



# Unidata and Climate Education, Research and Services: Where Do We Go From Here?

Unidata Policy Committee

15 April 2010

Arlington, VA

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UCAR Community Programs  
Boulder, CO

# Mission

To provide the data services, tools, and cyberinfrastructure leadership that advance Earth system science, enhance educational opportunities, and broaden participation.

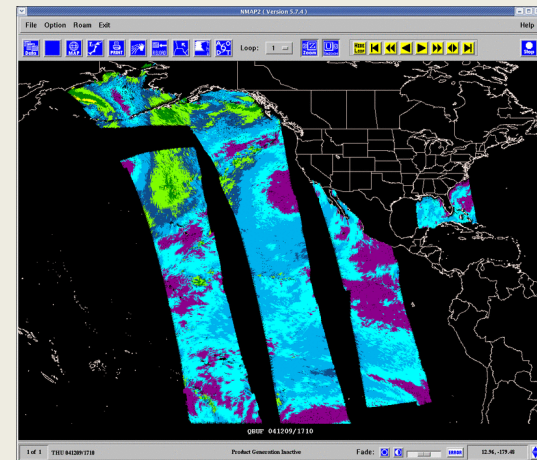
## Unidata:

*Facilitates data access*

*Develops and provides tools for data management, analysis, and visualization*

*Provides comprehensive support, including training*

*Serves as an intellectual commons for addressing data-related issues.*



# Unidata Strategic Plan, 2007

- “Studying Earth system phenomena such as global change, including the role of natural and anthropogenic factors or understanding water cycle changes, requires interdisciplinary approaches, transcending disciplinary as well as geographic boundaries.”
- “...they require finding, collecting, integrating and assimilating data and information from observations and model simulations from diverse fields and across traditional disciplinary boundaries.”



# Unidata's Five Year Proposal, 2008-2013

- “Even though Unidata has a tradition of *proactively* enabling research and education related to weather, the climate science community has only *indirectly* benefited from many of the capabilities developed by the UPC. As universities respond to challenges presented by climate change, Unidata must accommodate needs in that area.”
- “...the climate community has been using Unidata software, although climate science has not thus far been a primary focus for Unidata.”
- “In this proposal, facilitating research and education in climate is singled out as a new priority area for Unidata.”

# Climate Change: President's Priority



27 January 2009

## **Obama Makes Climate Change a National Priority**

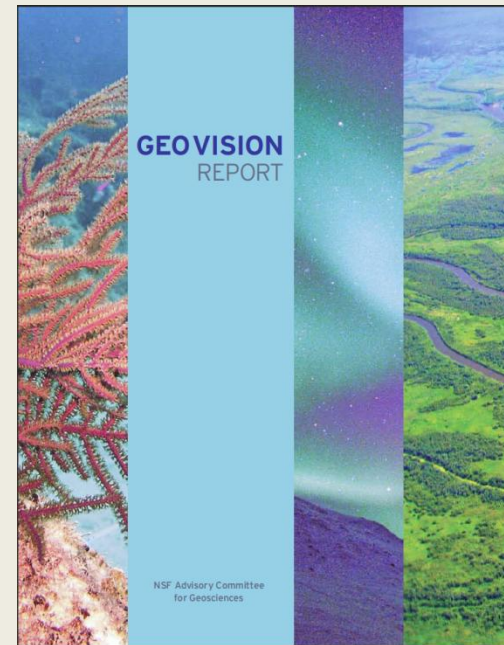
U.S. technical agencies prepare to help regions understand local effects

## **Summers: Energy and climate bill a top White House 2010 priority**

By Ben Geman - 04/06/10 02:17 PM ET

# NSF Geo Vision Report

- “To realize the GEO vision, we issue a Call to Action to the geosciences community to establish a framework to understand and predict responses of the Earth as a system.”
- Recommendations to NSF/GEO include:
  - Reaching out in bold new directions, engaging and incorporating other disciplines
  - Investing wisely in and responsibly manage the next generation of tools, technologies, and techniques
  - Build effective and enduring partnerships
  - Create a broad and diverse cadres of geoscience researchers who can use creative approaches to geosciences education and literacy at all levels



