



EARTH SYSTEM RESEARCH LABORATORY

Serving Society through Science

ESRL Atmospheric Chemistry Review: Organization Overview

Alexander E. MacDonald

*Director, Earth System Research Laboratory
DAA for Laboratories and Cooperative Institutes*



ESRL Atmospheric Chemistry Review
January 29-31, 2008 ~ Boulder, Colorado



Earth System Research Laboratory

Talk Overview

- **Who We Are: Role within NOAA and OAR**
- **ESRL Overview, Mission, and Approach**
- **Organization and History**
 - ...With an eye toward our atmospheric chemistry research
- **Atmospheric Chemistry Research at ESRL**
 - Major Foci • Major Drivers
- **Resources**
 - Personnel • Budget • Facilities
- **Preeminence and Leadership**
- **Partnerships and Products**





Earth System Research Laboratory

Who We Are

NOAA's Mission Line Offices

Oceanic & Atmospheric Research

National Marine Fisheries Service

National Weather Service

National Environmental Satellite, Data & Information Service

National Ocean Service

Oceanic & Atmospheric Research

Assistant Administrator for Oceanic & Atmospheric Research

Richard W. Spinrad

**Deputy Assistant Administrator Laboratories & Coop. Institutes
Director, Earth Systems Research Laboratory**

Alexander E. MacDonald

Air Resources Laboratory

Earth System Research Laboratory

Atlantic Oceanographic & Meteorological Laboratory

Great Lakes Environmental Research Laboratory

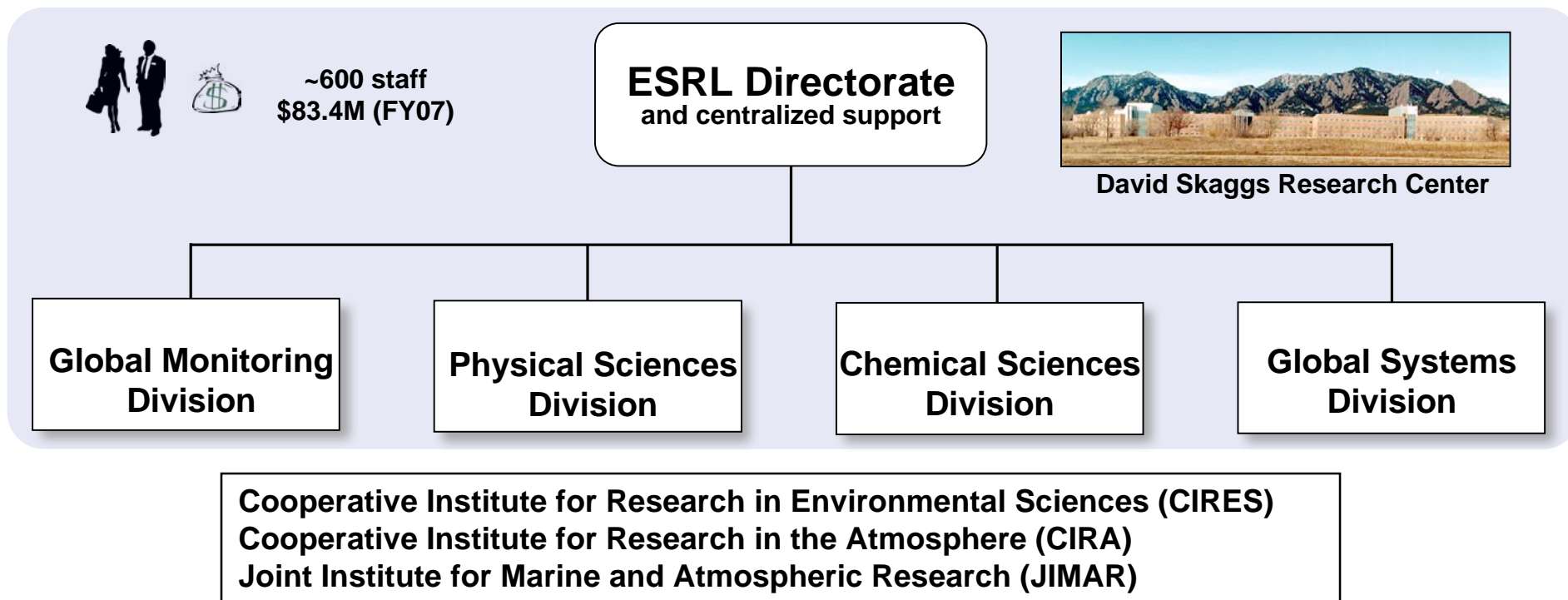
Pacific Marine Environmental Laboratory

National Severe Storms Laboratory

Geophysical Fluid Dynamics Laboratory



ESRL Overview and Mission



ESRL's one-word rationale: "integration" (i.e., better..., more..., broader...)

⇒ **An integrated research focus to support NOAA's "whole-Earth" operational and information-service mission.**

Mission

"To observe and understand the Earth system and to develop products through a commitment to research that will advance NOAA's environmental information and service on global-to-local scales."

