Global Monitoring Division

Welcoming Addresses

Contents:

- Dr. Sandy MacDonald
- Dr. Steve Fine
- Dr. James Butler

Earth System Research Laboratory
Global Monitoring Division Review

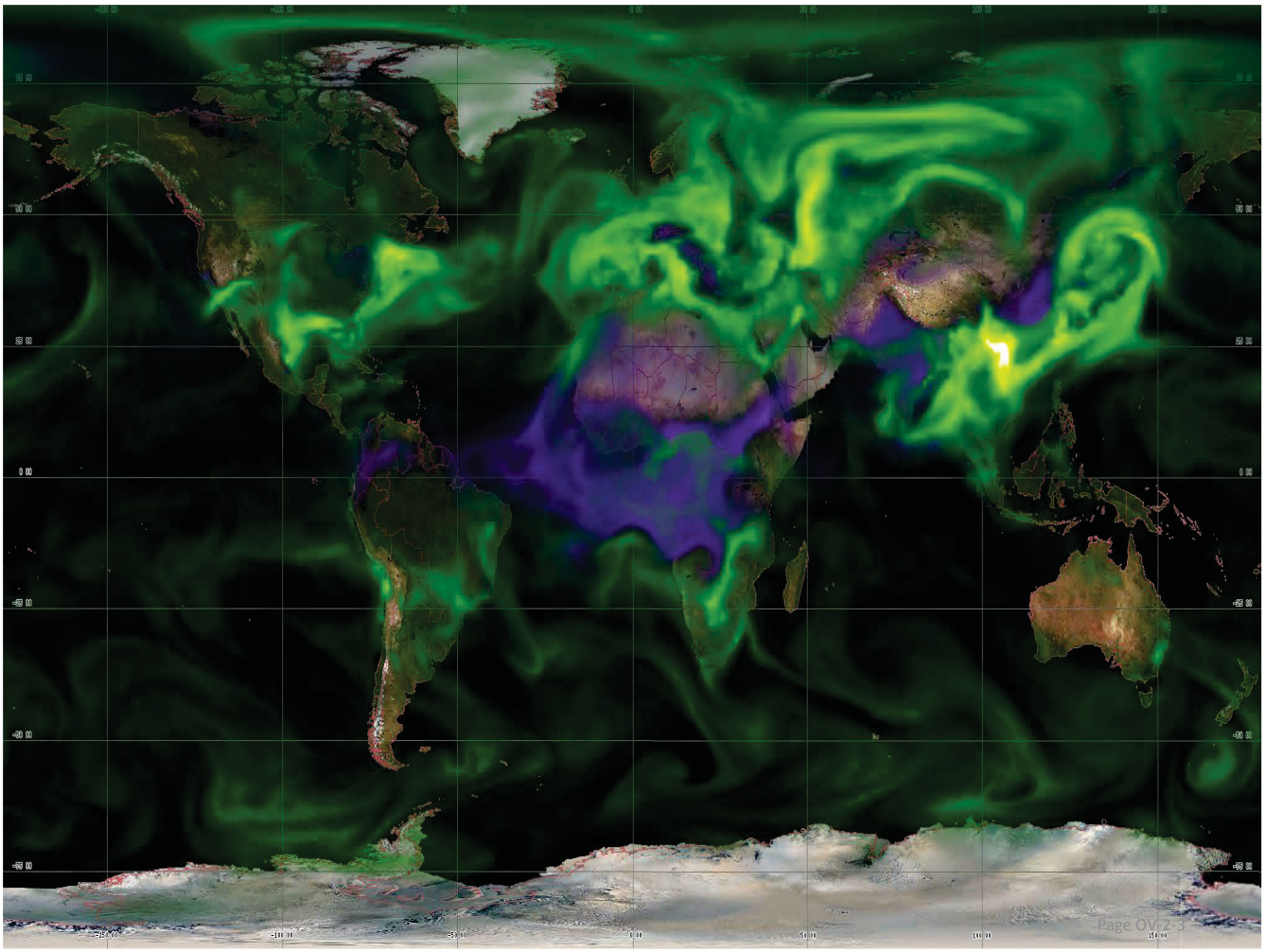
Welcome

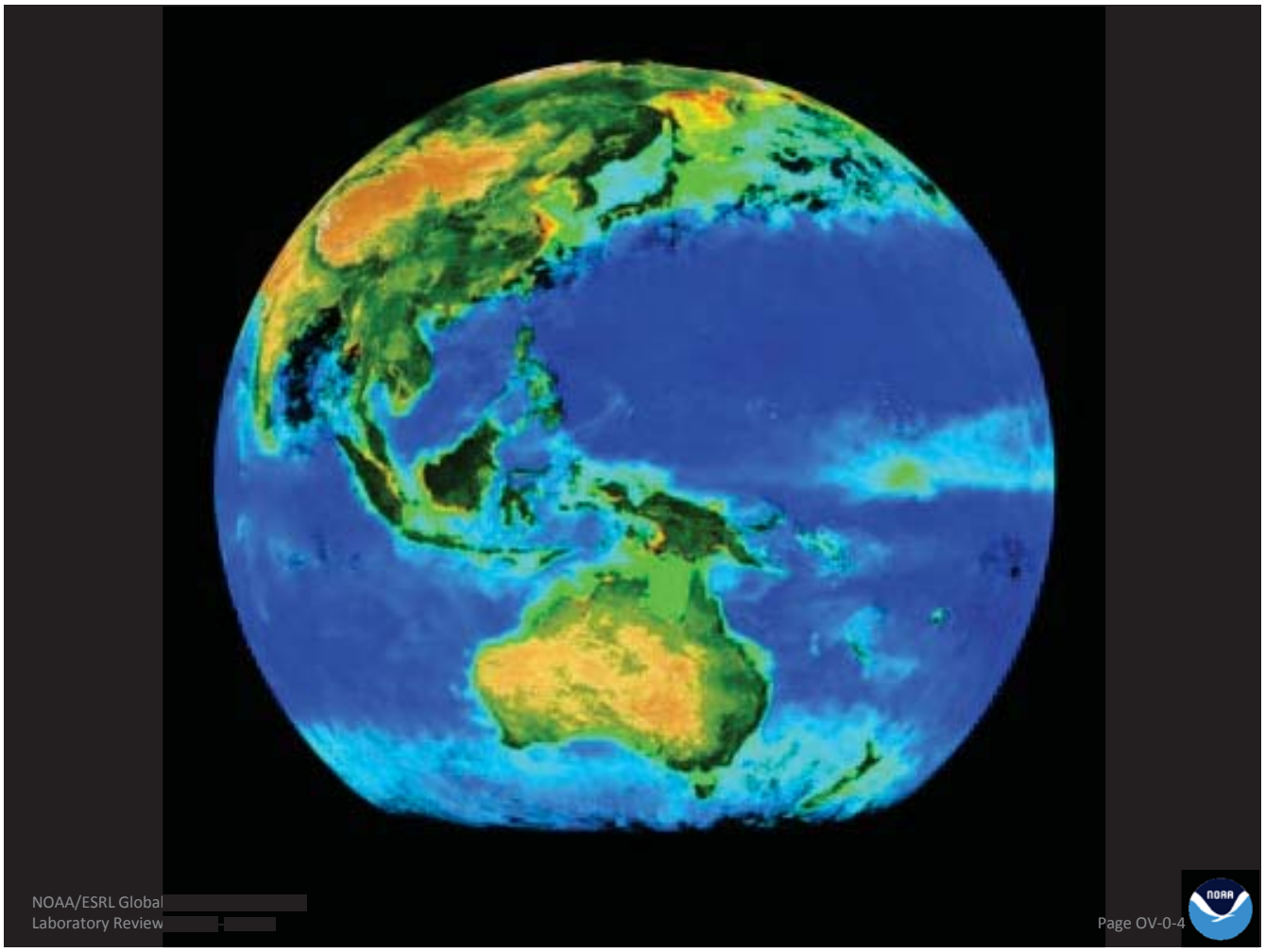
April 3, 2013

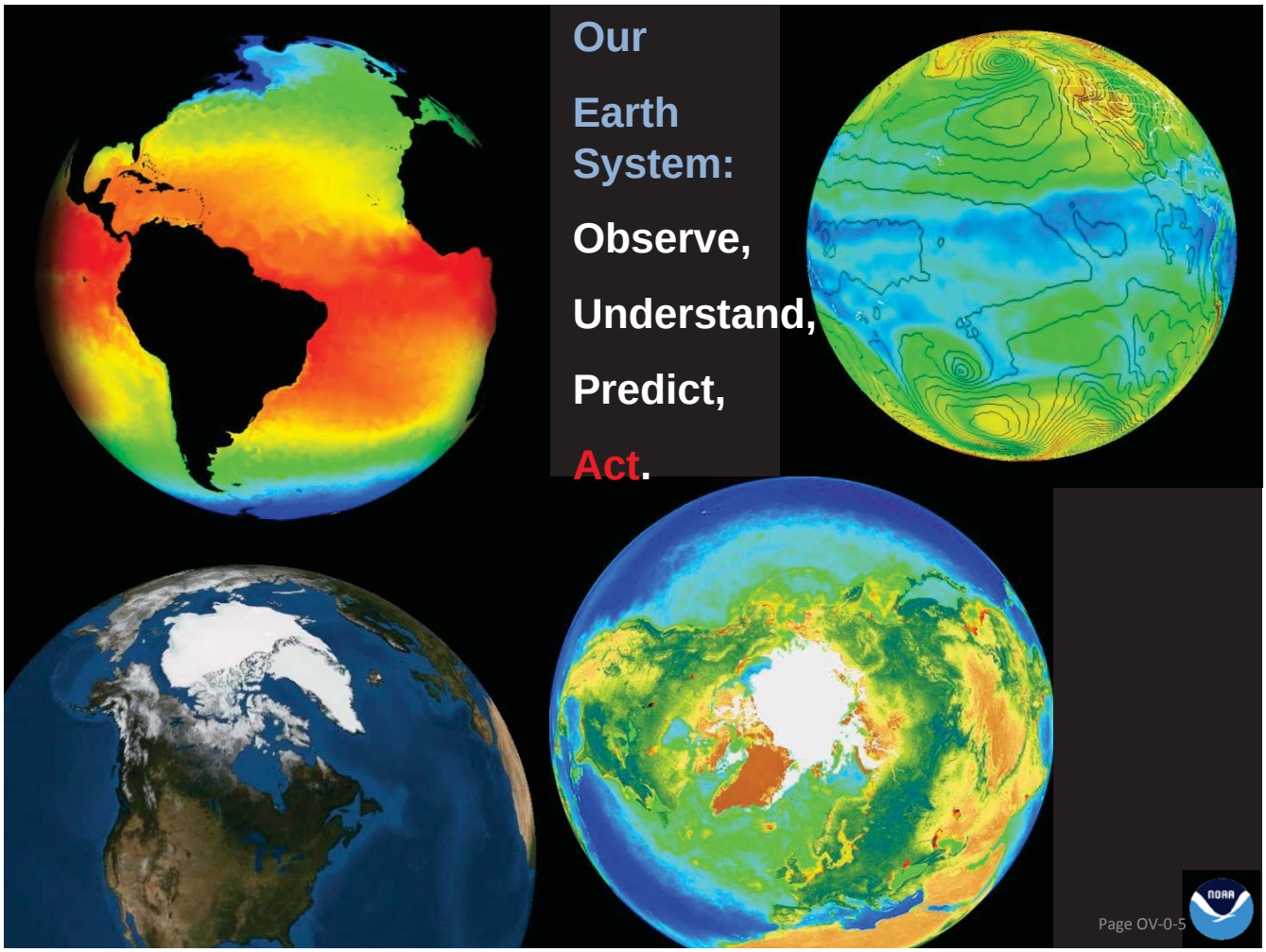
Alexander E. MacDonald
OAR Chief Science Advisor
Director
Earth System Research Laboratory
Boulder, Colorado

Earth System Research Laboratory

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.







OAR Leadership

Dr. Robert Detrick
Assistant Administrator of OAR

Dr. Steven Fine
Deputy Assistant Administrator for Labs and Cooperative Institutes

Craig McLean
Deputy Assistant Administrator for Programs and Administration

Dr. Alexander MacDonald
Chief Science Advisor, and ESRL Director

Review Panel Members

Professor Michael B. McElroy
Gilbert Butler Professor of Environmental Studies
Harvard School of Eng. and Applied Sciences
Primary Expertise: **Climate Forcing**
Secondary Expertise: **Ozone Depletion**

Professor Beverly Law
Forestry Department
Primary Expertise: **Climate Forcing**
Secondary Expertise: **Air Quality**

Dr. Carl Brenninkmeijer
Max Planck Institute for Chemistry
Primary Expertise**: Climate Forcing**
Secondary Expertise**: Ozone Depletion**

Review Panel Members

Review Chair
Dr. Kenneth W. Jucks
