

- How do tropical cirrus clouds affect water and radiation budgets?
- What are the microphysical characteristics of thin, high-level cirrus clouds that are ubiquitous in the area?
- What controls the diurnal cycle of oceanic convection, and how is this related to the evolution of the boundary layer structure?

A focus of the experiment will be the validation of results from ground-based and satellite remote sensing. These include in situ measurement of cirrus cloud microphysics to validate and test the remotely sensed retrievals of cloud characteristics from radar, lidar, and radiometers from the ground and from aircraft. Validation of the NASA CloudSat and CALIPSO (Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observation) products also are key experiment goals.

Data arising from this experiment will be made available to the wider community, and could be a major resource for tropical meteorological research for many years. Programs and centers that will use the data include the World Climate Research Programme's Global Energy and Water Cycle Experiment Global Cloud System Study and the European Centre for Medium-Range Weather Forecasting.

TWP-ICE is collaborating closely with the aircraft experiment organized through the European Union's SCOUTO3 (Stratospheric Climate Links with Emphasis on the UTLS)

project and the United Kingdom's Natural Environment Research Council (NERC) ACTIVE (Aerosol and Chemical Transport in Tropical Convection) projects in November and December 2005. These projects will benefit from the outstanding permanent observing network in the area (one of the best anywhere in the tropics). The projects also will use a number of research aircraft, some of which will also be available in TWP-ICE.

Additional science questions for this component of the austral summer's activities that are combined with TWP-ICE include the following:

- What is, and what controls, the chemical composition of the tropical tropopause layer (TTL)?
- How fast are short-lived chemical species (e.g., bromine compounds) transported into, and through, the TTL? What is their likely impact on the ozone budget?
- How do thunderstorms transport aerosols and chemical species into the TTL?
- What is the relative importance of deep convection and large-scale advection in determining the composition of the TTL?

The studies made in TWP-ICE and related campaigns offer an unprecedented opportunity to address the relative roles and impacts of intense continental-type storms and the more widespread but weaker oceanic storms with one of the most comprehensive tropical data sets ever collected.

Table 1. TWP-ICE Aircraft and Their Principal Roles

<i>Aircraft</i>	<i>Primary Role/Instruments</i>
DOE Proteus	lidar/in situ microphysics
ARA Egrett	in situ microphysics, aerosols, and chemistry
NERC Dornier	aerosols and chemistry
Twin Otter International	radar/lidar
ARA Dimona	in situ state measurements, fluxes

More information about the experiments is available online at <http://www.bom.gov.au/bmrc/wefor/research/twpice.htm>, <http://science.arm.gov/~mather/darwiniop/>, and http://www.ozone-sec.ch.cam.ac.uk/scout_o3/Darwin/index.htm.

—PETER T. MAY, Bureau of Meteorology Research Centre, Melbourne, Victoria, Australia; JAMES H. MATHER, Pacific Northwest National Laboratory, Richland, Wash.; and CHRISTIAN JAKOB, Bureau of Meteorology Research Centre, Melbourne, Victoria, Australia

MEETINGS

Water Supply Planning in the Lake Michigan Region

PAGE 287

Standing in Chicago, Illinois, and gazing across the vastness of Lake Michigan, it is hard to imagine that communities in the surrounding region could be concerned about running short of water. However, international treaties, U.S. Supreme Court decrees, and interstate agreements restrict diversions of water from the Great Lakes in an effort to maintain lake levels. This forces the region to use alternative sources of water to serve the rapidly growing population.

Local governments in the southern Lake Michigan region, and likely elsewhere in the Lake Michigan region, need to acquire and integrate data and information regarding the region's water supply into planning processes.

In response to the clear potential for water supply shortages, the Northeastern Illinois Planning Commission (NIPC) and the Illinois State Water Survey (ISWS) organized a recent conference entitled "Straddling the Divide" to foster a dialogue between engineers, planners, scientists, politicians, and other stakeholders who have a common interest in maintaining

the availability of water for the region's communities. Among the more than 200 conference attendees were representatives from municipalities, councils of government, regional planning commissions, state and federal agencies, water resources consulting firms, and universities.

