

Hydro on the H i l l

By David
Diodato - with
contributions
by Erik Webb



U.S. Capitol Dome. Photo by Keith Stanley,
www.kestan.com. (Used with permission.)

Water resources have the attention of policy makers on both sides

of Capitol Hill, and water resources science and public policy will be featured at the annual meeting of the Geological Society of America in Salt Lake City. Both scientists and policy makers face a problem that involves multiple states and spans long times. Common scientific problems – lack of data, limited analyses, and uncertain predictions – present opportunities to advance science through improvements in theory and method. As involved citizens, scientists can listen to the needs of policy makers and respond with relevant and timely information. The challenge for policy makers, who operate in a landscape of compelling and competing

priorities, is to incorporate that information in their deliberations. There is no single solution to the wide range of water resources challenges facing America. However, scientists and policy makers can and ought to work toward articulating common values and objectives, and toward establishing a path forward for meeting those national goals.

Challenges to water resource scientists and policy makers span the nation from west to east. For example, the Colorado River supplies 88% of southern Nevada's water, an area that includes America's fastest-growing city: Las Vegas. As a result of the worst drought on record - a drought that some scientists caution may not end for years - the water levels in Lake Mead have declined to a 40-year low, and in 2005 were approximately 100 feet below the maximum of 1220 feet stored in 1998. In the mid-continent, the High Plains aquifer stretches from Nebraska to Texas, supporting as much as 30% of America's agricultural production. Because water levels in that 173,000 square-mile aquifer system have declined more than 150 feet in places, more energy is required to pump water up from greater depths, increasing costs to farmers. In the east, nitrate and phosphorous draining into the Chesapeake Bay from its 64,000-square mile watershed have contributed to reduced oxygen availability and shellfish production, and threatened industries dependent on the Bay. Taken together, these examples illustrate the broad range of challenges to the nation's water resources.

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EDITOR'S NOTE: A color version of this newsletter is available on the web at [<http://gsahydrodiv.unl.edu>]

Chair's Corner...



**Janet Herman, Chair
GSA Hydrogeology
Division**

My life has changed dramatically since I became Division Chair at the 2004 GSA Annual Meeting in Denver. The following week I was diagnosed with breast cancer, and the ensuing seven months have been nothing like what I was expecting! I am nearing the end of active treatment and feeling very well, but I have learned a lot. First, make sure the women you care about get their routine annual mammograms, although I hope their experience with the remote imaging of a subsurface environment turns out to be more benign than mine. Second, my

colleagues in the Hydrogeology Division have been.... AWESOME! How can I even begin to explain how essential the calls, the flowers, the chocolates, the books, the CDs, the chocolates, the e-mails, the jokes, and the chocolates were to my well-being? I learned in the most gratifying way that we are a community that supports its members, professionally and personally.

I have been repeatedly reminded of the dedication and energy of our colleagues in the first half of my tenure as Chair. The Division is populated by accomplished and thoughtful individuals who make a real difference in the field of hydrogeology and in the larger world. I want to use this opportunity to relate some of the activities of our Division, remind you of the value of your membership, and encourage you to be more involved in the coming year.

Our Division is the dominant force in the technical program at the GSA Annual Meeting offering more sessions and presentations than any other Division. In Salt Lake City, the Hydrogeology Division will sponsor two Pardee Keynote Symposia, 28 topical sessions, possibly another 6-8 general sessions, two short courses, and one field trip. This kind of outstanding technical program arises from the efforts of more than 70 of our

professional colleagues who developed proposals for sessions and who are now following through with invitations to speakers.

Our Division recognizes the outstanding accomplishments of individuals making important contributions to the field of hydrogeology. Each year at the Annual Meeting, we make several awards, and our committees work hard to evaluate the nominations brought forward by our members. As Chair, I experienced the pure delight of calling our award winners with the news that their peers value them highly. One area of recognition in which we fall short, however, is nomination of our own members for the status of GSA Fellow. Our Division is under-represented among the Fellows. We can do much to rectify our low number of Fellows, because we clearly have deserving members. You can help. Go to <<http://www.geosociety.org/members/fellow.htm>> to read the eligibility criteria and obtain a nomination form. Each nomination requires the involvement of three GSA members. The primary nominator must be a Fellow, and the supporting signatories

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The Hydrogeologist

The Hydrogeologist is a publication of the Hydrogeology Division of the Geological Society of America. It is issued twice a year, to communicate news of interest to members of the Hydrogeology Division. During 1998, the publication moved from paper-based to electronic media. The electronic version may be accessed at: <<http://gsahydrodiv.unl.edu>>. Members of the Hydrogeology Division who have electronic mail will receive notification of all new issues. Other members will continue to receive paper copies.

Contributions of material are most welcome, and should be directed to the Editor. Submission as Word or WordPerfect document is most expedient.

F. Edwin Harvey, Editor
The Hydrogeologist
107 NH
University of Nebraska
Lincoln, Nebraska 68588-0517

Voice: (402) 472-8237
Fax: (402) 472-4608
Email: feharvey1@unl.edu

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2004 Annual Business Meeting Minutes

Reported by Ralph Davis
Secretary / Treasurer
GSA Hydrogeology Division

The 2004 Annual Hydrogeology Luncheon, Awards Ceremony and Business Meeting of the Hydrogeology Division of the Geological Society of America (GSA) were held Monday, November 8, 2004 at the Hyatt Hotel in Denver, Colorado. Chairman Chris Neuzil introduced the Division officers, awardees, and special guests. Awards were presented by Chair Neuzil immediately following the luncheon.

Student Research Awards were presented to the following:



2004 Student Research Award winners (from left to right) - T.J. Fudge, Liqiong Zhang, Kelly Schultz, Abhijit Mukherjee, and Joan Blainey. Photo by Ed Harvey.

1. Joan B. Blainey, Uncertainty in Coupled Interaction Between Surface and Saturated Hydrologic Processes, University of Arizona.
2. T. J. Fudge, Creating a Spatially Integrated Melt Water Input Model for Bench Glacier, Alaska, University of Wyoming.
3. Abhijit Mukherjee, Study of Geochemical Evolution of Groundwater and Fate of Arsenic Along a Regional Flow Path in the Western Bengal Basin, India, University of Kentucky.
4. Kelly N. Shultz, Hydrogeology Investigation of Pond Brook Metro Park and Twinsburg Park and Nature Preserve, Summit County, Ohio Pond Brook Metro

Park and Twinsburg Park and Nature Preserve, Summit County, Ohio, University of Akron.

5. Liqiong Zhang, Study of Groundwater and Radioactive Solute Transport in the Aquifer of Yucca Mountain Using an Integrated Approach Radioactive Solute Transport in the Aquifer of Yucca Mountain Using an Integrated Approach, University of Nevada-Las Vegas.

