves ORAL

5.A.D-1: Detrital apatite and zircon (U-Th)/He evidence for early formation and slow erosion of the Gamburtsev Mountains, East Antarctica

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The enigmatic Gamburtsev Subglacial Mountains in East Antarctica are important as the postulated source point for Eocene glaciation, but have not been sampled directly because they are covered by 0.6-4 km of ice. Topography and ice flow suggest that they shed terrigenous sediment to the Lambert Graben-Prydz Bay Basin. We measured (U-Th)/He ages of 110 to 316 Ma on detrital apatite grains and 197 to 397 Ma on detrital zircon grains (of pan-African U-Th-Pb age) from Prydz Bay cores. Hornblende and biotite $^{40}Ar/^{39}Ar$ ages from these samples cluster around 500 Ma, representing rapid exhumation following the pan-African high grade metamorphism represented in U-Th-Pb ages. Combined zircon and apatite (U-Th)/He cooling models require gradual, slow cooling since about 500 Ma with erosion rates of 0.03 km/Ma or less. Models that require rapid uplift and erosion or recent formation of the Gamburtsev Mountains appear to be eliminated by these data.

5.A.D-2: Evidence from detrital hornblende $^{40}Ar/^{39}Ar$ and zircon U-Pb ages for the sources of glacial deposits in the Prydz Bay region

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We report $^{40}Ar/^{39}Ar$ analyses of individual hornblende grains and laser ablation U-Pb analyses of individual zircon grains from East Antarctic glacial diamict samples from the Prydz Bay region. Hornblende ages are strongly concentrated near 500 Ma and thus record a regional pan-African metamorphic overprint. Zircon U-Pb ages have a prominent *ca*. 550 Ma peak, also consistent with a large pan-African regional event, but additionally have an important peak in the interval between 880 and 950 Ma. In detail the cores capture sediment from different glacial flow lines based on published balance velocities, and there are some differences in the zircon U-Pb age distributions that are interpreted to reflect source variations along these different flow lines. There may also be some differences among different diamict layers from the same cores, but more work would be required to demonstrate whether this is significant.

5.A.D-3: Exploring under the East Antarctic Ice Sheet with a new aerogeophysical survey over the Wilkes Subglacial Basin, the Transantarctic Mountains and Dome C

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As we enter the IPY geological boundary conditions for the stability of the East Antarctic Ice Sheet (EAIS) remain largely unknown. During the 2005/06 field season a major new aerogeophysical survey was performed over the Wilkes Subglacial Basin, the Transantarctic Mountains and Dome C. Over 60,000 km of new airborne radar, aeromagnetic and aerogravity data were collected. We will describe the survey layout and methodologies and present new geophysical images as a tool to address the highly contentious stability of the EAIS during warmer than present palaeoclimates, the underlying crustal structure, and to study subglacial lakes.

5.A.D-4: A forward scattering and propagation model for Antarctic ice sheet investigations

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A forward scattering and propagation model has been developed with the primary intent to investigate the feasibility of sounding the Antarctic ice sheet using a spaceborne radar system. The use of the model is also envisaged for support and interpretation of airborne ice sounding or ground penetrating radar data. The model computes the time-pulsed backscattered response from a very large 3D volume which includes a series of user-defined gridded layers representing the ice surface, bedrock, intermediate ice layers and other possible material that may be found within the ice, e.g. volcanic ash. Earth curvature, large-scale topography, undulations or sastrugi are taken into account in the elevation of each elementary grid cell. Presented simulation results are compared with actual data in order to demonstrate the overall validity and functionality of the model. The model architecture is such that it allows input description of both the ice sheet and instrument characteristics.

5.A.D-5: Evidence of of bed deformation beneath the Wright Lower Glacier, south Victoria Land, Antarctica

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A tunnel excavated into the margin of Wright Lower Glacier revealed a basal ice sequence dominated by the presence of frozen blocks of sand that contained well-preserved fluvial sedimentary structures. The sedimentary structures, together with the presence of ice between the frozen sand blocks and ice wedges in the uppermost block of sand suggest that the material is an overridden proglacial permafrost environment. Velocity and strain measurements made in the tunnel show that the permafrost is being deformed and the glacier has entrained the sediment blocks. The measurements also reveal a compound basal velocity profile that is the result of no or very low internal shear in the sand blocks whereas the relatively clean ice experiences relatively high strain rates. The pattern of strain and displacement strongly resembles the velocity structure associated with the deformation of subglacial sediment.

