

CCSP FY 2008 KEY INTERAGENCY IMPLEMENTATION ACTIVITIES

The program's long-term vision, mission, goals, and objectives are described in the *CCSP Strategic Plan*. Implementation of this long-term plan occurs through agency activities that often benefit significantly from ongoing CCSP-facilitated coordination. CCSP has identified several key areas for FY 2008 that require particularly strong interagency coordination to achieve success; they cannot be adequately addressed by one agency alone. Although these priorities are only a small part of the overall program,

they are vital mechanisms through which CCSP will continue to integrate agency activities to create knowledge and products that are greater than the sum of the individual agency inputs. The development of CCSP interagency priorities is the result of a variety of planning processes, including planning processes within the 13 CCSP agencies (see Appendix A) and interagency planning conducted by the CCSP Interagency Committee (i.e., the Subcommittee on Global Change Research) and its subsidiary Interagency Working Groups. CCSP's interagency planning is informed by external advice from several NRC committees. CCSP's annual implementation priorities are logical evolutions of the program's interagency approaches to the priorities established in the *CCSP Strategic Plan*. The selection criteria for these activities require that they are founded upon a solid intellectual basis and are of high scientific quality; require coordination and/or integration across multiple CCSP agencies to create value-added products and services that cannot be created by any one agency alone; improve the characterization of key areas of scientific uncertainty and/or improve decision-support tools; provide a timely response to a particular need or leveraging opportunity; and are cost-effective.

The interagency implementation priorities generally represent only a fraction of CCSP's portfolio. The focus areas are listed here in an order similar to the research elements described in the *CCSP Strategic Plan*. However, due to their integrative nature they do not follow a one-to-one mapping to the research elements.

Understanding Aerosol Forcing and Interactions with Clouds and Non-CO₂ Trace Gases. The key objectives of this set of activities are to quantify the effects of atmospheric aerosols (tiny airborne particles) on radiation and on clouds, to quantify the modification of the radiation balance by non-CO₂ greenhouse gases, and to quantify the influence of the chemistry of the lower atmosphere on both aerosols and non-CO₂ greenhouse gases. Research will include use of newly initiated and enhanced measurements of water vapor in the upper troposphere and the lower stratosphere and water vapor's role in altering climate directly and via its influence on aerosols, cirrus clouds, and chemical composition. Studies on the potential contributions of air pollution and aviation to global climate forcing will be extended. In addition, field missions are planned to understand the properties of absorbing aerosols and their precursors and their transport to the Arctic polar region as a part of the International Polar Year, in an effort to quantify the contribution of absorbing aerosols to the melting of the Arctic ice.

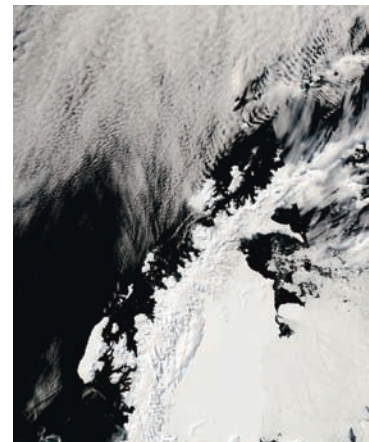


The U.S. Climate Change Science Program for FY 2008

Development of an Integrated Earth System Analysis Capability. By combining global observations of the atmosphere, ocean, land, biosphere, and ice-covered areas with models that dynamically couple these components of the Earth system, it will be possible to produce internally consistent maps (i.e., “analyses”) of the state of the planet. Time series of such analyses will allow researchers to better explain observed changes in the climate system and will allow decisionmakers to develop more informed options to address future changes. Additional reanalysis activities in FY 2008 will include an improved treatment of the hydrological cycle and efforts to extend atmospheric reanalyses to span the entire 20th century. Further advances in producing integrated Earth system analyses will require progress in ongoing efforts to construct models that properly simulate the interactions among the physical and biogeochemical processes in the climate system.

Carbon Cycle Research Integration. CCSP’s carbon cycle research element 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, the underlying processes, and the dynamics that determine influences on atmospheric CO₂ and methane (CH₄). This integration will clarify and reduce uncertainties about the North American carbon budget and provide better information for decisions about carbon management. Improved observations, methods, and understanding of carbon cycling will be integrated into global models and analysis systems to provide more reliable capabilities for studying and predicting future changes in atmospheric CO₂ and CH₄ and carbon storage by terrestrial and oceanic ecosystems.

