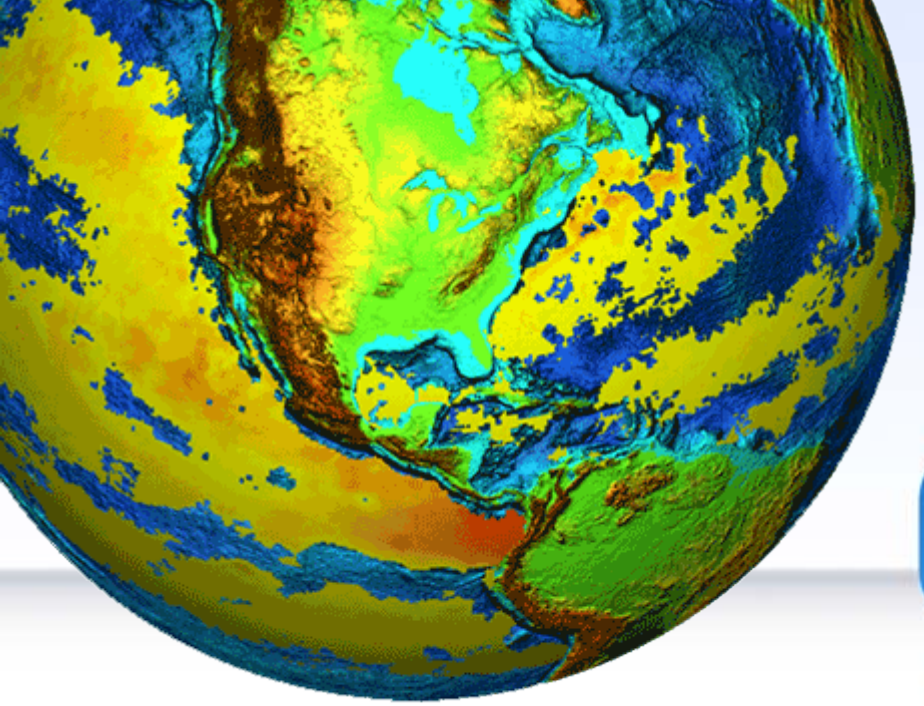


THE CLIMATE SERVICE

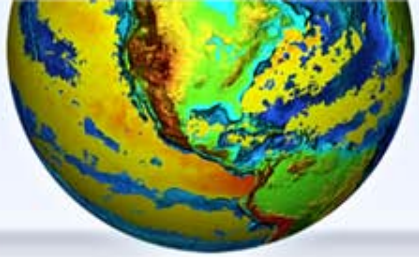
SAB update – Climate Service Strategic Framework

Thomas R. Karl

Transition Director, NOAA's Climate Services

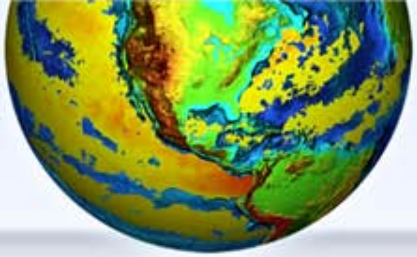
Chair, Subcommittee on Global Change Research

November 30, 2010



Overview

- Background of the Climate Service
- Progress to date
- Vision, Mission and Objectives
- Core Capabilities and Societal Challenges
- Examples of Climate Service Activities
- Assessments
- Partners
- Regional Climate Service Directors
- NAPA Recommendations
- Proposed Organization
- Feedback on Strategic Framework



Background: February 8th DOC – NOAA Announcement

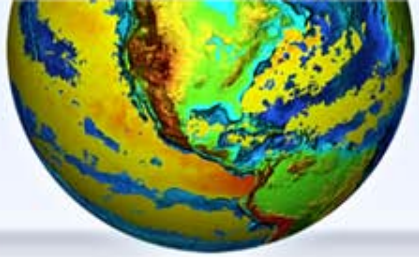
"…NOAA's intent to establish a new office called the NOAA Climate Service. This would create a single office for climate science and service bringing together the climate assets and capabilities that are currently dispersed in multiple units across the agency."

"We are announcing the intent to reorganize existing assets to make NOAA's Climate Services more responsive to the needs of those who use our services. While additional funds will be needed to increase NOAA's core climate capabilities going forward to meet growing demands, the proposed reorganization is independent of new resources."

"The proposed reorganization would retain the Office of Oceanic and Atmospheric Research recognizing the unique importance of a dedicated science and research enterprise with in NOAA."

- Joint press conference with Secretary Gary Locke and Under Secretary Jane Lubchenco

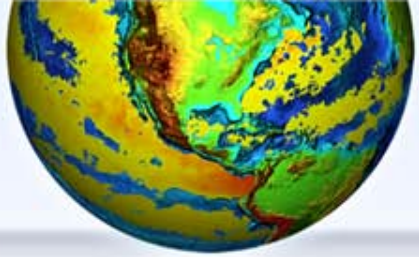
http://www.noaa.gov/climate.html



Progress Since February

Interagency collaborations

- Regional Climate Services Directors hired and plans for early activities completed
- Completion of National Academy of Public Administration Study requested by Congress
- Development of draft reprogramming package
- Development of Vision and Strategic Framework document
  - Written by NOAA senior climate science and service managers and practitioners from across the line offices



Climate Service Vision and Mission

Vision

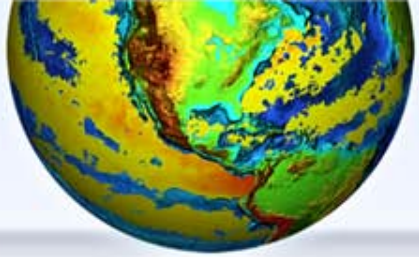
By providing science and services, the Climate Service envisions an informed society capable of anticipating and responding to climate and its impacts.

Mission

Improve understanding and prediction of changes in climate and promote a climate-resilient society by:

- Monitoring climate trends, conducting research, and developing models to strengthen our knowledge of the changing climate and its impacts on our physical, economic, and societal systems
- Providing authoritative and timely information products and services about climate change, climate variability, and impacts
- Informing decision making and management at the local, state, regional, national, and international levels

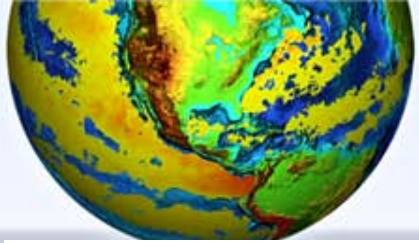
The Climate Service delivers products and services in collaboration with public, private, and academic partners to maximize social, economic, and environmental benefits.



Climate Service Objectives

Consistent with Climate objectives from NOAA's Next Generation Strategic Plan (public comment period closed)

- Improved understanding of the changing climate system and its impacts
- Integrated assessment of current and future states of the climate system that identify potential impacts and inform science, services, and decisions
- Mitigation and adaptation choices supported by sustained, reliable, and timely climate services
- A climate-literate public that understands its vulnerabilities to a changing climate and makes informed decisions.



Climate Service Core Capabilities Address Societal Challenges

Examples of Private and Public Sector Concerns

Energy and water demands, food quality and quantity, reliable infrastructure during extremes of climate, plant and animal range expansion, ocean productivity, and other concerns, as affected by climate variability, global warming, heat waves, cold snaps, drought, fires, heavy downpours, blizzards, floods, sea-level rise, storm surge, sea-ice and glacier loss, snow cover, and other physical variables.

Core Capabilities

- Integrated Service Development & Decision Support
- Observing Systems, Data Stewardship & Climate Monitoring
- Predictions and Projections
- Understanding

Service (including assessments)

Research

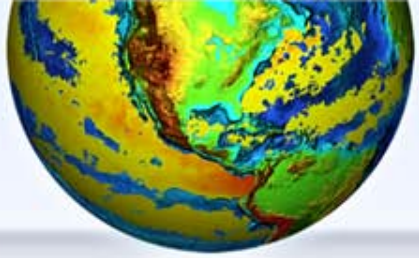
Partners
- International
- Federal
- DOC/NOAA
- State/Local
- Academic
- NGOs
- Private Sector

Basic climate services are provided in these example sectors

Agriculture | Energy | Health | Transportation

Initial priorities to meet societal challenges

- Sustainability of Marine Ecosystems
- Coasts and Climate Resilience
- Climate Impacts on Water Resources
- Changes in Extremes of Weather & Climate



