

# Appendix

## DEPARTMENT OF COMMERCE / NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

---



### Principal Areas of Focus

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
- 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.

### Program Highlights for FY 2007

#### *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 and the Global Earth Observation System of Systems (GEOSS) 10-Year Implementation Plan.

Activities in FY 2007 will:

- Reduce uncertainties in sea-level change, sea surface temperature, and estimates of changes in the carbon inventory in the global ocean

- Document the ocean's heat storage and transport, and changes in the ocean's contributions to the global water cycle
- Via aircraft, deploy drifting data buoys in the path of approaching hurricanes to measure the ocean's heat energy potential
- Assess and address the impact on the climate observing system of changes in the future National Polar-Orbiting Operational Environmental Satellite System (NPOESS)
- Retrofit the Global Climate Observing System (GCOS) Upper Air Network sites in developing nations and continue serving as the GCOS Lead Center for the GCOS Surface Network
- Working with Canada, deploy an atmospheric observatory in northeastern Canada to provide high-resolution characterization of clouds and aerosols, and of incoming and outgoing radiation
- Collect data to understand changes in the temperature and salinity structure of the ocean beneath sea ice, and the biotic response to physical changes (rapid warming and diminished ice cover)
- Implement the "Near-Term Opportunities" outlined in the U.S. Group on Earth Observations' Strategic Plan—that is, disaster warning, global land cover, sea level, drought, air quality, and enhanced data management.

### *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 2007 will:

- Contribute to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) and the international assessment regarding the depletion of the ozone layer
- Involve participation in a multi-institutional intensive field program that will investigate scientific questions common to both climate and air quality (i.e., the Gulf of Mexico Atmospheric Composition and Climate Study)
- Analyze ozone profiles measured across mid-latitude North America during a 2004 climate field study, with the aim of estimating how much ozone is formed over the continent in the summer
- Investigate aerosol distributions and their warming and cooling effects via the Oklahoma City Field Study, planned for the summer of 2007
- Continue the carbon atmospheric observing system across the Nation in support of research to reduce uncertainty in U.S. carbon sources and sinks
- Continue to develop and test methods for regional and continental estimates of carbon sources and sinks via an intensive field investigation centered on the mid-continent region of North America
- 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
- Design new sensors to measure carbon dioxide exchange across the air-sea interface for use on autonomous platforms such as floats, gliders, surface drifters, and autonomous underwater vehicles.

## Appendix

### *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 2007 will:

- Address significant uncertainties associated with the water cycle through a study that comprehensively addresses the water budget within DOE's Atmospheric Radiation Measurement Program Southern Great Plains site
- Hone advanced ensemble multi-model prediction techniques for surface and subsurface hydrological parameters, with the objective of transferring or transitioning the improved techniques for operational application in the seasonal/interannual time scale
- Continue research on extended drought causes via monitoring, analysis, prediction, and support to drought information systems such as the National Integrated Drought Information System
- Build upon results from the 2006 African Monsoon Multidisciplinary Analysis campaign.

### *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 forecasts of changes in fishery, coastal, and coral reef resources in response to climatic changes. The forecasts provide users and managers of ocean and coastal resources the information they require to adapt to changing climate regimes. In FY 2007, a collaborative research program will synthesize field and model information in the Northeast Pacific to better understand and predict responses of these ecosystems to climate change.

### *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 2007 will:

- Produce the following CCSP synthesis and assessment products slated for publication in 2007
  - “North American Carbon Budget and Implications for the Global Carbon Cycle” (2.2)
  - “Aerosol Properties and Their Impacts on Climate” (2.3)
  - “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)
  - “Best-Practice Approaches to Characterize, Communicate, and Incorporate Scientific Uncertainty in Decisionmaking” (5.2)
  - “Decision Support Experiments and Evaluations using Seasonal to Interannual Forecasts and Observational Data” (5.3)
- Launch “Coping with Drought through Research and Regional Partnership” as a new effort to analyze the social and economic impacts of drought, and the use of climate information in drought planning
- Transfer research to applications through a competitive program that supports proposals for transitioning experimentally mature climate tools, methods, and processes from research to sustained operational delivery of useful climate information, products, and services to local, regional, national, and international decisionmakers and policymakers.

## Related Research

In addition to focused CCSP efforts, related activities include coastal and coral reef resources in response to climatic changes in oceanic water mass distributions, sea-surface temperature, sea-level rise, and coastal runoff; enhanced prediction and observation systems in support of weather and seasonal to interannual climate forecasts; determination of long-term changes in temperature and precipitation over the United States through long-term (50+ years) operation of the U.S. Climate Reference Network; continued buildout of the Comprehensive Large-Array Storage System to meet the growth in observational data from satellite and radar systems; and dissemination of global change information.

DOC’s National Institute of Standards and Technology (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. NIST provides a wide array of data and modeling tools that provide key support to developers and users of complex prediction models.