



THE EARTH OBSERVER

July / August 2004, Vol. 16, No. 4

In this issue ...

Other Items of Interest

- Decrease in Surface Water Across a Warming Subarctic Landscape.....3
In Memoriam — Bill Bandeen5
Moist Soil ‘Hot Spots’ May Affect Rainfall8

Regular Features

- EOS Scientists in the News.....6
Earth Science Education Program Update9
Science Calendars11
The Earth Observer Information/InquiriesBack Cover

EDITOR’S CORNER

Michael King

EOS Senior Project Scientist

Congratulations to the Aura Team on the successful launch of the Aura satellite July 15, from Vandenberg Air Force Base. All instruments are currently operating nominally except for HIRDLS which is experiencing some difficulty. As of August 12, the MLS instrument was fully configured and operational in the full science mode. A “first light” press conference for Aura is scheduled for the American Geophysical Union (AGU) Fall Meeting in San Francisco in December.

The transformation of NASA’s organizational structure continues at both NASA Headquarters and Goddard Space Flight Center. Latest developments include the retirement of Goddard’s Deputy Director, Bill Townsend. Chris Scolese, whom many of you will remember as the EOS Program Manager before his transfer to Headquarters, will replace Townsend as Deputy Director. The new Center Director is Dr. Edward Weiler, who has been the Associate Administrator for Space Science since 1998.

There will be a new Sciences and Exploration Directorate at Goddard encompassing both Space and Earth Sciences. In this new configuration, Franco Einaudi, current Director of Earth Sciences, will become Division Chief of Sun-Earth Exploration, Richard Vondrak will become Division Chief of Solar System Exploration, and Nicholas White will become Division Chief of Exploration of the Universe.

Within the new Science Mission Directorate at Headquarters, along with Al Diaz as Associate Administrator and Ghassem Asrar as Deputy Associate Administrator, Allison McNally has been named Deputy AA for Management and Orlando Figueroa has been named Deputy AA for Programs. Mary Cleave is acting Director of the Sun-Earth System under which our activities reside.

Continued on page 2

This transformation is obviously in it's infancy, so more changes will be made in the coming weeks. You may keep abreast of some of the developments at NASA Headquarters by going to www.nasa.gov/home/, and at Goddard by going to www.gsfc.nasa.gov/orgs.html.

The EOS Project Science Office suffered a tremendous loss in the sudden death of Bill Bandeen on July 2. His obituary can be found on Page 5. Bill was a pioneer in the field of remote sensing, participating in the Vanguard and TIROS programs in the early 1960s, and ultimately becoming Associate Director of Space and Earth Sciences at Goddard Space Flight Center. Since his retirement from NASA in 1989, he has been a consultant to the EOS Project Science Office in the capacity of Senior Scientist. He is sorely missed by his colleagues here at Goddard Space Flight Center as well as throughout the EOS community. Our heartfelt sympathy goes out to his family and many friends.



The Delta II rocket that carries the Aura satellite blasts off from its launch pad at Vandenberg Air Force Base in California. Aura is the third in a series of major Earth Observing Satellites to study the environment and climat change. Aura's primary mission is to study Earth's upper atmosphere, including its composition, the processes that connect local and global air quality, and Earth's ozone layer. Aura was successfully launched on July 15, 2004.



Aura Launch : July 15, 2004
Vandenberg Air Force Base, CA



Decrease in Surface Water Across a Warming Subarctic Landscape

— Brian Riordan, *ftbar1@uaf.edu*, University of Alaska Fairbanks
 — Dave Verbyla, *D.Verbyla@uaf.edu*, University of Alaska Fairbanks
 — Dave McGuire, *ffadm@uaf.edu*, University of Alaska Fairbanks

Regions in northern latitudes are expected to witness the most significant changes in response to climate change. Field studies in Alaska have documented shrinking glaciers, melting permafrost, reduced tree growth, and increased insect infestations related to a warming climate. Under NASA's Land Cover Land Use Change (LCLUC) program Brian Riordan from the University of Alaska Fairbanks has been exploring a possible climate warming effect at the regional scale: shrinkage of closed-basin ponds and lakes.

This study was generated after a pilot study conducted by Dave Verbyla located a significant difference in water bodies between the years of 1986 and 1995 in the Copper River Region of Alaska. The following fall Brian Riordan conducted a detailed analysis of the Copper River area including two more time periods. The results were just as dramatic. Riordan has analyzed over 880,000 hectares and 33,421 water bodies from nine regions around Alaska using historical remotely sensed imagery.