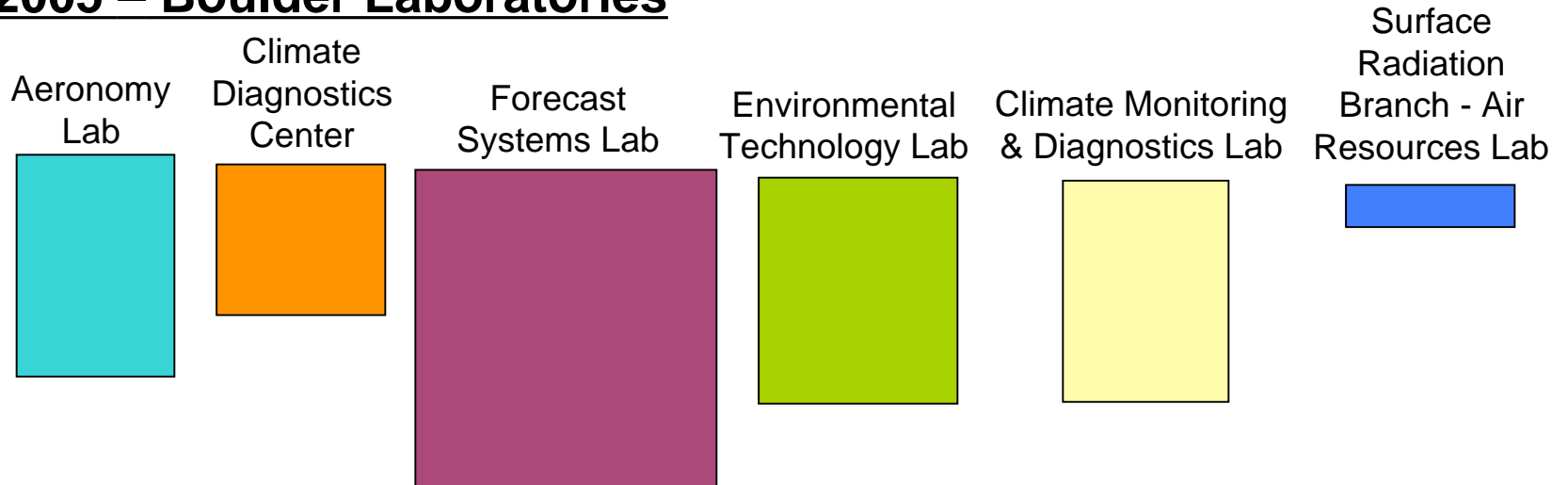


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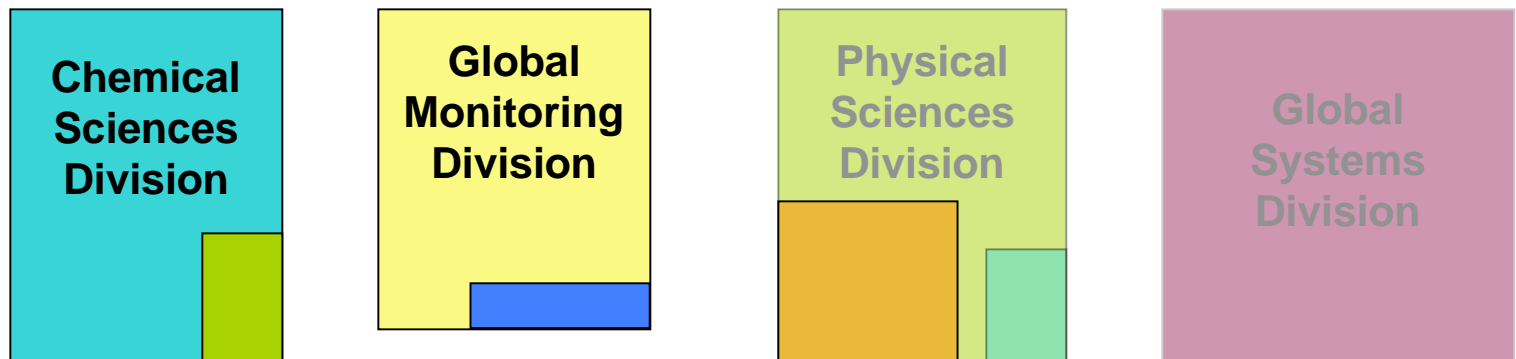
Our Organization: A Bit of History

Period of this review: 2004 - present
⇒ *Over this time, we have evolved!*

FY 2004-2005 – Boulder Laboratories



FY 2006-Present – ESRL

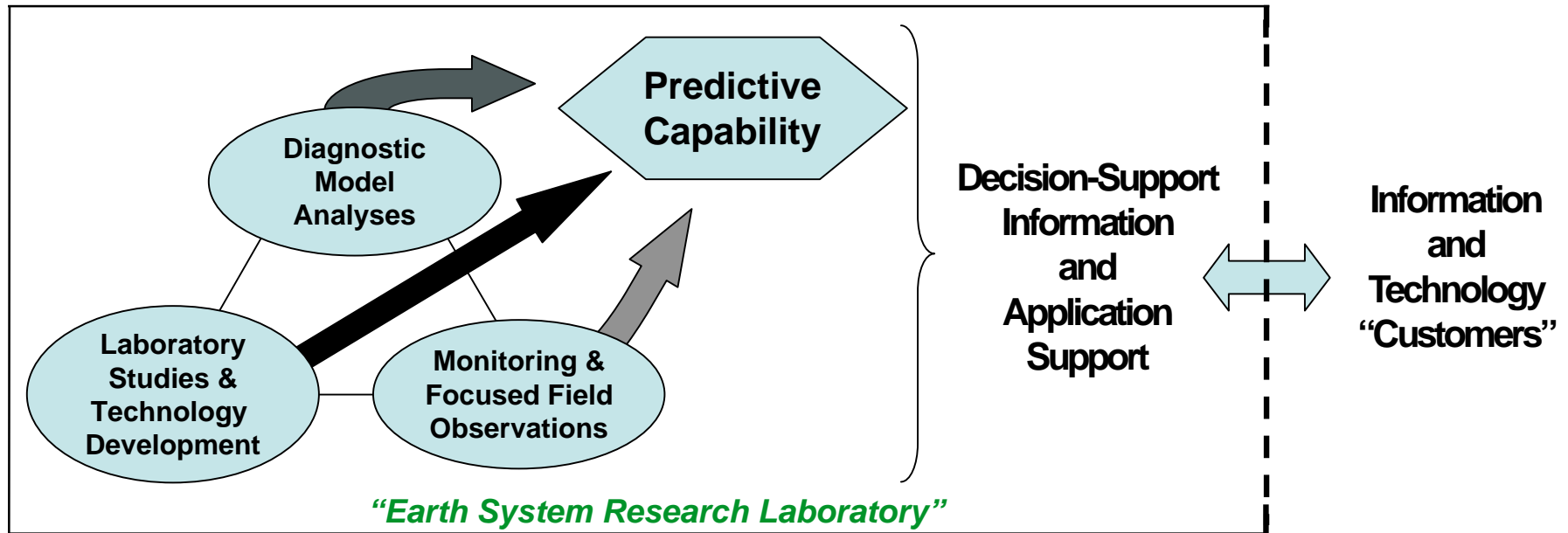




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ESRL Approach

The ESRL breadth affords opportunity for “end-to-end” science in service to society.