# NSF Climate Initiatives

- NSF has issued five program solicitations
  - Climate Change Education Partnership Program
  - Decadal and Regional Climate Prediction using Earth System Models (EaSM) [NSF, USDA & DOE partnership]
  - Water Sustainability and Climate
  - Dimensions of Biodiversity
  - Ocean Acidification

The success of above initiatives requires robust cyberinfrastructure and other facilities, including appropriate data services, to support the needs of funded projects as well as those of the broader community.



# NSF Science, Engineering and Education for Sustainability

- SEES is proposed to address challenges in climate and energy research and education...through:
  - Short and long term observations enabled by a new generation of experimental and observational networks;
  - Data analysis, modeling, simulation and intelligent decision-making facilitated by advanced computation
  - Building of research and education partnerships, both nationally and internationally

**Again, Unidata can help investigators to achieve SEES goals**



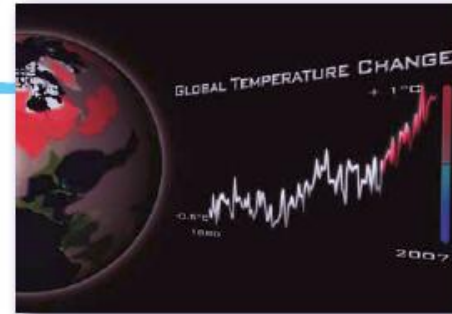


# NOAA Climate Service

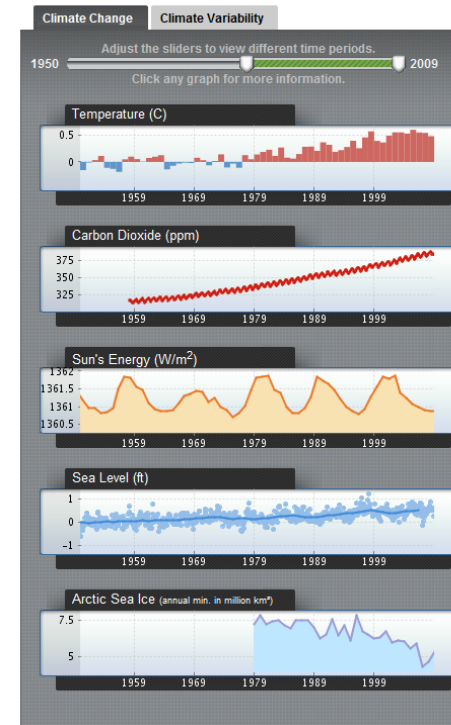
## Proposed to Meet Essential National Needs

*NOAA's strong commitment to scientific integrity and to advancing science while strengthening product development and delivery remain steadfast as NOAA adapts to a changing nation and a changing world.*

Jane Lubchenco, Ph.D.  
Under Secretary of Commerce for Oceans and Atmosphere  
Administrator, National Oceanic and Atmospheric Administration (NOAA)



Global Climate Dashboard



NOAA HOME WEATHER OCEANS FISHERIES CHARTING SATELLITES CLIMATE RESEARCH COASTS CAREERS



# NOAA CLIMATE SERVICES

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Prototype

Explore: ClimateWatch Magazine | **Data & Services** | Understanding Climate | Education | Search all of NOAA



“The timely production of useful climate, data, information and knowledge to decision makers.”