5.P1.A: Solid earth-ice sheet interactions ORAL

5.P1.A-1: Characteristic seismic signals associated with ice sheet and glacier dynamics, eastern Dronning Maud Land, East Antarctica

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Several kinds of natural signals were recorded by a seismic experiment on the continental ice sheet in Eastern Dronning Maud Land during the 2002 austral summer. They include not only tectonic earthquakes, but also ice related phenomena possibly involving recent global climate change. The recorded signals include (1) a teleseismic event, (2) local ice-quakes and (3) an unidentified event (X-phases). Interestingly, frequency content at 2.0 Hz is small in the waveforms recorded by stations in middle part of the seismic profile. Alternatively, 5.0 Hz and 1.5 Hz components are large at these stations which are above a valley in topography at the interface between the ice sheet and topmost crust. The abrupt change of topography in the valley might cause both the anomalous frequency content and travel times. The estimated origin of the unidentified event might be an intraplate earthquake or possibly a large ice-quake around East Antarctica.

5.P1.A-2: Teleseismic surface waves radiated by the stick-slip motion of the Whillans Ice Stream

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Whillans Ice Stream, West Antarctica, regularly undergoes tidally modulated stick-slip episodes with a ~25 minute duration and a total seismic moment equivalent to an Mw 6.5 earthquake. Here we report on simultaneous teleseismic and GPS observations of these slip episodes. Seismic arrivals generally are most prominent at periods of 20-100 seconds and consist of three packets. Time correlation with the GPS observations identifies the first packet with the initial rupture nucleation and the final packet with rupture termination at the grounding line. The seismic amplitudes are correlated with the spring-to-neap tidal cycle and with rupture velocity. We suggest that the Whillans slip events can be monitored using permanent seismic stations allowing us to detect changes over a longer time period than is possible with in-situ measurements. More generally, other glaciers and ice streams can be remotely monitored for fast glacial slip using seismic detection techniques.

5.P1.A-3: On geodetic inferences of Antarctic lithosphere, mantle viscosity, past ice history and present-day balance

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Attempts to extract mantle viscosity and lithospheric thickness in Antarctica from glacial isostatic adjustment (GIA) data are frustrated by the relative scarcity of relative sea–level (RSL) data. Geodetic trend signals now have sufficient signal-to-noise ratios that forward models can be used to 'best-fit' the parameters of GIA-Earth structure models. Trends reported from the Gravity Recovery and Climate Experiment (GRACE) analysis centers and continuously operating Global Positioning System (cGPS) data reported to the International GPS Service (IGS) analysis centers provide important constraints. New geologic, ice and sediment core, and exposure age data, also constrain ice history at the margins of the east Antarctic ice sheet along the coast of the Indian Ocean. A family of GIA models can adequately fit the spatial-dependence of geodetic (GRACE + cGPS) trend data that span 2003 - mid 2007 in this region, but each has deficiency in matching the amplitudes of the trend signals.

5.P1.A-4: Moho topography of the West Antarctic Rift System from inversion of aerogravity data: Ramifications for geothermal heat flux and ice streaming

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The West Antarctic rift system, a region of thinned continental crust, dominates the lithospheric structure of the Ross Embayment in West Antarctica. It has long been hypothesized that the lithospheric structure beneath the West Antarctic Ice Sheet is a major influence on the formation, nature and dynamics of the ice sheet. The structure of the crust-mantle boundary is a fundamental geophysical parameter for understanding lithospheric processes and for geodynamic interpretation. In this paper, we use aerogravity data to derive a map of the crust/mantle boundary beneath the West Antarctic Ice Sheet and to reveal the impact of relative changes in thickness of the crust and lithosphere on surface heat flow and ice streaming.

