dent of the Union appoint an independent panel to draft the statement. In addition to scientists who are active in the issue under consideration, the panel also includes one member from COPA, the originator of the request, and one member from the AGU Council. Before position statements come to a vote before Council, all AGU members are notified, usually by an announcement in *Eos*, that AGU is working on a statement and they are welcome to comment. The panel drafts a statement, taking into consideration comments received from other AGU members, and forwards the draft to the Council for their consideration and vote.

As an organization, AGU has a representative form of governance, and elected members of the AGU Council are the representatives for the Union. The Council consists of Presidents and Presidents-elect of the ten sections, five elected Union Officers (President, President-elect, General Secretary, International Secretary, and past-President) and the AGU Executive Director. Members of the Council review and discuss the draft statements, which are issued on behalf of the Union, before voting to adopt or reject a position statement. AGU policy makes it more difficult to accept a new position statement than reject one or to withdraw an existing statement. Acceptance of a position statement requires a supermajority vote, or 2/3 of Council members. Statements have a lifetime of no more than 4 years, unless the Council chooses to reaffirm a statement. The Council can withdraw a statement at any time by a simple majority vote, or elect to shorten a statement's lifespan.

The revised procedures approved by the Council at the Fall Meeting recognize the need for AGU to stay within its guidelines for public advocacy while also allowing AGU to participate in collaborative efforts on short notice. When other organizations request AGU endorsement, members of COPA and Council discuss the merits of each proposal and then forward the committee's recommendation to President John Knauss for a decision. The revised procedures allow AGU to maintain its integrity as a scientific society but not miss opportunities to be an advocate for science in a timely fashion.

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Permafrost Digital Databases Now Available

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Two global cryospheric data products are now available in digital form: the Circum-Arctic Map of Permafrost and Ground-ice Conditions and the Circumpolar Active Layer System (CAPS) CD-ROM.

Both products are the result of multinational projects of the International Permafrost Association (IPA), a program supported at the American Geophysical Union (AGU) over the past 5 years with a National Science Foundation (NSF) grant. The digital data should prove useful for global climate change models and polar and mountain research and contribute to the assessments of the Intergovernmental Panel on Climate Change.

For the first time, spatial variations in permafrost and their relationship to ground ice, physiography, and overburden thickness have been accurately computed using a digital database. The total area of the Northern Hemisphere covered by permafrost, glaciers, and ice sheets, 25.4%, agrees with earlier estimates (for example, by A. L. Washburn in Geocryology, 1980): 25.5 million km^2 in the map and 24.7 million km^2 in the book. Approximately 65% of the hemisphere's permafrost is found in mountains, highlands, and plateaus, characterized by relatively thin overburden. As warming occurs, significantly large areas of permafrost at high elevations would be susceptible to thawing and increased ground instability. The remaining hemispheric permafrost occupies lowlands, highlands, and intermontane depressions, characterized by thick overburdens. The distribution by map unit is shown in Table 1.

The printed copy of the Circum-Arctic Map of Permafrost and Ground Ice-Conditions (1:10,000,000) can be obtained from the U.S. Geological Survey (USGS), Information Services, P.O. Box 25286, Federal Center, Denver, Colorado 80225 USA. When ordering, refer to the map as USGS Circum-Pacific Map Series CP-45. Cost is $4.00 plus $3.50 postage. The digital version of the map can be obtained from the National Snow and Ice Data Center (NSIDC) at ftp://ftp.ngdc.noaa.gov/Snow_Ice/Permafrost/IPA_map/ or from the United Nations Environment Programme GRID in Norway by contacting grid@grida.no.