The chair recognized the accomplishments of Dr. Barbara Bekins, U.S. Geological Survey, during her tenure as the 2003-2004 Birdsall-Dreiss Distinguished Lecturer. Dr. William Woessner, University of Montana was introduced as the 2004-2005 Birdsall-Dreiss Distinguished Lecturer.

A plaque for the Distinguished Service Award was presented to Dr. R. Allan Freeze for his contributions to the Hydrogeology Division, the Geological Society of America, and hydrogeology over the course of his career. A summary of major accomplishments was documented in a brochure provided for each person attending the

luncheon.

The O.E. Meinzer Award was presented to Dr. Ghislain de Marsily. Dr. Mark Person was the citationist for Dr. de Marsily. Dr. de Marsily was presented with a plaque and a miniature of the Meinzer Bowl for his significant contribution to the field of hydrogeology with specific reference to the following papers:

1. Matheron, G. and Ghislain de Marsily, 1980, Is transport in porous media always diffusive? A counter example, Water Resources Research, Vol. 16, Issue 5, p. 901-917.

Please see **Secretary** on page 11

Salt Lake City GSA Meeting Will Satisfy All!

By Joe Donovan

Photo by Alan Yorgason. Used with permission.

The 2005 GSA Annual Meeting, October 16-19 in Salt Lake City, promises to be another outstanding scientific event for the Division. Of the 151 topical sessions planned for the overall meeting, 28 have the Hydrogeology Division as primary sponsor. The list of our co-sponsors is long and reflects the real diversity of the Hydro program: International Association of Hydrogeologists, National Ground Water Association, Karst Waters Institute, American Geophysical Union, American Institute of Hydrology, Minnesota Ground Water Association, and the Geochemical Society. There are also many intra-GSA linkages with other divisions including Engineering Geology, Geobiology & Geomicrobiology, Quaternary Geology & Geomorphology, Sedimentary Geology, Structural Geology, and the Geology and Public Policy Committee. Our many conveners represent a broad spectrum of scientists active in the field of hydrogeology today, and you will find the resulting technical program to be broad and interdisciplinary. Full descriptions of all planned topical sessions can be viewed at <<http://www.geosociety.org/meetings/2005/sessions/topical.asp>>.

In 2005, for the first time in several years, there will be not only one but *two* Division-sponsored Pardee Keynote Symposia, giving the Hydro Division a significant portion of the eight Pardee Symposia put on by GSA each year. The Wasatch Range–Great Salt Lake Hydroclimatic System (co-sponsored with IAH, AGU, GSA Quaternary Geology and Geomorphology Division, and Friends of the Great Salt Lake), convened by Chris Duffy, Danny Marks, Dave Tarboton, and Craig Forster, promises to be a landmark synthesis of one of the largest-scale geohydrologic systems on the continent. It is coupled with a topical session within the meeting, and complemented by a Division-sponsored field trip Biogeochemistry, Limnology, and Ecology of Great Salt Lake — A Half-Day Trip on Wednesday, led by David Naftz, Wayne Wurtsbaugh, and Don Paul (cost \$75). The trip involves a fabulous boat tour of the lake and promises to be a great review of the scientific fabric of the lake and its

significance to humans. The second Hydro-sponsored Pardee Symposium, Water Resources Science and Public Policy, co-sponsored by the Geology and Society Division and the Geology and Public Policy Committee, is chaired by Dave Diodato, Pete Folger, and Tamara Dickinson. This session will convene prominent national policy makers and scientists to discuss present and future challenges and opportunities at the interface of water resources science and public policy. We salute the efforts of the Pardee Symposia conveners in developing these sessions that communicate

Some highlights of the technical program include:

- **Chemistry, ecology, and hydrology of lakes and wetlands**
- **Fluid movement near faults**
- **Hydrogeology and climate change**
- **New frontiers in hydrologic modeling**
- **Groundwater interactions at the land-sea margin**
- **Perchlorate in the hydrologic cycle**
- **Arsenic occurrence and fate**
- **Stream hyporheic interactions**
- **Geochemistry of springs**
- **Retrospective celebration of the career of Olaf Pfannkuch**

the broad relevance of hydrogeological science to a large and diverse audience.

There will be two Saturday pre-meeting Division Short Courses: A Tracer Runs through It: Applications of the Tracer-Injection Methods, by Briant A. Kimball (bkimball@usgs.gov) and Rob Runkel (cost \$310); and Springs Inventory and Classification, with Abe Springer (aspringer@nau.edu), Larry Stevens, and Heidi Kloeppel

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Fluxes Through Carbonate & Karst Aquifers

By Jon Martin & Ira Sasowsky

As a part of the 2005 GSA Annual Meeting, a special Topical Session titled: T33 “Water, solute, and sediment fluxes through carbonate and karst aquifers” is being held. We hope that members of the Division will consider submitting an abstract. The session is sponsored by the GSA Hydrogeology Division, GSA Sedimentary Geology Division, and the Karst Waters Institute.

Subject matter suitable for the session would include field & theoretical studies of water, solute, and sediment movement through sinkholes, drip water, speleothems, matrix, fractures and conduits. Present- and paleo-hydrology are appropriate. A holistic understanding of complex systems is sought through varied approaches. Details can be found at <<http://www.uakron.edu/geology/facpages/ids/wssf.html>>.

It has been long recognized that the high solubility and brittle nature of carbonate rocks controls fluxes of water, dissolved components, and solids through a complex system of intergranular matrix porosity, fractures in the rocks, and large cavernous openings. The understanding of transport processes through these multiple porosity systems has evolved from one focusing on the matrix flow field with little regard for the conduits, to one where conduits were regarded as the primary control of the flow field. It has been recognized recently, however, that flow and transport in these system must be viewed holistically, with each part of the aquifer contributing to the flow and transport. These multi-porosity systems are scientifically important for a variety of reasons including: A) Paleoclimate studies - both chemical (speleothem) and clastic deposits in caves record useful

information about past climate, but there are many transport processes and linkages to the record which are poorly understood; B) Transport of anthropogenic impacts - Carbonate aquifers are an important resource but are susceptible to contamination from sources such as agriculture,

manufacturing, transportation, and waste-water disposal, including dissolved, LNAPL, and DNAPL contaminants, as well as sediments. An understanding of, and approaches to solving, these problems are rapidly developing but need to be considered for the entire flow



The Red River in Organ Cave, West Virginia. This flow developed catastrophically in September of 1989 due to nearby water well drilling. The well perforated a lower confining unit, and allowed artesian water to flow upwards in to the cave. (Photo by Ira Sasowsky)

field; C) Paleohydrologic research - the structure and characteristics of karst conduits, as well as the deposits within them, allow reconstruction of groundwater flow systems as far back as several million years. These reconstructions, in turn, allow interpretation of landscape development in concert with the evolution of the groundwater flow system. For each of these problems, it is important to understand the flow fields and transport through the aquifers.