Program Manager, Upper Atmosphere Research Program
NASA, Earth Science Division
Primary Expertise**: Ozone Depletion**
Secondary Expertise**: Climate Forcing**

Dr. Øystein Hov
Research Director
Norwegian Meteorological Institute
Primary Expertise: **Air Quality**
Secondary Expertise: **Climate Forcing**

Professor Anne M. Thompson
Professor of Meteorology Penn State University
Primary Expertise: **Ozone Depletion**
Secondary Expertise**: Air Quality**

Earth System Research Laboratory

Office of the Director

February 1, 2013

Office of the Director

Alexander E. MacDonald
ESRL Director / OAR Chief Science Advisor
303-497-6378

Katy Stewart
Program Analyst
303-497-6005

CDR Adam Dunbar
Acting ESRL Deputy Director
303-497-7228

Information Technology Office
Richard Beeler
Chief IT Manager
303-497-6841

Research Programs Office

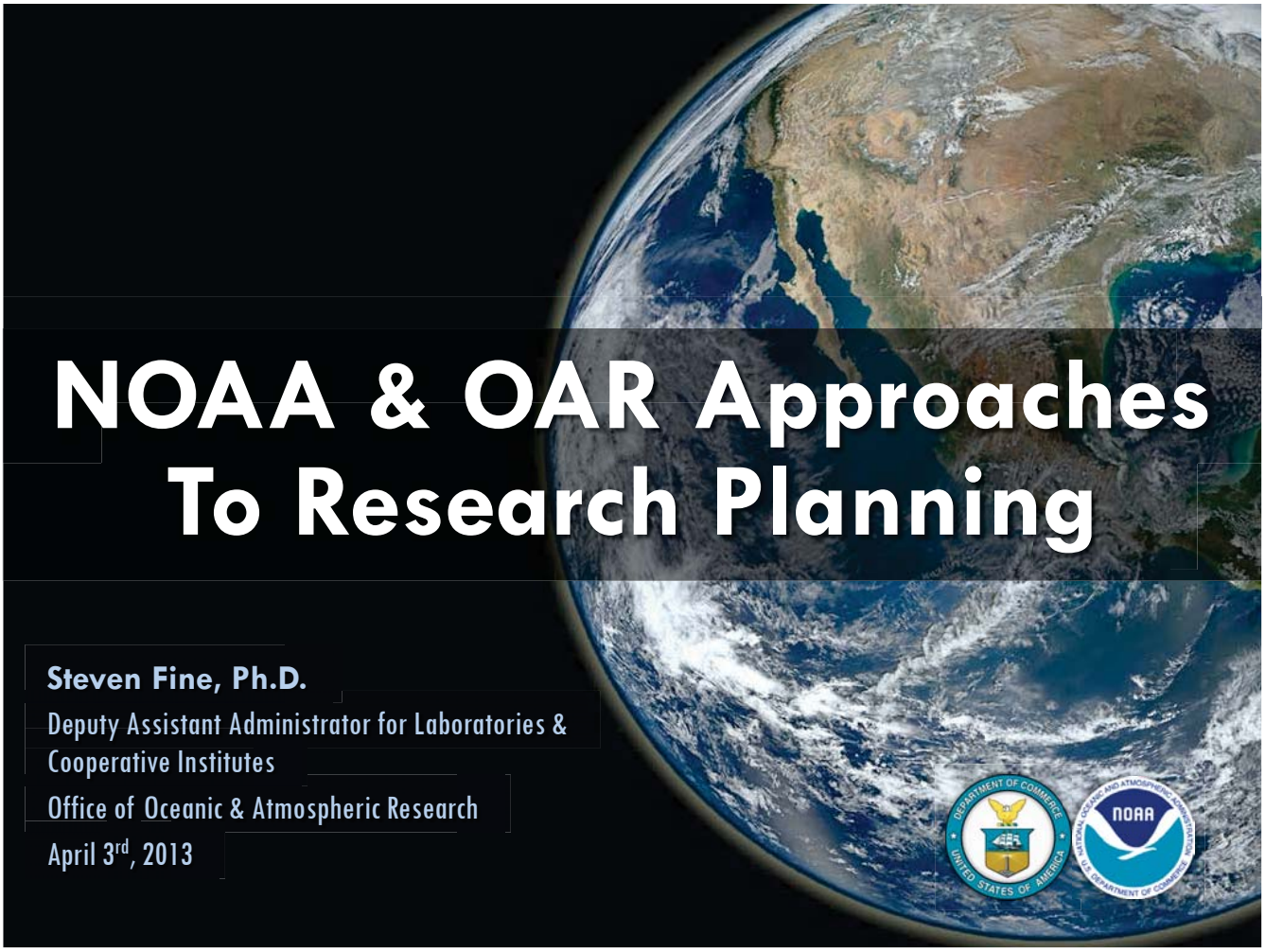
Budget & Administrative Office
Sandra J. Aschert
Chief Budget & Administrative Officer
303-497-6803

Global Monitoring Division
James Butler
Director
303-497-6898

Physical Sciences Division
William Neff
Director
303-497-6265

Chemical Sciences Division
A.R. Ravishankara
Director
303-497-5821

Global Systems Division
Scott Hausman
Acting Director
303-497-4104



NOAA & OAR Approaches To Research Planning

Steven Fine, Ph.D.
Deputy Assistant Administrator for Laboratories & Cooperative Institutes
Office of Oceanic & Atmospheric Research