Societal Challenge: Coasts and Climate Resilience

Sea Level Rise and Coastal Flooding Impacts Viewer

Features

Displays potential future sea levels

Provides simulations of sea level rise at local landmarks

Communicates the spatial uncertainty of mapped sea levels

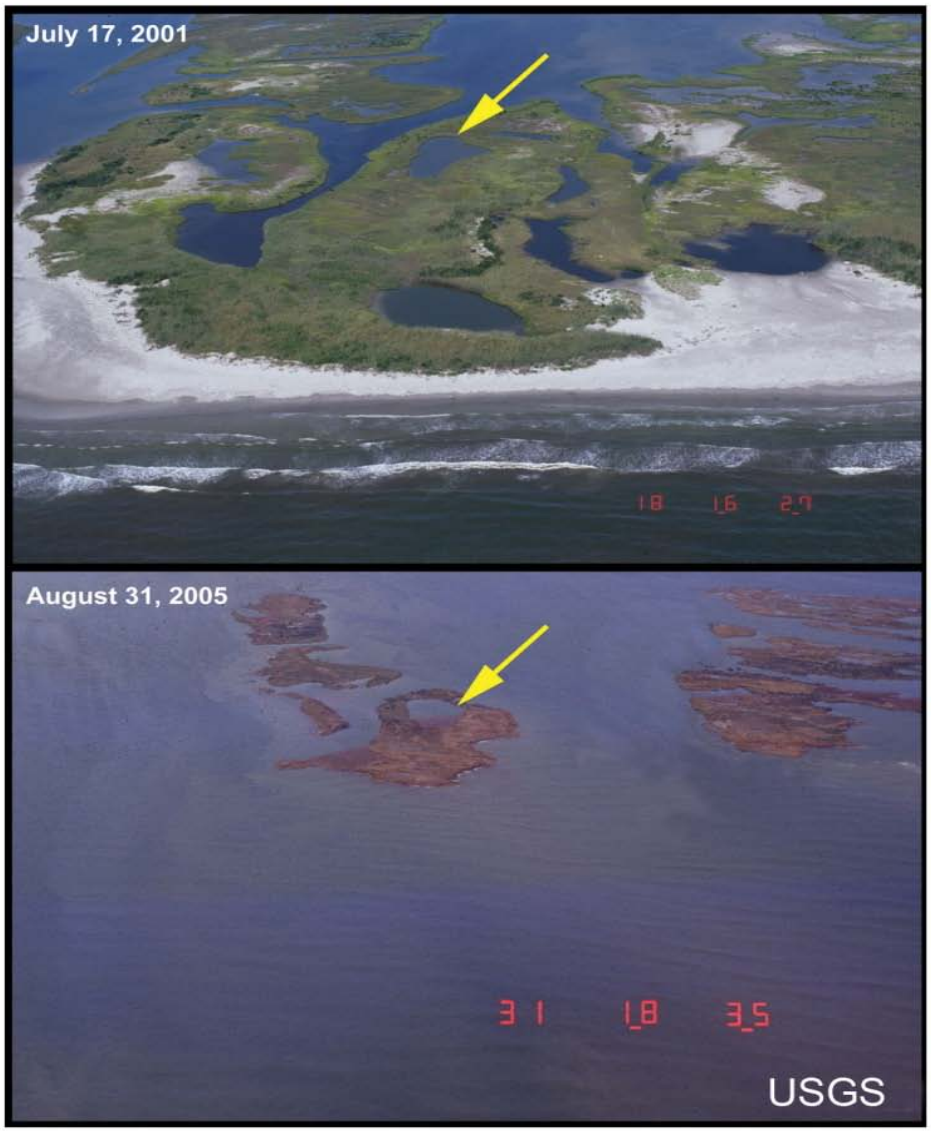
Models potential marsh migration due to sea level rise

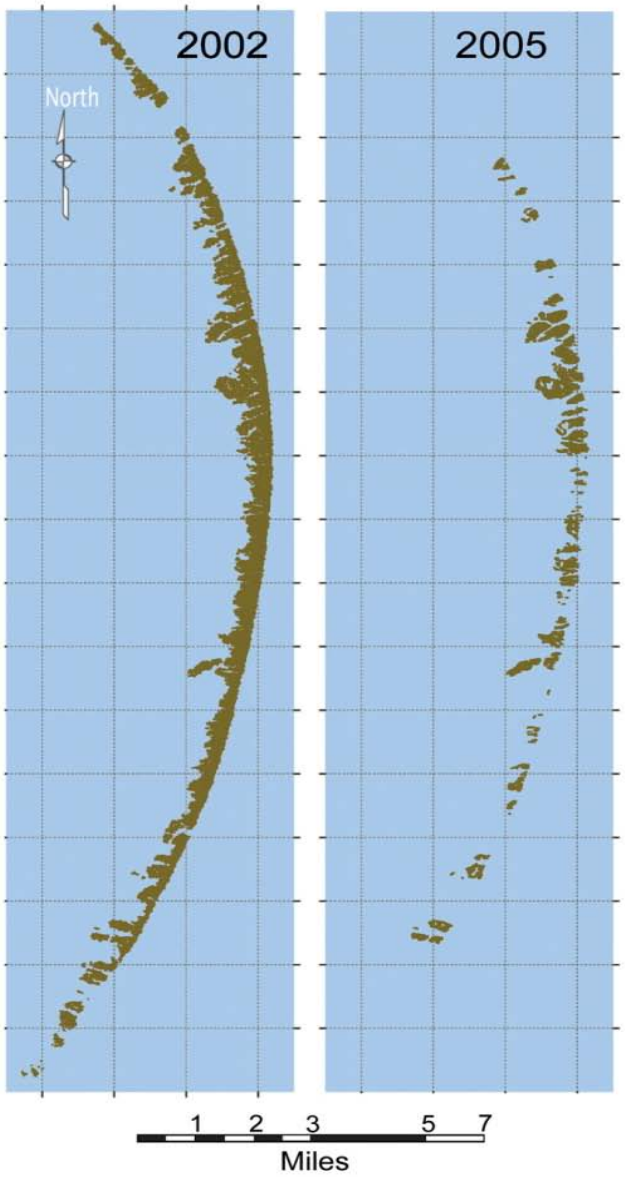
Overlays social and economic data onto potential sea level rise

Examines how tidal flooding will become more frequent with sea level rise

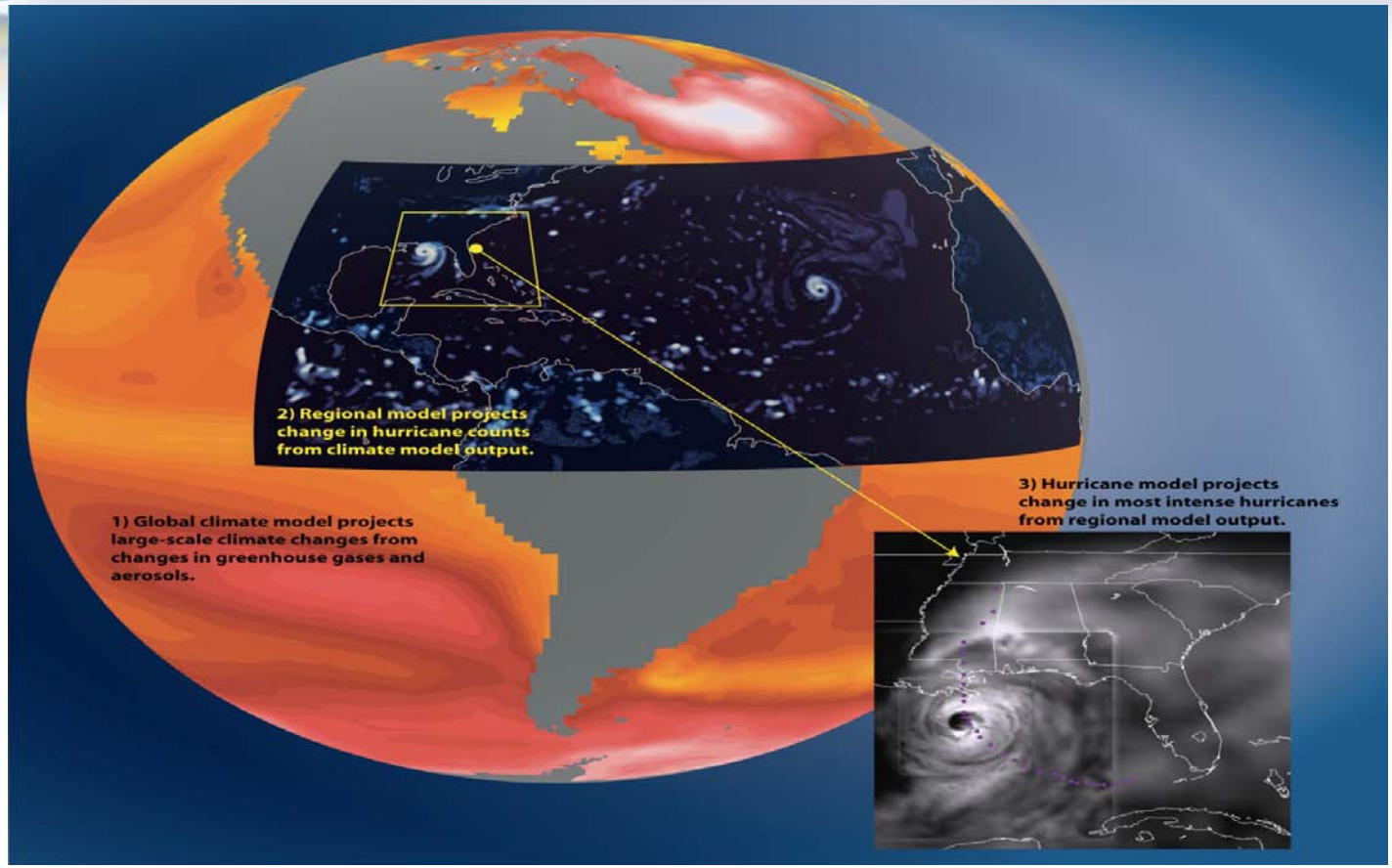
http://www.csc.noaa.gov/digitalcoast/tools/slrviewer