There are many researchers approaching these various problems, all of which fall under our common theme of “Fluxes through carbonate aquifers.” By bringing these researchers together, we hope they will benefit from considering their particular problem in a discussion of a holistic view of fluxes in multi-porosity aquifers.

We hope that you will be able to participate.

Jon Martin <jmartin@geology.ufl.edu>

Ira Sasowsky <ids@uakron.edu>



2004 Birdsall-Dreiss Distinguished Lecturer's Report

By Barbara Bekins

As a former Ph.D. student of Shirley Dreiss, it was an especially great privilege to serve as the 2004 Birdsall-Dreiss lecturer. My first presentation was hosted by Shemin Ge at University of Colorado in conjunction with an Ocean Drilling Program (ODP) panel meeting. I joined the panel members for a half-day field trip on the geology of the Boulder area, and many of them attended my presentation that afternoon entitled “Fluids and the Weak Nature of Plate Boundary Faults.” It was an appropriate beginning because this lecture grew out of the original modeling of fluids in accretionary complexes presented by Shirley during her Birdsall lectureship. Hydrogeologic modeling of fluids in accretionary complexes has since become a mainstay of ODP investigations in subduction zones. There were many other reminders of Shirley’s influence during the year. Some of my hosts remembered hosting her when she was the 1993 Birdsall lecturer. Moreover, I was hosted by five of her former students at University of Florida, Los Alamos National Laboratory, Ball State University, Indiana, and USGS in Richmond, Virginia.

Between November 2003 and November 2004 I gave 61 lectures. My early efforts to limit the number of lectures soon evaporated in the face of overwhelming enthusiasm for the lectureship and universally gracious hosting. The lectures were presented at 56 institutions comprising 43 academic institutions, nine government labs, and four scientific societies. The above-mentioned talk on fluids and faults was requested 28 times compared to 33 for the “The Influence of Hydrogeology on 25 Years of Natural Attenuation at a

Crude Oil Spill Site.” A frequent question asked of all lecturers is whether repeatedly presenting the same talks becomes boring. I did not find this to be true, probably because of my ongoing efforts to improve both talks, which were guided by an outstanding book entitled *The Craft of Scientific Presentations*. A highlight of the year was a meeting with the author, Michael Alley, at Virginia Polytechnic Institute,



Barbara Bekins visits McConnell Springs Park in Lexington, Kentucky. Photo by Alan Fryar.

where Madeline Schreiber hosted my visit. There were many other memorable aspects and it seems appropriate to provide a few samples to give a sense of the experience. While visiting the University of Florida, Liz Screaton took me out on a glorious clear day in March canoeing to the source of a first-order spring. In April, on my way to visit Kent Keller at Washington State University in Pullman, friends and I toured the channeled scablands carved by the glacial Missoula floods. (For a highly readable guide, see the book, *Fire, Faults, &*

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NGWA and GSA: Collaborative Activities in 2005

By Vicki Kretsinger, AGWSE Chair



Vicki Kretsinger,
AGWSE Chair

NGWA Co-Sponsors Two Sessions at 2005 GSA Annual Meeting

As an Associated Society of the Geological Society of America (GSA), the National Ground Water Association/ Association of Ground Water Scientists and Engineers (NGWA/AGWSE) is pleased to co-sponsor two sessions at

the 2005 GSA Annual Meeting and Exhibition, "Science – Learning – Colleagues," October 16-19, 2005 in Salt Lake City, Utah. Co-sponsorship of these sessions by NGWA/AGWSE also furthers collaborative activities that benefit both organizations and is in concert with the additional alliance established when NGWA's Mutual Cooperation Agreement formalized a reciprocal partnership between NGWA and GSA in December 2004.

One of the co-sponsored sessions at the 2005 GSA annual meeting is **"Groundwater Quality and Quantity Interconnections: The Effects of Natural and Anthropogenic Contamination on Groundwater Availability"**, which is being co-convened by Mike Moran of the U.S. Geological Survey (USGS) and Vicki Kretsinger of Luhdorff and Scalmanini, Consulting Engineers. This session (T15) will focus on the interconnections between groundwater quality and quantity, including the effect that quality can have on the volume of groundwater that is effectively available for present and future human and ecological needs. Invited speakers presenting in this session include Graham Fogg of the University of California at Davis, Kevin Dennehy of the USGS, Jean Moran of Lawrence Livermore Laboratories, and Paul Squillace of the USGS. The abstract deadline of July 12 is approaching, and papers are welcomed on topics such as: understanding the vulnerability of groundwater systems to quality/quantity degradation, identifying criteria for assessing the quality/quantity of ground water; and water quality/quantity

management objectives and methods for sustainability. For further information about session T15, please contact Mike Moran at <mjmoran@usgs.gov>, or Vicki Kretsinger at <vkretsinger@lcse.com>.

The other session (T18), **"Innovations and New Frontiers in Hydrologic Modeling,"** which is being co-sponsored by GSA's Hydrogeology Division, NGWA/AGWSE, the US National Chapter of the International Association of Hydrogeologists (IAH), and GSA's Engineering Geology Division is being organized by Frank Schwartz of Ohio State University and Motomu Ibarki of the University of Waterloo. This session will explore how models have grown from a mathematical curiosity to an indispensable tool for analysis of hydrologic systems. This session will also examine new developments in groundwater and hydrologic modeling, emphasizing innovations in theory, design, and data handling. Invited speakers presenting in this session include Ed Sudicky of the University of Waterloo, Al Woodbury of the University of Manitoba, and Zhongbo Yu of Ohio State University. For further information about session T18, please contact Frank Schwartz at <frank@geology.ohio-state.edu>.

GSA Hydrogeology Division Co-Sponsors AGWSE Summit Events

Many thanks to GSA's Hydrogeology Division as a co-sponsor of several activities that occurred at the new AGWSE annual technical conference, the "Ground Water Summit", launched April 17-20, 2005 in San Antonio, Texas.

Distinguished Lecturer Exchange

This first Summit provided a continued opportunity to recognize the NGWA and GSA distinguished lecturers. The 2005 Darcy lecturer, Dr. Kip Solomon (professor in the Department of Geology and Geophysics at the University of Utah and the Director of the Noble Gas Laboratory and also First Vice-Chair of GSA's Hydrogeology Division) illustrated the basic concepts of using inert gas tracers along with case studies that describe their applications to ground water flow problems in his lecture on "Inert Gas Tracers in

Ground Water.” The 2005 GSA Birdsall-Dreiss Lecturer, Dr. William Woessner (professor at the University of Montana, co-founder and Acting Director of the University of Montana Center for Riverine Science and Stream Renaturalization, and immediate past AGWSE Board member) gave his lecture on “Occurrence, Transport and Fate of Viruses and Pharmaceuticals in Ground Water Impacted by Septic System Effluent: The Hydrogeologists and Human Health.”

