

# 40<sup>th</sup> Global Monitoring Annual Conference

Boulder, Colorado  
May 15-17, 2012

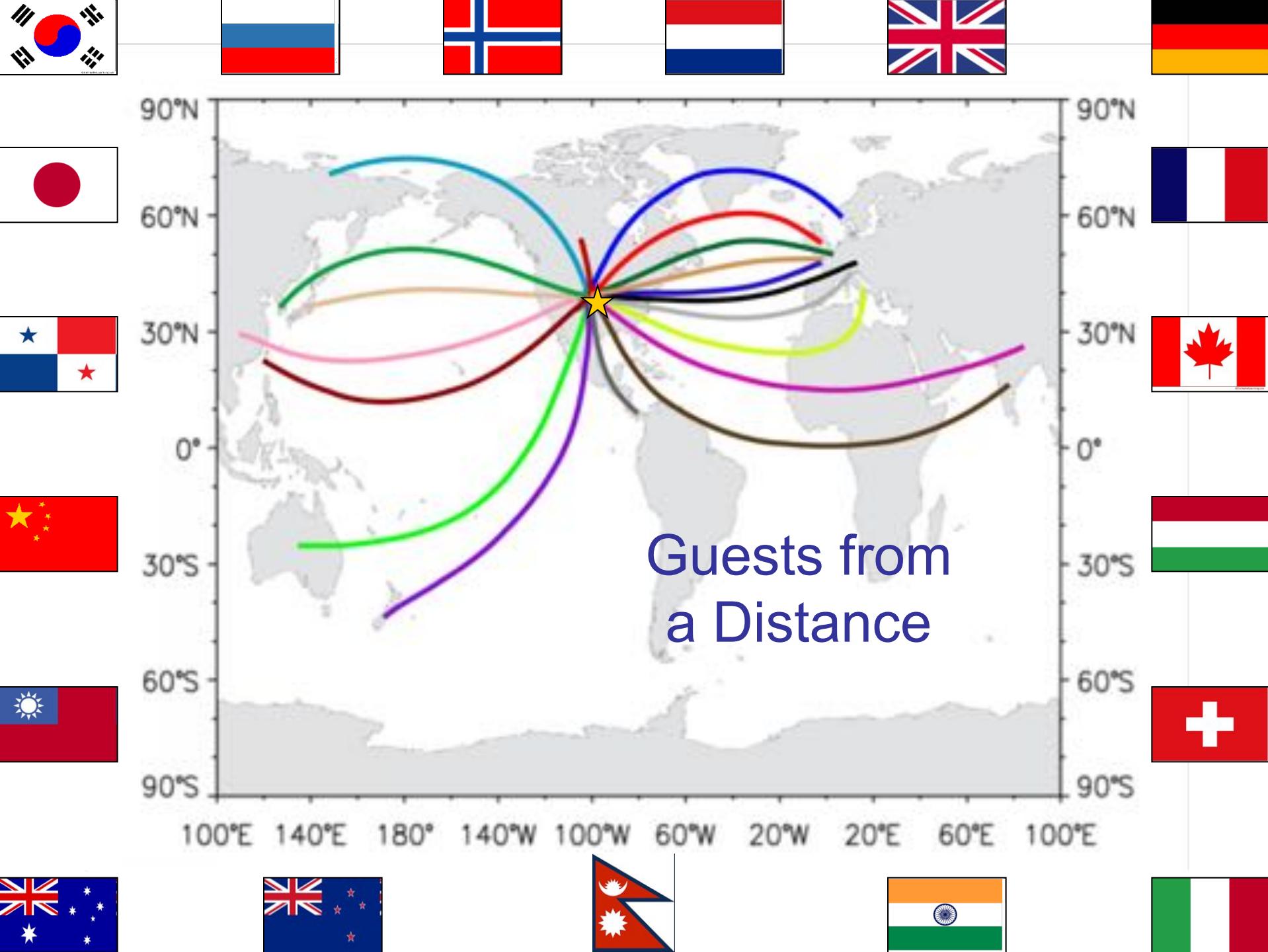
[www.esrl.noaa.gov/gmd/annualconference](http://www.esrl.noaa.gov/gmd/annualconference)



# Purpose of the Conference

*Looking forward to the next 55 years of monitoring . . .*

- Goals:
  - to advance understanding of the research that drives, and derives from, long-term, global monitoring
  - to share information on the latest observing techniques, approaches, and systems
  - to enhance collaboration among national and international partners
- Side meetings this year
  - Observatory operations (2 meetings)
  - CarbonTracker workshop
  - Training workshop for Aerosol Federated Network
  - Observatory Safety Training
  - AGAGE meeting



# Make-up of the 2012 GMAC

## Attendees

- 250+ Attendees
  - 52 Foreign national
  - 86 GMD
  - 116 Other US
  - 18 Countries
  - 10 International agencies & organizations
  - 5 International universities
  - 12 Federal agencies
  - 12 US universities

## Authors & Co-Authors

- 108 Presentations
  - 108 Lead authors
  - 320 “unique” co-authors
- Organizations
  - 10 NOAA laboratories
  - 15 “other” federal agencies/labs
  - 20 Countries
- Academics
  - 28 US universities
  - 36 International universities



# On-line Agenda with Links (Presentations, Abstracts Available)

U.S. Department of Commerce | National Oceanic & Atmospheric Administration | NOAA Research

 **Global Monitoring Annual Conference**

**May 15-17, 2012**  
**Boulder, Colorado**

Home Registration Agenda Presentations Directions Lodging GMD Home

[View presentation list sorted by author.](#) [Printer friendly](#)

**Agenda** (Revised 04-10-2012)

[Tuesday, May 15](#) [Wednesday, May 16](#) [Thursday, May 17](#) [Poster Session - Tuesday, May 15](#)

**Tuesday, May 15, 2012 AGENDA**

(Only presenter's name is given; please refer to abstract for complete author listing.)