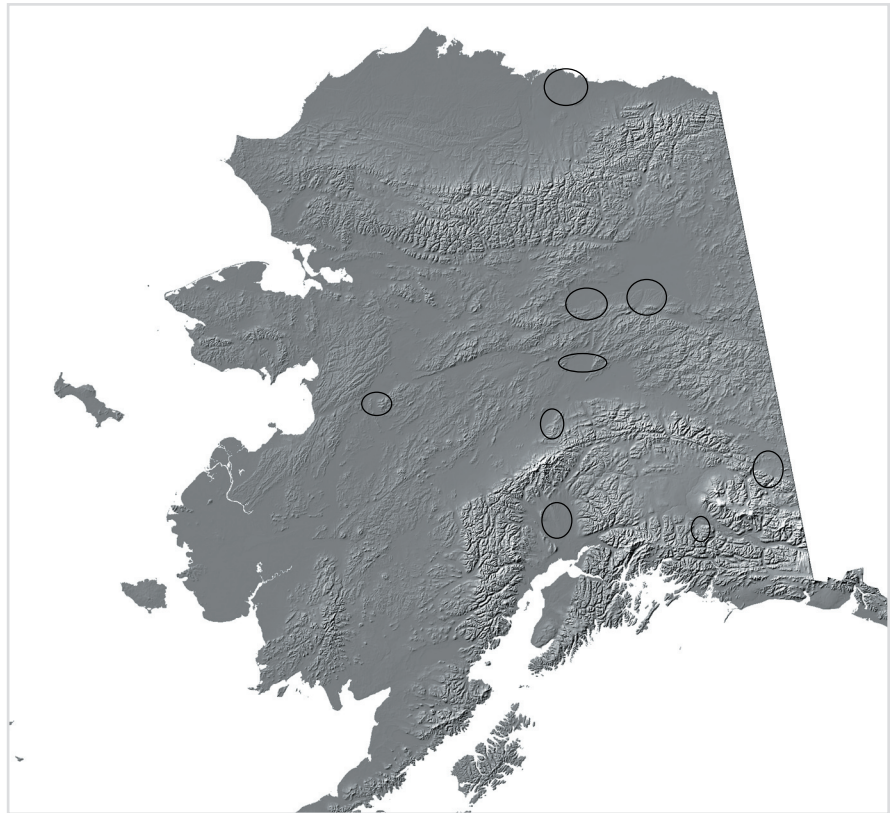
Riordan used several geographical information system (GIS)/Remote Sensing approaches during this study. In order to create a 50-year time sequence he used both aerial photography and satellite imagery. Each of the regions had to have a minimum of three time periods in order to generate a trend. Images used in the analysis, which

were primarily from the midsummer period of July 15 to August 15, were co-registered for change analysis. Closed basin water bodies were visually interpreted from each historic image and traced as polygons into GIS. The area of each water body polygon was computed and stored as an attribute in the GIS. Regional changes in surface water were estimated by summing the area change from each water body between sequential time periods.

Of the nine regions studied, eight showed a decrease in surface water

area. Five of these eight regions had losses greater than 10%. Three regions—Copper River Basin, Innoko Flats National Wildlife Refuge, and Minto Flats—displayed losses greater than 20%. The Copper River Basin is the most southern of these regions. All regions from discontinuous permafrost areas had a loss of surface-water area. In the Arctic Slope Region, where permafrost is continuous and deep, there was no significant change in surface water area.

Hydrology is a key component of any



Map of the nine study areas in Alaska. Circles roughly indicate where each area was located.

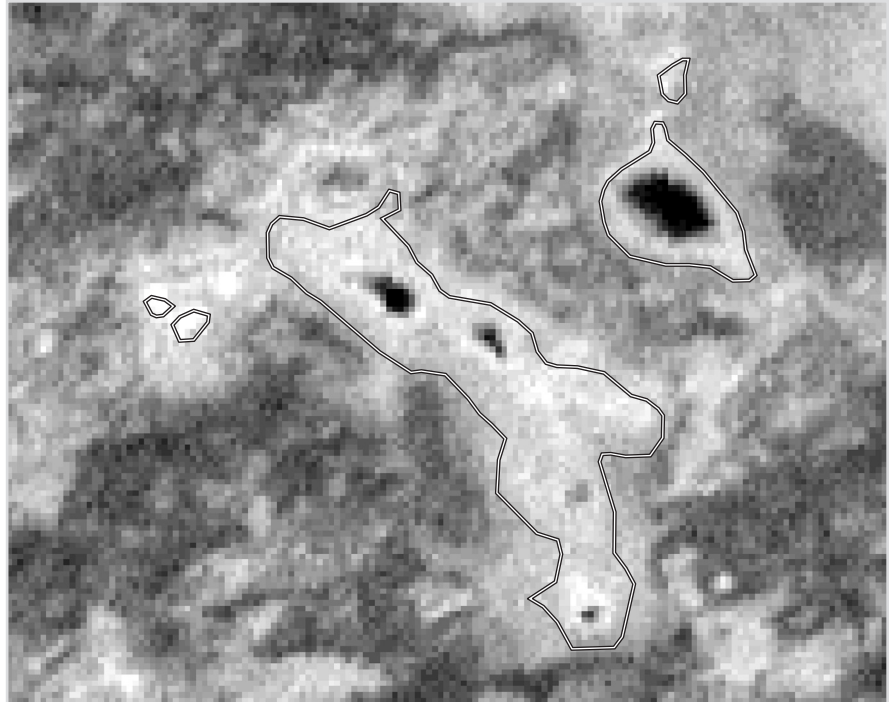
ecosystem. The observed loss of surface water may be due to several factors. Much of subarctic and arctic Alaska is underlain by permafrost. In many regions this permafrost is within a few degrees Celsius of thawing. This permafrost layer can act as an impervious barrier. As discontinuous permafrost thaws, water can drain to unfrozen gravel allowing subsurface drainage to occur.

Another possible explanation of loss is an increased rate of evaporation due to a substantial rising trend in temperatures with no trend in precipitation over the last 30 years.

This study has provided the groundwork for many exciting field-based opportunities. Studies are currently being planned that will focus on exploring potential mechanisms for surface-water loss. A more finely scaled remote-sensing study, using radar to focus on inter-annual variability within specific study areas, is also planned.