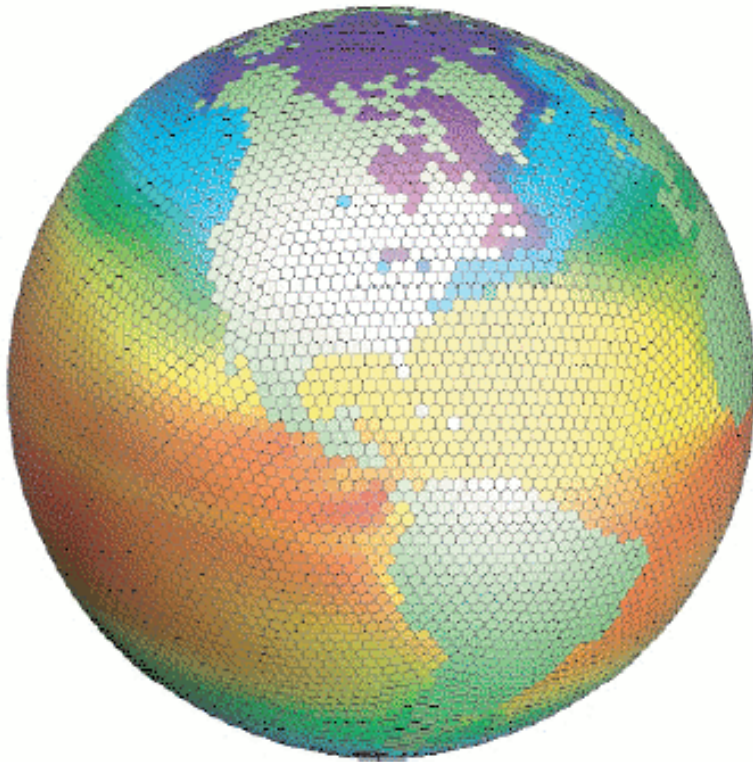




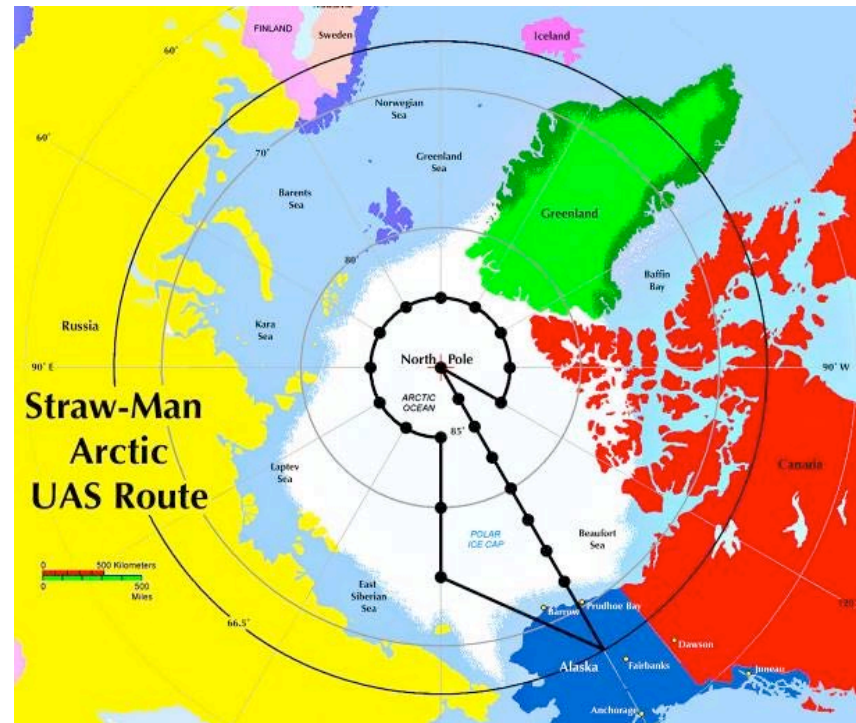
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ESRL Approach

Examples of Integration with ESRL Physical Sciences



GSD Global Models



PSD UAS Arctic Research



ESRL Atmospheric Chemistry Research

Major Foci:

Stratospheric Ozone Layer

Climate

Air Quality

Strategy: Focus on Key Questions

- What has caused polar and extrapolar ozone depletion?
- Is the ozone layer recovering as expected?
- How do climate and ozone layer depletion interact?
- What are the trends, sources, and sinks of climate-relevant gases?
- What are the interactions and feedbacks among clouds, aerosols, non-CO₂ trace gases, and water vapor in the radiative forcing of climate?
- What factors cause poor air quality (ozone, particulate matter) in the Nation's most polluted areas?
- How do climate and air quality interact?

Our Atmospheric Chemistry Niche: Monitoring the important atmospheric constituents (GMD) and understanding atmospheric processes (CSD, GMD) to improve environmental prediction, and assessing the state of understanding for decisionmakers (CSD, GMD).



YOU WILL HEAR MUCH MORE ON THIS FROM RAVI AND JIM

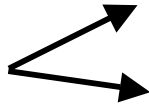


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Atmospheric Chemistry Research

Major Drivers:

NOAA Strategic Plan



Climate Goal (climate, ozone layer)

NOAA Research Plan

Weather and Water Goal
(air quality)