(Click on presentation title to view abstract.)

- 07:00 Registration Opens in GC-402 – lunch orders and posters collected at registration table
- 07:30 - 08:10 Morning Snacks – Coffee, tea, fruit, bagels & donuts served

Session #	Introduction, Keynote Address, and Setting the Stage — Chaired by Russ Schell	
08:10 - 08:30	Welcome Address James H. Butler & Alexander E. MacDonald (NOAA Earth System Research Laboratory, Boulder, CO)	
08:30 - 09:00	<b>KEYNOTE: Atmospheric Chemical Composition, Climate, and Societal Implications</b> Steven Wofsy (Biosphere-Atmosphere Exchange Group, Harvard University, Cambridge, MA)	
09:00 - 09:15	Global Atmospheric Distributions of Some Short-Lived Halocarbons Stephen A. Montzka (NOAA Earth System Research Laboratory, Boulder, CO)	
09:15 - 09:30	Partitioning of Terrestrial Carbon Sources Using $^{13}\text{CO}_2$ Observations and Modeling Scott Lehman (University of Colorado, Boulder, CO)	
09:30 - 09:45	Are Oceanic and Terrestrial Sinks of $\text{CO}_2$ Not Able to Keep Up with Emissions? Peter Tans (NOAA Earth System Research Laboratory, Boulder, CO)	