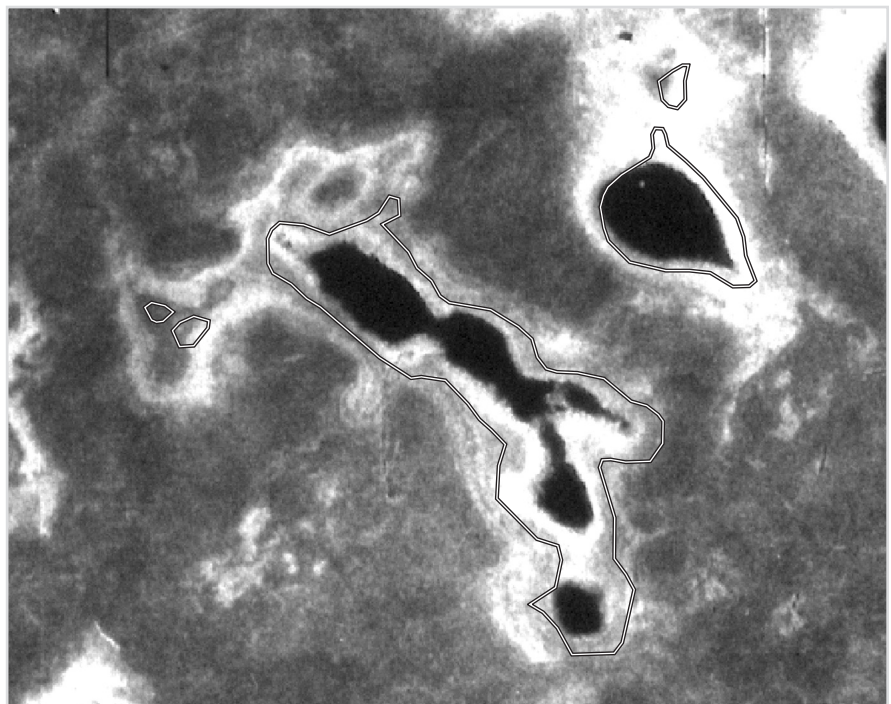


▼ This is a black and white aerial photograph taken in 1952 from the Yukon Flats study region. This is the *base* image for this region.



This is a Landsat ETM+ satellite image taken in 2000 from the Yukon Flats study region. This is the *most recent* image for this region. The outline around the ponds represents the water body boundary from the base image.

This is a black and white orthophotograph created from high altitude aerial photographs taken in 1978 from the Yukon Flats study region. This is the *middle* image for this region. The outline around the ponds represents the water body boundary from the base image.



IN MEMORIAM

William Reid Bandeen

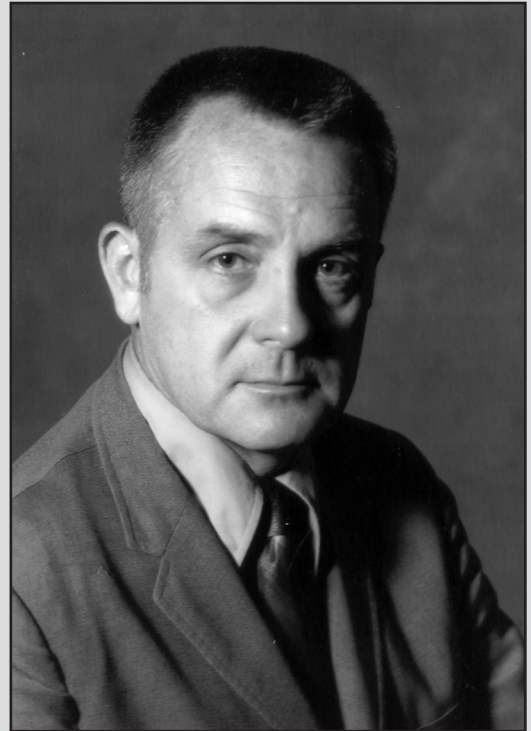
October 11, 1926 – July 2, 2004

Our esteemed colleague, Bill Bandeen, passed away suddenly July 2, 2004, at his home in Brookeville, MD. Bill was among the first meteorological scientists recruited in the early days of NASA's formation, joining the TIROS meteorological satellite program in 1959. For the next 30 years, he worked at Goddard on successive TIROS, Nimbus, and other meteorological satellite programs, and ultimately became Associate Director of Space and Earth Sciences. He retired from NASA in 1989, and joined the EOS Project Science Office Support Team as a Senior Scientist working for STX, and most recently Science Systems and Applications, Inc. (SSAI).

Over his career, he published a number of papers in the field of atmospheric radiation and was elected Fellow of the American Meteorological Society, the American Geophysical Union, and the American Association for the Advancement of Science.

Bill was a dedicated scientist, a gentleman and a scholar. Through his leadership and encouragement, many young scientists and engineers joined NASA, and their achievements ultimately led to the international status Goddard and NASA gained in Earth science. He will be sorely missed by the EOS Project Science Office staff and his many colleagues throughout the science community.