National Programs

U.S. Legislation

Interagency Agreements

International Agreements



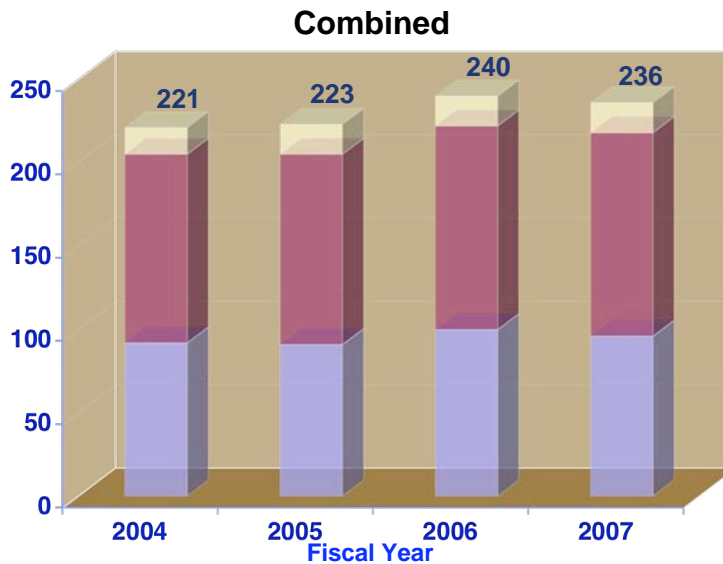
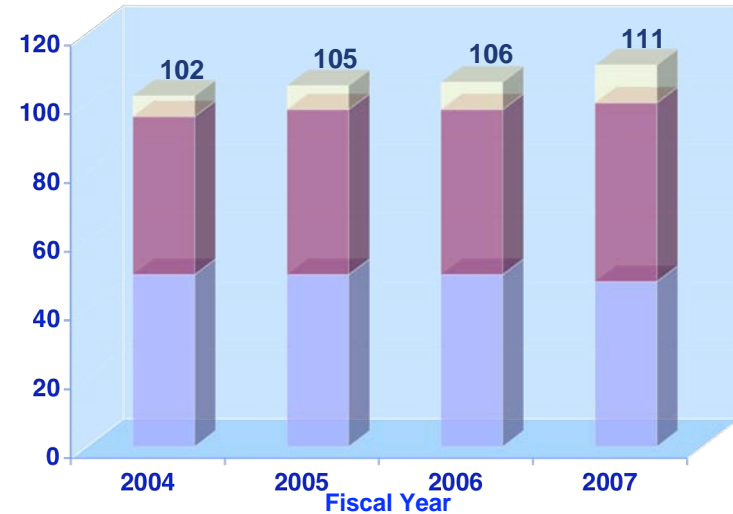
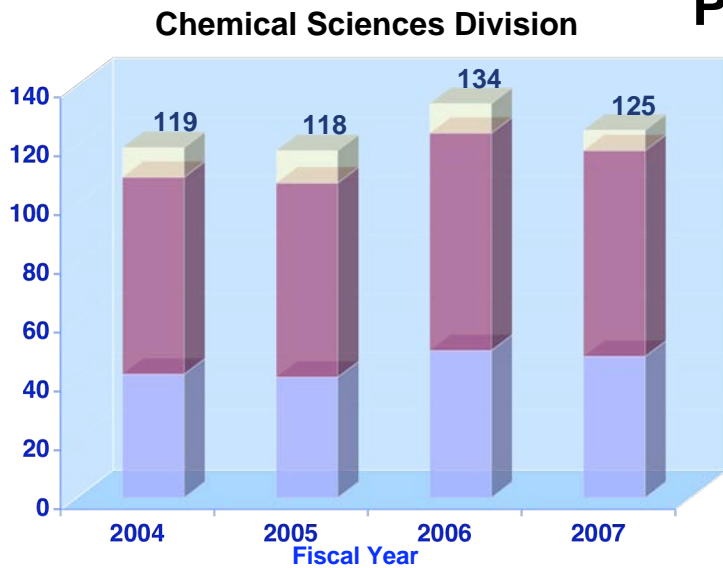
YOU WILL HEAR MUCH MORE ON THIS FROM JIM



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Resources - People (our most valuable resource)

Personnel Trends



Messages:

- Small shifts at 2006 are due to reorganization, other factors
- ~Steady totals over the last 4 years
- Our Joint Institute partnerships are thriving (over 50% of our staff are our JI colleagues)

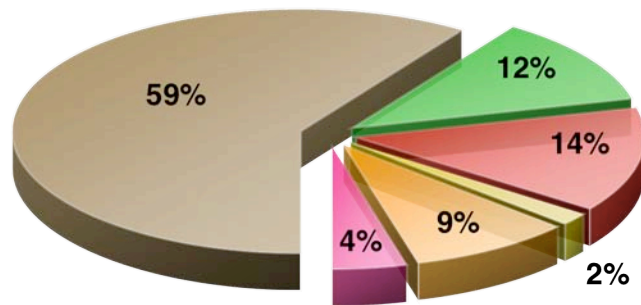


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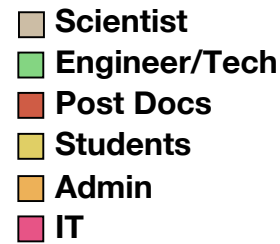
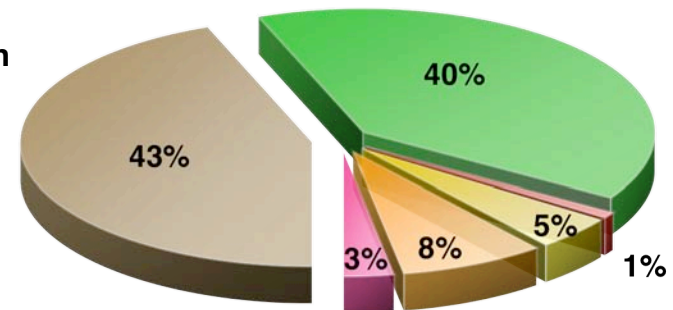
Resources - People (continued)

Personnel by Job Type

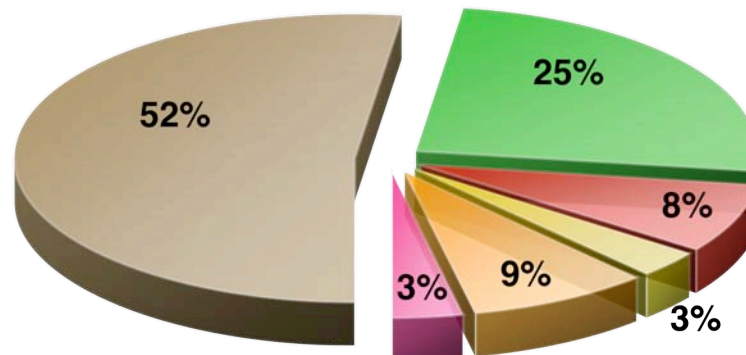
Chemical Sciences Division



Global Monitoring Division



Combined



Messages:

- ~90% of our staff are scientific/technical

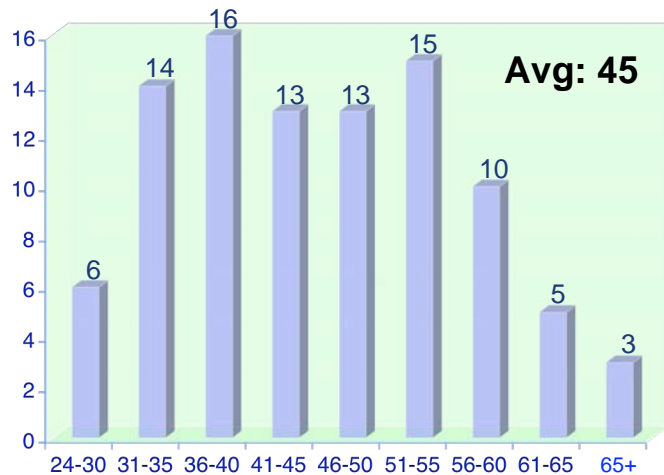


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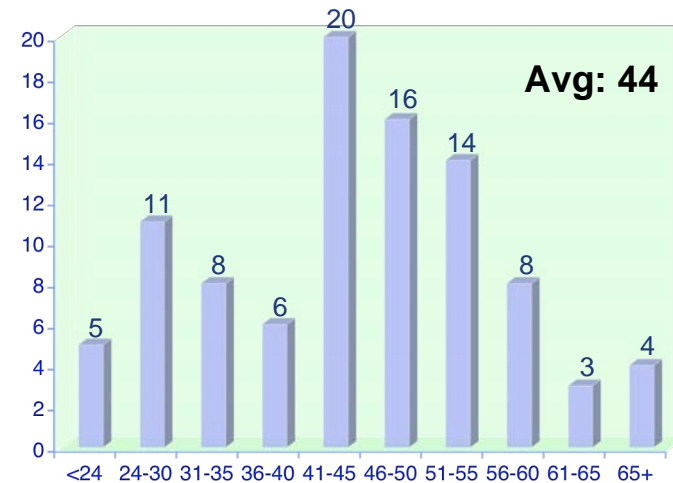
Resources - People (continued)

Staff Age Distribution

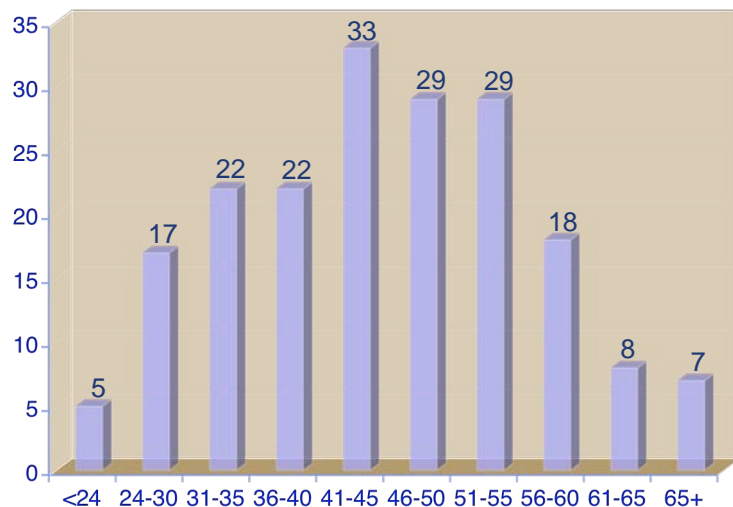
Chemical Sciences Division



Global Monitoring Division



Combined



Messages:

- An unobstructed pipeline: healthy flows in and out
- A gradual increase in the average age of our staff has occurred:
Aeronomy Lab in 1998: ~40
CMDL in 2002: ~42

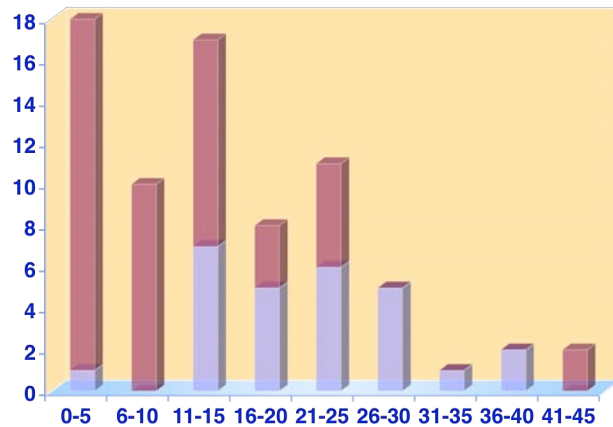


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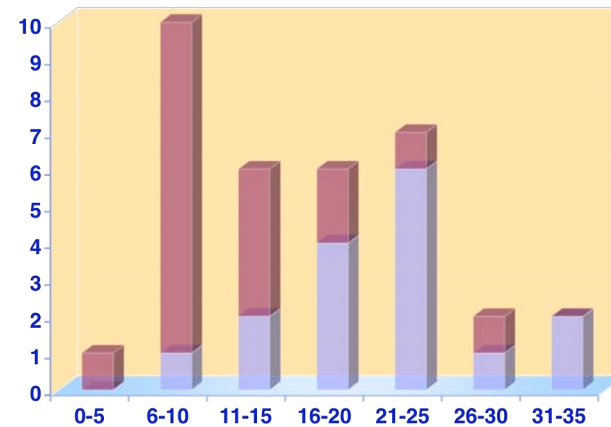
Resources - People (continued)

Years Since Ph.D.