# Meeting Organization

## (GMD in a Nutshell)



### *Themes*

Climate  
Forcing

Ozone  
Depletion

Baseline 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

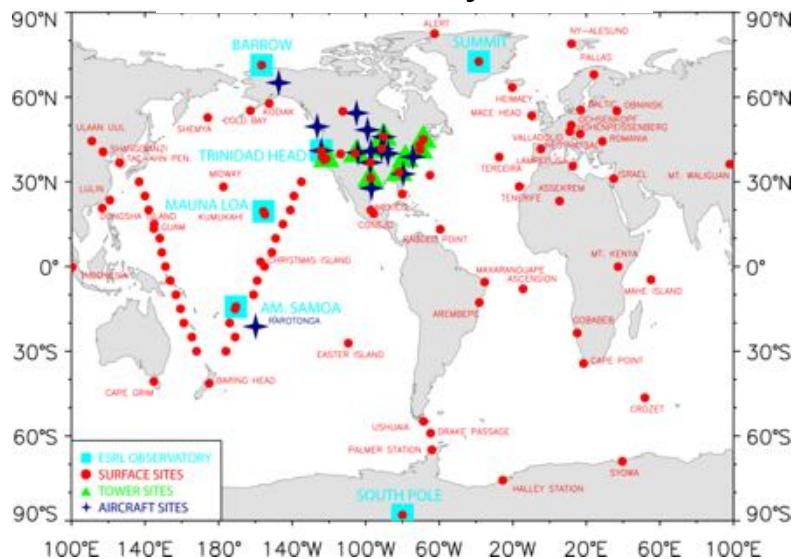
American  
Samoa

South  
Pole,  
Antarctica

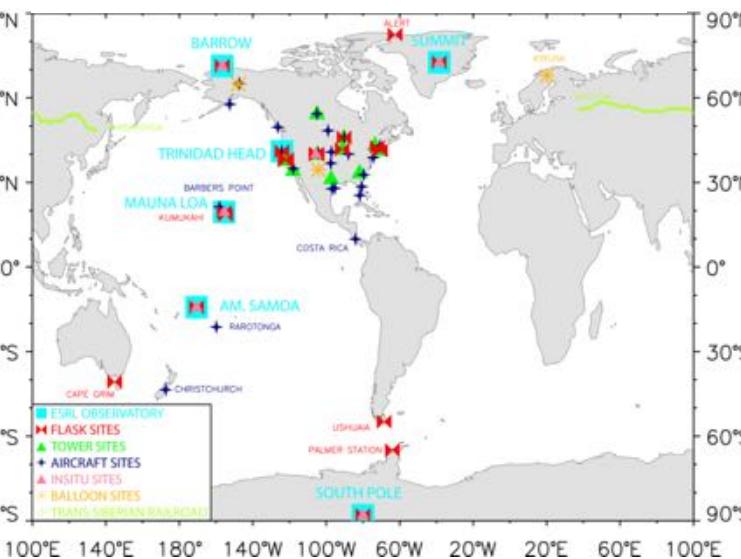
# GMD Observing Networks



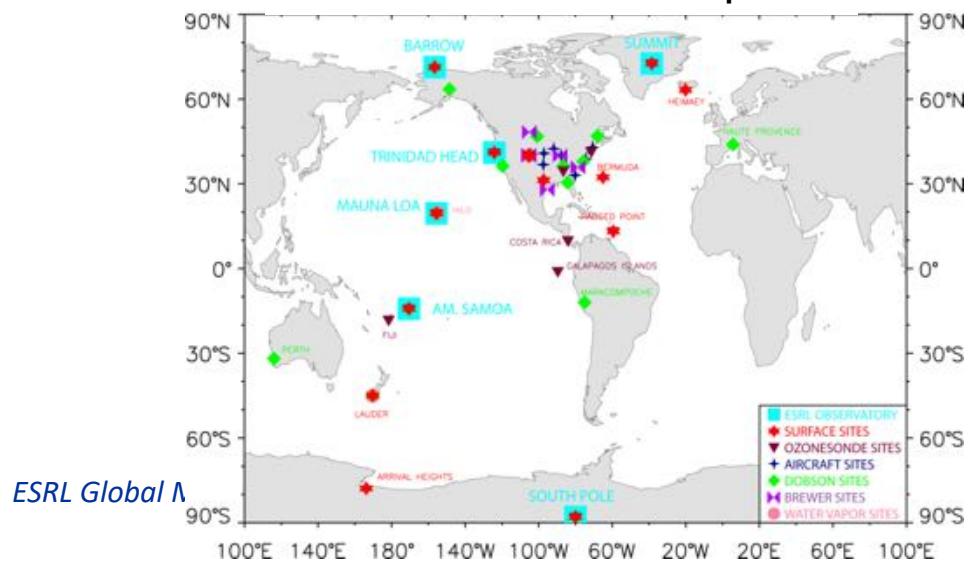
# Carbon Cycle



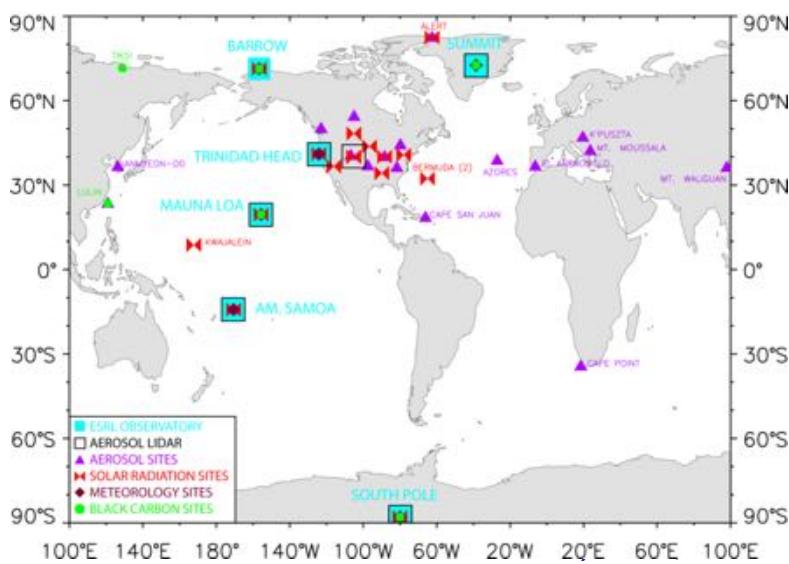
# Halocarbons



## Ozone & Water Vapor



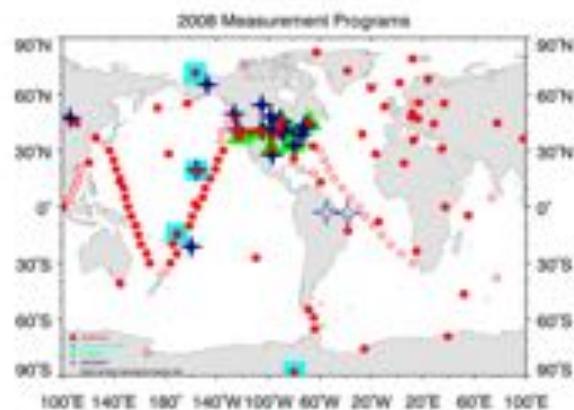
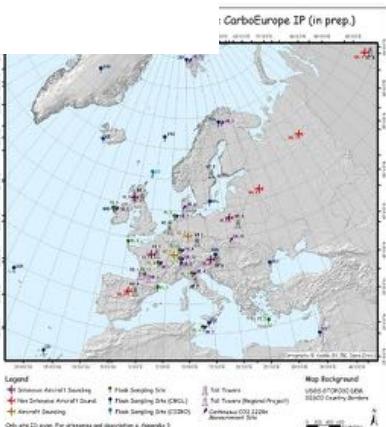
## Aerosols & Radiation



