

Appendix A

DEPARTMENT OF COMMERCE



Principal Areas of Focus

The National Oceanic and Atmospheric Administration (NOAA) and the National Institute of Standards and Technology (NIST) comprise the Department of Commerce contribution to the CCSP.

NOAA's climate mission is: "To understand and describe climate variability and change to enhance society's ability to plan and respond." This is an end-to-end endeavor focused on providing decisionmakers a predictive understanding of the global climate system and to "translate" data so the public can incorporate the information and products into their decisions. These outcomes are achieved through implementation of a global observing system, focused research to understand key climate processes, improved modeling capabilities, and the development and delivery of climate information services. Specific objectives follow:

- Describe and understand the state of the climate system through integrated observations, analysis, and data stewardship
- Reduce uncertainty in the information on atmospheric composition and feedbacks that contribute to changes in Earth's climate
- Provide climate forecasts for multiple time scales to enable regional and national managers to better plan for the impacts of climate variability, and climate assessments and projections to support policy decisions with objective and accurate climate change information
- Understand and predict the consequences of climate variability and change on marine ecosystems and people
- Provide information and tools to support decisionmakers in improving management of risks to the U.S. economy in sectors and areas that are sensitive to impacts from weather and climate.

NOAA relies on its Federal, academic, private, and international partners to achieve its objectives. These objectives are implemented through five distinct, yet integrated, programs: Climate Observation and Analysis, Climate Forcing, Climate Predictions and Projections, Climate and Ecosystems, and Regional Decision Support.

NIST provides measurements and standards that support accurate and reliable climate observations. NIST also performs calibrations and special tests of a wide range of instruments and techniques for accurate measurements. In FY 2008, NIST is included as a discrete element of the CCSP cross-cut for the first time, to provide specific measurements and standards of direct relevance to the program.

Program Highlights for FY 2008

National Oceanic and Atmospheric Administration

Observations and Analysis

The objective of the Climate Observations and Analysis (COA) Program is to describe and understand the state of the climate system through integrated observations, data management, and analysis. The COA Program is organized under three capabilities: Observations (atmosphere and oceans, including the Arctic), Data Management, and Analysis of the Climate System. These capabilities taken together

increase the value and utility of observations, improve the performance of models, and reduce the uncertainty of predictions. A major objective of the COA Program is to contribute to the national and global objectives outlined in the *Strategic Plan for the Climate Change Science Program*, as well as NOAA's Strategic Plan, the Strategic Plan for the U.S. Integrated Earth Observation System (IEOS), and the Global Earth Observation System of Systems (GEOSS) 10-Year Implementation Plan.

Activities in FY 2008 will:

- Construct high-quality reanalysis of the coupled ocean-atmosphere system from the start of the satellite era (late 1970s) through 2007.
- Begin activities under the project Explaining Climate to Improve Predictions (ECIP) to provide global climate analyses required to describe major features of 20th century climate and the capacity to address the causes of observed regional climate variations.
- Complete the U.S. Climate Reference Network (USCRN) that provides benchmark quality measurements used to monitor and evaluate long-term changes in temperature and precipitation over the United States.
- Improve the National Integrated Drought Information System (NIDIS)
 - Begin the installation a full suite of soil (moisture and temperature) measurements at all 114 USCRN stations.
 - Establish the U.S. Drought Portal (USDP) developed in conjunction with Federal partners (USGS, NASA, and USDA) and non-Federal partners (Drought Mitigation Center and the Earth Systems Integrated Enterprise).
- Enhance the Global Ocean Observing System (GOOS)
 - Sustain and continue progress toward completing the U.S. contribution to the international GOOS.
 - Complete the Argo Profiling Float Array and place additional emphasis on increasing the number of tide gage stations and ocean carbon observations, important for reduction in uncertainty of ocean sea level and the ocean carbon budget.
- Begin planning work towards the establishment of a Global Climate Observing System Reference Upper Air Network (GRUAN) to aid in enhanced climate quality upper air data including improved upper tropospheric and lower stratospheric water vapor measurements.

Climate Forcing

The objective of the Climate Forcing Program is to better quantify the information on atmospheric composition and feedbacks that contribute to changes in Earth's climate. Specifically, the program seeks to provide the understanding needed to link "emissions" to the "radiative forcing of climate change" for science-based decision support. The Climate Forcing Program is providing research (i) to understand atmospheric and oceanic processes, both natural and human-related, that affect carbon dioxide trends; (ii) to quantify the climate roles of the radiatively important trace atmospheric species such as fine-particle (aerosols), ozone, and chemically active greenhouse gases; and (iii) to understand and assess stratospheric ozone depletion. Research may be directly applied to climate projection and to policy decisions regarding carbon management, and provides timely and adequate information needed to broaden the suite of non-carbon options for addressing changes in climate forcing.

Activities in FY 2008 will:

- Integrate the research efforts of the North American Carbon Program and relevant aspects of the Ocean Carbon and Climate Change Program to better quantify and understand the carbon budget of North America and adjacent ocean basins, including terrestrial, freshwater, oceanic, and atmospheric sources and sinks that influence atmospheric CO₂ and CH₄.