Chemical Sciences Division

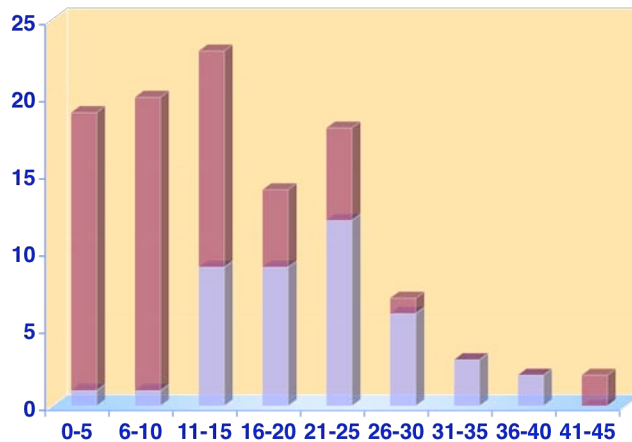


Global Monitoring Division



Legend:
Federal (light blue)
Other (red)

Combined



Messages:

- A strong influx of new Ph.D.'s
- Our federal staff is aging and that is a problem that we need to address

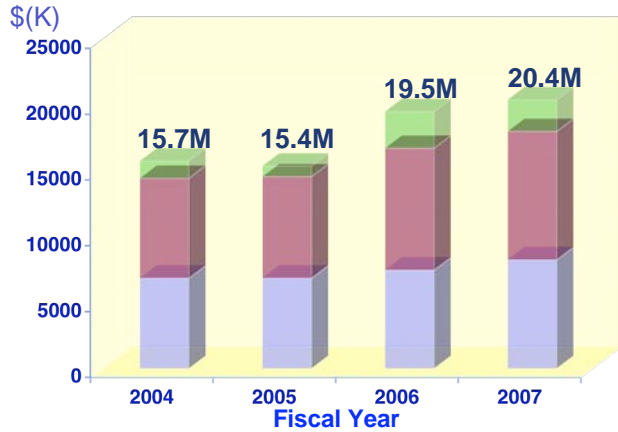


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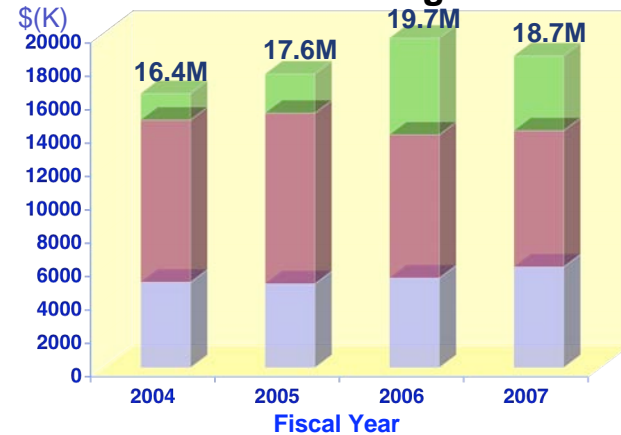
Resources - Budget

Our Budget: Where it comes from...

Chemical Sciences Division

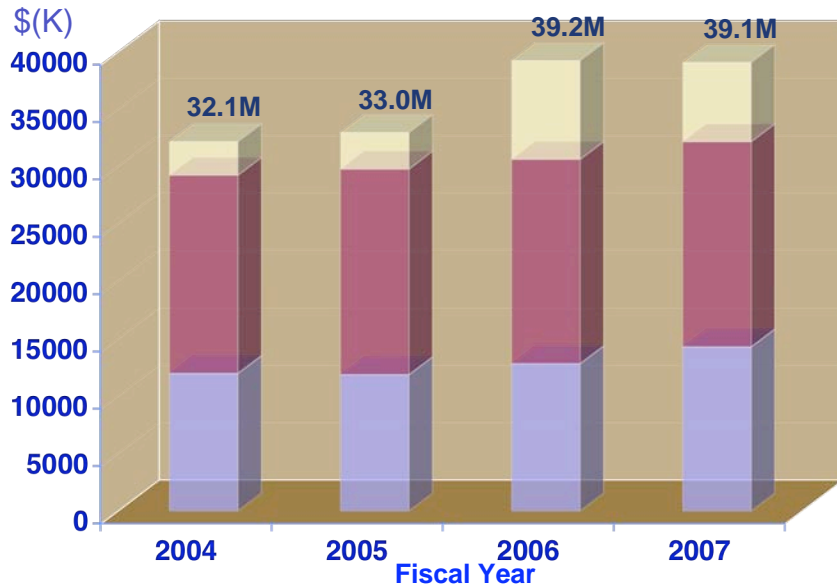


Global Monitoring Division



■ Non NOAA
■ Other NOAA
■ NOAA Base

Combined



Messages:

- Most of our funding is NOAA money (there are guidelines set by OAR on these issues...)
- Reorganization in 2006 led to a step change
- Fluctuations are palpable but so far manageable

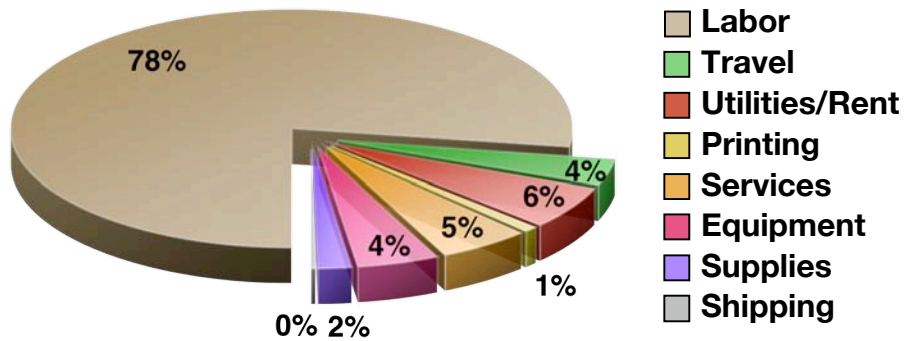


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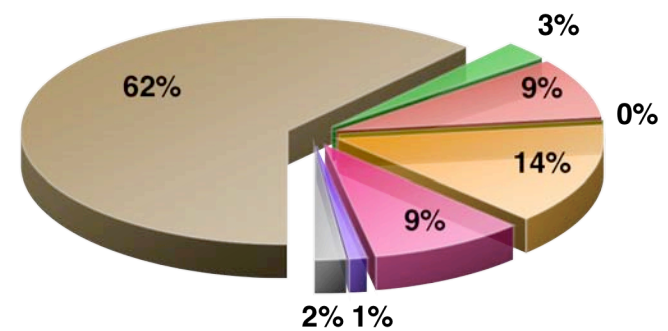
Resources - Budget (continued)