April 3rd, 2013

GMD RESEARCH DRIVERS

LEGISLATIVE DRIVERS

- National Climate Protection Act (1978)
- Global Climate Protection Act (1987)
- Global Change Research Act (1990)
- Clean Air Act (1990)

POLICY DRIVERS

- United States Global Change Research Program (USGCRP)
- US Carbon Cycle Science Plan
- National Ocean Policy
- Magnuson-Stevens Act
- GCOS Implementation Plan
- GEOSS Strategic Plan

NOAA'S NEXT GENERATION STRATEGIC PLAN GOALS

Healthy Oceans	Weather Ready Nation	Climate Adaptation & Mitigation	Resilient Coastal Communities & Economies
			

SCIENCE & TECHNOLOGY

NOAA'S ORGANIZATION

LEADERSHIP

Assistant Administrator
Oceanic & Atmospheric Research (OAR)
Dr. Robert Detrick

Deputy Assistant Administrator
Programs & Administration
Craig McLean

Deputy Assistant Administrator
Laboratories & Cooperative Institutes
Dr. Steven Fine

Chief Science Advisor
Dr. Alexander MacDonald

PROGRAMS

Climate Program Office	National Sea Grant College Program	Office of Ocean Exploration & Research	Office of Weather & Air Quality	Ocean Acidification Program
Dr. Rick Rosen (A)	Dr. Leon Cammen	Dr. Tim Arcano	Dr. John Cortinas	Dr. Libby Jewett

LEADERSHIP/HQ STAFF OFFICES

Chief Financial Officer & Chief Administrative Officer	Office of Policy, Planning & Evaluation	International Activities Staff	Communications Office	Science Advisory Board Staff
Jason Donaldson	Dr. Gary Matlock	Rene Eppi	Barry Reichenbaugh	Dr. Cynthia Decker

HQ OFFICES

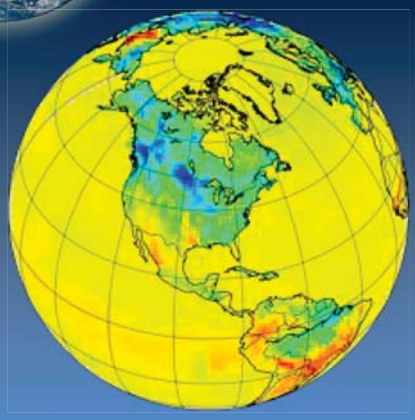
Laboratories & Cooperative Institutes
Dr. Mike Uhart

LABORATORIES

Air Resources Laboratory	Atlantic Oceanographic & Meteorological Laboratory	Geophysical Fluid Dynamics Laboratory	Earth System Research Lab (*Global Monitoring Division, Physical Sciences Division, Chemical Sciences Division, Global Systems Division*)
Dr. Steven Fine	Dr. Robert Atlas	Dr. Verkatachalam Ramaswamy	Dr. Alexander MacDonald

Great Lakes Environmental Research Laboratory	National Severe Storms Laboratory	Pacific Marine Environmental Laboratory
Dr. Marie Colton	Dr. Steven Koch	Dr. Chris Sabine

OAR'S VISION & MISSION



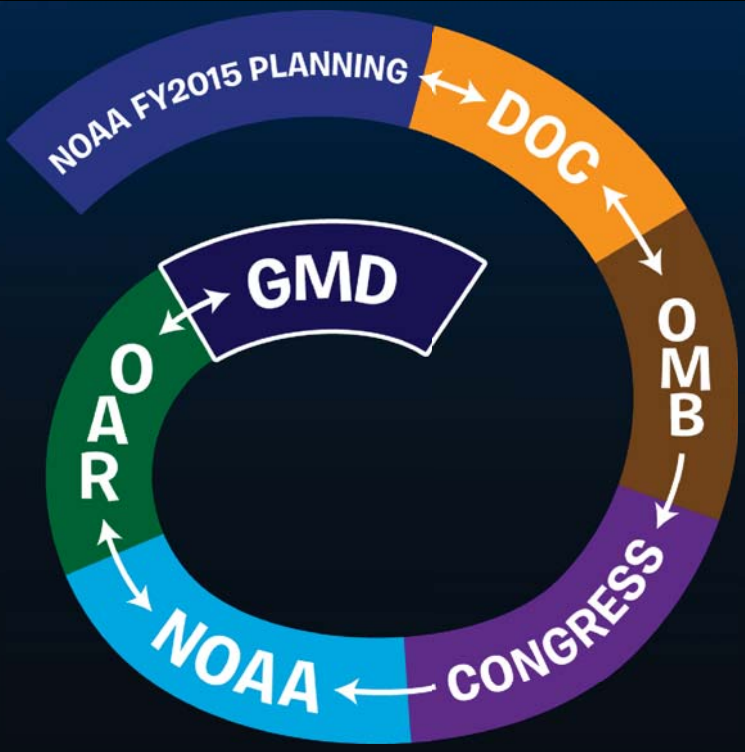
A society that uses the results of our research as the scientific basis for more productive and harmonious relationships between humans and the environment.

VISION

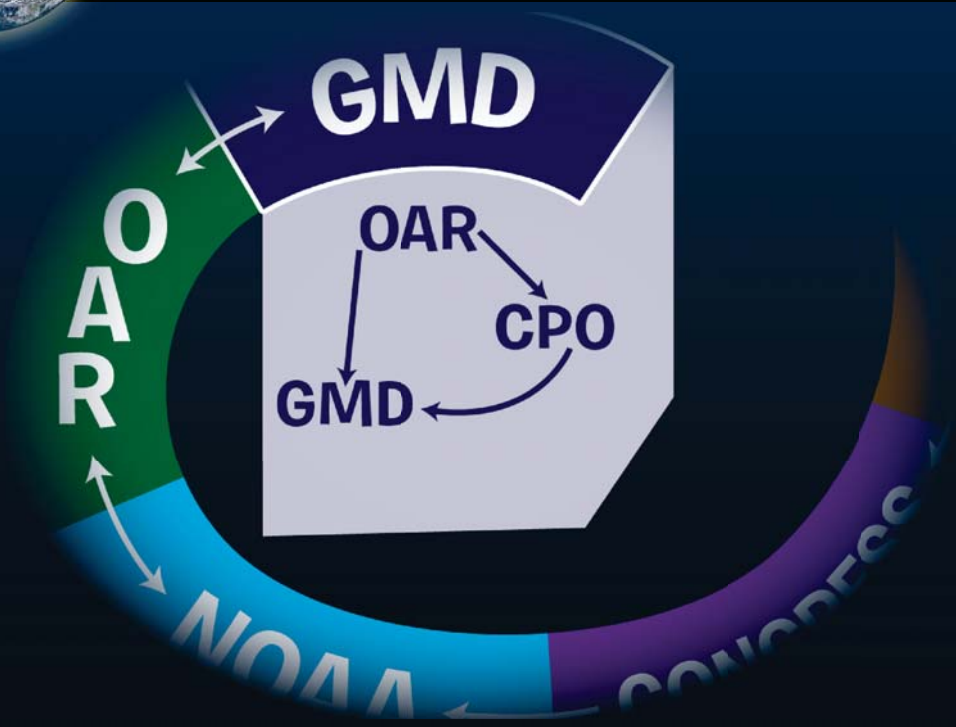
To conduct environmental research, provide scientific information and research leadership, and transfer research into products and services to help NOAA meet the evolving economic, social, and environmental needs of the Nation.

MISSION

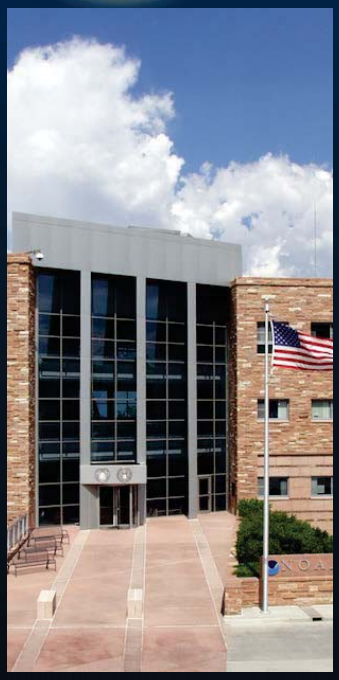
NOAA'S FUNDING PROCESS



NOAA'S FUNDING PROCESS

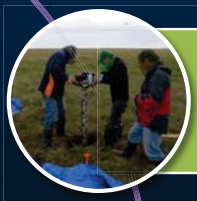


HOW OAR USES YOUR REVIEW



- Assist labs in strategically positioning & planning future science
- Maintain consistency with NOAA planning, programming, & budgeting
- Recognize lab scientists' leadership excellence & contributions in research fields
- Identify equipment & facility deficiencies
- Locate communication strengths & weaknesses between labs/offices/ leadership

