

MEETINGS

Investigators Share Improved Understanding of the North American Carbon Cycle

U.S. North American Carbon Program Investigators Meeting, Colorado Springs, Colorado, 22–25 January 2007

The U.S. North American Carbon Program (NACP) sponsored an “all-scientist” meeting to review progress in understanding the dynamics of the carbon cycle of North America and adjacent oceans, and to chart a course for improved integration across scientific disciplines, scales, and Earth system boundaries. The meeting participants also addressed the need for better decision support tools for managing the carbon cycle of North America, so that strong science can inform policy as interest in taking action increases across the nation.

Herein we report on themes to integrate the diversity of NACP science and fill significant gaps for understanding and managing the North American carbon cycle: integration among disciplines involving land, atmosphere, and ocean research; strengthening data management infrastructure to support modeling and analysis; identification of study regions that are critical for reducing uncertainties in the North American carbon balance; and integrating biophysical science with the human dimensions of carbon management and decision support.

NACP requires cross-disciplinary integration to evaluate the range of carbon sources and sinks contributing to the carbon balance of North America and adjacent oceans. For example, carbon dynamics in coastal margins are poorly understood, in part because few studies have spanned terrestrial, atmospheric, and ocean reservoirs and disciplinary boundaries. Improved integration would reduce gaps in knowledge of the carbon cycle and how it is changing, and improve attribution of changes to major driving factors such as climate variability, wildfires, insects, and land-use change.

Integrated long-term observation systems are the backbone of the NACP. Some critical observations are “contributed” to the NACP from well-established programs such as land inventories conducted by the U.S. Department of Agriculture. The AmeriFlux observation network can quantify the effects of climate variability on the carbon cycle at seasonal to interannual timescales. An open ocean observing system is being developed as part of the Global Earth Observation System of Systems (GEOSS). Remote sensing observations and analyses have proven critical to supporting biophysical modeling activities within NACP. The meeting participants noted that long-term continuity of these systems is essential.

Equally important is the need to support integrated modeling with robust data man-

agement. Large investments in individual projects were not matched by data system infrastructure to enable storage, search, and access of data.

Meeting participants identified a number of regions where intensive studies can fruitfully address NACP goals. In addition to the ongoing midcontinent intensive study, these regions include coastal margins, the interior West region of mixed grasslands and woodlands, and the boreal/Arctic region. Lack of systematic monitoring and comprehensive modeling across all of North America represents a critical shortcoming of carbon cycle science.

To achieve its objectives, the NACP must integrate human dimensions with the biological, atmospheric, and oceanic sciences. Social processes that drive land use and fossil fuel emissions should be quantitatively integrated into land use/cover and emissions modeling, to promote the emergence of the carbon/climate/human modeling needed to provide science and analytical tools for climate action programs at various levels of government. Decision support integrated with basic research would ensure that outcomes are as intended.

A companion meeting followed that involved the carbon programs of Canada, Mexico, and the United States, offering the intriguing possibility of better understanding and management of the carbon cycle by considering a broader array of data sources, models, and management opportunities in the context of diverse national goals, policies, and land-use histories within North America.

The full text of this meeting report can be found in the supplement to this *Eos* edition.

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