... and where it goes

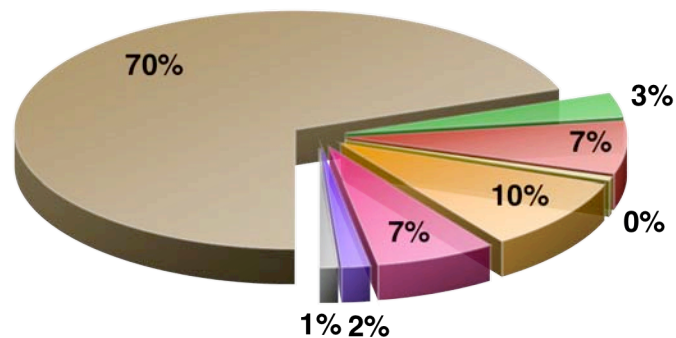
Chemical Sciences Division



Global Monitoring Division



Combined Divisions



Messages:

~70% salaries

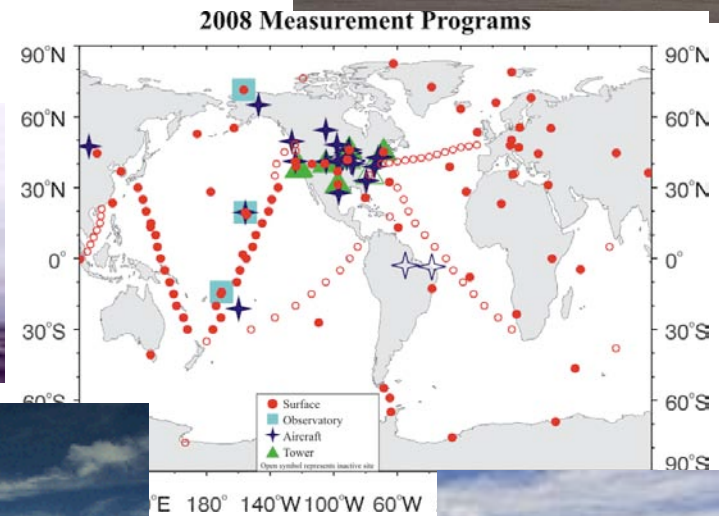
~30% "doing business"



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Resources - NOAA Facilities

- **David Skaggs Research Center Laboratories**
(Tours – Tuesday & Wednesday)
- **Calibration & Test Facilities**
- **Platforms for Field Studies (air, sea, ground)**
- **Global Observations Network**
- **Baseline Observatories**



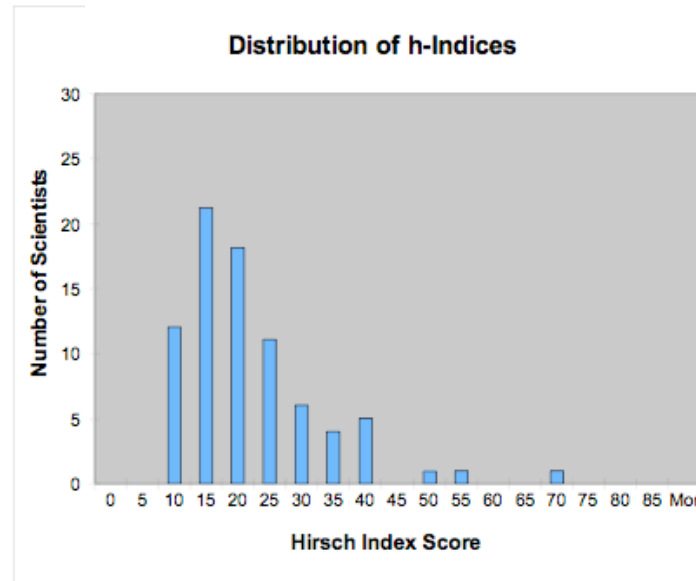


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Preeminence

- Publications Summary: ~700 journal publications in 4 years!

- Hirsch Index:
A measure of
publication impact



Median = 22

50th %-ile = 17 - 27

Range = 11 - 73

No. Scientists considered = 80

"Typical" values of Hirsch Index, *h*

- ~12 = Faculty at major research universities
- ~18 = Advancement to full professor
- ~15 - 20 = Considered for fellowship in APS
- ~35 = Nobel Prize Winners
- ~46 = membership in NAS

- Among the World's 338 "Most Highly Cited" Authors in Geosciences: 12 of ESRL's ~120 scientists (NCAR - 12; NASA - 19; CU - 4)
- Awards/Prestigious Memberships
"too numerous to mention" but we must point out:
 - Nobel Peace Prize (2007) (18 ESRL scientists)
 - Blue Planet Prize, National Medal of Science (Susan Solomon)
 - Presidential Rank Awards (2 ESRL scientists since 2004, others before!)
 - Two NAS members; 9 AGU Fellows



You have "the rest of the story" in your notebooks!



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Leadership: A Few Examples

Within NOAA Programs:

Air Quality Program

“Understanding Climate Processes” component, Climate Research and Modeling Program

“Monitoring Climate Forcing” component, Climate Observations and Monitoring Program

National Co-chair roles:

CCSP Atmospheric Composition Interagency Working Group

CCTP Technology Program Measurements and Monitoring Working Group

CCSP Synthesis and Assessment Products (2.2, 2.4)

CENR Air Quality Research Subcommittee

International Co-chair roles:

WMO/GAW Science Advisory Group for Greenhouse Gases

SPARC/WCRP Scientific Steering Committee

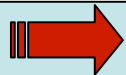
UNEP/TEAP Task Force on Emissions Discrepancies

IGBP AIMES Global Emissions Inventory Activity

International Assessment Co-chairs:

IPCC Working Group I

Scientific Assessment Panel, U.N. Montreal Protocol



You have “the rest of the story” in your notebooks!