Appendix A

- Quantify the effects of atmospheric aerosols on radiation and clouds.
- Quantify the modification of the radiation balance by non-CO₂ greenhouse gases.
- Quantify the influence of the chemistry of the lower atmosphere on both aerosols and non-CO₂ greenhouse gases.
- Study the interactions between aerosols and non-CO₂ gases, enhanced measurements of atmospheric water vapor, and interactions of pollutants with climate change.
- Execute field missions to understand the transport and properties of absorbing aerosols and their precursors to the Arctic polar region as a part of the International Polar Year (IPY) in an effort to quantify the contribution of absorbing aerosols to the melting of Arctic ice.
- Continue to re-measure key ocean properties along cross-sections in the South Atlantic and North Pacific that were last measured in 1989 and 1991, respectively, via the Repeat Hydrography Program.

Predictions and Projections

The objectives of the Climate Predictions and Projections Program are to provide climate forecasts for multiple time scales to enable regional and national managers to better plan for the impacts of climate variability, and to provide climate assessments and projections to support policy decisions with objective and accurate climate change information. This program provides the Nation with a seamless suite of environmental forecasts (i.e., outlooks and projections) on intraseasonal, seasonal, interannual, and multidecadal time scales and on regional, national, and global spatial scales. The global environment includes not only the atmosphere, hydrosphere, cryosphere, biosphere, and lithosphere, but also land/ocean biogeochemical processes, ecosystems, atmospheric chemistry, and air quality. To achieve its objectives, this program maintains a suite of operational climate outlooks and strives to implement the next-generation operational climate outlooks and assessments by improving climate models, improving forecast generation techniques, and maintaining real-time climate monitoring data sets.

Activities in FY 2008 will:

- Emphasize model experiments designed to test potential mechanisms for abrupt climate change.
- Continue paleoclimate research on patterns, causes, and impacts of past abrupt climate events.
- Produce global analysis of tropospheric weather patterns at 6-hour time resolution that extends through the entire 20th century.
- Continue to focus on the calibration and validation of research-mode ensemble forecasting techniques for surface and subsurface hydrological parameters, especially on longer seasonal time scales.

Climate and Ecosystems

The objective of the Climate and Ecosystems Program is to understand and predict the consequences of climate variability and change on marine ecosystems. The program accomplishes this by coupling observations with information from retrospective and process studies in order to detect the impacts of climate on marine ecosystems and build an understanding of climate-ecosystem relationships. The goal of the program is to develop climate-related forecasts of changes in fishery, coastal, and coral reef resources, and of human and animal threats (e.g., harmful algal blooms). The forecasts provide users and managers of ocean and coastal resources the information they require to adapt to changing climate regimes.

Activities in FY 2008 will:

- Collect observations, conduct research, and synthesize results to increase the understanding of regional climate impacts on marine ecosystems.
- Initiate development of biosensors for harmful algal blooms and pathogen for eventual incorporation in observing systems.

Regional Decision Support

The Regional Decision Support (RDS) Program provides information and tools to support decisionmakers in improving management of risks to the U.S. economy—and taking advantage of opportunities—in sectors and areas that are sensitive to impacts from weather and climate. Effective incorporation of climate information provides decisionmakers with the data, analysis, and new knowledge that can help them achieve the best possible outcome with regard to a varying climate. This includes the socioeconomic effects of drought, El Niño and La Niña events, sea-level rise, and other high-impact climate events. RDS addresses an increased demand for traditional climate services, such as data and forecast dissemination and customer support, as well as identifying and satisfying new requirements for decision support in sectors such as water, fire, emergency preparedness, health, transportation, energy, coastal, urban, and ecosystem management. Demand for increased services is met through research into decisionmaker needs and prototype product development, transition of research products into application and operations, and operational delivery and support of climate services.

Activities in FY 2008 will:

- Produce the following CCSP synthesis and assessment products slated for publication in 2008:
 - *Trends in Emissions of Ozone-Depleting Substances, Ozone Layer Recovery, and Implications for Ultraviolet Radiation Exposure* (2.4)
 - *Climate Projections based on Emissions Scenarios for Long-Lived Radiatively Active Trace Gases and Future Climate Impacts of Short-Lived Radiatively Active Gases and Aerosols* (3.2)
 - *Weather and Climate Extremes in a Changing Climate. Regions of Focus: North America, Hawaii, Caribbean, and U.S. Pacific Islands* (3.3)
 - *Decision-Support Experiments and Evaluations using Seasonal to Interannual Forecasts and Observational Data* (5.3).
- Develop methods, models, and mechanisms for integrating climate information into analyses of the social and economic ramifications of drought as well as the policy and decisionmaking processes in the face of drought.
- Further development of the National Integrated Drought Information System (NIDIS).

National Institute of Standards and Technology

The National Institute of Standards and Technology provides measurements and standards that support accurate and reliable climate observations. In FY 2008, NIST will address critical gaps in climate change science that are limiting long-term climate policy decisionmaking by:

- Resolving discrepancies in satellite measurements of radiation, including solar irradiance, reflected solar radiation, outgoing longwave radiation, and surface radiation
- Providing critical information about aerosols and atmospheric components believed to play a major role in global climate change.