In keeping with the distinguished lecturer exchange program that began in 2003, Kip will also be providing his lecture at this year’s GSA Annual Meeting and Exposition in Salt Lake City.

First Darcy Forum – The Relevance of Ground Water Science in Today’s Society

At the first Summit, GSA’s Hydrogeology Division also co-sponsored the new Darcy Forum. Dave Rudolph, a professor at the University of Waterloo and immediate past AGWSE board member, created the concept for this new program. Upon reflection of new frontiers in hydrologic sciences or research that will meet future societal needs, the topic for the first Darcy Forum became “The Relevance of Ground Water Science in Today’s Society.” To address this topic, a group of renowned panelists was assembled, each of whom, in a panel discussion orchestrated by Warren Wood (Chair of the Darcy Lecture Selection Committee), provided their observations related to scientific advancements and the relevance of ground water science to society. They also offered their insights on important areas of research, new approaches, and future societal endeavors. Forum panelists included:

- **Mary Jo Baedeker**, recently retired as the Chief Scientist of Hydrology at the US Geological Survey Headquarters in Reston, VA;
- **William Woessner**, a professor at the University of Montana and the 2005 Birdsall-Dreiss Lecturer;
- **Mary Anderson**, a professor at the University of Wisconsin-Madison and Editor-in-Chief of *Ground Water*; and
- **John Bredehoeft**, President of The Hydrodynamics Group, Sausalito, CA.

The panelists’ insights demonstrated significant common threads. Based on their comments, hydrogeologists should be enthused about contributions yet to be made to society through direct application or future research. There exist enormous opportunities for future advancements; there

are also clear needs to evolve our scientific and research approaches, engage in interdisciplinary problem solving, and tackle the challenges we will assuredly face at the interface between science, policy, and public health.

Ground Water Education Session

AGWSE, GSA’s Hydrogeology Division, and IAH co-sponsored a very informative session on “Ground Water Education: Field vs. Classroom.” This session, co-convened by Richard Laton of the California State University at Fullerton, Vicki Remenda of Queen’s University, and Alan Dutton of the University of Texas at San Antonio, included presentations on the interactive learning methods instructors have developed and employed in the field and the classroom to engage students in the educational process and stimulate their enthusiasm for learning. Innovative teaching approaches that integrate classroom theory with practical applications enhance student’s abilities to synthesize various forms of information to solve academic and research problems.

It is evident that interactive training methods, including “hands-on” field methods courses, need to be employed at more institutions, including methods appropriate to lower grade levels. These training methods strengthen the linkages between teaching, learning and research and improve the foundation for addressing society’s increasingly complex earth science and water resources problems. As academicians, researchers, and practicing geoscientists and engineers, we should seek opportunities to promote the value of geoscience education.

2006 Ground Water Summit

The second AGWSE Ground Water Summit will again be in San Antonio, Texas in Spring 2006. Planning is underway, and the AGWSE Board welcomes continued session and other event co-sponsorship by GSA’s Hydrogeology Division. Check the NGWA web site at <www.ngwa.org> for the Call for Conveners; session proposals are due August 1, 2006.

The AGWSE Board extends many thanks to GSA for embracing continued opportunities for geoscience collaboration! We look forward to more opportunities to demonstrate the value of allied efforts.



Visit the GSA Hydrogeology Division web site at <<http://gsahydrodiv.unl.edu>> to catch up on the latest happenings within the division.

Nation's Largest Source of Fresh Water – Ground Water – Needs More Study

In considering the nation's increasing demand for water, the federal government should support efforts to study the largest source of available fresh water – ground water, said the National Ground Water Association (NGWA) in testimony this Spring before the U.S. Senate Energy and Natural Resources Committee. Although ground water makes up roughly 95 percent of the earth's fresh water supply, "Few states have sufficient information necessary to adequately understand the potential yield of their aquifers," NGWA Member David Wunsch told the committee on April 5. NGWA was among 22 groups selected by Senate committee to present and discuss their proposed solutions to the challenges of meeting the nation's ever-increasing demand for water at a half-day Bipartisan Water Conference. NGWA was chosen to speak on the topic, "Knowledge of Water Resources." In a survey of 28 states, NGWA identified increased federal funding for cooperative ground water quantity and quality data collection and aquifer mapping as the most useful actions the federal government could take.

NGWA members consistently stated that the most useful and efficient action the federal government could take would be to increase federal funding for cooperative ground water programs and data collection" Wunsch said. The National Cooperative Geological Mapping Program was given as a good example of a successful program. Specific activities meriting additional discussion include:

- Data Gaps – there is a need for a national clearing house for ground water information and data, including real-time data, help maximize everyone's data-gathering efforts.
- Research Areas – Top priorities for development of long-term ground water sustainability plans include research on water reuse and conservation; alternative treatment systems; development of brackish ground water supplies; aquifer storage and recovery or artificial recharge; emerging contaminants and the development of remediation technologies; and the development of models and data standards.
- Education – We need to educate the public nationwide so they will understand the urgent need for exercising responsible water use.

"No study of our nation's water supplies can be complete without a clearer picture of our ground water resources. One key to success is a vigorous federal role in funding cooperative

efforts with state and local governments to address data gaps," Wunsch said.

For more information, contact:

Cliff Treyens

Director of Public Awareness

National Ground Water Association

Email: <ctreyens@ngwa.org>



Does the United States Have Enough Water? - White House Report Details Need for Science and Technology to Support Water Availability

The short answer to the question is, we do not know. Despite increasing conflicts over allocation of scarce water resources for various needs, we do not have a clear picture of how much fresh water is available. Our monitoring and assessment of water storage and flow in rivers, lakes, snowpacks, soil, and aquifers is incomplete. As for water use, we have a general idea of how much is used to meet various needs such as public supply, irrigation, industry, energy production, commerce, and livestock, but we need more precise measurements, and we need to assess water requirements for healthy ecosystems.

According to John H. Marburger III, Director of the Office of Science and Technology Policy,

"The health of the American people and the economic growth of the Nation depend on continuing availability of clean fresh water. The recent drought in the western U.S. and the increasing number of conflicts over the allocation of limited water supplies amplify the need for a better understanding of water availability. This report provides a clear statement of need for coordinated science and technology efforts to understand the supply, human demand, and environmental requirements for fresh water in the United States."