Land Lost During 2005 Hurricanes





Hurricane Prediction Using Multiple Models

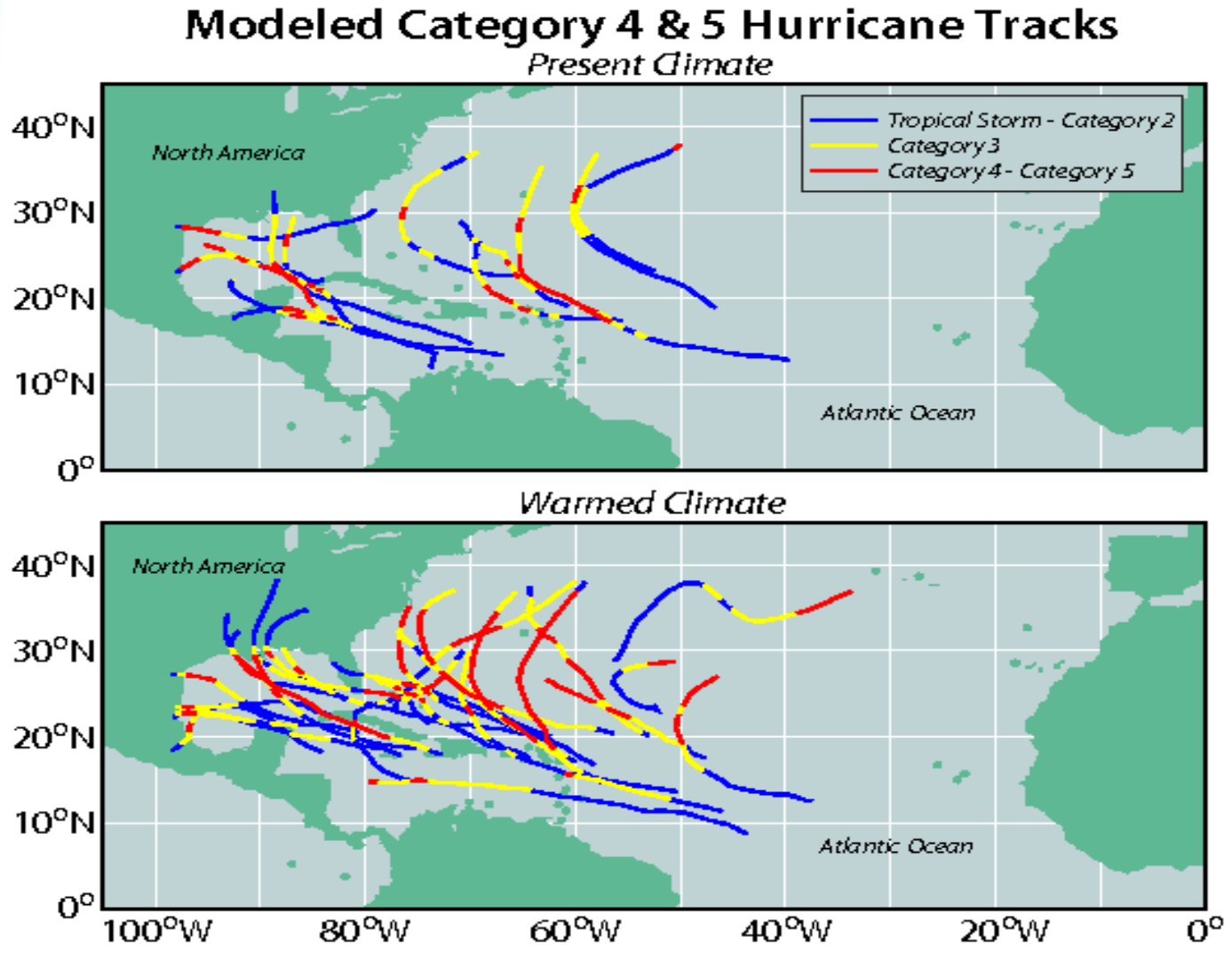


Most recent GFDL downscaling study (Bender et al, Science, 2010)

Uses two downscaling steps:

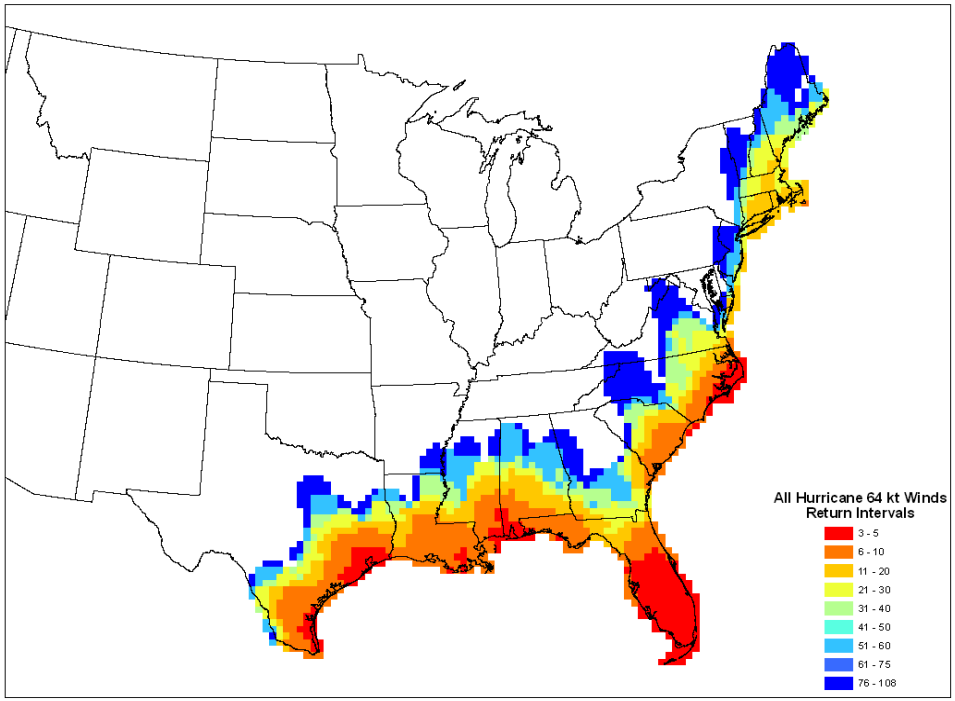
- Global CMIP3 models => regional model of Atlantic hurricane season
- regional model => operational GFDL hurricane prediction system