5.P1.B: Supercontinent breakup history and processes ORAL

5.P1.B-1: Cretaceous oblique detachment tectonics in the Fosdick Mountains, Marie Byrd Land, Antarctica

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The Fosdick Mountains form an E-W trending migmatite dome in the northern Ford Ranges of Marie Byrd Land, Antarctica. Pervasively folded migmatites derived from lower Paleozoic greywacke and middle Paleozoic plutonic rocks constitute the dome. New field research documents a transition from melt-present to solid-state deformation upon the south flank of the dome, and a throughgoing mylonitic shear zone mapped for 10 km between Mt Richardson and Mt Getz. Kinematic shear sense is dextral normal oblique, with top-to-the-SW and -WSW transport. A U-Pb age of 107 Ma, from a leucosome-filled extensional shear band, provides a melt-present deformation age, and a U-Pb age of 96 Ma, from a crosscutting granitic dike, gives a lower age limit for deformation. The structure, here named the South Fosdick detachment zone, forms the south flank of the migmatite dome and was in part responsible for the exhumation of mid-crustal rocks.

5.P1.B-2: Geophysical survey reveals tectonic structures in the Amundsen Sea embayment, West Antarctica

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The Amundsen Sea embayment of West Antarctica is in a prominent location for a series of tectonic and magmatic events from Paleozoic to Cenozoic times. Seismic, magnetic and gravity data from the embayment and Pine Island Bay (PIB) reveal the crustal thickness and some tectonic features. The Moho is 24-22 km deep on the shelf. NE-SW trending magnetic and gravity anomalies and the thin crust indicate a former rift zone that was active during or in the run-up to breakup between Chatham Rise and West Antarctica before or at 90 Ma. NW-SE trending gravity and magnetic anomalies, following a prolongation of Peacock Sound, indicate the extensional southern boundary to the Bellingshausen Plate which was active between 79 and 61 Ma.

5.P1.B-3: Break-up of Gondwana and opening of the South Atlantic: Review of existing plate tectonic models

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The opening history the Weddell Sea and South Atlantic Ocean is critical to understanding the breakup of Gondwana and the evolution of Antarctica since Early Jurassic times. Unfortunately the tectonics of the region is difficult to resolve because of the paucity of data coverage and its inherent complexity. Although considerable progress has been achieved in the past 20 years, there are still several models which differ in crustal ages and schemes of opening. We present a review of four of those models. Focusing on poles of rotation, synthetic isochrons and flowlines, we show crustal age maps that display the estimated trace of the triple junction for each model, and plot reconstructions for comparison. The diverse simplifying assumptions used by the models, including plate fragmentation to account for the syn-rift basins and periods of stretching, are strong indicators that rigid plate tectonics is too simple a model for the present problem.

5.P1.B-4: New Rb-Sr mineral ages temporally link plume events with accretion at the margin of Gondwana

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Five of six Rb-Sr muscovite mineral isochron ages, from the Scotia Metamorphic Complex of the South Orkney Islands, West Antarctica, average 190 ± 4 Ma. The muscovite ages are interpreted to date foliation-formation and thus also accretion and subduction at the Gondwana margin. Co-incident picrite and ferropicrite magmatism, indicative of melts from deep-seated depleted mantle, permits a causative link between accretion and the arrival of the Karoo – Ferrar – Chon Aike mantle plume in the Early Jurassic. Three biotite Rb-Sr mineral isochron ages are consistently younger and average 176 ± 5 Ma. The biotite ages may record post-metamorphic cooling or more likely retrogressive metamorphic effects during uplift.

5.P1.C: Climate records: Ice core and Quaternary geological records ORAL

5.P1.C-1: Spatial and temporal distribution of ikaite crystals in Antarctic glacial marine sediments

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Ikaite formation in Antarctic glacial marine muds is spatially limited to regions of the NW Weddell Sea (Vega Dift) and Eastern Bransfield Basin. The conditions providing this limited occurrence are related to the high regional productivity and very cold outflow of waters derived from the Weddell Sea. Early diagenetic conditions contributing to the formation and preservation of abundant Ikaite in the Vega Drift are as yet unknown although preliminary geochemical indices on degraded ikaite (calcite) indicate that alternate carbonate phases (other than ikaite) are not yet stable to depths of 10's of meters and the alkalinity is derived from microbial degradation of organic matter within the surrounding sediment, rather than methanogenesis at depth.