Many of the Federal programs to monitor, assess, and forecast water availability are in need of improved coordination and consistency. Some of these programs need to be focused more specifically on information needs of those who manage, treat, distribute, and protect water resources. New technologies for water conservation and supply

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NGWA 2005 Summit Education Session Co-Sponsored by IAH - Learning by Doing is Fun!

By John E. Moore

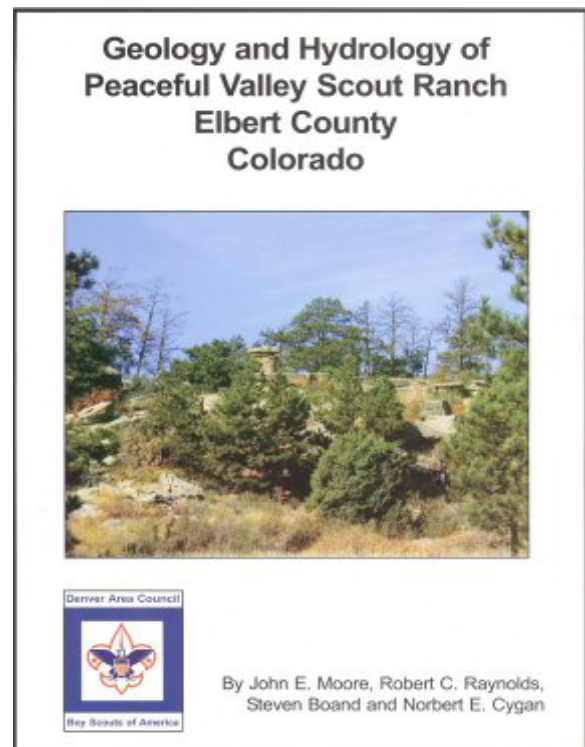
The U.S. National Chapter of the International Association of Hydrogeologists (IAH) and the Geological Society of America (GSA) co-sponsored a very informative and thought provoking session on “Groundwater Education: Field vs. Classroom” at AGWSE’s 2005 Ground Water Summit. This session, co-convened by Richard Laton of the California State University at Fullerton, Vicki Remenda of Queen’s University, and Alan Dutton of the University of Texas, Austin, included presentations on the many innovative methods instructors have developed to engage students in active learning. Such approaches, whether in the field or the classroom, stimulate student’s enthusiasm for learning “by doing” and increase their ability to synthesize many forms of information as they tackle educational and research problems. Through this active process, knowledge-based skills are enhanced, and problems are more often approached with an atmosphere of intrigue and discovery. Essentially, learning is fun! Most importantly, an interactive learning environment creates a basis where the desire to learn, grow, and develop a passion for geoscience can last a lifetime.

Dr. John Moore, Chair of the IAH Education and Training Commission (E&T Commission), made a presentation in this session on IAH’s E&T Commission. IAH which has 3,500 members in 135 countries and established its E&T Commission in 1993 to prepare training guides and other publications, sponsor short courses, develop fact sheets, and translate technical books. The Commission’s efforts have provided training tools for teachers and also the general public.

One objective of the training guides is to promote wise management and protection of groundwater. In 1995, the American Geological Institute (AGI) published the first IAH guide, “Groundwater-a Primer”; this guide is available in four languages, including Spanish, French, and Italian. The “Glossary of Hydrology,” a handy reference for all groundwater professionals, was published in 1998 by AGI. A third publication, “A Geologic and Hydrologic Guide for Peaceful Valley Scout Ranch, Colorado” (2002), was developed to educate and interest Boy Scouts in geology and hydrology. The Peaceful Valley Scout Ranch provides a terrific outdoor educational setting with a wide variety of rocks (including surface exposures of conglomerate and arkosic sandstone), minerals, and fossils. The guide includes

color photographs of the rocks and fossils found at the Ranch to aid the Scouts in understanding the local geologic features. Similar Boy Scout guides are being prepared for other Scout ranches, including the Philmont Scout Ranch in Cimarron New Mexico and ranches in South Africa, Spain, Portugal, and Germany.

The E&T Commission has sponsored hydrogeologic short courses in Mexico, Egypt, Argentina, Australia,



Germany, Serbia, in the U.S. Short courses are also planned for the IAH Congress in China in 2006. The Commission is currently preparing a series of two page fact sheets on groundwater-related topics, including locating water supplies, well contamination, spring contamination, and septic systems.

Those interested in the activities of the E&T Commission, or in becoming a member of the Commission, can contact John Moore at <Moore123@aol.com>. Additional information on IAH is posted at <www.iah.org>.



Secretary from page 3

2. De Marsily, Ghislain, 1986, Quantitative Hydrogeology, Academic Press, New York, New York, 440 p.



Dr. Ghislain de Marsily addresses luncheon guests after being awarded the 2004 O.E. Meinzer Award. Photo by Ed Harvey

The annual business meeting was called to order at 2:05 p.m. after completion of presentation of awards. The first order of business was reading of the necrology followed by a moment of silence. Following this, chairman Neuzil presented the state of the division.

The Secretary/Treasurer report was presented by R. K. Davis.

For the year July 1, 2003 to June 30, 2004 there was \$9,219 in revenue from dues. An additional \$309 in revenues was realized from contributions from continuing education courses sponsored by the Division. There were also contribution revenues of \$25. The total revenues for the period were \$9,553. Expenses include the annual meeting, newsletter, postage, student travel awards, and the Birdsall-Dreiss lecture tour for a total of \$11,109. There was net income for the

year of (\$1,556). The negative net income during the budget period resulted because the costs of the Birdsall-Dreiss lecture series were billed against the general Hydrogeology Division funds in an effort to defray applying these costs against the Birdsall-Dreiss funds which have been heavily impacted by market fluctuations over the last several years. The ending balance for the Hydrogeology Division account on June 30, 2003 was \$21,593. Three funds managed by the GSA Foundation for the Hydrogeology Division did remain relatively stable or increased slightly over the period as a result of improved markets and significant contributions from Hydrogeology Division Members (**Thank You!!**) The Hydrogeology Division Award Fund ended the period with \$47,859 an increase of \$7,353; the Birdsall Award Fund ended the period with a balance of \$71,447 an increase of \$12,223; and the Dreiss Award Fund had an ending balance of \$32,933, an increase of \$7,383. Now that these funds are stable and increasing again they will be leaned on to defray the costs of the Birdsall-Dreiss Lecture series in the coming year with some additional support provided from the Hydrogeology Division's main fund. The combination of revenues from the Birdsall and Dreiss funds and the main Division fund will provide approximately \$8,500 for this year's lecture tour. This is a vast improvement from the past several years but still slightly short of the \$10,000 goal that the management board would like to be able to provide in support of the Birdsall-Dreiss Distinguished Lecture series.

