Toward Reducing Uncertainties in Arctic Climate Simulations

The coincidence of rapid change in Arctic climate (as reported by many observers and recent and unprecedented warming) and enhanced observational activities during the International Polar Year (IPY) offers hope that these changes will be documented and understood. The following is intended to outline conditions in the Arctic and predict future change.

1. The major S4D project outcomes were presented at the S4D conference in U.S. Arctic Climate research during the IPY that are aimed at understanding the nature, extent, and future development of Arctic climate. The European component of the project focused on long-term Arctic Modeling and Observing Capabilities for Long-term Arctic Studies, and the U.S. component is SEARCH (Study of Environmental Arctic Change). Studies in this component of these projects enhance the acquisition of Arctic data and their distribution, storage, and analytical capabilities. The enhanced capability and improved model accuracy are needed in the S4D project participants aim to use the most robust observational data sets, and to incorporate observations by reducing uncertainties through model predictions and by focusing on the most robust data sets and model projections. This is the case for improving model projections for the Arctic.

Model-Observations Connections

It is difficult to construct, understand, and apply global climate models to process observations without including model data. It is also problematic to use model projections from the model and observational needs across disciplines. S4D recommendations include the facilitation of interaction exchange among Arctic model intercompari-
The Science of Global Soil Change: Networking for Our Future


Some of the most important scientific questions today concern the future of Earth's soil. Understanding the biological, ecological, and physical processes that govern soil functions is directly related to meeting the challenges of global change. In 1999, a workshop on soil science and environmental change was held at the National Academy of Sciences (NAS) in Washington, D.C., and the proceedings of that meeting are available online (http://www.nap.edu/html/9856.html). A major conclusion from that meeting was that "a global, coordinated effort is needed to develop and implement a long-term soil science infrastructure," in order to "negotiate a harmonious relationship between the food system and the global environment." The Soil Science Society of America (SSSA) and the Center for Environmental Farming Systems (CEFS) have continued the effort to advance global soil science through the Third International Conference on the Science of Global Soil Change (S4D 2008). The site of the conference is the Popular Garden, a year-round garden which has been restored to its historical state, and which is also being used as a demonstration site for educational and agricultural purposes.

Soil is a dynamic and vital component of Earth's surface. Soil processes are fundamental to the functioning of ecosystems, and soil science is essential for understanding and managing the effects of global change. The S4D 2008 conference will bring together soil scientists, ecologists, and other scientists from around the world to discuss the current state of global soil science, and to identify the key research questions that need to be addressed in the future. The conference will include plenary lectures, poster sessions, and workshops, and will be held from 15 to 17 October 2008 at the University of Colorado, Boulder, Colorado.

Atmospheric reanalysis models. The program has been engaged in long-term studies of inversions and the temporal variability of snow and ice albedo. More specialized talks focused on modeling and its implications for the two communities.

There is also a need to increase the visibility of geomorphology within the atmospheric sciences community. Few very atmospheric scientists are aware of the research challenges posed by geomorphic processes, so it was suggested that a speaker program be developed to support the travel of geomorphic researchers to give seminars to the atmospheric science departments, that there be joint sessions at national meetings of the American Meteorological Society and AGU, and that the two communities develop joint field programs or joint modeling projects.

The outcome of the workshop is being summarized in a white paper for the NRC, which will review the workshop and its implications for the two fields in an appropriate manner.

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Climate over Landscapes

Workshop on Atmospheric Sciences and Surface Processes; Boulder, Colorado, 1–3 October 2007

Some of the most exciting advances in geophysics over the past decade have come from exploring the links among the Earth's atmosphere, surface, and interior. Through this integration, the scientific community is redefining paradigms for the growth and decay of mountain ranges, the response of landscapes to changing climate, and the coupling between atmosphere and surface processes at spatial and temporal scales ranging from cloud microphysics to continental deformation.

A workshop on the links between atmospheric sciences and geophysics was held at the National Center for Atmospheric Research (NCAR) in Boulder, Colo. The workshop was founded by the National Center for Atmospheric Research (NCF) as part of a series of workshops designed to inform a National Research Council (NRC) study on the future of Earth surface processes research in the United States. The motivation for this workshop was the recognition that the linkages between atmospheric processes and landscape evolution are still poorly established, but that the evolution of process-based geophysical studies along with advances in atmospheric sciences theory, modeling, and observation have opened the door for collaborative research. The aim of the workshop was to bring together atmospheric scientists and geomorphologists to explore existing knowledge and identity key questions and research opportunities. The workshop consisted of interactive lectures on geomorphic research, interpreting mesoscale meteorology, and global climate dynamics. More specialized talks focused on regional climate modeling, landscape evolution modeling, atmospheric inversion, landscape-ecosystem interactions, glaciology, and orogenesis.

While the importance of the land surface as a lower boundary condition has long been recognized within the atmospheric sciences, participants agreed that geographic research on the feedbacks between land-surface evolution and climate is crucial to the long-term and historical changes in the Earth's climate. The workshop and its implications for the two communities.

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