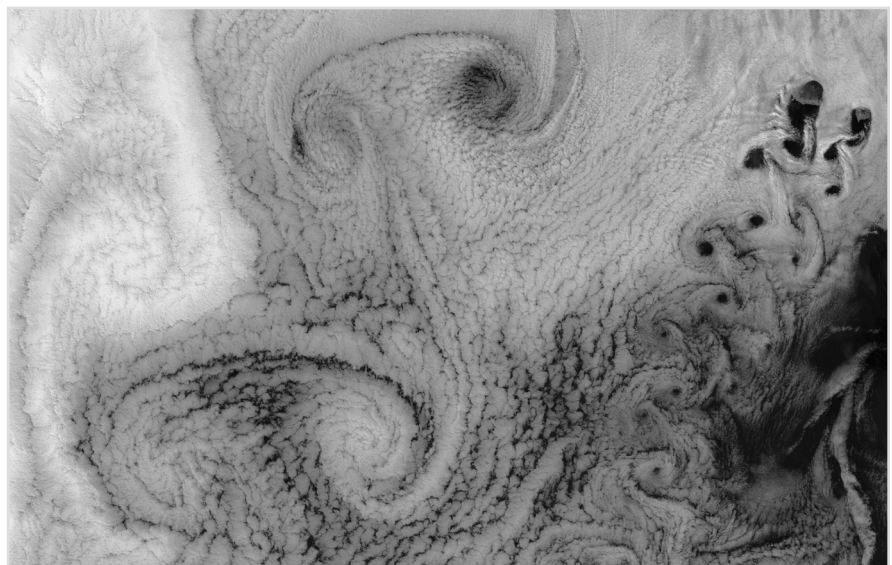
Bill is survived by his wife, Joan, two sons, Keith and Kevin, and daughter Karen. Our heartfelt sympathy goes out to his family.

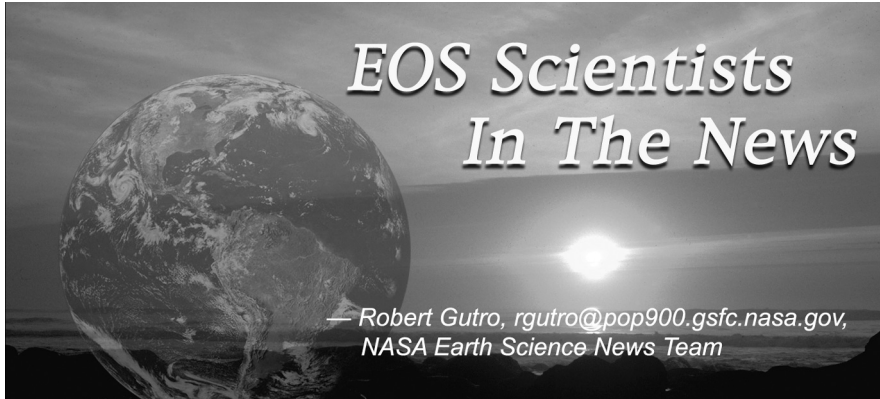


As air flows over and around objects in its path, spiraling eddies, known as Von Karman vortices, may form. The vortices in this image were created when prevailing winds sweeping east across the northern Pacific Ocean encountered Alaska's Aleutian Islands.

This image was acquired by Landsat 7's Enhanced Thematic Mapper plus (ETM+) sensor.

Image provided by the USGS EROS Data Center Satellite Systems Branch as part of the Earth as Art II image series





The following are summaries and highlights of NASA or NASA-funded scientists in the news during July-August 2004.

Moist Soil 'Hot Spots' May Affect Rainfall, August 19, 2004; *Science Daily*, *SciVev.net* (UK); A NASA researcher led an effort to locate areas where soil moisture may strongly affect rainfall. **Randal Koster** (NASA GSFC) led this study that appeared in *Science*.

Scientists Studying Desert Air to Understand Weather and Climate, August 18, 2004; *Environment News Service*; NASA scientists and others work in the Arabian Desert to study tiny airborne particles and their effect on weather and climate. **Hal Maring** (NASA HQ) discussed the importance of the project.

Airborne Science Eyes New Tech Development, August 12, 2004; *Los Angeles Daily News*; NASA is changing direction from operating existing science platform aircraft to developing new technologies and research. The story was based on interviews with **Tom Mace** (NASA Dryden).

Climate Predictions Gain Surer Footing, August 11, 2004; *Nature*; Researchers say they have reduced our uncertainty about the extent of warming to expect over the next 100 years. **Bruce**

Wielicki (NASA Langley) was quoted in the story.

Dangerous Fire Season Is Forecast, August 9, 2004; *LA Times*, *KABC Radio*; **Bill Patzert** (NASA JPL) was among scientists who claim this fire season promises to be significant. A prolonged drought, tree-killing pests and a century of fire suppression are among the factors creating the threat.

NASA Extends TRMM Operations Through 2004 Hurricane Season, August 5, 2004; *Science Daily*; NASA will extend operation of the Tropical Rainfall Measuring Mission (TRMM) through the end of 2004. **Ghassem Asrar** (NASA HQ) commented on the extended mission.

Scientist Say It's Too Early to Call Pacific Warming an El Niño, August 5, 2004; *Associated Press*, *San Jose Mercury News*, *USA Today*; **Bill Patzert** and **Lee-Lueng Fu** (both NASA JPL) were quoted in an article about the possibility of a developing El Niño this year.

Retreating Glaciers Spur Alaskan Earthquakes, August 2, 2004; *Atlanta Journal Constitution*, *The Economist*; **Jeanne Sauber** (NASA GSFC) found that retreating glaciers in southern Alaska may be opening the way for future earthquakes.

Tracking 'America's Tailpipe', August 1, 2004; *Portland Press Herald*; **Jim Podolske** (NASA Ames), **Stephanie Vay** (NASA Langley), and **Edward Winstead** (NASA Langley) discussed how NASA's DC-8 was serving as a laboratory in the sky for the largest and most complex air-quality study ever.