CHARGE TO REVIEWERS



QUALITY: Assess quality of lab's R&D

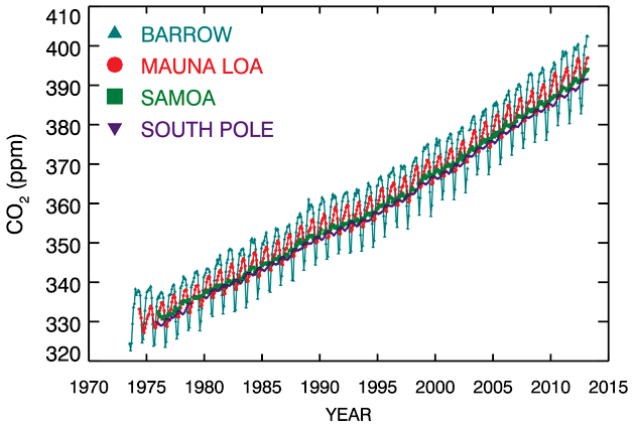
RELEVANCE: Assess lab's R&D relevance to NOAA's mission & value to Nation

PERFORMANCE: Assess overall effectiveness of lab's plans & R&D in meeting NOAA's Strategic Plan objectives & Nation's needs

Laboratory Review
NOAA/ESRL Global Monitoring Division

James Butler,
Director

3-5 April 2013



Outline

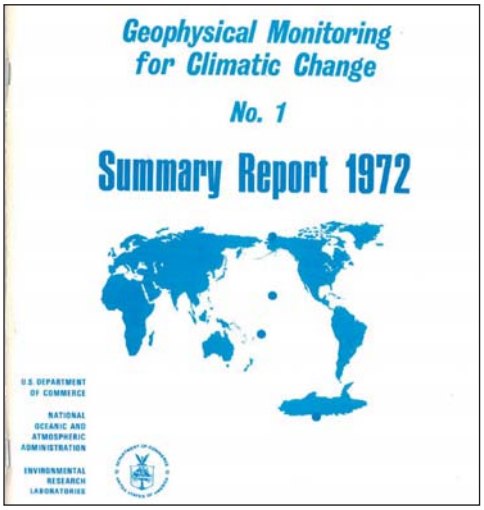
- Mission of NOAA's Global Monitoring Division
- Organization and Management
- How We Plan, Ensure, and Measure Success
- Past and Future
- Upcoming Sessions

GMD Mission

GMD Origins

". . . We must achieve a new awareness of our dependence on our surroundings and on natural systems which support all life, but awareness must be coupled with a full realization of our enormous capability to alter these surroundings."

Richard M. Nixon, 1970



"It is the objective of the GMCC program to respond to the need for this new awareness by providing a portion of the quantitative description and analysis needed. Specifically, it is our objective to measure the necessary parameters for establishing trends of trace constituents important to climate change and of those elements that can assist in apportioning the source of changes to natural or anthropogenic sources, or both."

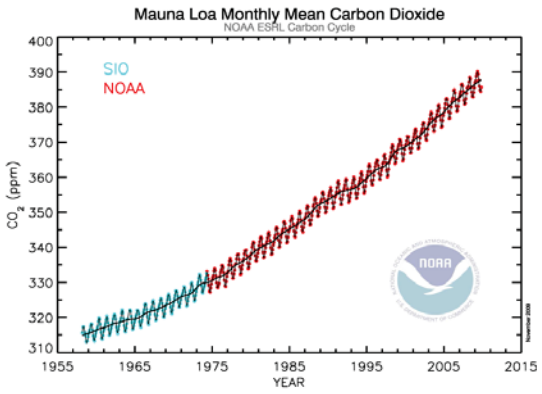
"This program has its special focus in establishing a long-term time series from ground-based information."

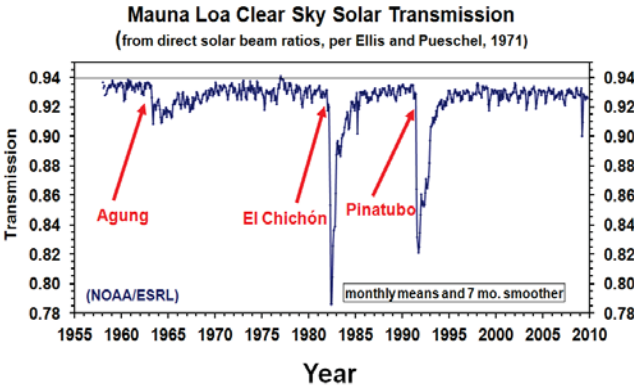
Geophysical Monitoring for
Climate Change
First Summary Report, 1972

GMD Vision and Mission

Vision

A society that has access to and uses the best possible information on atmospheric constituents that drive climate change, stratospheric ozone depletion, and background air quality.





Mission

To acquire, evaluate, and make available accurate, long-term records of atmospheric gases, aerosol particles, and solar radiation in a manner that allows the causes of the change to be understood.

Key Legislative Drivers of GMD's Research

- GMD's research contributes to fulfilling requirements for over 25 laws
- Four pieces of US legislation stand out
  - National Climate Protection Act (1978)
  - Global Climate Change Program Act (1990)
  - Global Change Research Act (1990)
  - Clean Air Act (1990)

Plans and Agreements

- United States
  - National Global Change Research Program Research Plan
  - US Carbon Cycle Science Plan
  - NOAA Next Generation Strategic Plan
  - NOAA Research Plan
  - NOAA/ESRL GMD Research Plan
- International
  - WMO Global Atmospheric Watch Strategic Plan
  - GCOS Implementation Plan
  - GEOSS Strategic Plan
  - GEO Carbon Strategy

Scientific Questions

(Details in Research Plan)

Climate Forcing

- ✓ Atmospheric levels and impact of greenhouse gases
- ✓ Sources and sinks of greenhouse gases
- ✓ Arctic and tropical reservoirs of carbon
- ✓ Upper tropospheric, lower stratospheric water vapor
- ✓ Aerosol optical properties
- ✓ Worldwide radiation budget
- ✓ Spectral surface albedo

Ozone Depletion

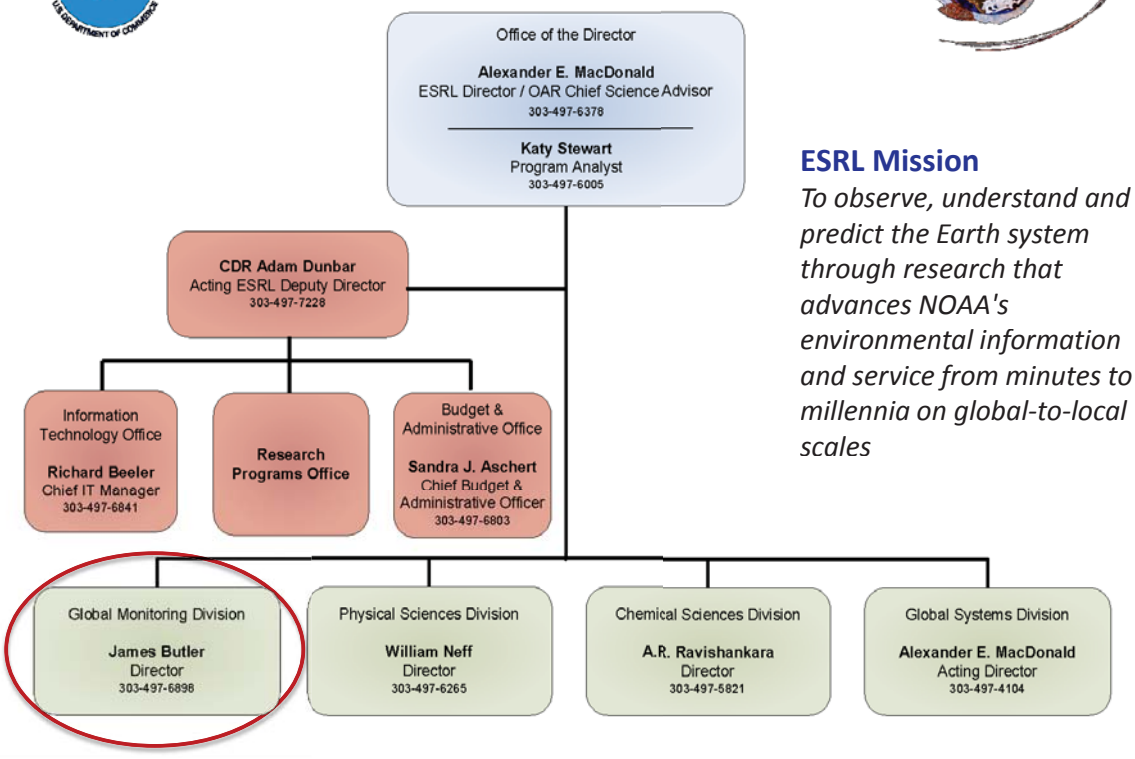
- ✓ Success of Montreal Protocol Process
- ✓ Recovery of Stratospheric ozone
- ✓ UV radiation at Earth's surface

Air Quality

- ✓ Intercontinental transport of pollutants
- ✓ Cleansing capacity of the global atmosphere
- ✓ Production and extraction of fossil fuels

