

OUTLINE OF RESEARCH ELEMENT ACTIVITIES

The CCSP participating agencies coordinate scientific research through a set of linked interdisciplinary research elements and cross-cutting activities that encompass a wide range of interconnected issues of climate and global change. Chapters 3-15 of the *CCSP Strategic Plan* contain more detailed discussions of the research elements as well as activities that cut across all areas of the program. This report focuses on highlights of recent research and program plans for FY 2006.

Atmospheric Composition – The composition of the global atmosphere has an influence on climate and the ozone layer, as well as their relation to air quality, all of which have implications for ecosystem vitality and human health. CCSP-supported research focuses on how human activities and natural phenomena affect atmospheric composition, and how those changes relate to societally important issues such as climate change and ozone layer depletion. Emphasis is on developing the research and observing framework that will provide timely scientific information for decisionmakers in the climate arena, both in the United States and abroad.

See CCSP Strategic Plan Chapter 3.



The U.S. Climate Change Science Program for FY 2006



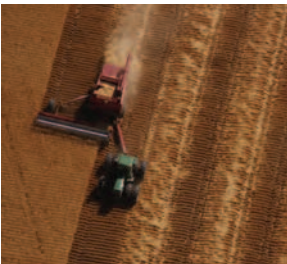
Climate Variability and Change (including Climate Modeling) – Scientists are increasingly recognizing that short- and long-term climate variability and climate change are intrinsically linked. CCSP-supported research has made significant advances in understanding the causes of climate variations. Substantial progress has also been made in incorporating this new knowledge into frameworks for predicting future climate variability on seasonal-to-interannual time scales and for investigating the effects of human activities on climate. A new generation of climate models incorporates improved representations of physical processes, as well as increased resolution, putting them at the forefront of international research. Despite these improvements, there are still significant uncertainties associated with certain aspects of climate models.

See CCSP Strategic Plan Chapters 4 and 10.



Global Water Cycle – The water cycle plays a critical role in the functioning of the Earth system. Inadequate understanding of the water cycle is one of the dominant causes of uncertainty in climate prediction. The water cycle integrates the complex physical, chemical, and biological processes that sustain ecosystems and influence climate and related global change. New understanding of these processes will be essential to developing options and responses to the consequences of water cycle variability and change.

See CCSP Strategic Plan Chapter 5.



Land-Use and Land-Cover Change – Land use and land cover are linked to climate and weather in complex ways. Key links include the exchange of greenhouse gases between the land surface and the atmosphere, the radiation balance of the land surface, the exchange of sensible heat between the land surface and the atmosphere, and the roughness of the land surface and its uptake of momentum from the atmosphere. Because of these strong links, changes in land use and land cover can be important contributors to climate change and variability.

See CCSP Strategic Plan Chapter 6.



Global Carbon Cycle – CCSP-supported research on the global carbon cycle addresses the scientific questions of how large and variable the dynamic reservoirs and fluxes of carbon within the Earth system are, and how carbon cycling might change and be managed in future years, decades, and centuries. This research will help human societies evaluate their options for managing carbon sources and sinks to achieve an appropriate balance of risk, cost, and benefit. Successful carbon management strategies will require solid scientific information about the basic processes of the carbon cycle and an understanding of its long-term interactions with other components of the Earth system.

See CCSP Strategic Plan Chapter 7.

Ecosystems – Global change has the potential to affect the structure and functioning of ecosystems in complex ways. The role of CCSP-supported ecosystems research is to increase the knowledge necessary to evaluate the potential effects of global change on ecosystems in order to help society respond effectively to changes that affect the goods and services provided by ecosystems. Research focuses on changes in ecosystem structure and functioning, potential changes in the frequency and intensity of climate-related disturbances that may have significant consequences for society, and the effects of ecosystems on climate.

See CCSP Strategic Plan Chapter 8.

Decision-Support Resources Development and Related Research on Human Contributions and Responses – Decisionmakers and other interested citizens need reliable science-based information to make informed judgments regarding policy and actions to address the risks and opportunities of variability and changes in climate and related systems. A wide variety of CCSP decision-support resources and related research on human contributions and responses is targeted at that objective. The outcomes of these activities are intended to inform public discussion of climate-related issues and scientifically assess and expand options for mitigation of and adaptation to climate variability and change.

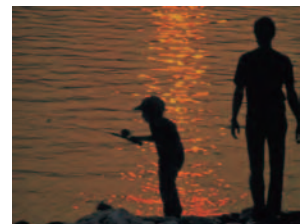
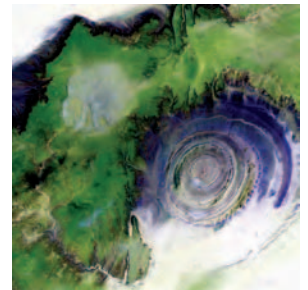
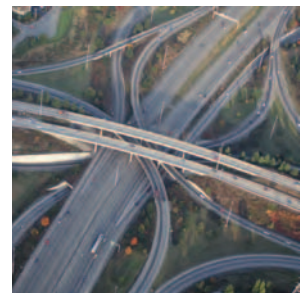
See CCSP Strategic Plan Chapters 9 and 11.

Observing and Monitoring the Climate System (including Data Management and Information) – The Interagency Working Group on Earth Observations has identified early opportunities for improved observations in disaster warning, global land cover, sea level, drought, and air quality, and has highlighted enhanced data management as an overarching need. Such cooperative efforts build upon the current GEOSS, including several new Earth-observing satellites, suborbital systems, surface networks, reference sites, and process studies now producing unprecedented high-quality data that have led to major new insights about the Earth’s climate system. The United States is contributing to the development and operation of observing systems that will combine the data streams from both research and operational observing platforms to provide for a comprehensive measure of climate system variability and climate change processes.

See CCSP Strategic Plan Chapters 12 and 13.

Communication – CCSP’s member agencies support a broad array of communications initiatives. CCSP has developed a strategy and implementation plan for helping to coordinate and facilitate these activities. These efforts are intended to improve public understanding of climate change research by disseminating the results of CCSP activities credibly and effectively, and by making CCSP science findings and products easily available to a diverse set of audiences.

See CCSP Strategic Plan Chapter 14.



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International Research and Cooperation – CCSP, through its working groups including the Interagency Working Group on International Research and Cooperation, participates in and provides input to major international scientific and related organizations on behalf of the U.S. Government and scientific community. CCSP also provides support to maintain the central infrastructure of several international research programs and international activities that complement CCSP and U.S. Government goals in climate science.

See CCSP Strategic Plan Chapter 15.

THE U.S. CLIMATE CHANGE SCIENCE PROGRAM FOR FY 2006 CHAPTER REFERENCES

- 1) **NRC**, 2001: *Climate Change Science: An Analysis of Some Key Questions*. Committee on the Science of Climate Change, National Research Council, National Academy Press, Washington, DC, USA, 42 pp.
- 2) **NRC**, 1999: *Global Environmental Change: Research Pathways for the Next Decade*. Committee on Global Change Research, National Research Council, National Academy Press, Washington, DC, USA, 616 pp.