The election results were presented: Total votes: 158–151 online and 7 paper. Approximately 14% of the voting members voted. Officers: Chair: Janet S. Herman; 156 yes, 2 write-ins, 0 abstain. First Vice-Chair: D. Kip Solomon; 157 yes, 1 write-in,

0 abstain. Second Vice-Chair: Scott W. Tyler–155 yes, 2 write-ins, 1 abstain. Secretary/Treasurer: Ralph K. Davis–156, 1 write-in, 1 abstain.



Dr. R. Allan Freeze accepts the Distinguished Service Award. Photo by Ed Harvey

Dr. Jim Hendry provided a report on the status of the Division's program for the 2004 annual meeting which was a fantastic success. There was a wide array of technical sessions sponsored or co-sponsored by the Hydrogeology Division that all appeared to be well attended. Dr. Joe Donovan was introduced as the Hydrogeology Division's joint technical program representative for the 2005 annual meeting scheduled for Salt Lake City, Utah.

A newsletter update was provided by Dr. Ed Harvey. The WEB site for the Hydrogeology Division is now being hosted by the Conservation and Survey Division, University of Nebraska. If you have questions or comments about the newsletter or the WEB page please send Ed a note. He's always looking for new material to add to the newsletter.

Ms. Karlan Blythe reported on the John F. Mann Mentor Program.

She encouraged Hydrogeology Division members to become active participants in this program. The program provides interaction between students and hydrogeologic professionals via the annual and sectional meetings of the GSA. Students are provided lunch and have an opportunity during this time to interact with professionals from their region who have volunteered as mentors for the program. It's a great chance for students to see what their careers may be like in

The final order of business occurred when Chair Chris Neuzil turned over the chair duties to Dr. Janet Herman. The meeting was adjourned at 2:53 pm.



Ralph K. Davis
Secretary -
Treasurer
GSA
Hydrogeology
Division



Chair from page 2

must be members. For those of you who haven't done this in a while, the rules changed in 2005. A GSA Fellow may sign two nomination forms per election cycle, only **ONE** of which may be as the primary nominator. A GSA member may not be the primary nominator but may sign as a secondary nominator for no more than **TWO** nominees per election cycle. Do you have someone in mind? You can develop the case anytime, but if you want to see your colleague elected to Fellow in 2006, the deadline is January 15, 2006. Why not work on the nomination now in the more leisurely pace of the summertime?

Our Division is singular in its commitment to students. At the Division Chairs meeting in February, other Chairs were known to identify themselves as "Hydro Division Wannabes." The reason for envy was two-fold: our famous student reception and our large number of student members reflecting upon the vigor of the field of hydrogeology. Again, this recognition arises from the work of the Division members. Students tell me that they enjoy the Annual Meeting because they feel so valued. We support their research through grants, we include them in the luncheon, and we go all out for the reception. How do we do it? With the support of your membership dues and donations, we fund the student reception (where 300 students met with senior professionals and received door prizes in 2004) and graduate student research grants. Your attendance at meetings where we involve students as full participants lets them know they are accepted into the professional community and are important to its future.

The Birdsall-Dreiss Distinguished Lecturer carries the message of the role of hydrogeology in the broader world at the same time that important research findings are communicated to students and professionals at many institutions. The willingness of our Lecturer and the requests from hosts far exceed our current travel budget. We have made some progress in improving the support of the Lectureship – a private donor has stepped up to match financial contributions from former lecturers. Yet, as members, we have not fully responded to Bob Ritzi's challenge of two years ago that each regular member of our Division pledge \$25 per year over four years. The reputation of our profession, the education of students, and the public understanding of

hydrogeology can all be elevated through this Lectureship.

How can you be more involved? As a membership organization, we are critically dependent upon membership dues to fund our activities and upon our members to contribute their time and expertise.

- If you are not currently a member, visit <http://www.geosociety.org/members/> and pay your 2005 Division dues of \$12 (or \$5 for students). Then, encourage a colleague or a student to join. All Division dues go straight to the Division.
- Attend Annual or Section meetings. Further, take students along so they can grow professionally. While there, attend the luncheon, make a donation to support student research, and receive an historical mug. Finally, stay for the Business Meeting to learn how you can help shape future Annual or Section meetings. See <http://www.geosociety.org/meetings/2005/> for Annual meeting information.
- Recognize an outstanding colleague by nominating her or him for annual awards or for GSA Fellow <http://www.geosociety.org/members/fellow.htm>.
- Contribute to our Birdsall-Dreiss Distinguished Lectureship fund to support the Division's foremost outreach and education effort. You can contribute by going to <https://rock.geosociety.org/donate/donate.asp> and selecting the drop-down menu for either the Birdsall Award Fund or the Dreiss Memorial Fund.

By the time of the next Newsletter, I hope you will have submitted an abstract or registered to attend the GSA Annual Meeting. Until then, celebrate the good things in your life, especially the important people who support you every day.



Water from page 9

enhancement need to be explored, and the economics of water use and water conservation need to be understood more fully.

These are some of the findings of a report just published through the White House Office of Science and Technology Policy. The report, *Science and Technology to Support Fresh Water Availability in the United States*, was prepared by the Subcommittee on Water Availability and Quality, a part of the Committee on Environment and Natural Resources, reporting to the National Science and Technology Council. Members of the Subcommittee included water research and technology directors from about a dozen Federal agencies.

[Report Title: *Science and Technology to Support Fresh Water Availability in the United States* <<http://water.usgs.gov/owq/news/swaqaqreport.pdf>>].

This report is available online at <http://water.usgs.gov/owq/news/swaqaqreport_2-1-05.pdf>. Printed copies may be obtained from OSTP by calling 202-456-6101. Questions about the report may be directed to Gene Whitney, OSTP, at 202-456-6081. For additional information please contact: Bob Hopkins, Office of Science and Technology Policy, 202-456-6098 or A.B. Wade, U.S. Geological Survey, 703-648-4483.



B-D Report from page 6

Floods: A Road & Trail Guide Exploring the Origins of the Columbia River Basin, by Marge and Ted Mueller). Finally, following Janet Herman's suggestion, I arrived in October at University of Virginia in time for the fall colors.