The CAPS CD-ROM includes a bibliography of permafrost literature spanning 1978-1997, a 12-language glossary of

Table 1. Permafrost Areas of Northern Hemisphere Based on Continuity (Extent) and Ground Ice Content

	Lowlands/Uplands with Thick Overburden			Mountains with Thin Overburden		
	Ice content by map unit					
	High >20%	Medium 10-20%	Low 0-10%	High >10%	Low 0-10%	Total (%)
Extent of Permafrost						
Continuous (90-100%)	1.49 (5.9)*	1.31 (5.1)	0.38 (1.5)	2.14 (8.4)	5.66 (22.2)	10.95 (43.1)
Discontinuous (50-90%)	0.08 (0.3)	0.87 (3.4)	0.38 (1.5)	0.75 (2.9)	2.34 (9.2)	4.42 (17.3)
Sporadic (10-50%)	0.11 (0.4)	0.31 (1.2)	0.56 (2.2)	0.32 (1.3)	2.66 (10.4)	3.99 (15.5)
Isolated (0-10%)	0.34 (1.3)	0.07 (0.3)	0.60 (2.4)	0.03 (0.1)	2.85 (11.2)	3.89 (15.3)
Relict†						0.12 (0.5)
Glaciers						2.12 (8.3)
Total areas	2.02 (7.9)	2.56 (10.0)	1.92 (7.5)	3.24 (12.7)	13.51 (53.0)	25.49 (100)

*Area, 10^6 km^2 and percentage (%) includes areas underlain by glaciers; glaciers in mountains of Asia and Europe were not included since digital information was not available.
†Area of relict permafrost is for region south of permafrost boundary in Russia; additional areas of relict permafrost included in other units.
Northern Hemisphere land area estimated at 100,407 million km^2 (Oleg Anisimov, personal communication, 1998).

frozen-ground-related terms, several digital maps, and a bibliography and index of more than 700 Russian permafrost maps. It features the Global Geocryological Database (GGD) containing 200 descriptions of permafrost-related datasets held by individuals and organizations around the world. Included are 56 datasets of active layer, borehole temperature profiles, and rock glaciers representative of sites from many of the 23 IPA member countries, and the 69-site dataset of the Circumpolar Active Layer Monitoring (CALM) network. An international soil (cryosol) database and a paleogeographical database of Europe are also part of the package.

The CD-ROM, compiled and produced by the NSIDC, is organized for use with an HTML browser such as Mosaic or Netscape. Netscape is included for users who do not already have an HTML browser. Data files are ASCII, and in a few cases data are also provided in DBase or ArcInfo formats. Images are in GIF format and include scanned photos of rock glaciers as well as maps of data collection areas. The GGD descriptions of each dataset (metadata) are available at Web site: http://www-nsidc.colorado.edu/NSIDC/CATALOG/ENTRIES/G01175.html. For further information on the CD-ROM, contact User Services, National Snow and Ice Data Center, Campus Box 449, University of Colorado, Boulder, CO 80309-0449 USA; Tel: +1-303-492-6199; Fax: +1-303-492-2468; E-mail: nsidc@kyros.colorado.edu. Information on IPA activities including a browse image of the permafrost map and abstracts of the Seventh International Conference on Permafrost are available on the IPA Web site: http://www.soton.ac.uk/ipa.

The CAPS CD-ROM was produced at NSIDC with funding from NOAA's Environmental Service Data and Information program. Additional support for the development of CAPS and the GGD was provided by IPA, NSF, the Geodata Institute at the University of Southampton, England, and the Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, Colorado. The NSF grant to the AGU for the support of the IPA facilitated many of data compilation activities over the past 5 years.

Authors

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GEOPHYSICIST

In Memoriam

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Carl V. Anderson died. He had been a member (Hydrology) since 1993.

Keith Frye died on August 4, 1998, at age 63. He had been a member (Volcanology, Geochemistry, and Petrology) since 1971.

Ross R. Heinrich died on December 14, 1997, at age 82. He had been a member (Atmospheric Sciences) since 1939.

Klaus L. Huber died on June 4, 1998, at age 36. He had been a member (Tectonophysics) since 1992.