Organization and Management

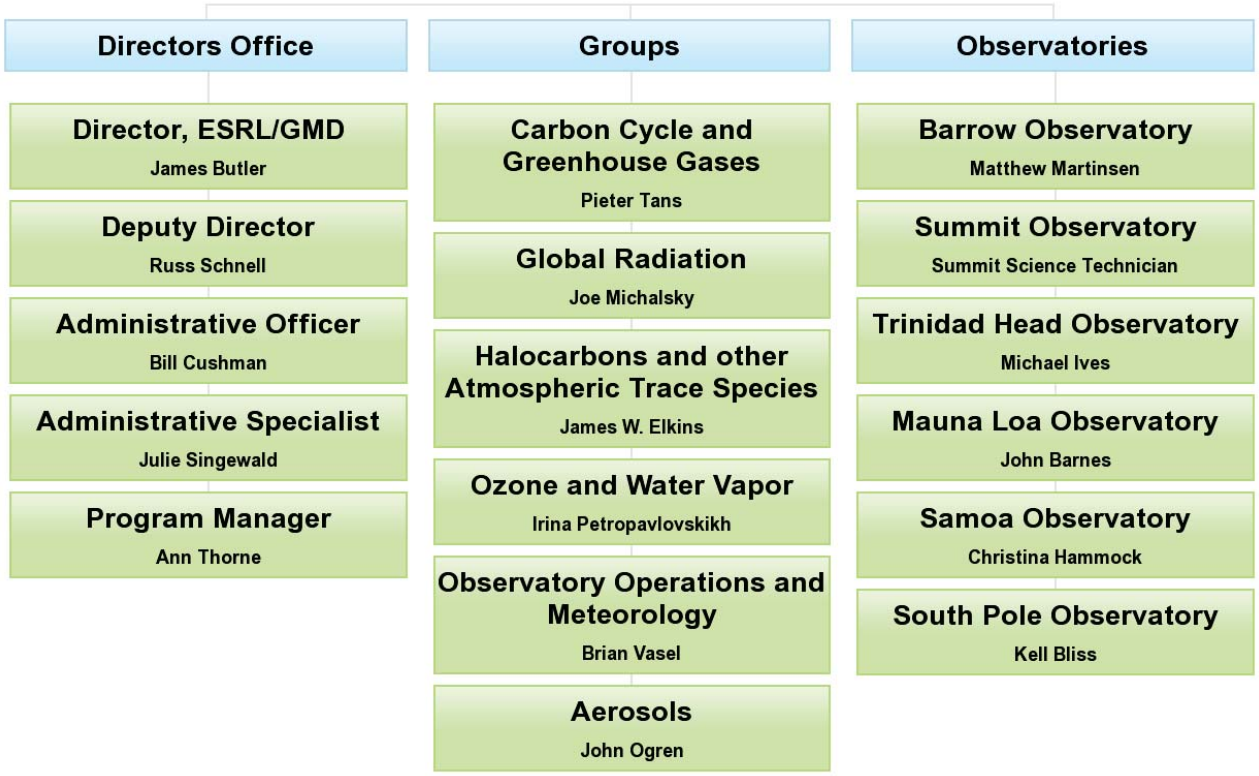
ESRL Organization



ESRL Mission

To observe, understand and predict the Earth system through research that advances NOAA's environmental information and service from minutes to millennia on global-to-local scales