Summarizing the status of hydrogeology around the country is the hardest aspect of this article, so it seemed appropriate to look back at what past lecturers have written. The main result of this exercise was the humbling realization that most of my observations have already been made by others. In 1995, Fred Phillips said that a strong quantitative background is essential for students who wish to pursue graduate studies in hydrogeology. He reflected that such courses can be difficult for geology students to fit in with all of their course requirements. This message is consistent with one I frequently heard, reflecting concern over weakness in quantitative skills among graduate applicants. Fred suggested that more flexibility in course requirements would help provide the time for students to acquire needed quantitative skills. In her article last year, Jean Bahr commented on the financial hardships facing public institutions; a subject that came up again repeatedly during my year. Particularly poignant were the concerns of assistant professors struggling to bring in research funding from local and national programs. In spite of these difficulties, an observation by Shirley Dreiss still applies – there is a striking variety and vitality of hydrogeology programs around the country. Recently hydrogeology programs are forging exciting links with biogeochemistry, surface water hydrology, and geography. I was struck also by the regional nature of much of the

hydrogeology research. As past lecturers have noted, many of the job opportunities for geoscience graduates are in hydrogeology, and the focus of these jobs is on local water and environmental issues. Hydrogeology professors who have developed local research interests are in great demand by the students. Moreover, these programs provide independent expertise and graduates with the skills needed to manage local environmental resources. Notable regional research focus areas were: Southwest – arsenic, paleohydrology, and mountain block bedrock recharge; Northeast – fractured rock flow and transport, mining impacts; Southeast – karst, freshwater-seawater interfaces; Midwest and California – impacts of agriculture and logging on water quality.

In the tradition of hydrogeology, the programs I visited covered theoretical, field, and laboratory components. Theoretical investigations included advances in attempts to relate heterogeneity to dispersion, test problems for inverse methods with incorporation of new data types, and extension of Lattice-Boltzman methods to new problems. Many laboratory investigations included microbiology components. At the field scale, applications of geophysics are growing, including mapping of seeps using infra-red imaging, detection of intermittent spring flow using resistivity changes, subsurface imaging using ground-penetrating radar, and the inference of hydrologic properties from a host of geophysical data. A number of programs around the country are beginning ambitious attempts to treat the surface water, unsaturated zone, and groundwater as a continuum to address both water-budget and water-quality issues. Efforts have focused on the effects of changing land-use, the role of groundwater in ecosystems, and the contribution of groundwater discharge

to surface-water quality. Incorporation of a deeper understanding of geology to characterize subsurface properties is a growing aspect of the large-scale approaches. New links with structural geologists were especially apparent to me from the number of fascinating new studies on the role of faults in controlling fluid flow.

In closing, I'd like to enthusiastically thank the Hydrogeology Division for keeping the lectureship healthy all these years, and for this fascinating opportunity. Thanks also to all the hosts, students, and faculty who met with me and explained their research in such a clear and compelling fashion. I wish I could have made it to the ~10 additional places that invited me. Finally, I am especially grateful to the USGS for providing me with the time for the lectures and to colleagues, family, and friends who helped out in innumerable ways.



Salt Lake from page 4

(cost \$295). Contact the convenors directly if you want more details.

As usual, only those sessions with enough abstracts submitted will survive the cut to be in the final schedule for the Annual Meeting. The deadline for abstract submission is July 12. So get your abstract in on time, and be sure to specify the topical session number in which you wish to be included!

The Birdsall-Dreiss Distinguished Lecture will be presented by Bill Woessner on Tuesday afternoon, after the Hydrogeology Division luncheon, awards ceremony, and business meeting. The National Ground Water Association's Darcy Distinguished Lecture ("Inert Gas Tracers in Ground Water") will be presented by Kip Solomon at the end of the topical session session Bedrock Infiltration: Advances in Understanding Vadose-zone Processes, Percolation through Macropores and Shallow Soils, and Recharge to Consolidated-rock Aquifers, convened by Vic Heilweil and Lorraine Flint.

In short, the 2005 Hydrogeology Division technical program will be diverse, intriguing, and a not-to-be-missed affair, thanks to the efforts of Division conveners and speakers! Thanks to our many conveners, trip leaders, and short course instructors for their hard work and creative ideas during the planning process!

See you in Salt Lake City!



Joe Donovan

Laura Toran

Joe Donovan &
Laura Toran
(Co-Chairs)
Technical Program
Committee



The 34th IAH Congress to be Held in Beijing, China Oct. 9-13, 2006.



The Great Wall of China (photo by George Yu)

The 34th Congress of the International Association of Hydrogeologists (IAH) will be held in Beijing, the People's Republic of China (PRC) from October 9 through 13, 2006. The theme of the Congress is *Groundwater – Present Status and Future Tasks*. The Ministry of Land and Resources of the PRC and IAH will be hosting the Congress with major sponsors including the IAH China National Chapter and the China Geological Survey. This Congress will also organize a special event to commemorate the 50th Anniversary of IAH. This is the second time China hosts an IAH Congress. In 1988, the 21st IAH Congress was held in China in the beautiful city of Guilin.

Many GSA members in the Hydrogeology Division are also members of the IAH. If interested in attending this meeting in 2006, please visit <www.iah34bj.com> for more information and to download the registration form. The registration form has to be sent to the organizing committee by August 31, 2005. Several post-conference geo-trips are planned including trip to Tibet plateau, Guilin tower karst landscape, and the Three Gorges Dam project site. Details of these trips can be found at the web site. If anyone has questions or encounters problems visiting the website, please contact Dr. George Yu at (865) 694-2981 or <guyu@mactec.com>.



Hydro from page 1

On April 12, the U.S. House of Representatives passed HR 135, the 21st Century Water Commission Act. The Act, a sustained effort of Representative John Linder of Georgia, provides \$9 million to establish a 9-person Water Commission to develop recommendations for a comprehensive water policy that ensures an adequate supply of fresh water for U.S. citizens over the next 50 years. Part of the Commission's legislative mandate would be to study the current water management practices of federal, interstate, state, and local agencies and to develop recommendations "directed at increasing water supplies and improving the availability, reliability, and quantity of freshwater resources." Five Commissioners of recognized standing and distinction in water policy issues would be appointed by the President, two by the Speaker of the House, and two by the Majority Leader of the Senate. The legislation is sensitive to the politics of state water rights, and directs that the Commission respect "the primary role of States in adjudicating, administering, and regulating water rights and water uses" and that it avoid placing increased mandates on State and local governments. Periodic interim reports would be followed by a final report in 3 years. If created, the Commission may recognize the value of hydrogeology in characterizing, quantifying, producing, protecting, and remediating ground water, because all of those activities support goals of the Commission's mandate. The bill has gone to the U.S. Senate for consideration.

