Meetings

cont. from page 196

Standardizing Experiments in Geoengineering

GeoMIP Stratospheric Aerosol Geoengineering Workshop; New Brunswick, New Jersey, 10–12 February 2011

The term "geoengineering" refers to deliberate large-scale anthropogenic modification of the climate. The most frequently discussed type of geoengineering, using so-called solar radiation management (SRM) to counteract global warming, has been to try to create a stratospheric aerosol cloud to reflect solar radiation. Stratospheric aerosols have the potential to cool the planet within a few years, as demonstrated by large natural volcanic eruptions. If a stratospheric aerosol layer could be maintained artificially, it could reduce or reverse some of the impacts of climate change, such as ice sheet melting, sea level rise, and thawing of permafrost.

However, there are potential risks in such a geoengineering strategy, two of the major ones being regional precipitation changes, including a weakened summer monsoon over Asia and Africa, and stratospheric ozone depletion. This Geoengineering Model Intercomparison Project (GeoMIP) workshop started a process to conduct standardized experiments with state-of-the-art climate models to investigate these potential risks and benefits. The GeoMIP project (see B. Kravitz et al., *Atmos. Sci. Lett., 12*(2), 162–167, doi:10.1002/asl.316, 2011) will not address other suggested SRM schemes of cloud or surface brightening but will be relevant to the very expensive suggestion of satellites in space to block solar radiation. Cloud and surface brightening also need to be evaluated. This type of research has been recommended in the AGU position statement entitled "Geoengineering the Climate System" (http://www.agu.org/sci_pol/positions/geoengineering.shtml).

Only a few climate model simulations have been conducted so far, but they are hard to compare because they used different forcings for both greenhouse gas warming and reduction of solar radiation. GeoMIP builds on experiments already being conducted as part of the Climate Model Intercomparison Project Phase 5 (CMIP5), with four sets of standardized experiments using solar constant reduction or stratospheric aerosol clouds to either balance anthropogenic radiative forcing or reduce it quickly. GeoMIP has been approved as a "CMIP Coordinated Experiment" as part of CMIP5.

The 3-day workshop was held at Rutgers University, where participants discussed initial experiments that have already been conducted; procedures for ensuring that all experiments are conducted the same way; potential future publications; and ancillary observations that can be used to validate the experiments, such as observations from volcanic eruptions. Results from experiments already conducted showed an immediate reduction of the hydrological cycle when balancing a carbon dioxide increase with a solar constant reduction. Proposals were made for additional GeoMIP runs, and these suggestions have already been incorporated into the experiment protocol.

The workshop was successful, with attendance by 30 scientists from seven different countries. Thirteen different climate modeling groups, including nine CMIP5 participants, have already agreed to conduct some or all of the GeoMIP model simulations, and others are invited to join the project, which is described at http://climate.envsci.rutgers.edu/GeoMIP/. This Web page also includes detailed specifications for the model experiments. Preliminary GeoMIP results will be presented at the World Climate Research Programme Open Science Conference in Denver, Colo., in October 2011 (http://www.wcrp-climate.org/conference2011/) and will contribute to discussion of geoengineering in the Intergovernmental Panel on Climate Change Fifth Assessment Report, now being written by some of the workshop participants and others.

B. Kravitz and A. Robock are supported by U.S. National Science Foundation grant ATM-0730452. O. Boucher is supported by the U.K. Department of Energy and Climate Change (DECC)/Department for Environment, Food and Rural Affairs (Defra) Integrated Climate Programme (contract GA01101). We thank the British Embassy in the United States and, in particular, May Akrawi, for arranging funding of the workshop and the travel of the British participants. We thank all of the participants of the workshop for their contributions and Melissa Arnesen for local support.

—ALAN ROBOCK, Rutgers University, New Brunswick, N. J.; now at Laboratoire de Météorologie Dynamique, Université Pierre et Marie Curie, CNRS, Paris, France; E-mail: robock@envsci.rutgers.edu; BEN KRAVITZ, Rutgers University, New Brunswick, N. J.; OLIVIER BOUCHER, Hadley Centre, Met Office, Exeter, UK

Correction

The author affiliations in the 7 June 2011 meeting report "Standardizing experiments in geoengineering" (*Eos, 92*(23), 197, doi:10.1029/2011EO230008) contain an error. It is Olivier Boucher, not Alan Robock, who is now at Laboratoire de Météorologie Dynamique, Université Pierre et Marie Curie, CNRS, Paris, France.