5.P1.C-2: The heterogenity of Holocene climatic and environmental history along the East Antarctic coastal regions

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The reconstruction of the climatic and environmental history along the East Antarctic coastal regions is mainly based on investigations of geomorphological features and of biological proxies in lacustrine and marine sediment sequences. Although some records show consistency in the onset and duration of warm and cold periods after deglaciation, others indicate significant differences even in the same area. These differences may partly be explained by dating uncertainties, overprinting of local factors, or possibly even misinterpretations of the proxies used. However, a comparison with climate histories deduced from ice core records reveals that the differences must be at least partly caused by local effects and small-scale variations, which still need to be better understood and demonstrate the need of further research.

5.P1.C-3: Holocene oceanographic and climatic variability of the Vega Drift revealed through foraminiferal interpretation

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Sediment core NBP0003-JPC38 (20.53 m) was recovered from the Vega Drift, Antarctica. Benthic foraminiferal analyses show significant faunal variations indicating important Holocene oceanographic and climatic changes. The early to middle Holocene sequence is dominated by the calcareous *Stainforthia fusiformis* assemblage and is characterized by calcareous forms including *Globocassidulina biora*, *G. subglobosa*, *Nonionella iridea*, and occurrence of the planktonic species *Neogloboquadrina pachyderma*. This assemblage has greatest similarities to modern assemblages found in the higher productivity and restricted oceanography of fjords from the western Antarctic Peninsula. The mid to late Holocene interval is defined by the *Textularia weisneri* and *Miliammina arenacea* assemblages, similar to modern assemblages directly to the south in the Prince Gustav Channel. The late Holocene is marked by several small intervals with taxonomic characteristics similar to the early to mid Holocene. Most agglutinated forms tend to increase up-core, and comparisons to modern analogues imply post-depositional disintegration.

5.P1.C-4: Quantifying changes in the global thermohaline circulation: A Circum-Antarctic perspective

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The Circum-Antarctic Ocean plays a particularly important role in the present-day global ocean circulation system, connecting the three major ocean basins, and acting as the intermediary of global water-mass exchange. As the global "blender" of water masses, changes in its tracer inventory through time reflect the vigor of the global thermohaline circulation (THC) system. Nd isotopes provide a unique potential to quantify present and past ocean circulation changes, as the only quasi-conservative paleocirculation tracer. We present the first Nd isotope record representing the Circum-Antarctic over the last 28 kyr. First order observations include shutdown of the THC during Heinrich Event 1 and during the early part of MIS 2, and a distinct but less intense weakening during the Younger Dryas, but increased THC vigor during the Last Glacial Maximum. Ongoing work with greater temporal resolution and on complementary records will allow quantification of THC intensity through time.

5.P1.D: Polar databases, repositories and maps ORAL

5.P1.D-1: The next generation Antarctic digital magnetic anomaly map

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Initiated in 1995, the Antarctic Digital Magnetic Anomaly Project (ADMAP) produced the first magnetic anomaly map of the Antarctic region south of 60°S (Golynsky et al., 2001). This map synthesized over 7.1 million line-kms of survey data available up through 1999 from marine, airborne and Magsat satellite observations. Since the production of the initial map, a large number of new marine and airborne surveys and improved magnetic observations from the Ørsted and CHAMP satellite missions have become available. In addition, an improved core field model for the Antarctic has been developed to better isolate crustal anomalies in these data. The next generation map also will likely synthesize the magnetic survey observations of the region in terms of a high-resolution spherical cap harmonic model. In this paper, we review the progress and problems of developing an improved magnetic anomaly map to facilitate studies of the Antarctic crustal magnetic field.