Abrupt Changes in a Warming Climate. Paleoclimate research indicates that major shifts in regional and global climate have occurred on time scales as short as decades, severely affecting rainfall patterns, droughts, ecosystems, and human civilizations.¹ Assessing the potential for future abrupt changes and implementing the capability to diagnose and predict their occurrence will require concerted efforts to improve Earth system analysis, decadal forecasting capabilities, reconstructions of past abrupt climate change, and understanding of societal impacts. Activities in FY 2008 will emphasize model experiments designed to test potential mechanisms for abrupt change, and paleoclimate research on patterns, causes, and impacts of past abrupt climate events. Both activities will help set



priorities for enhanced monitoring with the goal of developing an abrupt change early warning system. These efforts are integrated with the *Ocean Research Priorities Plan* near-term priority on the meridional overturning circulation of the Atlantic Ocean.²

Potential Effects of Climate Change on the Biodiversity and Productivity of Ecosystems.

Research will include new activities on two topics of urgency: (1) vulnerability of coastal ecosystems, both terrestrial and aquatic, to climate-related changes, including sea-level rise, increased sedimentation and runoff, increased storm frequency or intensity, saltwater intrusion, and oceanic warming; and (2) warming-induced changes in high-latitude and high-elevation ecosystems, including changes in species composition, alterations in the timing of water availability, migration of the tree line, retreat of glaciers, and loss of permafrost and sea ice. Both these topics require additional research on underlying ecological processes and development of models linking geophysical and ecological phenomena.

Integration of Water Cycle Observations, Research, and Modeling. The FY 2008 interagency priority for the global water cycle is the initiation of a multi-year activity that is planned to include a series of integrated projects, each building upon the experience gained from previous years. FY 2008 activities will focus on a few regional case studies in which both models and measurements will be used to develop closure in the terrestrial water cycle budget for those regions. This multi-agency CCSP project will utilize existing regional sites to improve observational capabilities (surface, subsurface, and remote sensing). A range of climate zones will be considered to provide a suitable research framework that concurrently addresses climate/water cycle science and water resource management issues. Enabling links with other projects will be explored through the Hydrological Information System portal, including data/product delivery to the National Integrated Drought Information System (NIDIS). In future years, an expansion in scope is envisaged to encompass time scales from seasonal to interannual and spatial scales from local to regional to global. This activity is designed to benefit both the broader research community as well as the operational applications community through a more accurate quantification of the water cycle and improved mathematical formulations of physical processes. Results will be incorporated into climate and hydrologic prediction models.

Land-Use and Land-Cover Change and Climate: Interactions and Critical Observations.

Land-use and land-cover priorities include understanding historic, current, and potential future land-use and land-cover change patterns, dynamics, and drivers; understanding the mutual effects and feedbacks between climate variability and land use/land cover; and forecasting environmental, social, economic, and human health consequences. All of these land-use and land-cover change priority issues directly



influence climate by affecting atmospheric trace gas composition and surface reflectance, and are thus critical to a broad spectrum of CCSP interests. The collection, archiving, and subsequent scientific use of global Landsat data from 2005 to 2006 is a priority for FY 2008, through the “mid-decadal Landsat data collection effort.” The FY 2008 priority also includes support for the Landsat Data Continuity Mission that is under development to continue the collection of global Landsat data. Without these satellite observations, the current pace of discovery and innovation in global land-use and land-cover change climate research would not be possible.

Coping with Drought through Research and Regional Partnerships. Building trust and collaborative efforts with stakeholders to help them take advantage of climate information, especially in the area of drought planning, is a long-term effort that requires consistent and continual interactions. Research in this area will focus on the development of 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. Scientific data products will include paleoclimatic and historical information about drought and its impacts, seasonal-to-interannual scale observations and predictions of drought, and longer term projections of decadal-to-centennial scale variability and change. Social and economic impact analyses including historical perspectives and near-term trends such as projections of water conflicts, water demand, population changes, and land-use changes will be used to augment the physical science analyses. This effort is linked to NIDIS.

DECISION SUPPORT: INFORMATION TO SUPPORT POLICY DEVELOPMENT AND ADAPTIVE MANAGEMENT

CCSP sponsors and conducts research that is ultimately related to policy and adaptive management decisionmaking. CCSP’s decision-support approach is guided by several general principles, including:

- Early and continuing involvement of stakeholders
- Explicit treatment of uncertainties
- Transparent public review of analysis questions, methods, and draft results
- Evaluation of lessons learned from ongoing and prior decision-support and assessment activities.

