what scientists know and, maybe more important, what we do not know.

Because there has been so much misrepresentation about climate change, I am also concerned about the inevitable backlash against science and scientists when the public ultimately learns the correct information. Even if climate scientists and other members of the Intergovernmental Panel on Climate Change (IPCC) are not directly responsible for the present confusion, they should take the necessary responsible action to help rectify the misunderstandings and clarify the confusion. I would suggest that the IPCC make an appropriate statement in this regard before the next Group of Eight (G8) meeting of governments in July 2008.

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(Editor's Note: Please also see the Brief Report by Susan Hassol on page 106.)

MEETINGS

Understanding the Atmosphere
Through Radio Occultation

Second FORMOSAT-3/COSMIC Data Users Workshop;
Boulder, Colorado, 22–24 October 2007

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The second FORMOSAT-3/COSMIC data users workshop was held at the University Corporation for Atmospheric Research, in Boulder, Colo., and was attended by more than 100 international participants from a dozen countries around the world.

COSMIC (Constellation Observing System for Meteorology, Ionosphere and Climate) is a joint Taiwan/U.S. mission consisting of six microsatellites, each carrying a Global Positioning System (GPS) receiver, a tri-band beacon to sense free electrons in the ionosphere via radio waves, and a Tiny Ionospheric Photometer to map ionospheric electron density via ultraviolet emission. The primary purpose of COSMIC is to demonstrate the value of radio occultation (RO) observations of the atmosphere to weather prediction, climate, and space weather. The RO technique produces a vertical profile of refractivity versus height in the ionosphere, stratosphere, and troposphere. This allows scientists to deduce valuable information on electron density, temperature, and water vapor in the atmosphere.

Among the key results presented were characterization of an atmospheric river (a band of water vapor) that produced severe flooding in the Pacific Northwest and a demonstration of the ability of RO to determine globally the height of the planetary boundary layer (the lowest part of the atmosphere that is influenced by the Earth’s surface), which can be used to validate global models of the atmosphere. The electron density profiles have been used to monitor the seasonal variations of three-dimensional ionospheric structures. They are being tested for assimilation into the Global Assimilation of Ionospheric Measurements (GAIM) model for space weather forecasting, which is a project supported by the U.S. Department of Defense. A new daytime equatorial ionospheric feature, called plasma caves, has been identified as being associated with prominent equatorial plasma fountains.

Researchers from operational numerical weather prediction (NWP) centers in the United Kingdom, the United States, and France reported on improvements in the skill of their daily numerical model forecasts through incorporating COSMIC data. The soundings will soon be used operationally in Canada, Japan, Taiwan, and other countries. RO is the only data set assimilated at the European Centre for Medium-Range Weather Forecasts without a bias correction and is therefore used to “anchor” and improve bias estimates for the other observational data sets. This not only improves the accuracy of and weight assigned to other observational data sets during assimilation, but it also improves the quality of NWP analyses for climate research.

The recent U.S. National Research Council “Decadal Survey” for Earth sciences identified RO as a key element in the global climate observing system because of its unique combination of all-weather sampling, high vertical resolution, high precision, and the ability for all measurements to be traced back to absolute international standards. Furthermore, the six-satellite COSMIC constellation has demonstrated the unique ability to profile the atmosphere over the entire day, including in and below clouds, addressing the need to determine how the diurnal cycle is changing in our evolving climate. Analysis of several years of refractivity data derived from Germany’s Challenging Minisatellite Payload (CHAMP) satellite by several independent RO processing centers is in progress. Initial trend comparisons confirm the expected inherent accuracy and precision of the data.

Discussions of the future included completing the COSMIC mission (2008–2011) as well as planning for a follow-on mission. New applications of RO included ocean surface reflections complementing data now gathered by satellite-borne altimeters and the use of additional frequencies 10 and 100 times higher than GPS to achieve the goal of simultaneously profiling water, ozone, temperature, and pressure from near the surface to the mesopause independently of models. Presentations from the data users workshop are available at http://www.cosmic.ucar.edu.

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