GMD Organization



GMD in a Nutshell

Themes

Climate Forcing

Ozone Depletion

Background Air Quality

Research Groups and Networks

Carbon Cycle & Greenhouse Gases

Halocarbons and Trace Gases

Ozone and Water Vapor

Aerosols

Surface Radiation

Baseline Observatories

Summit Greenland

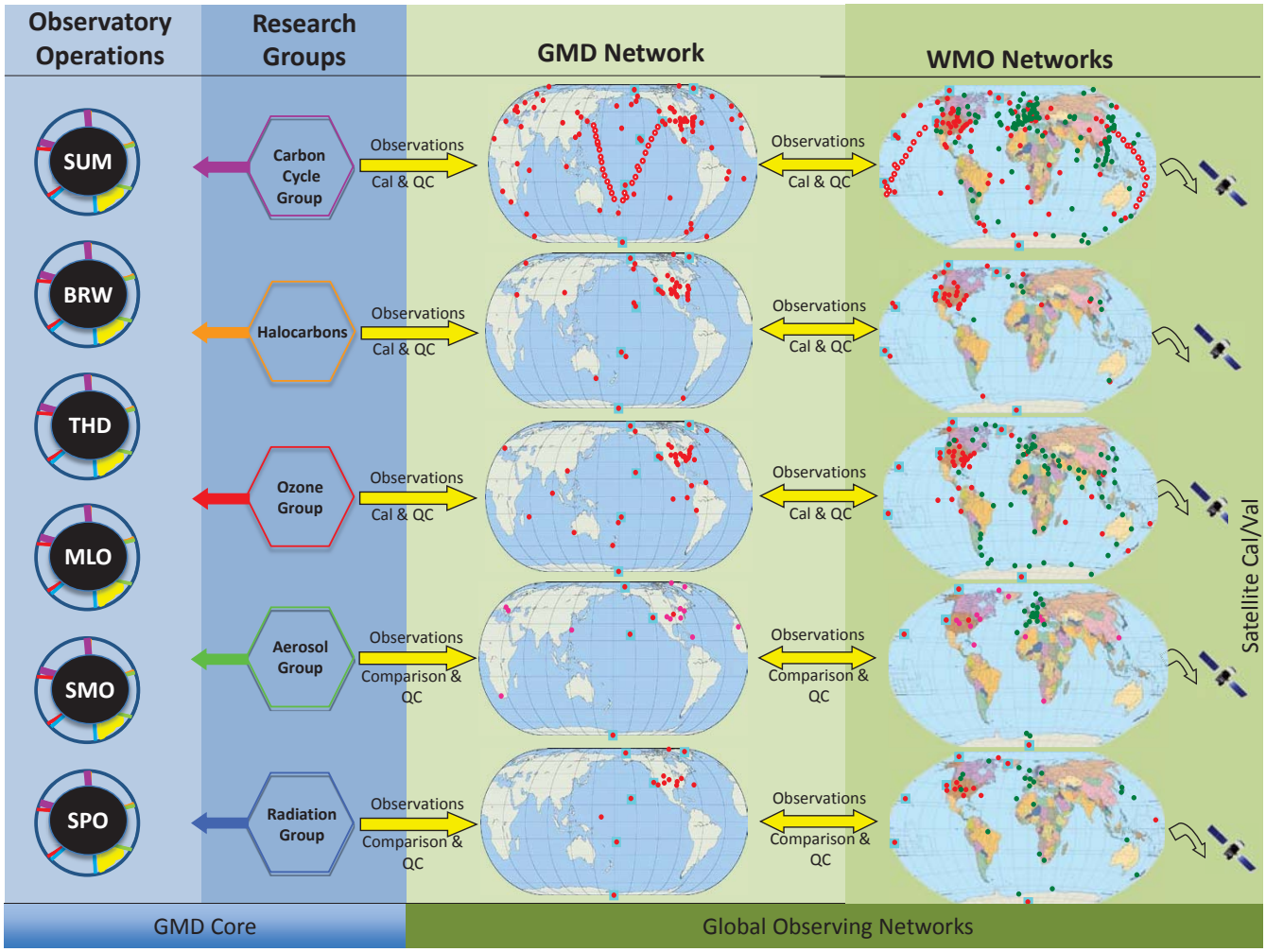
Barrow, Alaska

Mauna Loa, Hawaii

Trinidad Head, California

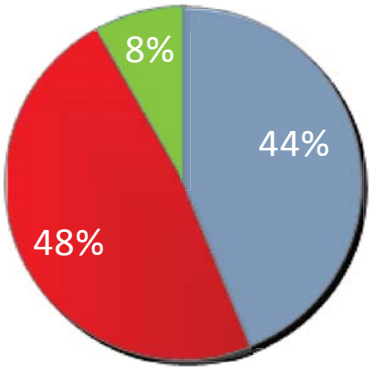
American Samoa

South Pole, Antarctica

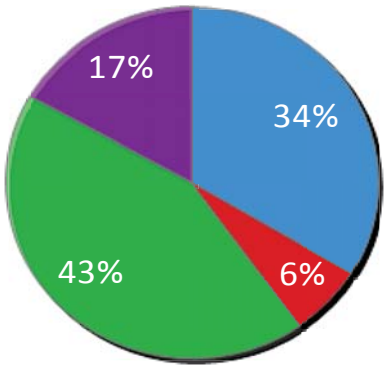


Workforce Profile

Total "FTE" = 107

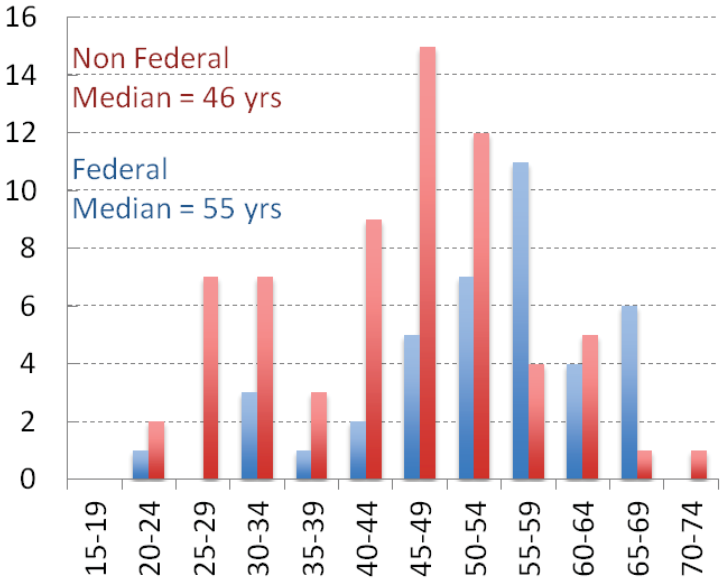


- Federal
- Cooperative Institute
- Contractors



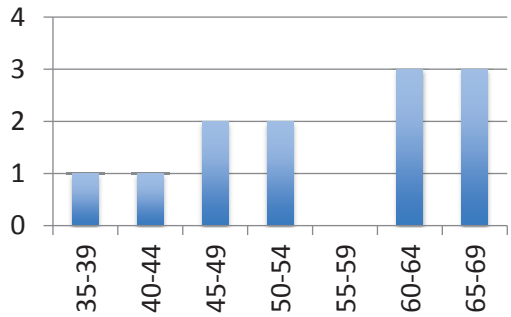
- PhD
- Masters
- Bachelors
- Other

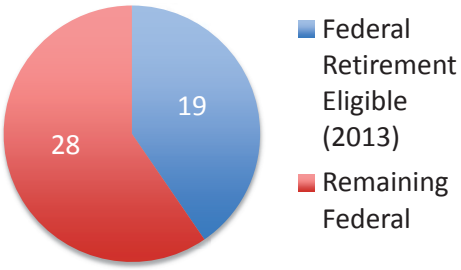
Workforce Age Distribution



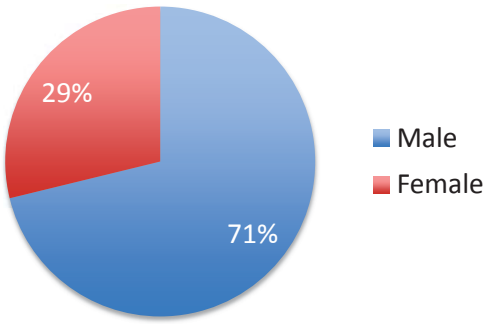
Median Ages of Scientists:
Feds = 59 yrs
Non-Feds = 47 yrs

GMD Leadership (n=12)