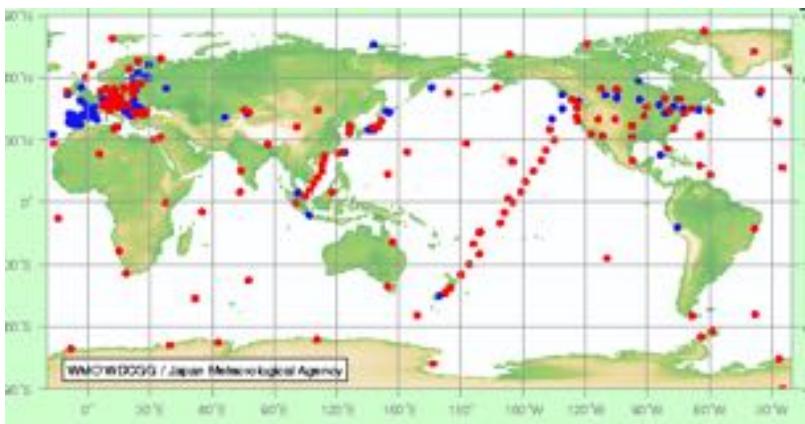
# Surface-based Networks – Carbon Cycle

## ICOS

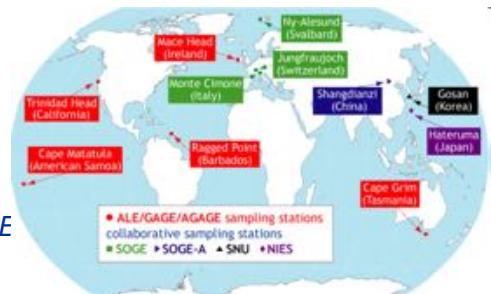
## NOAA



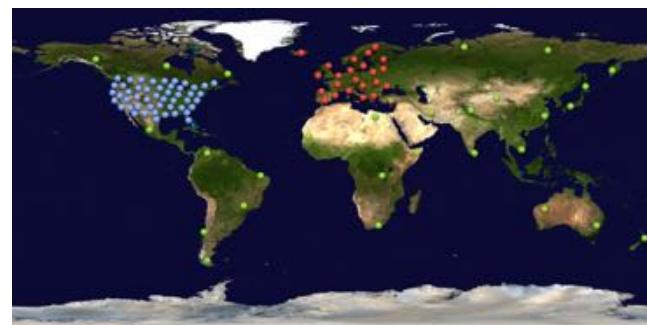
## WMO Global Atmospheric Watch



## AGAGE



## Earth Networks



## FluxNet (not WMO)





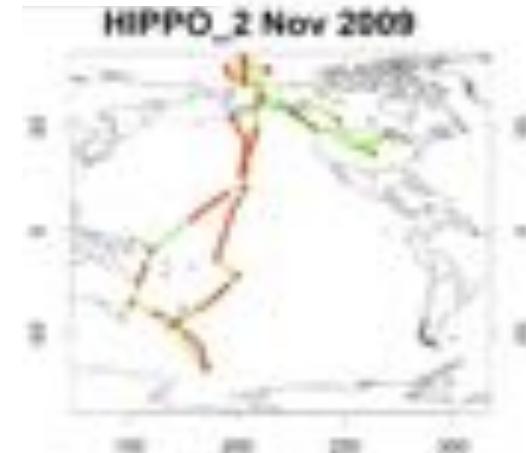
# Keynote Presentations



- Dr. Stephen Wofsy
  - Abbott Lawrence Rotch Professor of Atmospheric and Environmental Science at the Harvard School of Engineering and Applied Sciences (SEAS)
- Dr. Ron Prinn
  - TEPCO Professor of Atmospheric Science, Director of Global Change Science, Co-Director of the Joint Program on the Science and Policy of Global Change

# Wofsy: Atmospheric Chemical Composition, Climate, and Societal Implications

- Focus on CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O
- Analyzed data from four HIPPO missions, the CalNEX studies, and NOAA's Atmospheric Baseline Observatories
- Demonstrated the need to coordinate land-based and in-situ measurements to get the best results

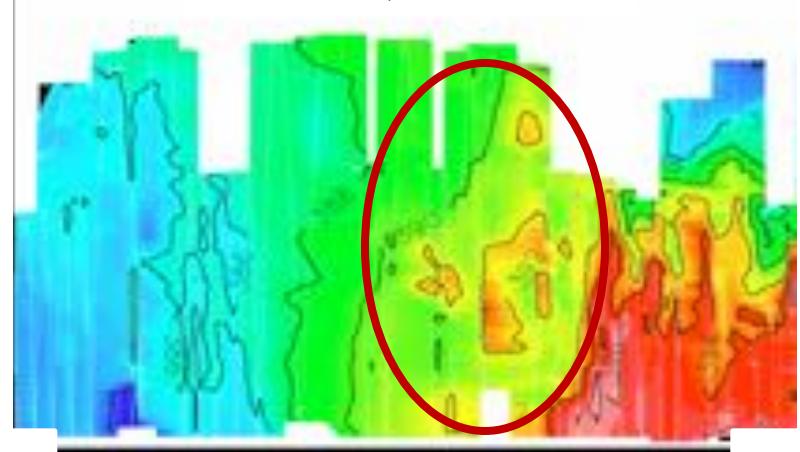


HIPPO images by  
Bruce C. Daube

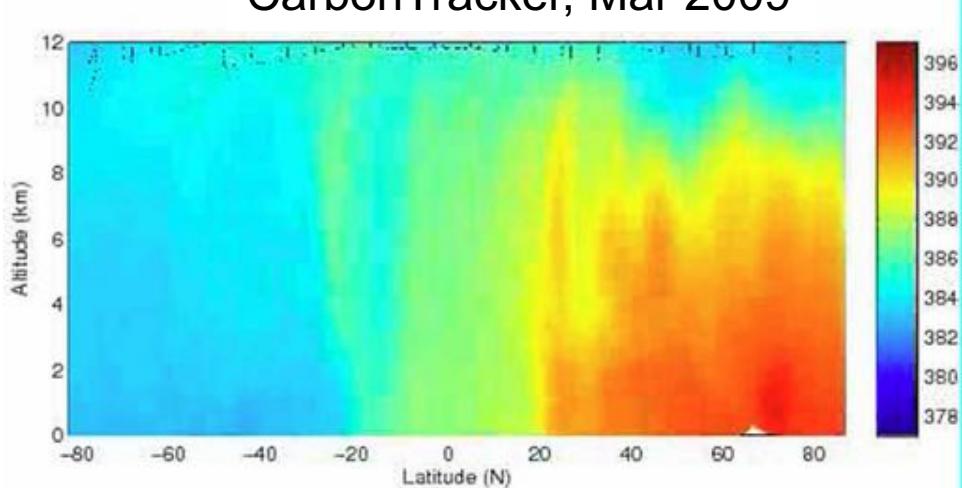
# Wofsy (cont'd): Evaluating Models

- CarbonTracker does pretty well for free troposphere, high altitudes
- Not so well for the sub-tropics
- Differences depend upon season