## GLOBAL CLIMATE CHANGE

NASA's Eyes on the Earth

Experience Earth satellites in **3D** »

**VITAL SIGNS OF THE PLANET**

ARCTIC SEA ICE MINIMUM ▶	CARBON DIOXIDE ▶	SEA LEVEL ▶	GLOBAL TEMPERATURE ▶	OZONE HOLE ▶
↓ 11.2 % per decade	↑ 389 parts per million	↑ 57 mm since 1993	↑ 1.5 ° F avg. temp. since 1880	9.3 million square miles (latest maximum)

- President's budget gives NASA's Earth science programs \$2.4 billion in new money over the next five years. That's an increase of more than 60%.
- Much of the new money will be spent trying to reinvigorate efforts to determine how fast the Earth's climate is changing, says Edward Eiler, Associate Administrator of NASA.



# Congress

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# Unidata & Climate: A Case for Merged Efforts

- Brand Name
  - Climate
  - Unidata
- Customers
  - Climate – USG, Industry, Academia, International
  - Unidata – several hundred universities, global presence, users in every geoscience sector
- Technology
  - Climate community is using Unidata technology
  - Unidata technology and services can benefit climate services
- Common Objectives
  - NSF's increased emphasis on Climate
  - Unidata's strategic focus on Climate and Earth System science
  - Integrating research and education – a long-standing NSF and Unidata goal

# US Global Change Research Program

**Brand Name**

Past and present climate variability and change

Projections of future change

Natural and human forces of change

Impacts, vulnerability, and climate response science

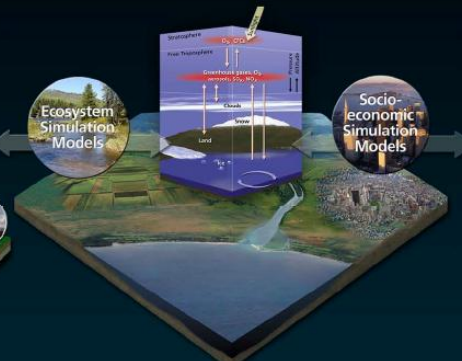
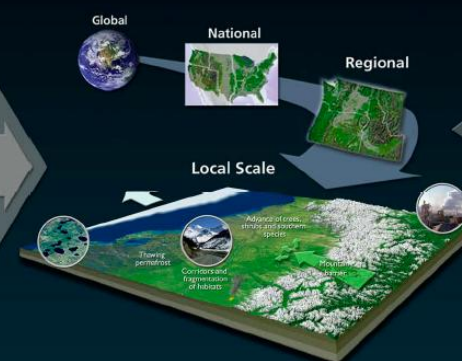


## Earth Observations

## Integrated Assessment

## Adaptation Research

## Climate Services





# Unidata and Climate Science

- For nearly 25 years, Unidata has strived to meet the weather data (and tools) needs of the university community.
- Many of the tools, technologies and techniques developed by Unidata are being used more broadly in other areas of atmospheric and related sciences.
- Unidata is in a position to play an important role in climate science, education, and services.
- How can Unidata build on and leverage its capabilities to meet the emerging needs of the climate science community?

# Unidata and Climate Science

- How can Unidata support climate science users (faculty, students, researchers) beyond its middleware infrastructure development projects?
  - Delivery of/provide access to climate data and products for education and research?
  - Develop and provide tools for climate science education and research?
  - Partner with other groups to establish a climate science data portal for education and research?

# Examples

- Deliver new types of climate and related data
  - Climate model output
  - Climate network observations
  - Data for multidisciplinary integration (e.g., SST, vegetation, snow cover, GIS information)
  - Seasonal Prediction, NDIS (Drought) products
- Enhance the IDV for climate analysis, integration, and visualization
- Integrate netCDF Operators and Processing Services with TDS/RAMADDA for climate analysis



# Final Thoughts

- The purpose of this presentation is to start a dialog with the Policy Committee and NSF/AGS on this subject.
- One of the strong elements will be a partnership with NOAA, other agencies , and universities.
- Unidata has unique strengths: high-quality staff, sustained CI work, a quarter century relationship with the university community, a program within UCAR (and close ties to NCAR)
- How can Unidata assist the climate science community?