5.P1.D-2: Antarctic Multibeam Bathymetry and Geophysical Data Synthesis: An on-line digital data resource for marine geoscience research in the Southern Ocean

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The Antarctic Multibeam Bathymetry and Geophysical Data Synthesis (AMBS) is a web-accessible data resource for marine geoscience research within the Southern Ocean. The primary focus is to preserve and provide public access to multibeam seabed bathymetry acquired during expeditions of research vessels supported by the U.S. National Science Foundation. Since inception in 2003, our primary goal has been to facilitate specialist and non-specialist visualization and exploration of the sub-sea landscape to the full detail of the original data. Uniform visualization across a wide-range of map scales at high latitudes is made possible by dynamic access to a gridded synthesis in both Polar and Mercator projections. A second goal is to support multi-disciplinary research needs by offering data discovery and visualization of numerous complementary geoscience datasets. In this report, we describe the design objectives and architecture of the AMBS, and recent developments regarding data submission and delivery via Web Services.

5.P1.D-3: GIS based data compilation of the new International Bathymetric Chart of the Southern Ocean (IBCSO)

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The SCAR expert group for the compilation of the International Bathymetric Chart of the Southern Ocean (IBCSO) focuses on the buildup of a revised and updated bathymetric database for the entire Southern Ocean with additional seamless data derived from radar satellite images, satellite altimetry, and gravity. Bathymetric and additional data are provided by a great number of hydrographic offices, research institutes, and geoscientific data centers. The work plan in terms of data processing can be summarized by following steps: (i) data transfer to the IBCSO database management system, (ii) compilation of the heterogeneous data sets, (iii) data merge of georeferenced data sets, (iv) data analyses and optimization and, (v) iterative quality control. Data management and processing is conducted by use of geographic information systems. This approach allows production of traditional cartographic paper products and digital web maps. Hence the bathymetric chart is generated time and cost efficiently.

Author Index

Lead author papers are shown in bold font.

Correlation table giving various numbers for each presentation at the 10th ISAES.

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1.PS-29	EA 076	1813
1.PS-3	EA 131	1596
1.PS-30	SS only	2026
1.PS-4	EA 013	1429
1.PS-5	EA 018	1656
1.PS-6	SRP 079	1096
1.PS-7	EA 045	1630
1.PS-8	EA 005	1454
1.PS-9	EA 136	1629
2.A.A-1	SRP 094	1211
2.A.A-2	EA 150	1671
2.A.A-3	EA 159	1777
2.A.A-4	SRP 021	1263
2.A.A-5	SRP 043	1191
2.A.A-6	EA 037	1762
2.A.A-7	SRP 020	1369
2.A.B-1	EA 188	1778
2.A.B-2	EA 164	1361
2.A.B-3	EA 006	1415
2.A.B-4	SRP 099	1244
2.A.B-5	EA 183	1836
2.A.B-6	SS only	1870
2.A.B-7	EA 033	1833
2.A.C-1	EA 162	1733
2.A.C-2	SRP 059	1229
2.A.C-3	EA 046	1621
2.A.C-4	EA 166	1586
2.A.C-5	EA 002	1546
2.A.C-6	EA 064	1542
2.A.C-7	EA 163	1616
2.A.D-1	EA 039	1451
2.A.D-2	SRP 103	1315
2.A.D-3	SRP 088	1220
2.A.D-4	EA 054	1624
2.A.D-5	EA 177	1767
2.A.D-6	EA 151	1763
2.P1.A-1	EA 061	1732
2.P1.A-2	SRP 026	1353
2.P1.A-3	SRP 005	1120
2.P1.A-4	SRP 037	1247
2.P1.A-5	SRP 024	1192
2.P1.B-1	EA 133	1798
2.P1.B-2	SRP 080	1362
2.P1.B-3	SS only	2021
2.P1.B-4	SRP 082	1380
2.P1.B-5	EA 034	1790
2.P1.C-1	EA 049	1724
2.P1.C-2	EA 020	1537
2.P1.C-3	EA 030	1440
2.P1.C-4	SRP 042	1069
2.P1.C-5	EA 203	2083
2.P1.D-1	SRP 102	1300
2.P1.D-2	SRP 104	1326
2.P1.D-3	SRP 033	1394
2.P1.D-4	EA 066	1609
2.P1.D-5	EA 070	1659
2.P2.A-1	EA 186	1800
2.P2.A-2	EA 140	1317
2.P2.A-3	SRP 095	1398
2.P2.A-4	EA 024	1719
2.P2.B-1	EA 047	1722
2.P2.B-2	SRP 003	1228
2.P2.B-3	SRP 066	1171
2.P2.B-4	SRP 083	1175
2.P2.C-1	EA 055	1869
2.P2.C-2	EA 170	1617
2.P2.C-3	SRP 058	1328
2.P2.C-4	EA 196	1618
2.P2.D-1	SRP 035	1201
2.P2.D-2	SRP 045	1144
2.P2.D-3	EA 069	1672
2.P2.D-4	EA 063	1714
2.PL-1	KNP 04	1932
2.PL-2	KNP 10	1947
2.PS-31	EA 038	1472
2.PS-32	SRP 006	1298
2.PS-33	EA 168	1511
2.PS-34	SRP 105	1213