HIAPER, Mar 2009



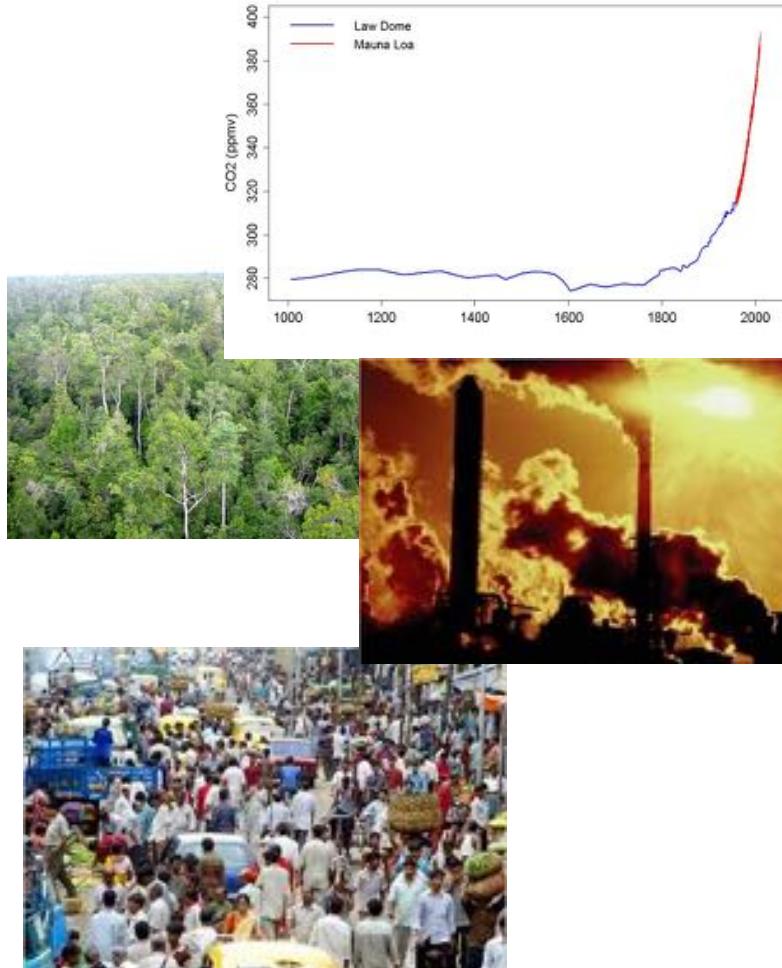
CarbonTracker, Mar 2009



# Prinn: Merging Earth System Measurements, Global Social Data and Earth System Models

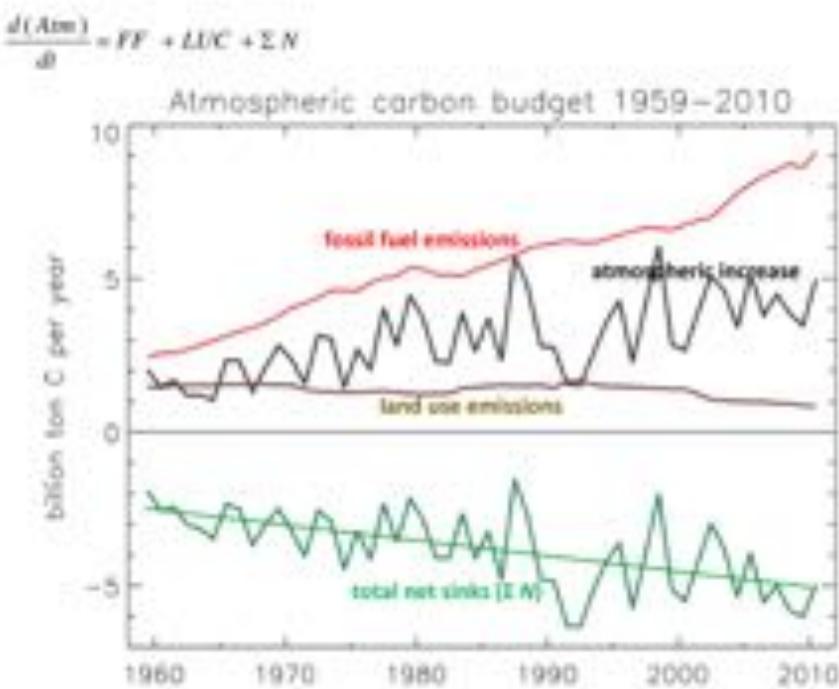


- Evaluated need for coordinated observations and modeling
- Introduced the human element
  - Economics
  - Social Systems
- Showed relevance of key scientific questions
  - Where are we going?
  - How does research help us change that?