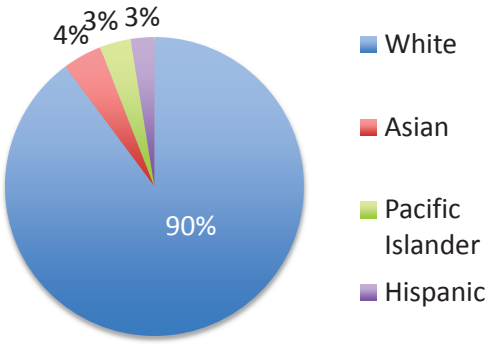


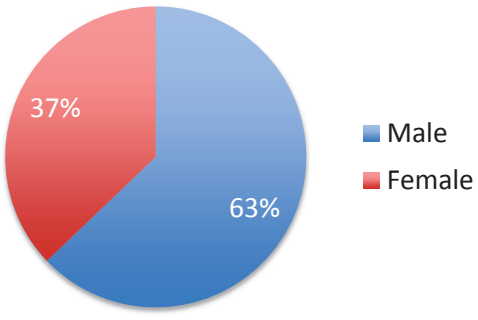


Workforce Demographics

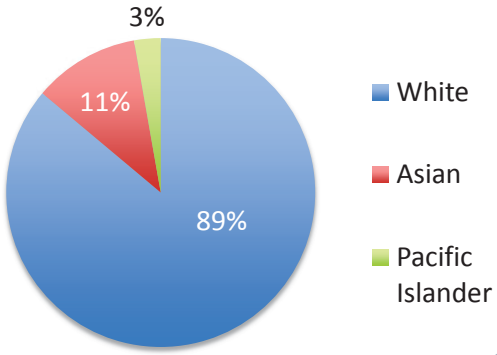


All GMD Staff

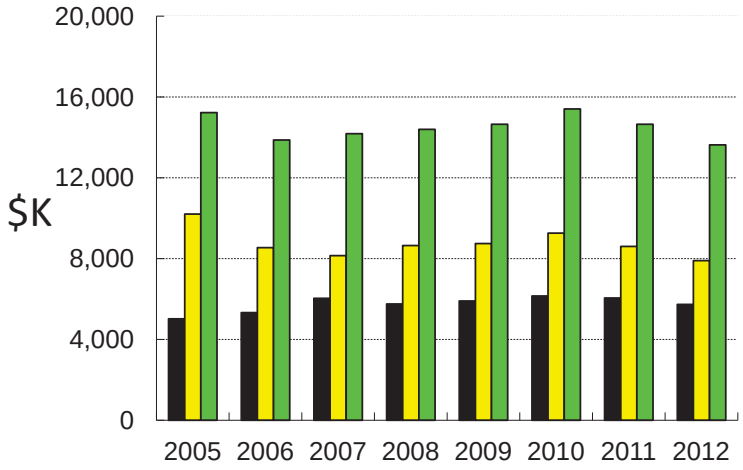


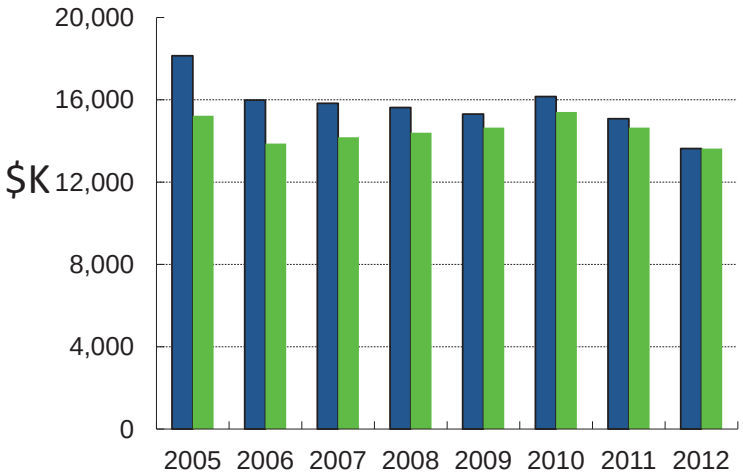


GMD Staff < 40yrs



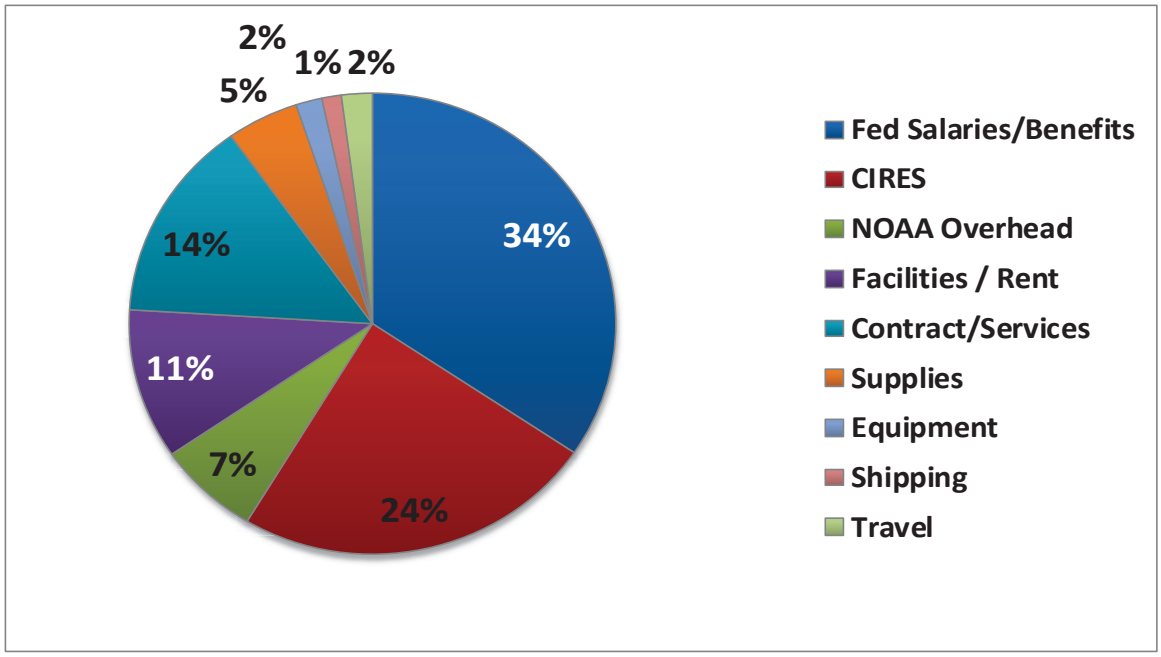
GMD Income*





*NOAA funds only. External funding adds another 15-20 %

Expenditures by Function

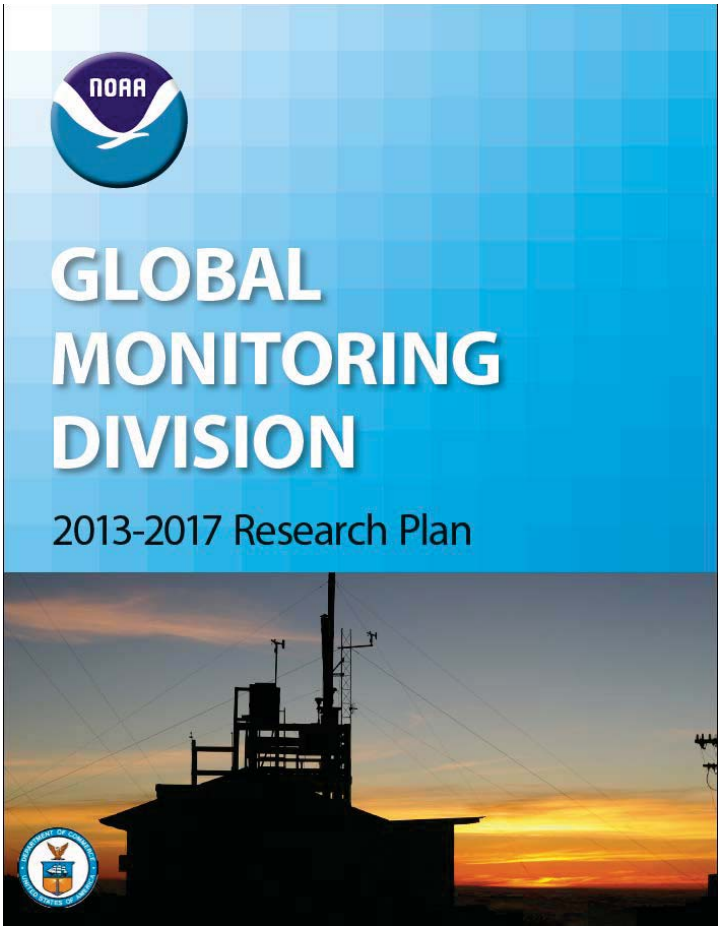


Facilities, Rent , and Contracts are observing site costs and DSRC Rent.

How We Plan, Ensure, and Measure Success

How GMD sets priorities

- Legislative mandates
- Consistency with NOAA's strategic plan
- Relevance to interagency and international plans
- Relevance to national and international assessments
- Within the framework of GMD's mission:
  - Identify key scientific questions
  - Determine role of long-term observations to answer those questions
  - Sustain quality and continuity of observations
  - Understand the observed distributions and trends
    - Expand networks as needed
    - Conduct periodic regional-scale studies



GMD Research Plan

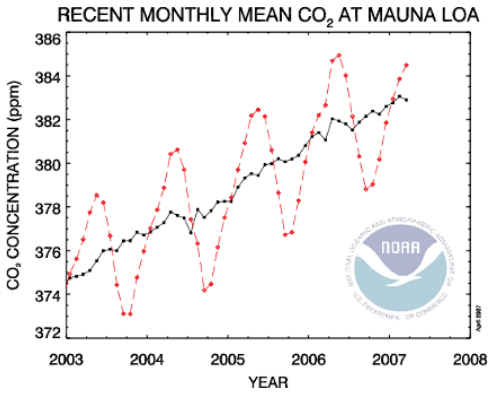
- Documents GMD's purpose
- Identifies key scientific questions
- Shows how GMD activities help answer those questions
- Lays out a path forward
- Provides milestones as measures of performance

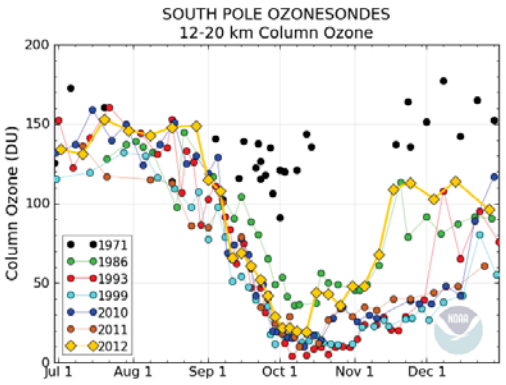
How We Measure Success

- Sustained high-quality long-term records of atmospheric composition
- Preeminence of our science as documented through the peer-review process
- External recognition of staff
- Ability to update products regularly
- Use of products by external partners
- Leadership on committees
- Contributions to assessments

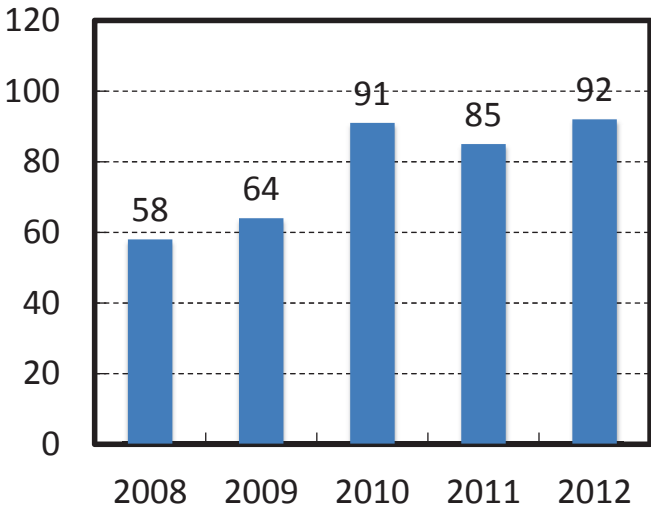
On-line Products

- Interactive Data Visualization
- Annual Greenhouse Gas Index
- Ozone-Depleting Gas Index
- South Pole Ozone
- GLOBALVIEW
- Mauna Loa Trends
- GMD 3 Dimensional Maps of Composition
- Solar Calculator



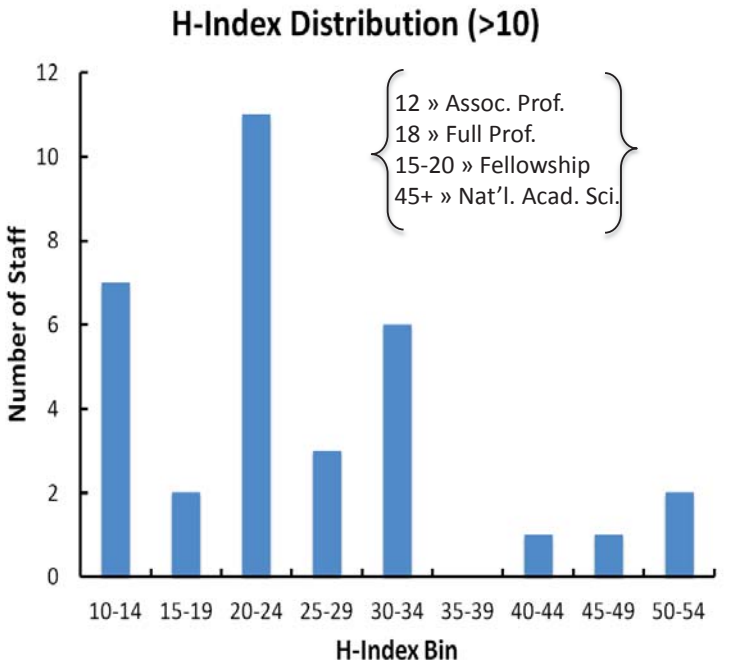


Publications by Year



- These are publications with GMD authorships.
- The number has increased at ~9 per year since 2008, our last review.
- This, despite a decrease in staff of nearly 15% during that time.