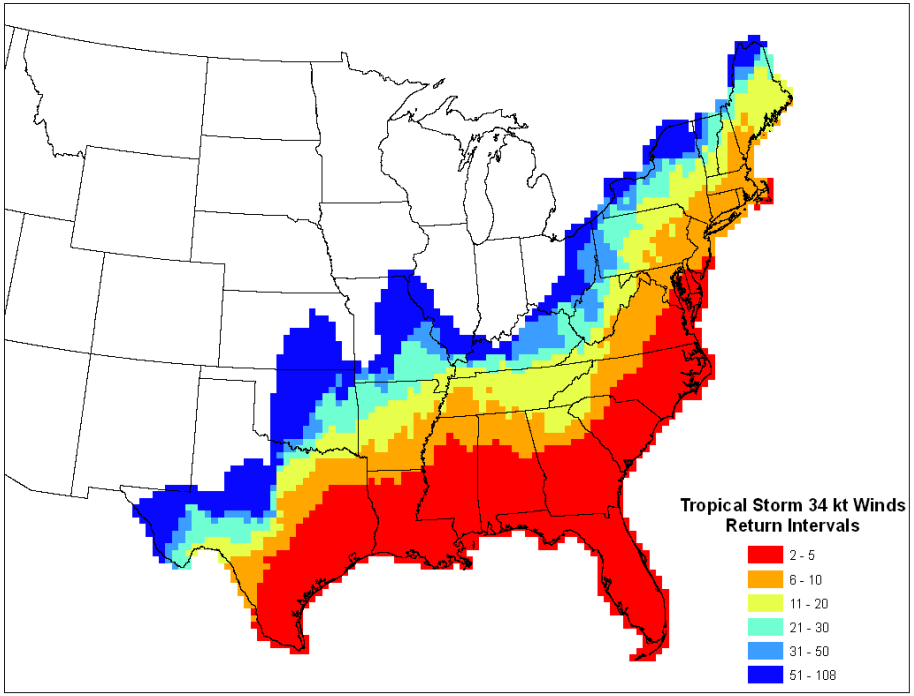
Modeled Category 4 & 5 Hurricane Tracks



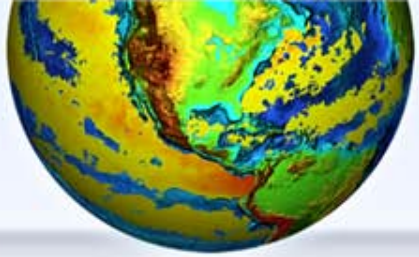
Conclusion: Best estimate anticipates doubling of Category 4-5 storms in Atlantic by end of century.

Hurricane Climatology





Climatology of the Inland Frequency of Hurricanes and Tropical Storms: 1900-2008



Societal Challenge: Climate Impacts on Water Resources

Drought

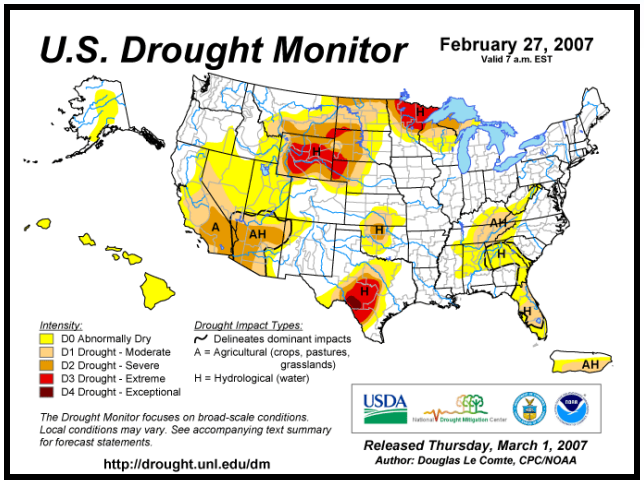
Applications & Impacts

Drought results in annual losses of $6-8 billion to all sectors of the economy

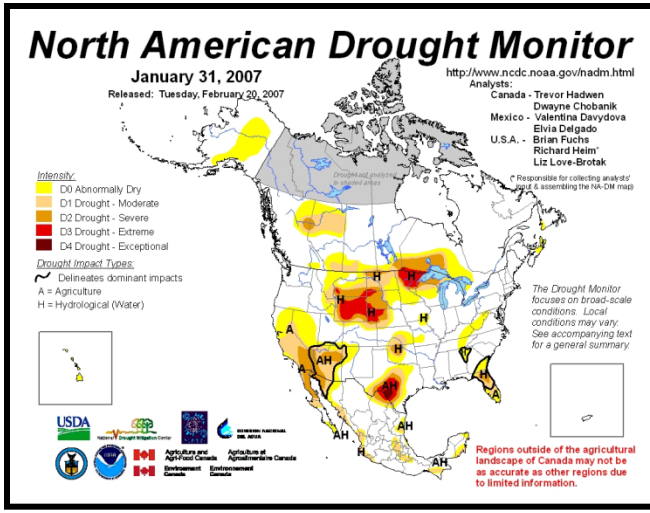
Energy sector impacts

- Hydropower generation curtailed
- Duration of Drought important factor – irrigation is powered by Natural Gas
- Many times drought occurs in conjunction with Heat Waves

NOAA Information Used



U.S. Monitor *(produced weekly)*



North American Monitor *(produced monthly)*

Drought:

National Integrated Drought Information System

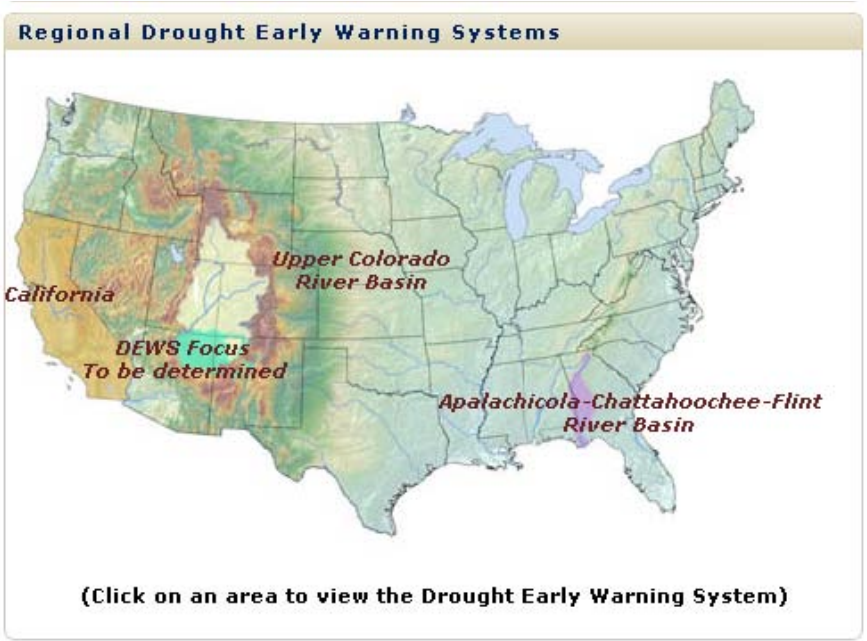
Establish and operate a Global Drought Monitoring Portal working with GEO and WMO.

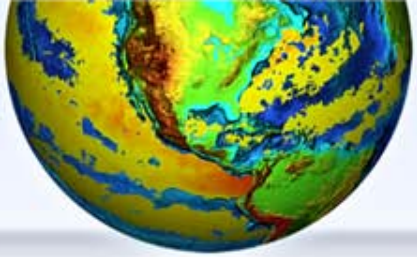
Improve the usability of North American drought monitoring data through enhanced products and services available through a new section on the web portal.

Establish a pilot project in California. Scoping to take place in early 2011. California is unique in that its water system is heavily managed.

Provide a public web presence for the pilot projects in the Upper Colorado Basin and the Southeast US.

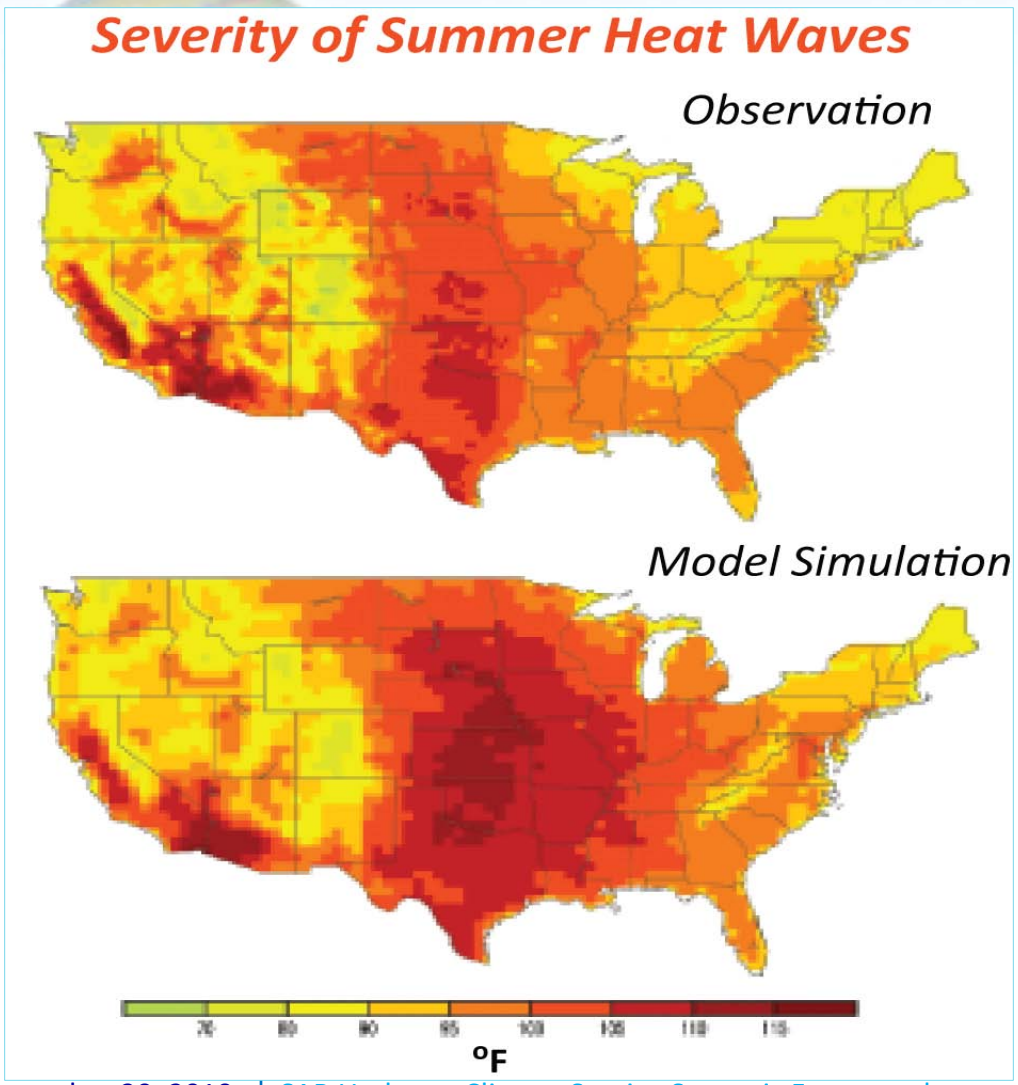
Complete the installation of soil moisture and soil temperature sensors at Continental United States Climate Reference Network stations.