According to census-based forecasts, future growth near Lake Michigan in Wisconsin, Illinois, and Indiana will present distinct challenges for planners in the region. The population of the region surrounding Lake Michigan is expected to grow by 20% by the year 2030. In many instances, population and urban development are increasing in areas where water is supplied by aquifers and where Lake Michigan water is not available. These trends underscore the need for careful planning to sustain the quantity and quality of groundwater available to meet future demand.

NIPC Director of Planning Sam Santell told conference attendees that although the region faces urgent water supply issues, there is an opportunity to address them now rather than wait for a bigger crisis. He said addressing the problem requires cooperation at the municipal, county, regional, and interstate levels.

One example of this multi-level, inter-regional planning is the U.S. Environmental Protection Agency's (EPA) 2004 management plan for Lake Michigan. It represents an agreement among four states, 10 Indian tribes, and six federal agencies on the sustainable use of the lake.

The conference helped to provide a critical follow-up step to the EPA planning process: engaging stakeholders across administrative and disciplinary divides that often hinder planning and management.

The conference consisted of over 20 invited talks summarizing scientific, engineering, and policy issues regarding the region's water resources. Greg Ellis, formerly of the Edwards Aquifer Authority in Texas, and Pat Stevens of the Atlanta Regional Commission in Georgia discussed water supply planning and management practices used in their regions, including water markets, regulations, and conservation programs.

Opening presentations summarized the need for water resources planning and the legal framework for water management in the region. Dan Tarlock of Chicago-Kent College of Law noted that unlike the system of water rights in the western United States, riparian law is the legal baseline in the Great Lakes states: Landowners abutting a water resource are required to share and make reasonable use of the resource. Tarlock argued that since enforcing riparian law requires winning a tort lawsuit, the limited risk and the lack of a comprehensive permit system encourage the unlimited use of water resources in the region without regard to conservation.

Dan Injerd of the Illinois Department of Natural Resources discussed the Great Lakes Charter Annex of 2001, an agreement among eight Great Lakes governors in the United States and two Canadian premiers to protect, conserve, restore, and improve the Great Lakes water resources for future generations. The Implementing Agreements of Annex 2001 address the range of water management issues in the Great Lakes basin, including conservation, consumptive use, and intrabasin diversions. The Implementing Agreements are currently undergoing revisions.

While water resources planning is a high priority for Lake Michigan region planners, significant research is needed to better understand the groundwater resources that will have to be tapped to provide future drinking water supplies to much of the region. Several talks noted ongoing groundwater studies by ISWS, the Illinois Geological Survey, Wisconsin Geological and Natural History Survey, and U.S. Geological Survey. These include geologic mapping, groundwater inventories, and computer modeling studies at a variety of scales and levels of effort. One immediate outcome of

the conference was a joint proposal by ISWS and the Wisconsin Geological and Natural History Survey to coordinate the measurement of potentiometric heads (observed elevations of water levels in wells) in the deep bedrock aquifers that extend across state lines.

G. Tracy Mehan III, former EPA assistant administrator for water, commented, "As we come to grips with a growing population in the face of water scarcity, we need to look at our water resources comprehensively rather than compartmentally. For too long, we have focused on different aspects of water management to the exclusion of others." Mehan said that for water management to be successful, it must "work socially and politically, not just hydrologically." He noted the economic, social, and hydrologic links across the region's political and watershed boundaries.

Ric Lawson of the Great Lakes Commission concurred, and advocated monitoring approaches that span political and disciplinary boundaries, such as those promoted by the Lake Michigan Coordinating Council of federal, state, tribal, and local agencies, businesses, and environmental groups.

The regional planning commissions will continue to coordinate and participate in the Southern Lake Michigan Regional Water Supply Consortium to collaboratively address the issues facing the region. In addition to maintaining a Web clearinghouse of information on Lake Michigan and water supply sources, the consortium provides an ongoing forum for regional water supply planning by allowing planners, scientists, and water supply providers to exchange ideas and results from ongoing studies and initiatives.

"Straddling the Divide: Water Supply Planning in the Lake Michigan Region" was held on 15–16 February in Chicago, Illinois. The conference was sponsored in part by the Joyce Foundation and the Illinois State Water Survey. Conference proceedings are available online at <http://www.nipc.org/environment/slmrwc/conferences/>.