# Tans: Are Oceanic and Terrestrial Sinks of CO<sub>2</sub> not Able to Keep up with Emissions?

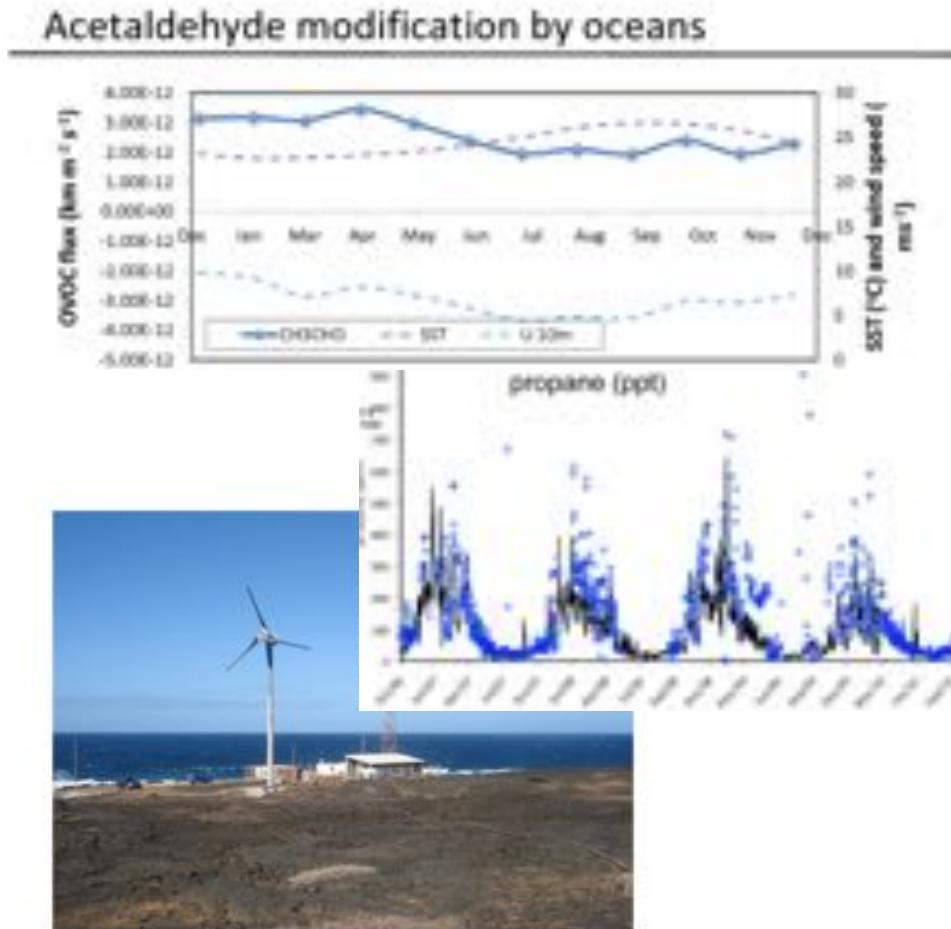
- “The reporting of my death was an exaggeration . . . ”
  - *Mark Twain, May, 1897*
- Analyzed the 2 most certain data sets available – global trends and global fossil fuel emissions
- Inclusion of land use emissions does not change conclusions but increases statistical uncertainty
- Large “missing” CO<sub>2</sub> sinks are alive and well.
- Fossil fuel emissions are an ever more dominant factor in the carbon cycle
- Actual uptake by the lands and ocean has doubled over the past 50 years



*“You heard it here first . . . ”*

# Carpenter (York Univ.): Marine Influence on Oxygenated VOCs

- Cape Verde Atmospheric Observatory launched in 2005
- Purpose is to advance understanding of climatically-significant interactions between the atmosphere and ocean
- Cooperative Initiative between German and UK Research Programs
- The ocean strongly modulates acetaldehyde and methanol in the boundary layer

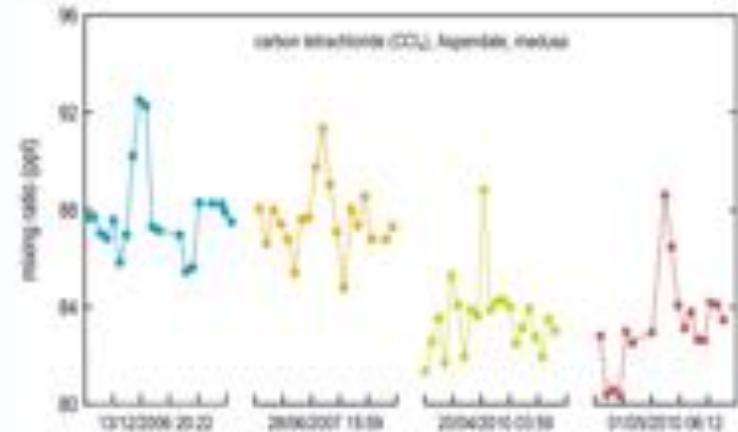


*“You heard it here first . . .”*

# Fraser (CSIRO, Australia): Australian Trends and “Missing” $\text{CCl}_4$ Sources

- Evaluated trends and variability of atmospheric  $\text{CCl}_4$  at Cape Grim, Tasmania
- Sinks identified included contaminated soils, landfills, toxic waste dumps
- Chlorination of swimming pools postulated as a possible significant source
- *“You heard it here first . . .?”*

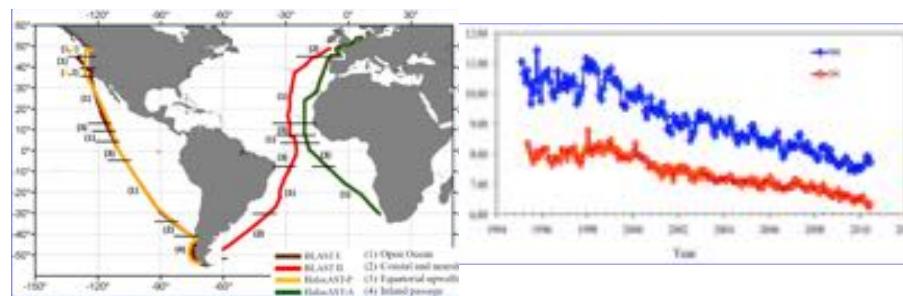
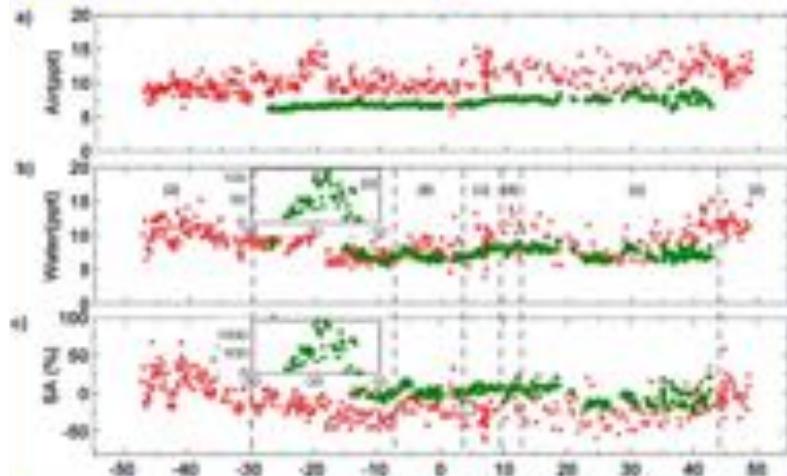
Aspendale  $\text{CCl}_4$  pollution episodes