Societal Challenge: Changes in Extremes of Weather and Climate

High-Resolution Modeling to Project Heat Waves



A new high-resolution global model (~50 km) developed by NOAA has produced promising results in simulating the severity and duration of summer heat waves.

This model was used to produce the bottom figure, from a 30-year simulation of present-day climate.

Top figure is based on observational data for a 24-year period.

Heat Waves

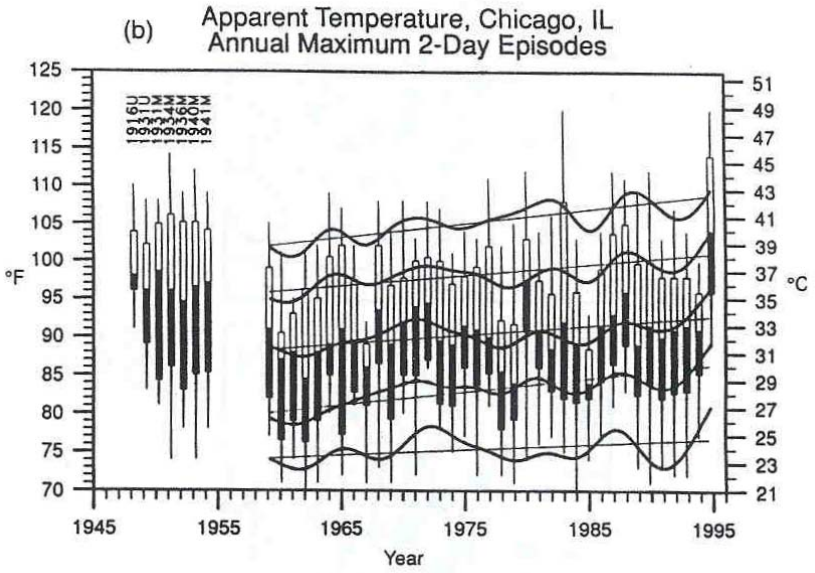
Example Applications and Impacts

Urban areas impacted severely

- Peak Power Loads affected
- Heat wave event fatalities

Event	Deaths
2000 SE U.S.	140
1999 E U.S	502
1998 TX to NC	200
1995 Chicago	> 500
1988 central to east U.	5-10,000
1980 central to east U.S.	10,000

NOAA Information Used

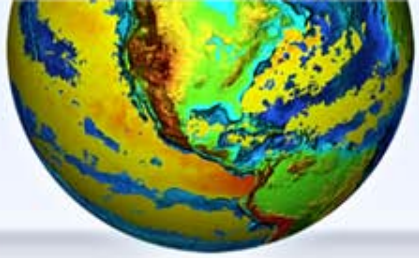


Analysis of the max. temperature at Chicago, IL

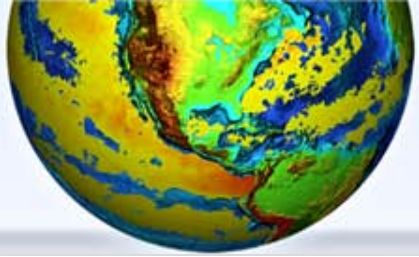
Used in:

- anticipating future heat waves

- monitoring long-term changes



Societal Challenge: Sustainability of Marine Ecosystems

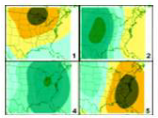


Climate Services Supporting Marine Ecosystems

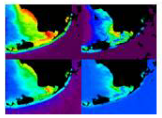
Global Pattern
(Climate and Circulation)

Regional
Local

Weather Types
(pressure, temperature, winds, clouds, etc.)



Precipitation/runoff, re-suspension, upwelling, transport, etc.



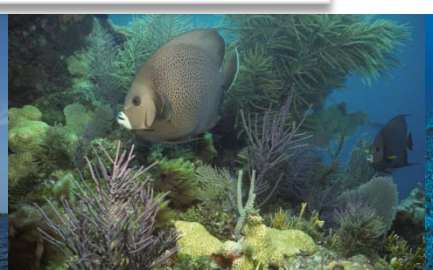
Water Response
(light attenuation, algal blooms, turbidity, salinity, temperature, etc.)

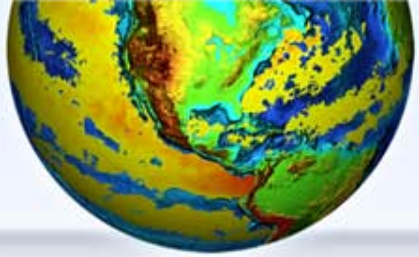
Benthic-pelagic coupling, trophodynamics, etc.

Climate Impacts
(habitat alteration, water quality degradation, fish mortality, etc.)

Integrated Marine Protected Area Climate Tools (IMPACT)

- *"Without the [Florida Keys National Marine] Sanctuary, most of the dive shops and charter boats probably would be out of business or struggling, and Key West would be a shadow of what it is. Are we concerned about global warming? Yes."*
  - A Key West dive center owner





Sector Example:
Energy

Energy and Climate

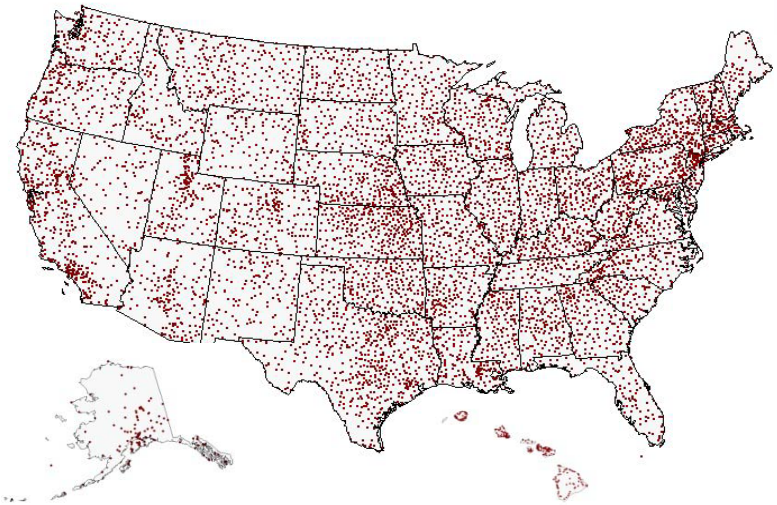
Climate Applications for Energy Sector

- Heating and cooling degree-days normals - used for rate adjustments and energy demand forecasts
- Renewable Energy – Siting, energy potential - wind turbines, solar, hydro
- Weather Derivatives market - To protect industries from extreme climate conditions
- Climate projections IPCC CCSP

Improved Climate Normals

- **Account for Changing Climates**
- **Forecast what Normals will be in the future**
- **Make Normals more representative of 2010, not the midpoint (1995/1996) of 30-year range**
- **More useful statistics for energy consumption variables (e.g., heating degree days)**
- **Define and provide normals product delivery schedule**

NOAA Information Used



Traditional Climate Normals

- Official 30 year averages for 8,000 sites
- Updated each decade
- Data
- Max, Min, Mean Temperature
- Precipitation
- Heating & Cooling Degree Days

Energy and Climate

Applications & Impacts

Index created by scaling population-weighted degree days for the continental U.S.