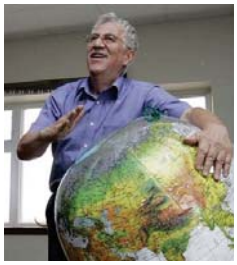
Hirsch Index



	H-Index	# Pubs.	# Citations
Oltmans	52	234	8,757
Tans	50	164	11,135
Elkins	47	147	6,189
Ogren	42	194	5,518
Hofmann	42	128	6,807
Montzka	33	82	3,286
Hintsa	33	70	2,902
Dlugokencky	31	79	3,383
Dutton, E.	31	44	1,483
Butler	28	53	2,556
Novelli	27	45	2,039
Schnell	27	93	2,903
Johnson	25	47	1,662
Barnes	24	70	3,894
Hurst	24	52	1,759
Jefferson	24	45	1,979
Michalsky	24	89	2,699
Miller, J.	23	43	1,525
Dutton, G.	21	44	1,495
Andrews, B.	20	39	1,589
Bruhwiler	20	34	2,202
Stone	20	50	1,324
Anderson, A.	19	76	1,142
Conway	19	34	2,251
Hall, B.	18	33	1,196

Awards Summary 2007-2012

- Presidential Rank (1)
- AGU Roger Revelle Medal (1)
- DOC Gold (2)
- DOC Silver (2)
- DOC Bronze (2)
- AGU Fellow (1)
- NOAA Distinguished Career (1)
- CIRES Fellow (1)

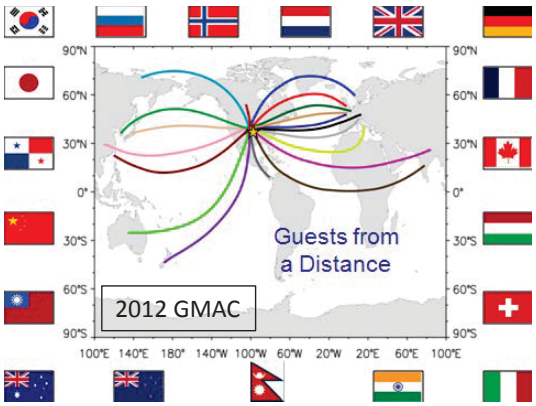


- OAR Outstanding Paper (3)
- EPA Stratospheric Ozone Protection (1)
- OAR Outstanding Science Communicator (1)
- AGU Excellence in Refereeing (3)
- Numerous additional awards from NOAA, OAR, CIRES, and JIMAR for significant accomplishments

Partners

- GMD operates instruments or collects samples at 78 locations in 35 states in the US
- Nearly all of the 13 US agencies participating in the USGCRP make use of GMD's data and products
- GMD operates similarly at 161 locations in 61 countries
- Over 100 partnering scientists worldwide, many in association with WMO Global Atmospheric Watch

- NOAA/ESRL Global Monitoring Annual Conference
  - Essentially GMD's annual meeting to engage with partners contributing to, sharing, or using GMD's data and data products routinely.

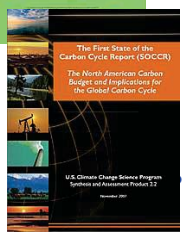


Leadership on Committees

- WMO Commission for Atmospheric Science (Butler)
- WMO Global Atmospheric Watch
  - Scientific Advisory Group for Greenhouse Gases (Dlugokencky, Chair; Hall)
  - Scientific Advisory Group for Aerosols (Ogren, Chair)
  - Scientific Advisory Group for Ozone (Evans)
  - Global Greenhouse Management Team (Several GMD participants)

- Global Climate Observing System (GCOS)
  - Atmospheric Observation Panel for Climate (Butler)
- US Global Change Research Program
  - Carbon Cycle Interagency Working Group (Butler)
  - Carbon Cycle Scientific Steering Group (A. Andrews)
  - North American Carbon Program Scientific Steering Group (Jacobson)
- Group on Earth Observations
  - Carbon cycle Advisory Group (Butler)

Assessments



- Our contributions to Assessments are the highest level product for our research:
  - Provide evaluations and syntheses of the most recent research
  - Operate at the interface of science and policy, providing policy-relevant information
- IPCC Assessments
  - Inform nations through UNFCCC on climate and climate change mitigation
    - Significant vehicles for educating global society on climate change
- Ozone Assessments
  - Inform nations through the Vienna Convention on the Ozone layer
    - Resulted in significant amendments to the Montreal Protocol
    - Led to acceleration of production phaseouts, most recently HCFCs
- National Assessments
  - Provide US policy-makers with climate-relevant information

U.S. Global Change Research Program
National Climate Assessment

Education and Outreach

- Building Global Capacity
  - Coordinating with scientists, universities, and agencies around the world to add sites
  - Training emerging scientists
  - "Twinning" with emerging WMO partners
- Public Outreach
  - Primary and secondary education
  - ESRL Student Program
  - Public presentations
- Selected Specific Activities
  - Trained 15 CMA (China Met.) scientists for 2 weeks in greenhouse gas monitoring.
  - Built a replica of GMD's analysis system in Brazil and trained scientists in sampling and operations.
  - Instrumental in expanding the Baseline Surface Radiation Network over the past 20 years.
  - Continued assistance with Peru's Dobson ozone observing program
  - Numerous educational activities at Barrow and Samoa
  - Engagement with tribal communities in Samoa
  - Weather monitoring system in collaboration with the Sicangu Sioux reservation in South Dakota

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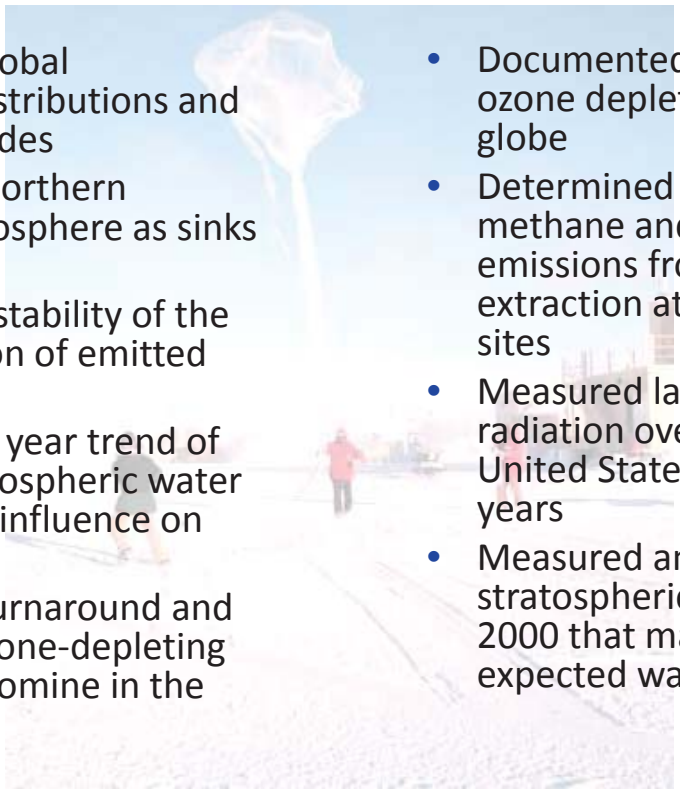
Past and Future

Scientific highlights



- Documented global atmospheric distributions and trends for decades
- Identified the northern hemispheric biosphere as sinks for CO_2
- Demonstrated stability of the airborne fraction of emitted CO_2
- Detected a 30+ year trend of increasing stratospheric water vapor, a strong influence on climate
- Reported the turnaround and reduction of ozone-depleting chlorine and bromine in the atmosphere.
- Documented the leveling of ozone depletion across the globe
- Determined the amount of methane and pollutant emissions from oil and gas extraction at Western U.S. sites
- Measured large increase in net radiation over the continental United States in the last 15 years
- Measured an increase of stratospheric aerosol since 2000 that may have reduced expected warming

The Future

Operational Challenges

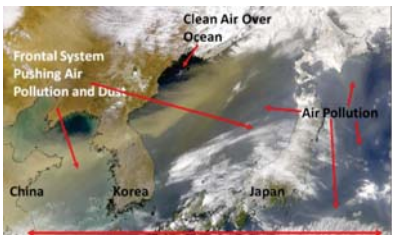
- Sustaining long-term observations in global networks
- Ensuring a world-class research workforce
- Addressing succession

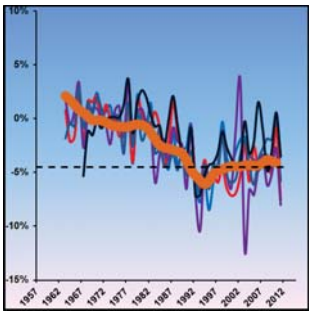
Scientific Opportunities

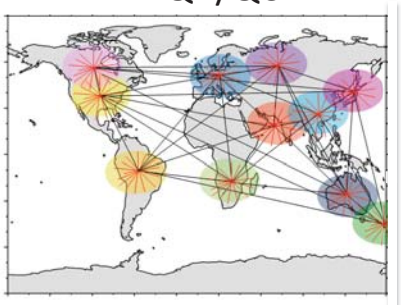
- Build commercial aircraft capability
- Expand C-14 efforts
- Serve as Global GHG "Reference Network"
- Enhance upper atmospheric research
- Support renewable energy evaluation
- Strengthen arctic observatories
- Evaluate natural gas emissions

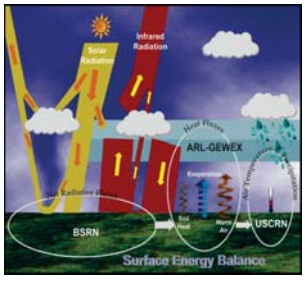
Upcoming Presentations

- Climate Forcing
  - Greenhouse gases
  - Aerosols
  - Surface Radiation
- Common Elements
  - Observatories
  - Calibration & QA/QC









- Ozone Depletion
  - Stratospheric Ozone
  - Ozone-depleting Gases
- Air Quality and Regional Studies
  - Tropospheric Ozone
  - Aerosols
  - Volatile Organic Compounds
  - Arctic Monitoring

Questions?

NOAA Global Monitoring Division

- *. . . providing the best possible information on atmospheric constituents that drive climate change, stratospheric ozone depletion, and baseline air quality.*

GMD Mission

- *To acquire, evaluate, and make available accurate, long-term records of atmospheric gases, aerosol particles, and solar radiation in a manner that allows the causes of change to be understood.*