MEETINGS

Achieving Satellite Instrument Calibration for Climate Change

Workshop on Achieving Satellite Instrument Calibration for Climate Change (ASIC³), Lansdowne, Va., 16–18 May 2006

For the most part, satellite observations of climate are not presently sufficiently accurate to establish a climate record that is indisputable and hence capable of determining whether and at what rate the climate is changing. Furthermore, they are insufficient for establishing a baseline for testing long-term trend predictions of climate models. Satellite observations do provide a clear picture of the relatively large signals associated with interannual climate variations such as El Niño–Southern Oscillation (ENSO), and they have also been used to diagnose gross inadequacies of climate models, such as their cloud generation schemes. However, satellite contributions to measuring long-term change have been limited and, at times, controversial, as in the case of differing atmospheric temperature trends derived from the U.S. National Oceanic and Atmospheric Administration's (NOAA) microwave radiometers.

Measuring long-term global climate change from space must be addressed from the fundamental physics of metrology, as practiced at the U.S. National Institute of Standards and Technology (NIST). The climate signals we are trying to detect are small, for example, temperature trends of only a few tenths of a degree Celsius per decade or ozone changes as little as 1% per decade. Current satellite systems are not up to the task. Sensors and onboard calibration sources degrade in orbit, long-term data sets must be stitched together from a series of overlapping satellite observations, orbital drift introduces artifacts into long-term time series, and insufficient attention is paid to meeting the high-accuracy, high-stability instrument requirements for monitoring global climate change.

The ASIC³ workshop brought together experts in satellite instrument calibration, metrology scientists from the U.S. and U.K. national standards institutes, remote sensing specialists, and climate data analysts. Topics included a review of the requirements for measuring global climate change, calibration status for current instruments, and concepts and methodologies for achieving calibration of global climate change measurements.

Two overarching recommendations were developed during the workshop. The first calls for a set of satellite benchmark missions to create irrefutable records and calibrate other satellite sensors. This is a new paradigm for achieving satellite instrument calibration for measuring long-term global climate change. The basic concept is to place in space a series of highly accurate benchmark instruments to measure with high spectral resolution the energy reflected and emitted by the Earth. These instruments would not only provide reliable long-term records in their own right, but would also serve as a reference standard in space to calibrate other environmental satellite sensors.

The second recommendation calls for the establishment of a U.S. National Center for Calibration (NCC) that could be organized by NOAA, NASA, and NIST. The NCC would bring together NOAA's expertise in operational missions and calibration/intercalibration of operational instruments, NIST's leadership in measurement science and standards, and NASA's capabilities in research missions and advanced calibration techniques. A NOAA-NIST program to improve satellite instrument calibration, scheduled to begin in fiscal year 2009, will be an initial step toward formation of a national center.

Implementing the recommendations of the ASIC³ workshop would allow early, irrefutable detection of climate change; verification of climate model predictions; and the achievement of the societal benefit goals of the Global Earth Observation System of Systems (GEOSS).

The full meeting report is available on the Eos Electronic Supplement at http://www.agu.org/eos_elec/eeshome.html

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Climate Change Impa Conservation

Planning for Extremes: Addre and Water Conservation, Milwa

Climate change and particularly precip tion changes will affect water runoff and s erosion from agricultural cropland, but w the change be large enough to warrant m ifications in U.S. conservation policy or p tice? In a 2003 report by the Soil and Wate Conservation Society (SWCS), this questi was answered with an emphatic yes [*SWS* 2003]. Impacts of projected precipitation changes on soil erosion and runoff are co plex, display high regional and temporal variability, and depend on a number of n climatic factors, such as seasonal timing agronomic practices and antecedent soil moisture conditions. Altogether, observed and projected changes in precipitation ar believed to substantially heighten the risk of runoff, soil erosion, and related enviro mental consequences. This article report on a follow-up workshop that called for a review of current approaches to estimatir soil erosion and runoff on agricultural lar enhancements to soil and water planning tools, and strengthening of conservation practices and standards.

The SWCS organized and hosted the jo United States–Canada workshop, 'Plannir for Extremes: Addressing Climate Change Impacts on Soil and Water Conservation.' Invited participants represented U.S. and Canadian academic institutions, federal a state agencies, environmental organizatio Canadian conservation authorities, and p vate landowners and farmers.

Objectives were to clarify the risks to s and water resources posed by increased precipitation frequency and intensity; inv tigate opportunities for adapting current soil and water conservation planning too and approaches to environmental risk ma agement of cropland under anticipated c mate change; and make recommendatio to enhance our ability to manage natural resources in agricultural watersheds und anticipated climate changes. The focal p for discussions was the Great Lakes regio because observed and projected change in precipitation patterns are significant in the region, and conservation planning an water quality improvement efforts are cur rently being investigated.

The majority of workshop discussions addressed the enhancement of conserva tion planning methodologies and tools

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