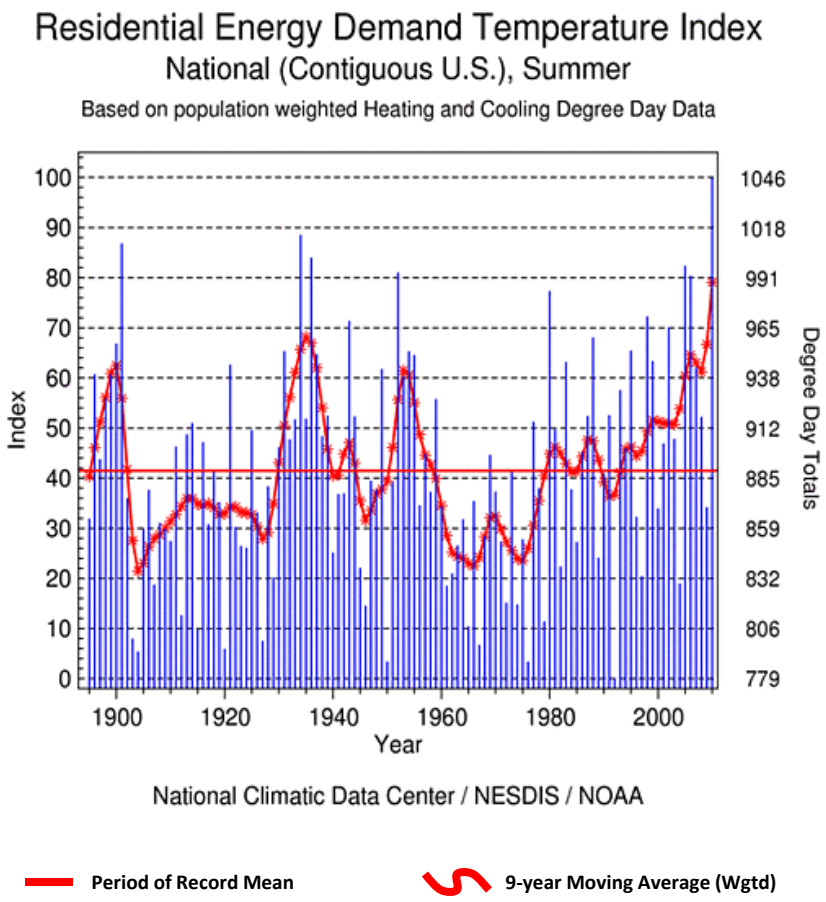
Scale: 0 to 100

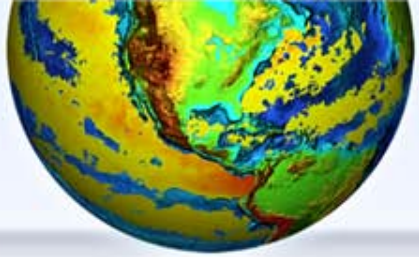
0 = Lowest energy demand

100 = Highest energy demand

Graph at right shows Winter seasons (Dec, Jan, Feb) from 1896-2007)

NOAA Information Used





Sector Example:
Agriculture

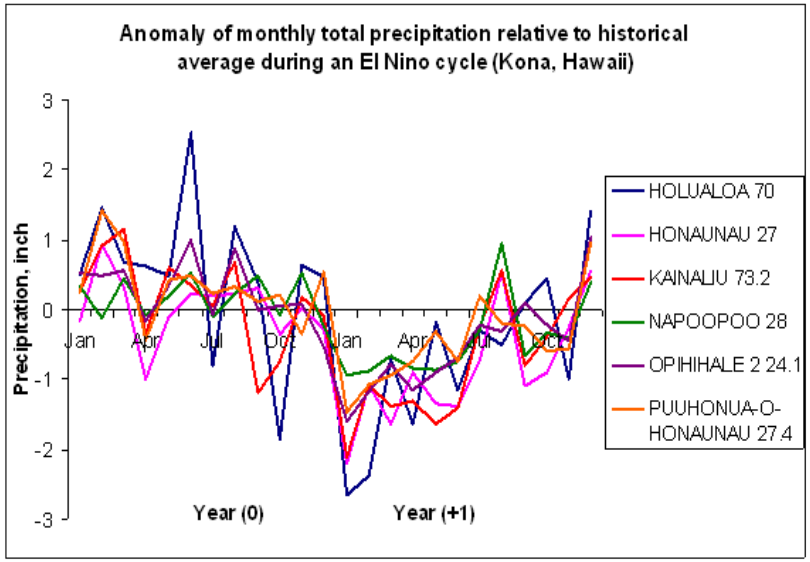
Agriculture and Climate

World's Premium Coffee:

Hawaii Kona Agricultural Climate Decision Making Support

- Users' requirements: Rainfall amounts during El Nino/La Nina
- For El Nino events, found significantly lower rainfall amounts from mid-December to May
- Vital decision-making information to improve quality and quantity of coffee bean in varying climates through targeted use of irrigation, fertilizer and insecticide

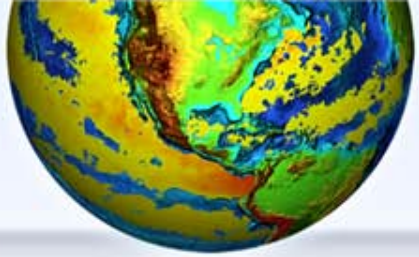
Rainfall differences during El Niño events



NOAA NATIONAL WEATHER SERVICE

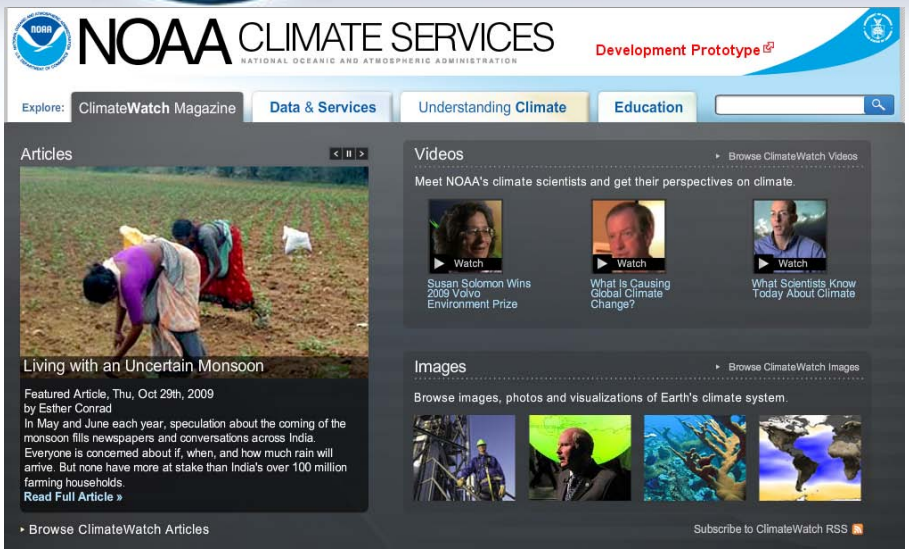
UOG/WERI

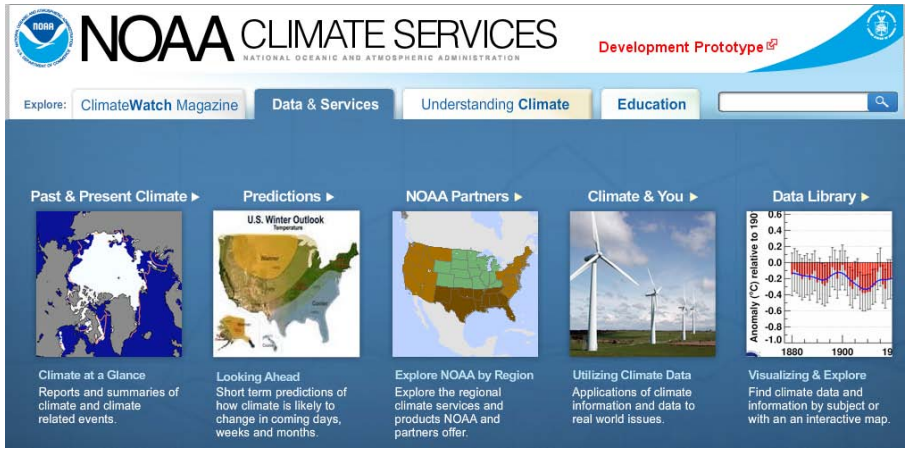
UNIVERSITY of HAWAI'I MĀNOA



Communication and Education

NOAA Climate Services Portal





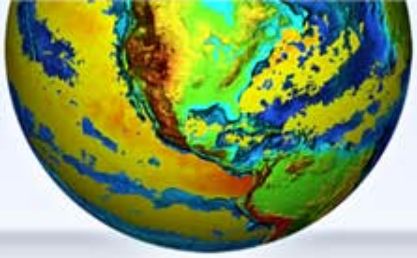
Climate.gov

Goal: One-stop access for NOAA's climate information

Multiple audiences so multiple avenues to access information

- ClimateWatch Magazine
- Data and Services
- Understanding Climate
- Education
- Climate Dashboard

www.climate.gov



Summer Institute on Climate Change

Summer Institute on Climate Change

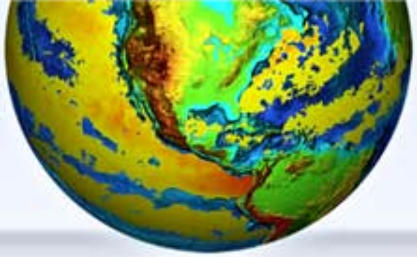
- Hosted by NOAA's Cooperative Institute for Climate and Satellites
- To be held in Asheville, North Carolina
- June 15 – July 1, 2011