In Distant Towns: Scarce Water, Fierce Penalties, August 1, 2004; *Riverside Press-Enterprise*; **Bill Patzert** (NASA JPL) said in an interview, "here in the lowlands, we're going to have to learn how to be more water wise, both with our yards and our agricultural land. The mountain and desert communities are a preview of coming attractions."

NASA Offers Clearer Images of Earth, July 29, 2004; *The Sun Herald* (Biloxi, Miss.); NASA's update to Landsat 7 satellite images/mosaics on the Web provides clearer images that visitors can download. The story includes quotes from **Tom Stanley** (NASA Stennis).

NASA Goes to the "SORCE" of Earth Sun-blockers; July 22, 2004; *MSNBC*; Scientists using measurements from NASA's Solar Radiation and Climate Experiment (SORCE) satellite have discovered that Venus and sunspots have something in common: they both block some of the Sun's energy going to Earth. Researchers **Gary Rottman** (Univ; of Colorado at Boulder) and **Robert F. Cahalan** (NASA GSFC) discuss their work on SORCE.

NASA to Decommission Tropical Rainfall Measuring Mission; July 16, 2004; *Washington Post*, *Science*; NASA will decommission the Tropical Rainfall Measuring Mission (TRMM) later this year. The story quotes NASA's Associate Administrator for Earth Science **Ghassem Asrar** (NASA HQ).

Aura Launched, to Better Understand the Air We Breathe; July 15, 2004; *Pasadena Star-News, SpaceFlight Now*; Aura, a mission dedicated to the health of the Earth's atmosphere, successfully launched on July 15th. NASA Associate Administrator for Earth Science **Ghassem Asrar** (NASA HQ) and Aura Project Manager **Rick Pickering** (NASA GSFC) are each quoted.

Prepare to Swelter; July 13, 2004; *San Diego Union-Tribune*; **Bill Patzert** (NASA JPL) was interviewed for an article about high heat, humidity and rain in outlying areas of San Diego.

The Devil Is in the Clouds; July 12, 2004; *Newsweek, MSNBC*; **Jim Hansen**

(NASA GISS) and **Bruce Wielicki** (NASA Langley) were both mentioned in this article that questions whether more information about climate is simply adding to uncertainties about the issues and confusing scientists.

In This Game of Inches, She Reigns as Champion; July 7, 2004; *San Diego Union-Tribune*; **William Patzert** (NASA JPL) had the second-closest guess in an annual precipitation prediction contest. He predicted 6.85 inches in San Diego, based in part on his assertion that we are in the midst of a negative phase of the Pacific Decadal Oscillation.

Jet Exhaust May Be Adding to Global Warming; July 6, 2004; *Newport News*

(Va.) *Daily Press*; Next time you're on a plane, think of this: The plane's exhaust might be adding just enough moisture to the atmosphere to create a cloud and keep it floating. **Patrick Minnis** and **Bruce Wielicki** (both of NASA Langley) were part of this story.

Early Snowmelt Worries Researchers; July 3, 2004; *Los Angeles Times*; **Bill Patzert** (NASA JPL) appears in this story about worries concerning the impacts of climate change on water supplies.



An intricate maze of small lakes and waterways define the Yukon Delta at the confluence of Alaska's Yukon and Kuskokwim Rivers with the frigid Bering Sea. Wildlife abounds on the delta and offshore where sheets of sea ice form during the coldest months of the year. This scene was acquired by the ASTER instrument on NASA's Terra satellite on May 26, 2002. Image provided by the USGS EROS Data Center Satellite Systems Branch as part of the Earth as Art II image series

Moist Soil ‘Hot Spots’ May Affect Rainfall

— Gretchen Cook-Anderson, gretchen.cook-anderson@nasa.gov, NASA Headquarters
 — Krishna Ramanujan, krishna_ramanujan@ssaihq.com, NASA GSFC

Earth Observatory Feature Story: <http://earthobservatory.nasa.gov/Newsroom/NasaNews/2004/2004081717451.html>

While the Earth is moistened by rainfall, scientists believe that the water in soil can, in turn, influence rainfall both regionally and globally. Forecasters, water resource managers and farmers may benefit once this connection is better understood.

A NASA researcher led an effort that used a dozen computer models to locate “hot spots” around the world where soil moisture may strongly affect rainfall during northern hemisphere summertime. The results appear in the August 20 issue of *Science Magazine*.

The “hot spots” appear in the central plains of North America, the Sahel, equatorial Africa, and India. Less intense hot spots show up in South America, central Asia and China. These hot spots are, in a sense, analogous to ocean areas where sea surface temperatures strongly affect climate and weather, the most famous example being in the eastern tropical Pacific, where El Niños occur.

“The study arguably provides the best estimate ever of the areas where soil moisture changes can affect rainfall,” said **Randal Koster**, a researcher at NASA’s Goddard Space Flight Center in Greenbelt, MD. Koster led the international computer modeling effort in collaboration with **Paul Dirmeyer** and **Zhichang Guo** of the Center for Ocean Land Atmosphere Studies, Calverton, MD.

In the Global Land-Atmosphere Coupling Experiment (GLACE), Koster

and colleagues duplicated the same experiment using 12 different computer models from around the world. With each model researchers compared the rainfall behavior in two sets of simulations: one in which the soil moisture differed between the simulations, and one in which all simulations saw the same soil moisture. Any increase in rainfall agreement in the second set of simulations shows an impact of soil moisture on the rainfall.