2.PS-35	SRP 044	1125	3.A.C-2	SRP 023	1279	4.A.C-3	SRP 076	1381
2.PS-36	EA 175	1635	3.A.C-3	EA 048	1726	4.A.C-4	EA 115	1588
2.PS-37	SRP 032	1312	3.A.C-4	EA 003	1494	4.A.C-5	EA 204	1575
2.PS-38	EA 105	1474	3.A.C-5	EA 077	1538	4.A.D-1	EA 071	1525
2.PS-39	SRP 060	1297	3.A.C-6	EA 004	1388	4.A.D-2	EA 135	1591
2.PS-40	EA 160	1469	3.A.D-1	SS only	2042	4.A.D-3	EA 075	1701
2.PS-41	EA 137	1866	3.A.D-2	EA 138	1480	4.A.D-4	EA 059	1759
2.PS-42	SRP 075	1358	3.A.D-3	EA 109	1801	4.A.D-5	EA 096	1595
2.PS-43	SS only	2029	3.A.D-4	EA 198	1614	4.A.D-6	SRP 081	1364
2.PS-44	SS only	1981	3.A.D-5	SRP 087	1141	4.P1.A-1	EA 113	1808
2.PS-45	SRP 072	1274	3.PL-1	KNP 03	1935	4.P1.A-2	EA 153	1848
2.PS-46	SRP 016	1135	3.PL-2	KNP 08	1937	4.P1.A-3	EA 127	1549
2.PS-47	EA 027	1740	3.PS-70	SS only	2009	4.P1.A-4	SRP 084	1189
2.PS-48	EA 035	1752	3.PS-71	SRP 001	1238	4.P1.B-1	SRP 049	1202
2.PS-49	SS only	2002	3.PS-72	SS only	2017	4.P1.B-2	EA 017	1684
2.PS-50	SRP 096	1327	3.PS-73	SS only	1997	4.P1.B-3	SRP 092	1384
2.PS-51	SRP 053	1239	3.PS-74	EA 007	1374	4.P1.B-4	EA 095	1628
2.PS-52	SRP 108	1366	3.PS-75	EA 192	1604	4.P1.B-5	EA 103	1737
2.PS-53	SS only	1975	3.PS-76	SRP 077	1289	4.P1.C-1	EA 072	1651
2.PS-54	SS only	2001	3.PS-77	SS only	1840	4.P1.C-2	EA 176	1667
2.PS-55	EA 021	1633	3.PS-78	SRP 015	1329	4.P1.C-3	EA 132	1619
2.PS-56	SRP 089	1370	3.PS-79	EA 116	1741	4.P1.C-4	EA 149	1612
2.PS-57	EA 051	1603	3.PS-80	EA 026	1681	4.P1.C-5	EA 080	1611
2.PS-58	EA 085	1694	3.PS-81	EA 050	1682	4.P1.D	EA 214	2102
2.PS-59	SS only	2023	3.PS-82	SS only	2010	4.P1.D-1	EA 068	1683
2.PS-60	SRP 086	1275	3.PS-83	EA 189	1688	4.P1.D-2	EA 117	1818
2.PS-61	EA 028	1496	3.PS-84	SRP 061	1195	4.P1.D-3	EA 100	1365
2.PS-62	EA 042	1562	3.PS-85	SRP 050	1180	4.P1.D-4	EA 058	1502
2.PS-63	EA 086	1584	3.PS-86	SRP 056	1299	4.P2.A-1	SRP 090	1114
2.PS-64	EA 110	1881	3.PS-87	SS only	2080	4.P2.A-2	EA 121	1640
2.PS-65	EA 084	1559	3.PS-88	SS only	2059	4.P2.A-3	EA 169	1717
2.PS-66	EA 088	1206	3.PS-90	SRP 011	1154	4.P2.A-4	SS only	1995
2.PS-67	EA 025	1652	3.PS-91	SRP 017	1337	4.P2.B-1	SRP 034	1276
2.PS-68	SRP 109	1178	3.PS-92	SRP 068	1226	4.P2.B-2	SRP 101	1344
2.PS-69	SRP 052	1320	4.A.A-1	EA 114	1792	4.P2.B-3	EA 057	1484
3.A.A-1	SS only	1775	4.A.A-2	EA 125	1465	4.P2.B-4	EA 078	1169
3.A.A-2	EA 191	1646	4.A.A-3	SRP 106	1341	4.P2.C-1	EA 082	1577
3.A.A-3	EA 056	1841	4.A.A-4	EA 122	1689	4.P2.C-2	EA 180	1230
3.A.A-4	EA 107	1712	4.A.A-5	EA 208	1569	4.P2.C-3	SRP 013	1257
3.A.A-5	EA 098	1856	4.A.A-6	SRP 074	1311	4.P2.C-4	EA 111	1350
3.A.A-6	SRP 009	1236	4.A.A-7	SS only	2038	4.P2.D-1	EA 019	1632
3.A.A-7	SRP 040	1260	4.A.B-1	EA 156	1847	4.P2.D-2	EA 141	1698
3.A.B-1	SS only	2028	4.A.B-2	SRP 022	1410	4.P2.D-3	EA 157	1666
3.A.B-2	EA 081	1731	4.A.B-3	EA 016	1495	4.P2.D-4	SS only	1984
3.A.B-3	SS only	2048	4.A.B-4	SRP 091	1356	4.PL-1	KNP 07	1968
3.A.B-4	SRP 036	1359	4.A.B-5	EA 087	1821	4.PL-2	KNP 02	1966
3.A.B-5	EA 062	1852	4.A.B-6	EA 091	1857	4.PS-100	SRP 039	1161
3.A.B-6	SRP 029	1270	4.A.B-7	SRP 098	1242	4.PS-101	EA 124	1422
3.A.B-7	SS only	1949	4.A.C-1	EA 206	1839	4.PS-102	EA 195	1838
3.A.C-1	EA 207	1739	4.A.C-2	SRP 070	1152	4.PS-103	SRP 100	1290