Earth System Research Laboratory *Partnerships*

The complexity of today's issues means that "no one can do it all"
(i.e., the ability to partner is of higher and higher value)

- **Cooperative Institutes**
➔ *CIRES, JIMAR, & CIRA are ~ half of our personnel*
- **Other OAR Labs and Programs**
ESRL (PSD, GMD), Climate Program Office, PMEL, AOML, ARL, GFDL, ...
- **Other NOAA Line Offices** *NWS, NESDIS, ...*
- **Other U.S. agencies** *NASA, DOE, EPA, ...*
- **Academia** *many, many longstanding partnerships! (e.g., Baseline Observatories)*
- **Private Industry** *Dupont, Yankee Environmental Services, Aerodyne Research Inc., ...*
- **International** *WMO, UNEP, WCRP, IGBP...*



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Partnerships (continued)

These partnerships are evident in our collaborations on publications:

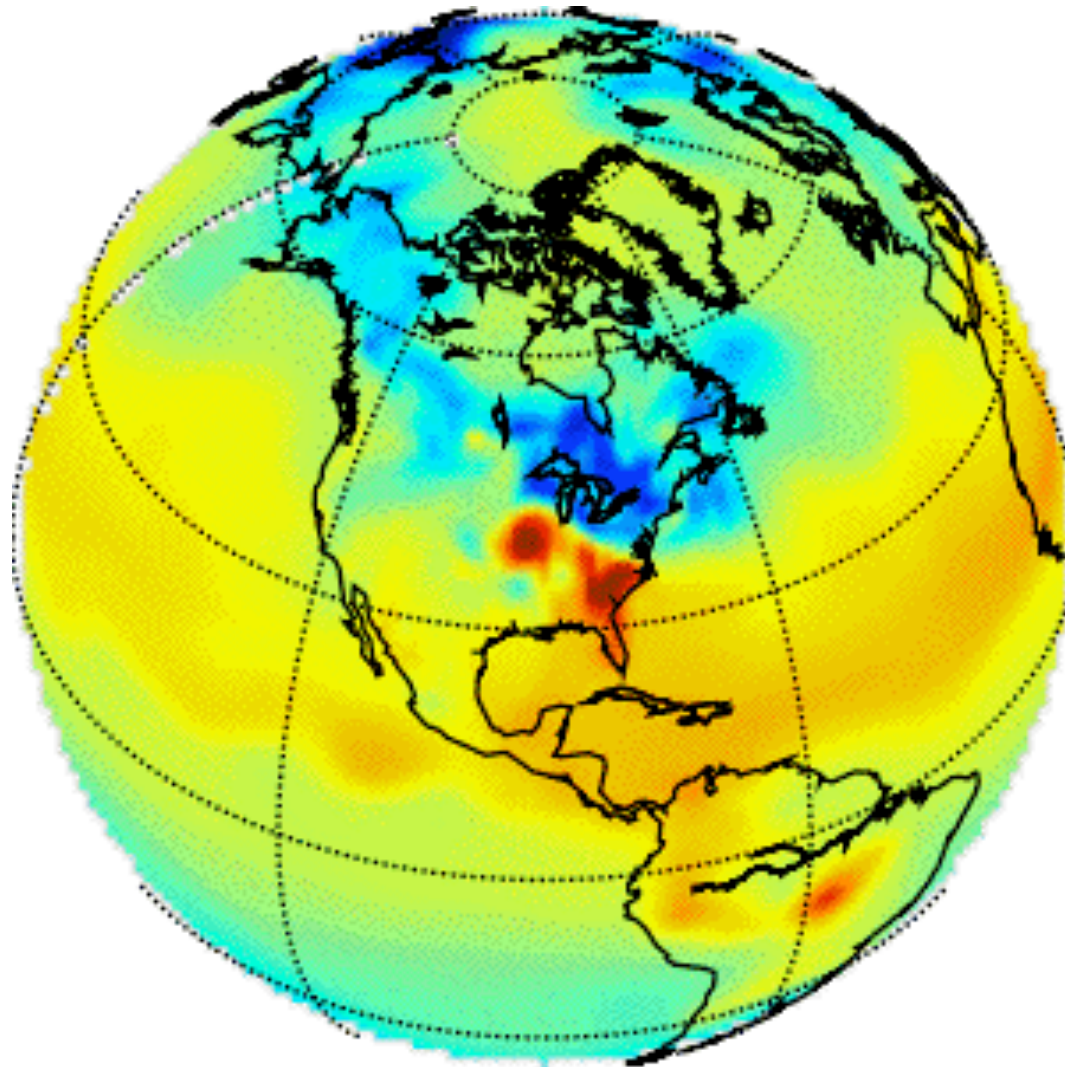
*Journal Publications
w/ authors OUTSIDE of ESRL*

*Journal Publications w/
authors from NOAA Joint
Institutes*

CSD	80%	70%
GMD	95%	60%



Earth System Research Laboratory *Products*



Carbon Tracker



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Next in the agenda...

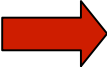
ESRL ATMOSPHERIC CHEMISTRY REVIEW

29-31 January, 2008 ~ David Skaggs Research Center ~ Boulder, CO

Day 1 – Tuesday, January 29th (GC-402)

7:30 – 8:15 *Breakfast Meeting - Reviewers and Craig McLean (GB-124)*

7:45 – 8:15 *Coffee/Continental Breakfast (GC-402)*

- 8:15** **Welcome** **Richard Spinrad**
Reviewers/Introductions; Charge to the Reviewers
- 8:30** **Welcome and ESRL Organization Overview** **Alexander MacDonald**
*ESRL history and 2005 reorganization; Personnel, Resources, Facilities;
Vision and Overview of Role of Atmospheric Chemistry in ESRL*
- 9:05** **Atmospheric Chemistry Research at ESRL** **A.R. Ravishankara/James Butler**
 *Major scientific areas, 6 topics; relation to societal needs, NOAA mission & program goals;
Key partnerships: Internal/External (ESRL, LO's, Joint Institutes, etc); Approaches (lab, field monitoring + intensives, theoretical/analysis); Products and customers; Review agenda*