Although the model results differed, the simulations also shared certain common features. By averaging together all the findings, the researchers identified the common features, or “hot spots” where soil moisture influences rainfall the most.

If soil moisture is assumed to affect rain locally, the hot spots tell researchers who study land and atmosphere interactions where to focus their measurements. NASA helps in the design of satellites and instruments to measure soil moisture. Currently, the Advanced Microwave Scanning Radiometer for EOS on NASA’s Aqua satellite measures the moisture in surface soil down to a depth of a few centimeters. In 2009, NASA plans to launch the Hydro-sphere State (HYDROS) mission that will provide the first global view of the Earth’s changing soil moisture down to 5 centimeters.

However, even if researchers could observe global soil moisture levels at depths greater than a few centimeters,

it would be very hard to tell from the data alone how this moisture contributes to precipitation. There are too many factors involved. “Computer models are notorious for their limitations. Still, given the overwhelming difficulty of finding the hot spots through direct measurement, our study provides the next best thing: a multi-model estimate of their locations,” Koster said.

In general, the hot spots have one thing in common: they occur in transition zones between wet and dry regions. This was expected. In wet climates, the Sun’s energy and cloudiness play a bigger role in determining evaporation rates than soil moisture. In dry climates, the limited water leads to limited evaporation rates, that are simply too small to have a large impact on the atmosphere. The fact that satellites cannot measure soil moisture through very dense vegetation is therefore less of a problem. Dense vegetation appears in wet regions, where the hot spots are typically not found.

“At NCEP, we are working on ways to specify soil moisture accurately, in order to take advantage of the type of connections examined in GLACE,” said co-author **Kenneth Mitchell** of NCEP. NCEP’s soil moisture estimation project, known as the Land Data Assimilation System, is run in collaboration with scientists at NASA. Institutions from the United States, Canada, the United Kingdom, Japan, and Australia each funded use of their own model.

Earth Science Education Program Update

—Ming-Ying Wei, ming-ying.wei-1@nasa.gov, NASA Headquarters

—Diane Schweizer, diane.schweizer@nasa.gov, NASA Headquarters

—Theresa Schwerin, theresa_schwerin@strategies.org, Institute for Global Environmental Strategies

NASA Earth Science Education Roadmap Community Meeting

November 1-4, 2004, Asilomar Conference Grounds, Monterey, CA

NASA will hold an open community meeting November 1-4, 2004, to engage the broad Earth science education community in developing a 10-year plan to guide the NASA Earth Science Education Program and ensure that future generations of Earth explorers have the knowledge and ability (including skills using tools and other resources) required to understand and protect our home planet and contribute to the Vision for Space Exploration.

The roadmap development will be based on community priorities, challenges, needs, and best practices, and begins with the NASA Earth Science Education Plan (June 2004), *Inspire the Next Generation of Earth Explorers*. The plan presents a strategic consideration for extending the Agency's accomplishments in Earth system research and applications in support of national priorities for science, technology, engineering, and mathematics education. The document is available at www.earth.nasa.gov/education — click on the link for "Earth Science Education Plan."

The community meeting will be held at the Asilomar Conference Grounds, an oceanfront conference facility that is part of the California state park system located on the Monterey Peninsula, www.asilomarcenter.com. A conference

web site, including registration and other meeting information, is available at www.tisconferences.com/ese.

All members of the Earth science education and research communities are invited to participate in this important planning activity. Please plan to join your colleagues at this community meeting and help shape the future of NASA's Earth Science Education Program.

"Where on Earth?" Mystery Image Quiz #19

Embark upon a geographical adventure with the Multi-angle Imaging SpectroRadiometer (MISR) Mystery Image Quizzes. The latest "Where on Earth...?" MISR Mystery Image Quiz (#19) can be found at www-misr.jpl.nasa.gov (click on the Earth-with-magnifying glass to view the Quiz collection). These puzzles are designed to inspire understanding of the physical, biological, and human processes that influence our home planet. They cover topics from archaeology to zoology. Several resources are provided for discovering and revealing the meaning of image features, which may help new geographical detectives to solve the challenging quiz questions.

2004 Satellite Direct Readout Conference: A Decade in Transition

December 6-10, 2004, Hilton Miami Airport and Towers Hotel, Miami, Florida

During the next decade, NOAA satel-

lite systems will transition into new technologies, resulting in significant changes for direct readout (DR) users. Direct readout is the process of acquiring freely transmitted live satellite data.

NASA and NOAA expect more than 250 participants from more than 40 countries to attend the "2004 Satellite Direct Readout Conference: A Decade in Transition," scheduled for December 6-10, 2004. The two agencies are cooperating in this year's conference to bridge the L-band and X-band user community with the goal of serving as an information exchange. In addition, the education community is encouraged to attend and learn about changes that will be occurring in High Resolution Picture Transmission (HRPT) from NOAA polar-orbiting satellites, affecting direct readout ground stations currently in high schools and universities. NOAA is currently working on a Web site, DirectReadout.noaa.gov/miami04/, where more details will be available in the near future.

DLESE 2004 Annual Meeting Held in July

The 2004 annual meeting of the Digital Library for Earth System Education (DLESE) was held at the University of Wisconsin-Madison, July 11-13, 2004. The overall meeting theme was: *DLESE: A Teaching and Learning Tool*.