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ABOUT AGU

Earth and Space Science Ph.D. Class of 2003 Report Released

PAGE 286

AGU and the American Geological Institute (AGI) released on 26 July an employment study of 180 Earth and space science Ph.D. recipients who received degrees from U.S. universities in 2003. The AGU/AGI survey asked graduates about their education and employment, efforts to find their first job after graduation, and experiences in graduate school.

Key results from the study include:

- The vast majority (87%) of 2003 graduates found work in the Earth and space sciences, earning salaries commensurate with or slightly higher than 2001 and 2002 salary averages. Most (64%) graduates were employed within academia (including postdoctoral appointments), with the remainder in government (19%), industry (10%), and other (7%) sectors. Most graduates were

positive about their employment situation and found that their work was challenging, relevant, and appropriate for someone with a Ph.D.

- The percentage of Ph.D. recipients accepting postdoctoral positions (58%) increased slightly from 2002. In contrast, the fields of physics and chemistry showed significant increases in postdoctoral appointments for Ph.D.s during the same time period.

- As in previous years, recipients of Ph.D.s in the Earth, atmospheric, and ocean sciences (median age of 32.7 years) are slightly older than Ph.D. recipients in most other natural sciences (except computer sciences), which is attributed to time taken off between undergraduate and graduate studies.

- Women in the Earth, atmospheric, and ocean sciences earned 33% of Ph.D.s in the class of 2003, surpassing the percentage of

Ph.D.s earned by women in chemistry (32%) and well ahead of the percentage in computer sciences (20%), physics (19%), and engineering (17%). Participation of other underrepresented groups in the Earth, atmospheric, and ocean sciences remained extremely low.

The survey was conducted by the Statistical Research Center of the American Institute of Physics. The AGU/AGI report draws on results from eight prior AGU/AGI surveys of Ph.D. classes (1996–2003), as well as on data from the U.S. National Science Foundation's Survey of Earned Doctorates.

Requests for information for the 2004 survey will be sent to the heads and chairs of Earth and space science departments by 15 September 2005. Timely survey participation by departments and recent Ph.D.s will help to ensure that the survey is a valuable measurement of employment trends in the Earth and space sciences that is used by many students worldwide. For more information, contact Brad Keelor at AGU headquarters, +1-800-966-2481, ext. 504; bkeelor@agu.org.

The report is available at http://www.agu.org/sci_soc/cpst/2003PhDSurvey.pdf.

—BRAD KEELOR, AGU Outreach

M E E T I N G A N N O U N C E M E N T S

PAGE 287

■ 13–15 September 2005 **International Symposium on Oil and Gas Activities in the Arctic**, St. Petersburg, Russia. Sponsor: Arctic Monitoring and Assessment Programme (AMAP). (AMAP Secretariat, Strømsveien 96, P.O. Box 8100 Dep., Oslo, Norway N-0032; Tel: +011-47-2324-1632; Fax: +011-47-2267-6706; E-mail: amap@amap.no; Web Site: <http://www.amap.no>)

Topics include oil and gas activities in the Arctic, past, present, and future; socio-economic aspects of oil and gas development, and indigenous people's perspectives; the effectiveness of regulations and emergency, preparedness and response; and the effects of petroleum hydrocarbons on Arctic biota and humans. Tours are scheduled.

■ 02–07 October 2005 **Third Symposium on Harmful Algae in the United States**, Asilomar,

California, USA. Sponsor: U.S. National Oceanic and Atmospheric Administration. (C. Scholin, Monterey Bay Aquarium Research Institute, 7700 Sandholdt Road, Moss Landing, California, USA 95039-0628; Tel: +1-831-775-1779; Fax: +1-831-775-1620; E-mail: scholin@mbari.org; Web Site: <http://www.whoi.edu/redtide/3rdsymposium/index.html>)

The conference will cover the "red tide" and other organisms responsible for causing paralytic, neurotoxic, lesion-inducing, and gut-wrenching symptoms in people and wildlife. Themes include toxins, fisheries, food webs, public health, and outreach.