Goals: "Adaptation into Action"

- Identify Adaptation opportunities in business operations
  - Learn the latest science as applied to business and commerce
- Expand knowledge of adaptation theory and practice
  - Learn best practices in coastal management, disaster management, water resource management and others
- Practice planning activities with professionals, executives, academics and policy makers

NOAA Information Used

- Official Climate Data and Statistics
  - Climate Variability and Extremes Data
  - Climate Modeling Tools and Published Results
  - Climate Monitoring and Outlooks
  - Climate Visualization Data
  - Drought Termination and Amelioration Data
  - Heating & Cooling Degree Day Data
- Global Climate Change Impacts Information
- US Drought and Climate Assessment
- Weather Observation Data, etc…



Assessments

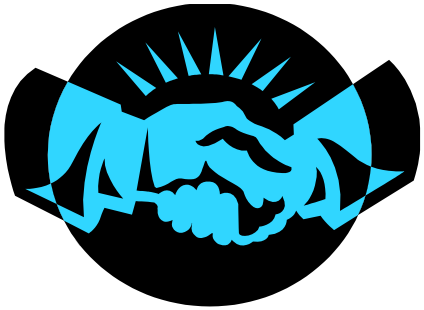
CS will engage in three types of assessments

- National and International Climate Science Assessments
  - ✓ Broad scope of problems and interest, broad set of peer-reviewed material (e.g., National Climate Assessment)
- Problem-Focused Climate Science Assessments
  - ✓ Often time-sensitive, address issues at local and regional levels (e.g., Devil's Lake)
- Needs Assessments
  - ✓ Help to identify gaps in science, understanding or services, including helping frame, and inform other assessments

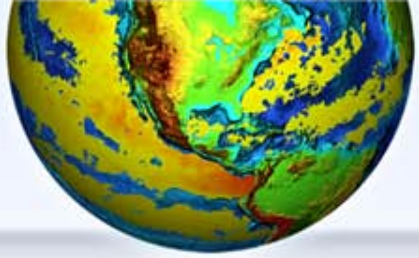
Partners

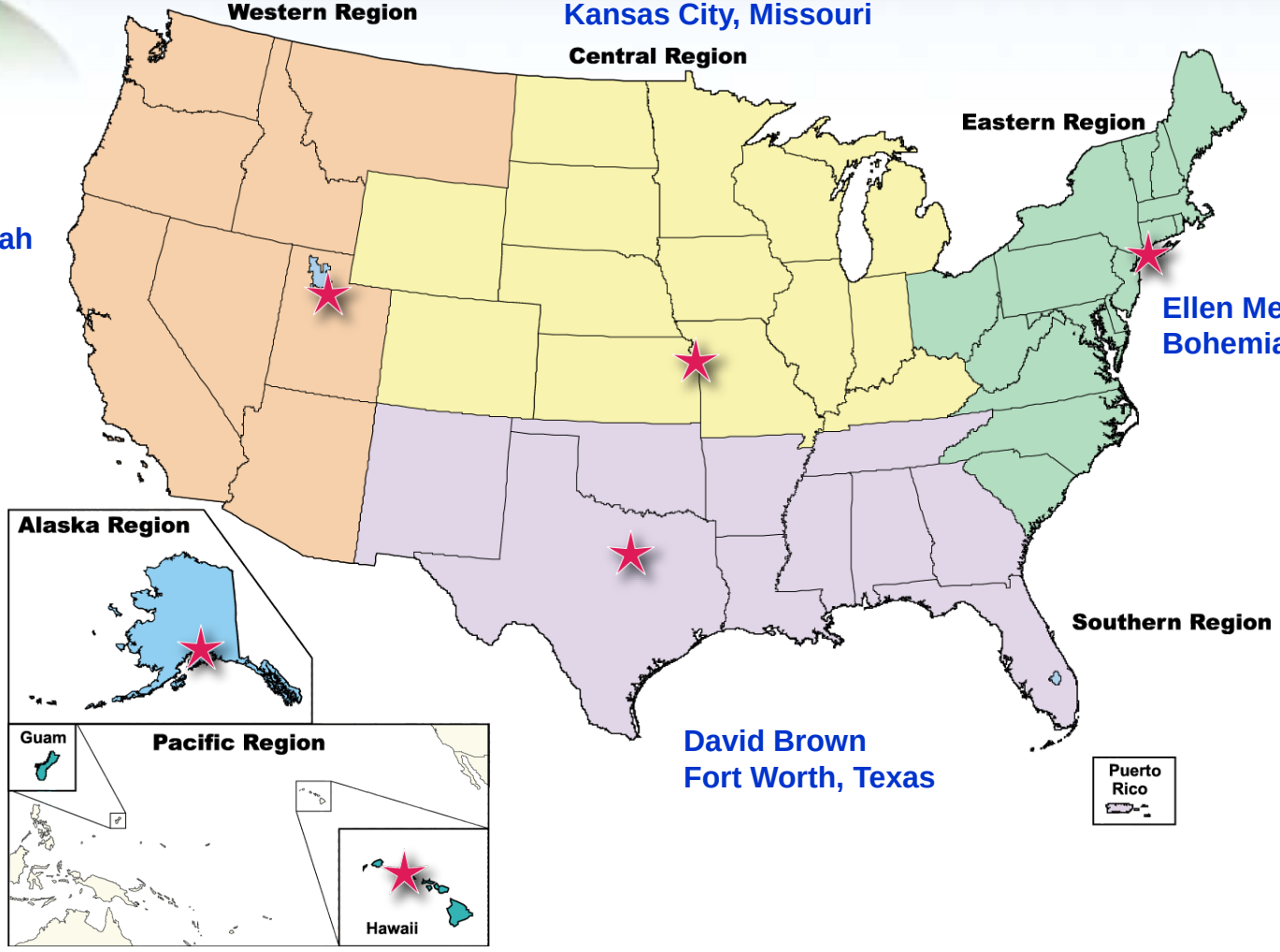
Partners from across the broader climate community both contribute to and benefit from the core capabilities

- Other parts of NOAA, federal, state, tribal and local agencies, cooperative institutes and other academic partners, the private sector, and the international community



Regional Climate Service Directors





Doug Kluck
Kansas City, Missouri

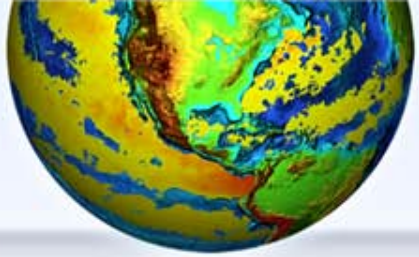
DeWayne Cecil
Salt Lake City, Utah

Ellen Mecray
Bohemia, New York

James Partain
Anchorage, Alaska

David Brown
Fort Worth, Texas

John Marra
Honolulu, Hawaii



NAPA Recommendations

1. Administration Recommendations

- The Administration should strengthen and expand interagency coordination structures tasked with aligning Executive Branch climate resources, and designate a lead agency
- A Climate Service in NOAA would be uniquely qualified to serve the public and private sectors as a lead federal agency for climate research and services, and to provide an ongoing accessible, authoritative clearinghouse for all federal science and services related to climate