4.PS-104	EA 041	1564	5.P1.C-1	EA 015	1723
4.PS-105	EA 216	1219	5.P1.C-2	EA 161	1488
4.PS-106	SRP 048	1346	5.P1.C-3	SRP 010	1304
4.PS-107	SRP 025	1116	5.P1.C-4	EA 209	1845
4.PS-108	SRP 028	1111	5.P1.D-1	SRP 093	1163
4.PS-109	EA 090	1805	5.P1.D-2	SRP 002	1349
4.PS-110	SRP 063	1259	5.P1.D-3	EA 023	1438
4.PS-111	EA 044	1607	5.PL-1	KNP 09	1933
4.PS-112	EA 043	1578	5.PS	SS only	2099
4.PS-113	SS only	2008	5.PS-119	EA 165	1708
4.PS-114	EA 073	1567	5.PS-120	EA 202	1803
4.PS-115	EA 212	1566	5.PS-121	EA 147	1822
4.PS-116	SS only	2070	5.PS-122	SS only	2006
4.PS-117	SRP 030	1249	5.PS-123	EA 126	1548
4.PS-118	EA 001	1434	5.PS-124	EA 200	1754
4.PS-93	SRP 065	1209	5.PS-125	EA 215	1789
4.PS-94	EA 036	1557	5.PS-126	EA 213	1756
4.PS-95	SRP 007	1102	5.PS-127	SS only	1900
4.PS-96	EA 145	1498	5.PS-128	SRP 067	1282
4.PS-97	EA 187	1757	5.PS-129	SS only	1889
4.PS-98	SRP 038	1124	5.PS-130	SRP 018	1411
4.PS-99	SRP 062	1338	5.PS-131	EA 067	1862
5.A.A-1	EA 146	1504	5.PS-132	EA 152	1761
5.A.A-2	SRP 073	1292	5.PS-133	EA 210	1296
5.A.A-3	EA 014	1643	5.PS-134	SRP 031	1330
5.A.A-4	EA 022	1645	5.PS-135	SS only	1851
5.A.A-5	SRP 071	1162	5.PS-136	SRP 097	1156
5.A.B-1	EA 154	1711	5.PS-137	EA 097	1556
5.A.B-2	EA 112	1455	5.PS-138	EA 181	1600
5.A.B-3	EA 065	1524	5.PS-139	EA 128	1615
5.A.B-4	SRP 085	1138	5.PS-140	SS only	2013
5.A.B-5	EA 211	1697	5.PS-141	EA 009	1563
5.A.C-1	EA 185	1585	5.PS-142	SRP 064	1355
5.A.C-2	EA 179	1829	5.PS-143	EA 102	1670
5.A.C-3	EA 158	1843	5.PS-144	EA 094	1693
5.A.C-4	SS only	1967	5.PS-145	EA 123	1707
5.A.C-5	SS only	2039	5.PS-146	EA 011	1448
5.A.D-1	EA 193	2040	5.PS-147	EA 144	1500
5.A.D-2	EA 089	1664	5.PS-148	EA 012	1554
5.A.D-3	EA 074	1648	5.PS-149	EA 173	1647
5.A.D-4	EA 197	1809	5.PS-150	EA 099	1844
5.A.D-5	EA 119	1776	5.PS-151	EA 120	1541
5.P1.A-1	EA 182	1499	5.PS-152	SRP 054	1308
5.P1.A-2	EA 190	1631			
5.P1.A-3	SS only	2045			
5.P1.A-4	EA 031	1589			
5.P1.B-1	SRP 046	1376			
5.P1.B-2	SRP 047	1199			
5.P1.B-3	SRP 055	1322			
5.P1.B-4	SRP 012	1174			