The meeting was attended by K-12 teachers, college faculty, librarians, and informal educators, as well as curricu-

lum and library developers. It provided a unique opportunity for these stakeholders to participate in DLESE's evolution as an Earth system educational tool.

Reports from the meeting are available at the DLESE collaborative web site at swiki.dlese.org/ReportOut2004/1. For more information on DLESE, visit www.dlese.org.

NASA Earth Science Education Plan: Inspire the Next Generation of Earth Explorers

Inspire the Next Generation of Earth Explorers presents a plan for extending the accomplishments of Earth Science Enterprise activities in Earth system research and applications in support of national priorities for science, technology, engineering and mathematics education. Emphasis is placed on expanding program impact, particularly among under-represented, under-served and disadvantaged populations. The approach outlined in this document utilizes digital information infrastructures and partnership networks to improve public literacy about the Earth system and to help grow a competitive science and technology workforce. The final plan is now available for downloading as a PDF file from: www.earth.nasa.gov/education — click on the link for "Earth Science Education Plan."

New ESSE 21 Participants Selected

The Universities Space Research Association (USRA), in collaboration with and supported by NASA's Earth Science Enterprise and the NASA Minority University Research and Education Program, is pleased to announce the selection of 6 new college and universi-

ty teams to receive grants to participate in the Earth System Science Education Program for the 21st Century (ESSE 21). ESSE 21 participants join a larger community of researchers and educators dedicated to incorporating NASA Earth science resources in reaching diverse populations with relevant and compelling content in science, technology, engineering and mathematics, while sharing results of their efforts with educators worldwide.

Following is the listing of the new ESSE-21 participants:

- *Lehigh University*, David Anastasio
- *Austin College*, R. David Baker
- *Loma Linda University*, Robert Ford
- *University of Wyoming*, Robert Kelly
- *Howard University*, Prabhakar Misra
- *New Mexico State University*, April Ulery

More information is available at esse21.usra.edu.

Join NASA Connect on the "A" Train Express

On "The 'A' Train Express" students will learn how weather affects everyone's daily lives, and will see national and international scientists using satellite technology to help improve weather forecasting and our understanding of aerosols and clouds. They will also be introduced to two NASA satellite Earth Science missions, CALIPSO and CloudSat. By conducting inquiry-based and web activities, students will make connections between NASA research and the mathematics, science, and technology they learn in their classrooms.

NASA CONNECT is an annual series of FREE integrated math, science, and technology programs for students in

grades 6-8 with three components—television broadcast, educator guide, and web activity—designed as an integrated instructional package. For more information, visit connect.larc.nasa.gov/.

New 2004 Earth Science Week (ESW) Kit Resources

In support of the ESW theme of "Living on a Restless Earth," the ESW kit contains activities, suitable for elementary through college-age students, for use in the home or classroom plus helpful tips for having a successful Earth Science Week. Educational materials will include posters and fact sheets from the American Geological Institute (AGI), NASA, the Incorporated Research Institutions for Seismology (IRIS), the Digital Library for Earth System Education (DLESE), and an ESW bookmark with the geologic timescale on the back. The Southern California Earthquake Center will be supplying an informational booklet entitled "Putting Down Roots in Earthquake Country." The U.S. Geological Survey and National Weather Service will also be contributing informative materials for the ESW kits. To request a kit, visit www.earthsciweek.org.



Erratum

On Page 11 of the May/June 2004 issue of *The Earth Observer*, we ran an image that was identified as Norway. Richard Williams from the Woods Hole Research Center pointed out to us that the image is really of Iceland.

EOS Science Calendar

October 17-18

NASA's Earth Science Data System Working Group Public Meeting, Greenbelt, MD. Call for posters. Contact: Kathy Fontaine, kathy.fontaine@nasa.gov. URL: lennier.gsfc.nasa.gov/seeds/index.html

October 26-27, 2004.

Aqua Science Working Group Meeting, NASA Goddard Space Flight Center, Greenbelt, MD, Building 33, room H114. Contact: Claire Parkinson, 301-614-5715, Claire.L.Parkinson@nasa.gov.

October 26-28

HDF & HDF-EOS Workshop VII, Aurora, CO. Contact: Lori Tyahla, lori_tyahla@sesda.com. URL: hdfeos.gsfc.nasa.gov.

October 27-29

SORCE Science Team Meeting, Meredith, New Hampshire. URL: lasp.colorado.edu/sorce/2004ScienceMeeting/meeting.html

November 16-17

First Workshop on EOS Snow and Ice Products, Greenbelt, MD. Contact: Dorothy Hall, dorothy.k.hall@nasa.gov

Global Change Calendar

September 20-24

International Geoscience and Remote Sensing Symposium (IGARSS), Anchorage, Alaska. URL: www.ewh.ieee.org/soc/grss/igarss.html

October 13-16

Surface Ocean Lower Atmosphere Study (SOLAS) 2004 Open Science Conference, Halifax, Nova Scotia, Canada. URL: www.uea.ac.uk/eng/solas/ss04/

November 8-12

SPIE's Fourth International Asia-Pacific Environmental Remote Sensing Symposium, Honolulu, Hawaii. URL: spie.org/conferences/calls/04/ae/

December 13-17

American Geophysical Union (AGU) Fall Meeting, San Francisco, CA. Tel 1-800-966-2481. E-Mail: meetinginfo@agu.org. URL: www.agu.org/meetings/fm04/

2005

January 9-13

85th AMS Annual Meeting, San Diego.