Rafael Katzman died at age 35. He had been a student member (Seismology) since 1993.

Vadim Lyatsky died at age 71. He had been a member (Planetology) since 1988.

Joseph D. Martinez died on February 11, 1998, at age 83. He had been a member (Tectonophysics) since 1952.

Harry R. Munkelwitz died in June 1998, at age 65. He had been a member (Atmospheric Sciences) since 1972.

Lewis L. Smith died at age 60. He had been a member (Atmospheric Sciences) since 1986.

Carlton W. Thoms died at age 84. He had been a member (Planetology) since 1962.

Recent Ph.D.s

Hydrology

Conflict analysis under climatic uncertainties: The upper Rio Grande basin, **A. Bella**, University of Arizona, Lucien Duckstein, Ferenc Szidarovszky, May 1996.

Multiobjective fuzzy regression applied to the calibration of fuzzy conceptual rainfall-runoff models, **E. C. Ozelkan**, University of Arizona, Lucien Duckstein, December 1997.

Downscaling precipitation and temperature under climate change over semi-arid regions of southwestern U.S., **B. P. Shreatha**, University of Arizona, Lucien Duckstein, January 1996.

Honors

John R. Apel, a former editor and member of AGU since 1971, wins the 1998 Pecora Award from NASA and USGS for his outstanding contributions toward the understanding of Earth by means of remote sensing. Apel is cited for his sustained pioneering work in the use of satellite and aircraft data in the study of the ocean. He has been a world leader in the advancement of radar remote measurement of the sea, and is known as the "Father" of the Seasat spacecraft, which was launched in 1976. Apel is currently a physicist/oceanographer and president of Global Ocean Associates in Silver Spring, Maryland.

Raymond Hide, an AGU Fellow, Bowie Medalist, and member since 1991, received the 1999 Lewis Fry Richardson Medal in recognition of his "pioneering experimental and theoretical studies of the nonlinear dynamics of rotating fluids, and their application to understanding the dynamics of planetary atmospheres and interiors." He is currently an Emeritus Professor of Physics and Honorary Fellow of Jesus College.

Mark H. Thiemens, a member of AGU since 1981, received the Ernest O. Lawrence Award in the category of environmental science and technology from the U.S. Department of Energy. Thiemens has contributed to current thinking on environmental science, the solar system, and the Earth's formation and evolution. In 1991, he discovered that carbon dioxide in the stratosphere possesses a large and variable mass-independent isotopic composition, which later provided crucial insight into the study of atmospheric molecules and processes. Thiemens is currently a chemist at the University of California, San Diego.

BOOK REVIEW

Aquifer Hydraulics: A Comprehensive Guide to Hydrogeologic Data Analysis

PAGE 635

Vedat Batu, John Wiley, New York, 727 pp., ISBN 0-471-18502-7, 1998, $95.

The past several decades have produced a surge in numerical methods of aquifer analysis, including more complex and sophisticated analytical approaches. For example, many consulting firms and universities have released graphic-intensive software packages for aquifer test data analysis, including automated optimization, data filtering, and preprocessing. It is not uncommon to find users of these products who are not versed in basic theory of aquifer hydraulics. Vedat Batu's *Aquifer Hydraulics: A Comprehensive Guide to Hydrogeologic Data Analysis* provides a valuable service—it teaches readers the most fundamental theory with a comprehensive overview of basic methods.

The quality of a textbook depends on the content from which it is drawn. As such, Batu's book is a very effective textbook. It is a comprehensive primer of classical aquifer hydraulics, summarizing seminal works including, but not limited to, those of (in no specific order) Theis, Hantush, Jacob, Cooper, Papadopulos, Neuman, Witherspoon, Boulton, Bredehoeft, and Lohman.

With a few exceptions, all of the fundamental theory covered in the text is several decades old. For example, much of the theory is also found in books by Walton, De Wiest, Kruseman and De Ridder, Lohman, and