# Yvon-Lewis (Texas A&M): $\text{CH}_3\text{Br}$ in the Ocean in Near-Equilibrium with the Atmosphere



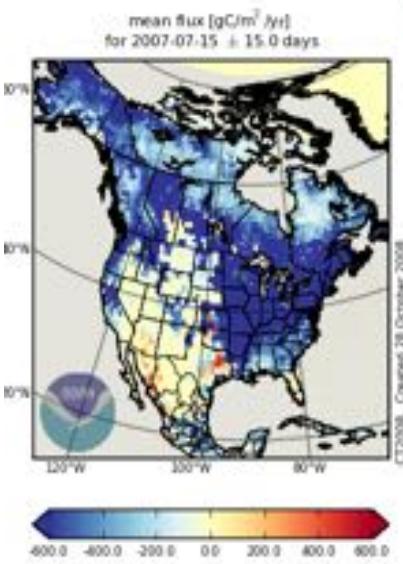
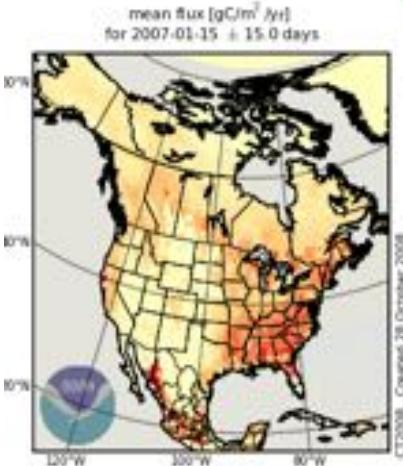
- 1994 postulation that net ocean flux of  $\text{CH}_3\text{Br}$  would decrease permanently as anthropogenic, atmospheric emissions decreased
- Three mid-90's cruises repeated in 2010-2011
- Results showed that ocean is no longer a net sink of atmospheric  $\text{CH}_3\text{Br}$ 
  - Now a small net source
- Degradation rate constants remain consistent with earlier work



*"You heard it here first . . . ."*

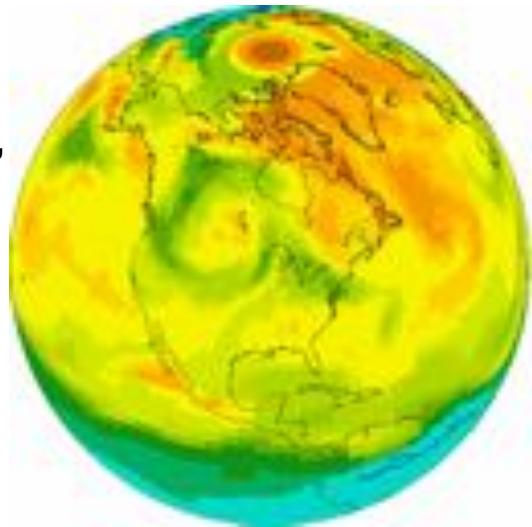


# What we do now . . .

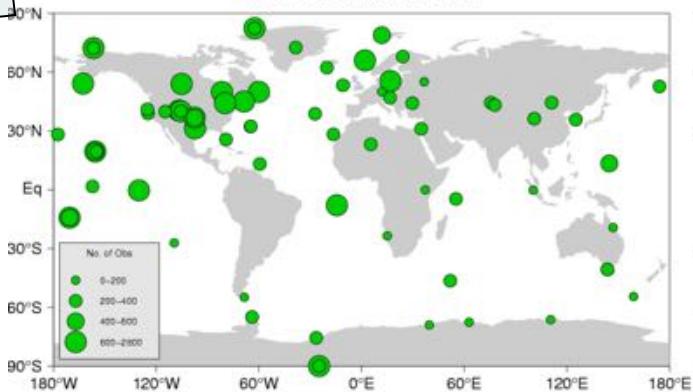


The diagram illustrates the CarbonTracker™ system. It features a large circle with a clockwise arrow. Inside the circle, the text "CarbonTracker™" is centered. At the top left, the text "January net CO<sub>2</sub> emission)" is positioned next to a large, light-gray arrow pointing upwards and to the right. At the bottom left, the text "July (net CO<sub>2</sub> uptake)" is positioned next to a large, light-gray arrow pointing downwards and to the right. The bottom right corner of the circle contains a small inset map of the Northern Hemisphere. The map shows latitude lines at 30°N, 50°N, and 60°N. Green dots are placed on the map at approximately 50°N, 55°N, and 60°N, with a gray shaded area extending from the 50°N line towards the pole. The text "We" is partially visible at the top right of the main circle.