Tel. 617-227-2425, E-Mail amsinfo@ametsoc.org, URL: www.ametsoc.org/meet/85annual/

November 30-December 2

International Conference, Earth from Space — the most Effective Solutions, Moscow. Contac: Liam Gumley, liam.gumley@ssec.wisc.edu. URL: www.transparentworld.ru/conference/2005/index.htm

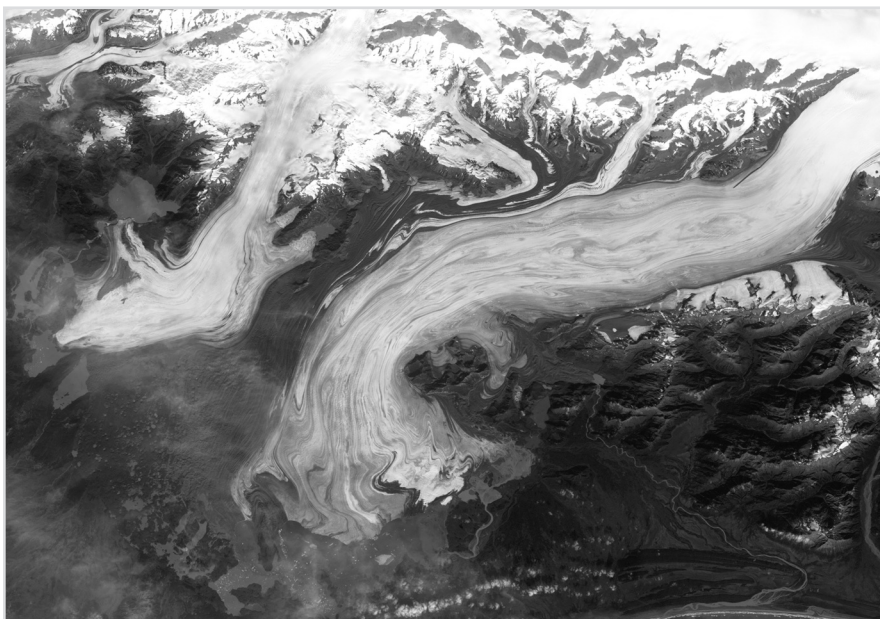
Bering Glacier currently terminates in Vitus Lake south of Alaska's Wrangell-St. Elias National Park, about 10 km from the Gulf of Alaska. Combined with the Bagley Icefield, where the snow that feeds the glacier accumulates, the Bering is the largest glacier in North America. Warmer temperatures and changes in precipitation over the past century have thinned the Bering Glacier by several hundred meters. Since 1900 the terminus has retreated as much as 12 km. (The Bering Glacier 'surges,' an acceleration of the flow rate of the glacier, every 20 years or so. During these periods the glacier terminus advances. The surges are generally followed by periods of retreat, so despite the periodic advances the glacier has been shrinking overall.) Most of the glaciers along the Alaskan coast are retreating along with the Bering Glacier.

The glacial retreat has an interesting side effect—an increase in the frequency of earthquakes in the region. The Wrangell and St. Elias mountain ranges that spawn the Bering Glacier were created by the collision of the Pacific and North American tectonic plates [the Pacific Plate is sliding underneath (being subducted by) the North American Plate]. The weight of the vast amount of ice in the Bering Glacier is enough to depress the Earth's crust, stabilizing the boundary between the two plates. As the glaciers lose mass, the pressure of the ice is diminished. This reduced compression allows the rocks along faults to move more freely, resulting in more Earthquakes.

This true-color image of the Bering Glacier terminus was acquired on September 29, 2002, by the Enhanced Thematic Mapper plus (ETM+) instrument aboard the USGS/NASA Landsat-7 satellite.

Jeanne Sauber of NASA's Goddard Space Flight Center, and Bruce Molnia, a research geologist at USGS, used NASA satellite data, GPS data, and computer models to study the interactions between the retreating glacier and the movement of the Earth's crust.

NASA Image by Robert Simmon, based on data provided by the Landsat 7 Science Team.





Code 900
National Aeronautics and
Space Administration

Goddard Space Flight Center
Greenbelt, Maryland 20771

PRSRT STD
Postage and Fees Paid
National Aeronautics and
Space Administration
Permit G27

Official Business
Penalty For Private Use, \$300.00

The Earth Observer

The Earth Observer is published by the EOS Project Science Office, Code 900, NASA Goddard Space Flight Center, Greenbelt, Maryland 20771, telephone (301) 614-5559, FAX (301) 614-6530, and is available on the World Wide Web at eos.nasa.gov/earth_observer.php or by writing to the above address. Articles, contributions to the meeting calendar, and suggestions are welcomed. Contributions to the calendars should contain location, person to contact, telephone number, and e-mail address. To subscribe to *The Earth Observer*, or to change your mailing address, please call Hannelore Parrish at (301) 867-2114, or send a message to hannelore_parrish@ssaihq.com, or write to the address above.

The Earth Observer Staff:

Executive Editor: Charlotte Griner (charlotte.griner@gsfc.nasa.gov)

Technical Editors: Renny Greenstone (rennygr@earthlink.net)

Tim Suttles (4suttles@bellsouth.net)

Alan Ward (alan_ward@ssaihq.com)

Carla Evans (carla_evans@ssaihq.com)

Design and Production: Alex McClung (alexander_mcclung@ssaihq.com)

Distribution: Hannelore Parrish (hannelore_parrish@ssaihq.com)



Printed on Recycled Paper