

**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." The long-term climate efforts of NOAA are designed to develop a predictive understanding of variability and change in the global climate system, and to advance the application of this information in climate-sensitive sectors through a suite of process research, observations and modeling, and application and assessment activities.



Climate activities in NOAA range significantly in terms of time and space scales for both research and services. Products are developed to support a range of international, national, regional, and local users. Specifically, NOAA's research program includes ongoing efforts in observations, with an emphasis on oceanic and atmospheric dynamics, circulation, and chemistry; understanding and predicting ocean-land-atmosphere interactions, the global water cycle, and the role of global transfers of carbon dioxide among the atmosphere, ocean, and terrestrial biosphere in climate change; improvements in climate modeling, prediction, and information management capabilities; the projection and assessment of variability across multiple time scales; the study of the relationship between the natural climate system and society, and the development of methodologies for applying climate information to problems of social and economic consequences; the relationship of climate to coastal and marine ecosystems; and archiving, managing, and disseminating data and information useful for global change research.

Program Highlights for FY 2006

Observations and Analysis

The goal of NOAA's Climate Observations and Analysis effort is an integrated ocean and atmosphere observing system in support of a predictive understanding of the global climate system. The NOAA observing system will be fully integrated into the U.S. Integrated Earth Observing System (IEOS). This will be implemented through a tiered and integrated observational network that provides sustained global and U.S. monitoring of key climate-related parameters; an end-to-end data management system to provide climate-quality information and respond to the projected data growth rates; and sophisticated analyses to differentiate climate variability and change as a result of natural processes and human activities.

Activities in FY 2006 will:

- Expand deployment of the U.S. component of the global Atmospheric and Ocean Observing System, with emphasis on reduced uncertainty in sea level, sea-surface temperature, and ocean carbon.
- Achieve global coverage with the 3,000-float Argo array.
- Achieve a modest increase in the number of Global Upper Air Network (GUAN) and Global Surface Network (GSN) stations.
- Increase the pilot Indian Ocean array with two additional moorings, for a total of five moorings in FY 2006.

Appendix

- Collect upper ocean temperature data by maintaining expendable bathythermograph probes globally along repeated ship track lines.
- Report on progress in developing a new atmospheric reanalysis data set to more fully document weather and climate variability over the entire 20th century.
- Report on temperature trends in the lower atmosphere, and progress toward understanding and reconciling differences in various estimates.

Climate Forcing

The goal of NOAA's Climate Forcing activities is to provide the understanding needed to link emissions to the radiative forcing of climate change. The specific aim is to attain a timely understanding of atmospheric carbon dioxide trends—both natural and human-produced—and to provide timely information on the climate roles of the radiatively important trace atmospheric species (e.g., fine particle aerosols and ozone) needed to broaden the suite of non-carbon options available for climate change policy support. A quantitative characterization of climate change forcing from greenhouse gas species is needed for input to global climate models to optimize predictions of what climate changes could result from policy decisions.

Activities in FY 2006 will:

- Continue implementation of the carbon cycle observing system.
- Estimate North American carbon dioxide uptake through new data and models.
- Expand the carbon cycle global network into under-sampled regions (e.g., Africa and South America).
- Conduct retrospective model simulations of the climate impacts due to 1980–2000 radiative forcing.
- Develop an instrument package for an airborne aerosol observatory.
- Conduct field and laboratory studies of factors that influence the radiative effect of aerosols.
- Continue the global ocean carbon inventory along cross-sections in the North Pacific.
- Expand the coastal carbon dioxide measurement network, which will provide information on atmosphere-ocean carbon dioxide exchange and atmospheric carbon dioxide at the continental boundary.
- Quantify the seasonal and interannual variations of air-sea carbon dioxide fluxes in the North Atlantic and North Pacific via measurements of surface-ocean pCO₂, conducted by research and volunteer observing ships as they are underway.

Predictions and Projections

The goal of NOAA's Climate Predictions and Projections component is to provide a seamless suite of climate outlooks and projections on intraseasonal, seasonal, interannual, and multi-decadal time scales to facilitate management of risks and opportunities related to climate variability and change.

Activities in FY 2006 will:

- Run climate projections for research and assessment based on emission scenarios developed through the Climate Change Technology Program. Likely case studies will include exploring the range of plausible future environmental consequences of different emission rates resulting from combinations of different technologies.
- Report on results of field experiments of processes influencing warm-season precipitation over the southwestern United States, and prospects and needs for improving summertime rainfall forecasts in this region.

- Develop prototype methods for applying climate information to address practical challenges associated with natural resource management and hazard mitigation.
- Support diagnostic studies that contribute to the planned Tropical Atlantic Climate Experiment (TACE) and Atlantic Marine ITCZ (AMI) process study of U.S. CLIVAR in the tropical Atlantic—U.S. components of the international African Monsoon Multidisciplinary Analyses (AMMA) project—to improve coupled models used for climate predictions.
- Support observing system simulation experiments for the planned Pacific Upwelling and Mixing Physics process study, a contribution to U.S. CLIVAR.

Regional Decision Support

NOAA’s Regional Decision Support effort aims to help society mitigate climate-related risks by translating the results of climate research into usable products for policymakers and decisionmakers, and by delivering that climate information operationally. The activities address an increase in the demand for traditional services (like routine seasonal forecasts and data products), accompanied by new requirements for expanded drought information and an increased emphasis on forecasts of risks of high-impact weather events associated with El Niño and La Niña, as well as sea-level inundation.

Activities in FY 2006 will:

- Initiate activities for mitigating the effects of drought through the National Integrated Drought Information System (NIDIS).
- Conduct exploratory workshops for research and evaluation to develop sector research (e.g., coastal, sea-level rise, drought, agriculture).
- Develop curriculum and communication tools for teachers and decisionmakers.
- Support transition of research products to applications through the NOAA Climate Transition Program.

Related Research

In addition to focused CCSP efforts, related activities include developing forecasts of changes in fishery, coastal, and coral-reef resources in response to climatic changes in oceanic water mass distributions, sea-surface temperature, sea-level rise, and coastal runoff; developing a prototype Arctic observing system for monitoring sea ice, heat content, freshwater, and ecosystem indicators; enhancing prediction and observation systems in support of weather and seasonal to interannual climate forecasts; determining actual long-term changes in temperature and precipitation over the United States through long-term (50+ years) operation of the U. S. Climate Reference Network; continuing to build out the Comprehensive Large-Array Storage System (CLASS) to meet the growth in observational data from satellite and radar systems; and facilitating the 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.