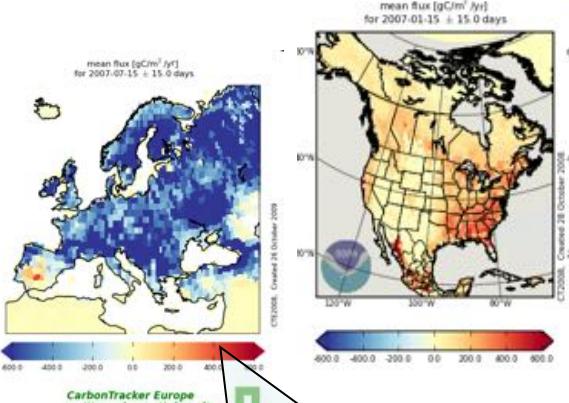
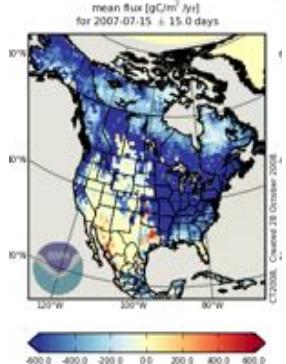
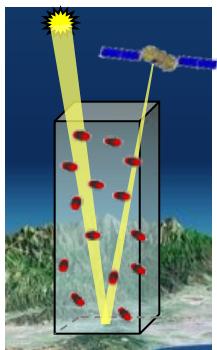
# “Carbon Weather”



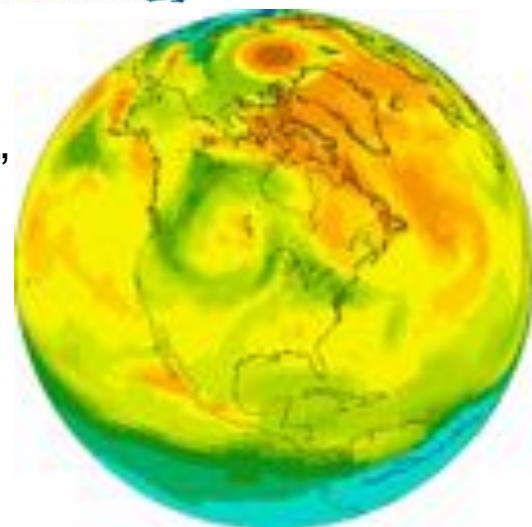
# Long-term Observations



## Satellites

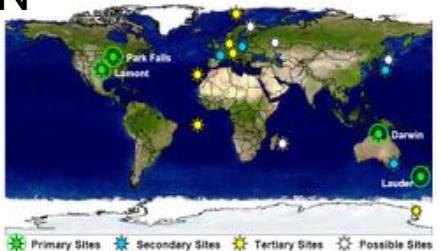


“Carbon Weather”



Where we need to go

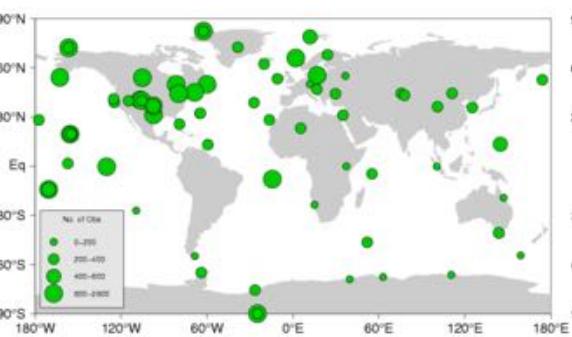
## TCCON

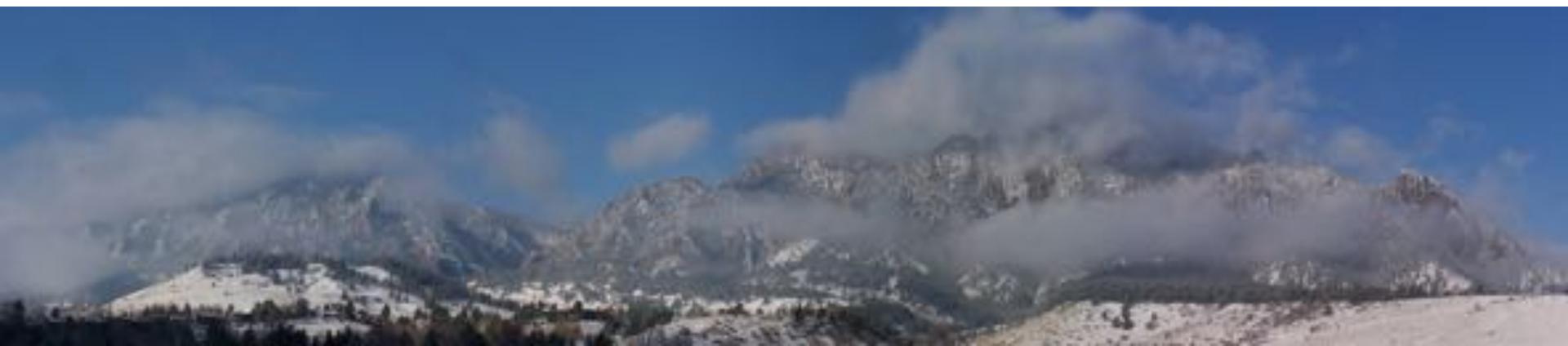


## Earth Networks



Current Network





# Questions?

[www.esrl.noaa.gov/gmd/annualconference](http://www.esrl.noaa.gov/gmd/annualconference)