ISAES 2007
UC Santa Barbara

Conference Facilities

1. **Corwin Pavilion**
   - Pre & Post Workshop & Main Conference Registration Location
   - Plenary & Concurrent Sessions
2. **Manzanita Village**
   - Non-Student On-Campus Accommodation
   - Registration Location on Sunday, 8/26
   - Opening Reception & Dinner
3. **Manzanita Village Bus Loop**
   - Banquet Transportation Loading
4. **Santa Rosa Residence Hall**
   - Student On-Campus Accommodation
   - Excursions & Banquet Transportation Loading
5. **MultiCultural Center Theater**
   - Concurrent Sessions
6. **Carrillo Dining Commons**
7. **Ortega Dining Commons**
8. **De Le Guerra Dining Commons**
9. **Lagoon Plaza**
   - Poster Session & Exhibitor Location
10. **Lot 2 Parking**
11. **Storke Plaza**
    - Group Photo Location
12. **Lot 22 Parking**

Points of Interest

A. **Santa Barbara Airport**
B. **Isla Vista**
C. **Beachside Bar Cafe**
D. **UCSB Lagoon**

- Accessible Parking
- Motorcycles
- Bus Stop
- Coastal Access
- Residence Halls
- Traffic Light
- Parking Meters (available to general public)
- Parking Dispensers
- Parking

SPEED LIMIT 25
Enforced by Radar