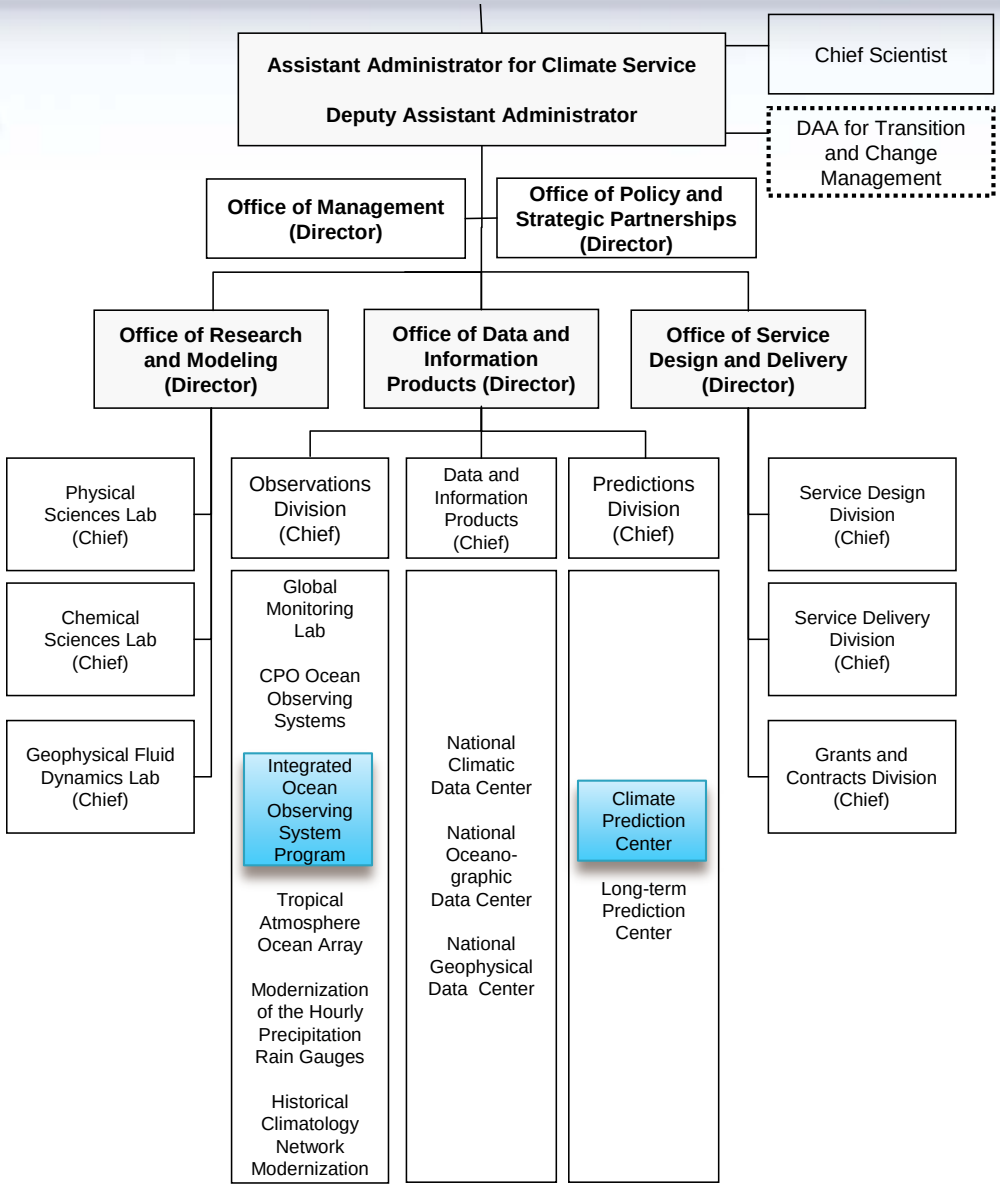
2. NOAA Organizational Recommendations

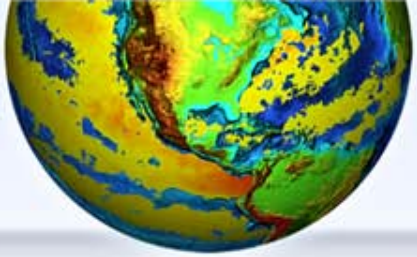
- A new Climate Service Line Office is the right organizational design choice
- Science and service assets should be combined within one Line Office
- NAPA's overall proposed Line Office structure aligns with the NOAA-DOC proposal

3. NOAA Implementation Recommendations

- Establish transitional leadership focused on implementation and change management
- Learn from examples of recent large reorganizations, in particular within the defense and security communities

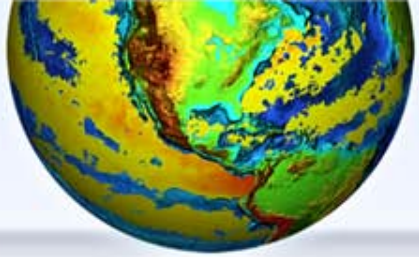
NAPA Proposal





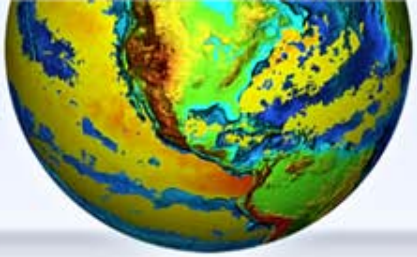
NOAA Proposal

- THIS IS A DRAFT PLACEHOLDER SLIDE
- If, by the time of the SAB meeting, NOAA's organization proposal has entered public record as a result of having been submitted to Congress before the time of the meeting, NOAA will include the proposed organization chart on this slide.
- Otherwise, this slide will be omitted.



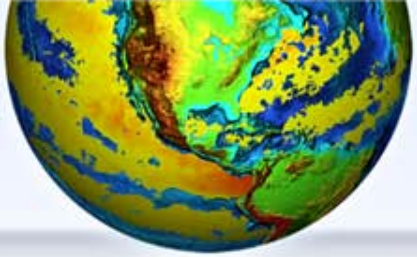
Feedback on Strategic Framework

- Organization
  - Change the name from NCS
  - Revisit inclusion of Climate Prediction Center, AOML, PMEL
  - Consider a core capability around “Predictions and Projections”
  - Revisit fifth societal challenge
  - Importance of Federal interagency partnerships, relationship to USGCRP
- Focus
  - Role and importance of basic research and academia
  - Prioritization: Balance long versus short term, user-driven versus NOAA-driven
  - Increase focus on and partnership with socio-economic sciences
  - Importance of private sector engagement
  - Increase specificity and detail, especially regarding delivery
  - More focus on downscaling, seasonal prediction, regional & state-level services
  - Better balance climate “variability” and “change”



Next Steps

- Finalize Vision and Strategic Framework document
- Engage Congress on the reprogramming package
- Pending approval, implement the Climate Service



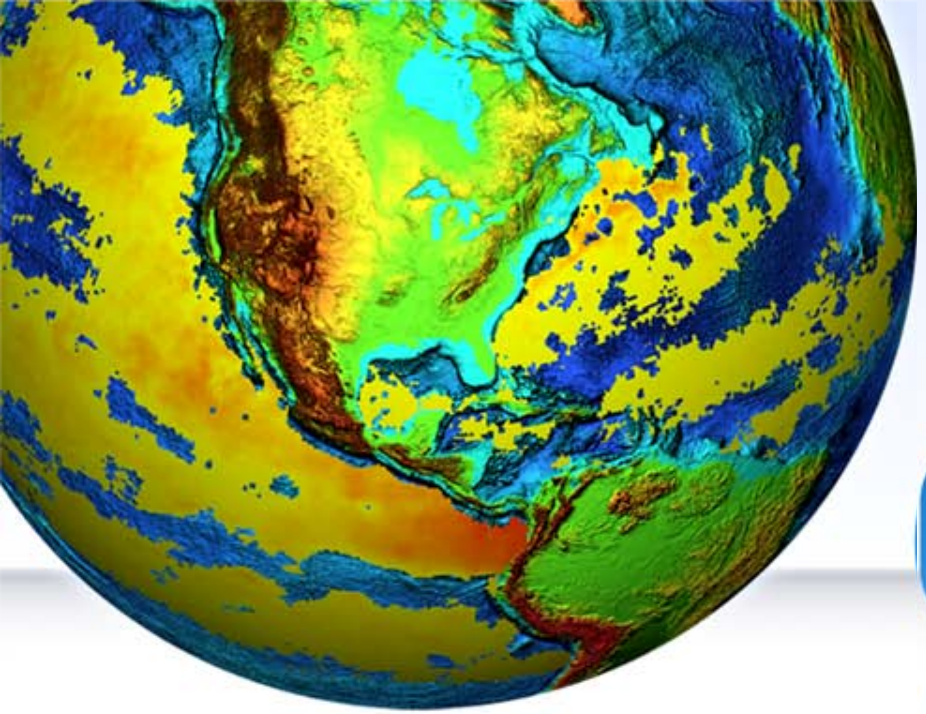
For More Information…

www.noaa.gov/climate

- NAPA report, Vision and Strategic Framework, Document, Q&As, climate handouts, links to background resources.

www.climate.gov

- NOAA's Climate Portal



THE CLIMATE SERVICE

Thank You…

Questions?