In the U.S. Senate, on April 5 the Energy and Natural Resources Committee held a Water Conference with the aim of identifying issues that could improve the management and development of water resources. The conference was jointly developed and managed by New Mexico Senators Pete Domenici and Jeff Bingaman, and had the participation of five other senators. In his press release, Senator Domenici said "I believe we need a new federal investment in water research, which has waned since the 1970s." Invited participants representing federal agencies, local and state governments, and non-governmental organizations expressed the need for comprehensive, accessible and organized water supply and water demand information. That need is consistent with the findings in the November, 2004, Office of Science and Technology Policy report "Science and Technology to Support Fresh Water Availability in the United States," which emphasized the collection of new data and the organization of information to "improve our understanding of the nation's water resources." The report is available from the National Science and Technology Council <www.ostp.gov>.

Subsequent to the conference, Senator Domenici, Senator Bingaman, and three co-sponsors introduced S.895, the Rural Water Supply Act of 2005. The Act provides \$20 million over a ten-year period for the Department of Interior to establish a water supply program in the sixteen Reclamation states¹ "to provide a clean, safe, affordable, and reliable water supply to rural residents."

Next fall, prominent national policy makers and scientists will participate in a Pardee Symposium on Water Resources Science and Public Policy at the annual meeting of the Geological Society of America. The symposium is sponsored by the Hydrogeology Division, in cooperation with the Geology and Society Division and the Geology and Public Policy Committee, all of whom recognize that a safe, sufficient, and reliable water supply is fundamental to the economic security of America and to the health of its citizens.

The outcome of legislative initiatives like those described above is uncertain. What is certain is that awareness of the water resources challenges facing our society has reached high elected officials. The dialog now begun can be informed by our scientific understanding, if we choose to engage and contribute. The suggestion of writing your congressperson is clichéd, but if you choose to do so their contact information is online at <www.senate.gov> and <www.house.gov>. Many representatives also maintain local offices for the convenience of the citizens that they represent! Another way to engage is to participate in meetings of local interest groups, where your expertise may be welcomed and appreciated. Over time that can prove to be a rewarding experience.

We hope to see you at the Symposium next fall. As always, your questions or comments are welcome at any time. Please send them to <ddiodato@TheHydrogeologist.com> or (703) 235-4473.


Thanks!

Footnotes

¹ The Reclamation states are Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Utah, Washington, and Wyoming.




BULLETIN BOARD



Darcy Talk and Fountains Book at GSA Again This Year

In case you missed it, **Patricia Bobeck** will present her talk about Darcy and the Public Fountains at GSA again this year in the Hans Olaf Pfannkuch session. She has also been invited by GSA to participate in the Members Corner and the Author Event. Pat's book will be on sale, and she will be available for a book signing.




PLACE YOUR ANNOUNCEMENT HERE!

Contact the editor today at <feharvey1@unl.edu> to get your note on the Bulletin Board.



GSA Salt Lake City Meeting Approaching Fast

Don't forget to submit your abstracts for the upcoming GSA Annual Meeting in Salt Lake City, UT. The online abstract deadline is midnight, Pacific Time, **July 12, 2005**. Please visit the GSA Webpage <www.geosociety.org/meetings/2005/> to review the list of this year's sessions.



Ground Water Age: Estimation, Modeling, and Water Quality Sustainability

September 23–26, 2005 at the Granlibakken Conference Center Lodge, Tahoe City, CA. Presented by NGWA. Visit <<http://www.ngwa.org>> for more information.



AGU Fall Meeting Deadlines Draw Near

Abstracts for the AGU 2005 Fall Meeting (December 5-9) in San Francisco are due on September 1 (by mail) or September 9 (online). For information on sessions see the AGU web site at: <<http://www.agu.org/meetings/fm05/>>.



2005 NGWA Ground Water Expo

Put Georgia on your mind and December 13-16 on your calendar as the annual NGWA Ground Water Expo heads south this year to Cobb County, Georgia. For more information visit the NGWA webpage at <<http://www.ngwa.org>>.



Wanna Get Away?...Then organize a Penrose Conference.

For guidelines contact GSA Headquarters via e-mail at:
ecollis@geosociety.org
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(303) 357-1034 • fax 303-357-1070

New Division Fellows Elected

The following Division members were named a GSA Fellow in May, 2005, and will be recognized at the Presidential Address and Awards Ceremony at the GSA Annual Meeting in Salt Lake City, Utah on Saturday, October 15th. Congratulations from your colleagues in the Hydrogeology Division!

Barbara A. Bekins, USGS
Isabelle M. Cozzarelli, USGS
George M. Hornberger, University of Virginia
Xiaolong (Bill) Hu, Florida State University
William Berry Lyons, Ohio State University
Robert W. Ritzi, Jr., Wright State University
Carol M. Wicks, University of Missouri
Chen Zhu, Indiana University

Francis H. Chapelle, USGS
Ghislain de Marsily, Univ. of Paris
Paul A. Hsieh, USGS
C. Kent Keller, Washington State University
Eileen P. Poeter, Colorado School of Mines
Laura Toran, Temple University
You-Kuan Zhang, University of Iowa



The National Academies'

Water Information Center

The National Academies have recently created a new web site for their water-related reports, called the "Water Information Center" <water.national-academies.org>. This is an online resource for scientists, managers and researchers providing peer reviewed reports from the National Academies that offer independent, objective advice on many water-related issues in the USA and internationally. Topics of direct relevance to hydrogeologists include groundwater and soil contamination and remediation, artificial recharge and aquifer storage and recovery, current science questions surrounding recharge and discharge issues, and evaluations of the USGS's water programs (e.g., Ground Water Research Program, NAWQA). Other related topics include water supply and sanitation, hydrologic hazards, water quality in the natural environment, river basin systems, and environmental management and restoration.

All of the reports can be read for free online, and summaries are also freely downloadable. PDF's of the entire text of some but not all of the reports can also be downloaded for free.

From The Editor...

Just a short note to personally thank everyone who contributed an article, note, announcement, etc., to this issue, and also to thank all of you who helped me with edits, photos, graphics, reports, and any other contributed information contained herein. This issue of the newsletter would not be possible without you. If you have comments, suggestions, or an idea for a column, or article, please contact me at <feharvey1@unl.edu>. This is your newsletter, and my goal is to publish copy that you the reader/member find informative and enjoyable.

F. Edwin (Ed) Harvey, Editor
[The Hydrogeologist](#)



Hydrogeology Division Contacts

2005 Management Board

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Second Vice-Chair: Scott Tyler (tylers@unr.edu)
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Rocky Mountain - Robert Sterrett
Southeastern - Joe Donovan & Brian Katz

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American Geological Institute - Dave Stephenson
National Ground Water Association - Dave Rudolph
International Assoc. of Hydrogeologists - Todd Halihan
Water Science Policy Liaison - Dave Diodato
Society for Sedimentary Geology - Gary Weissmann

Newsletter Editor: Ed Harvey (feharvey1@unl.edu)

Web Administrators: Ed Harvey, Duane Mohlman

GSA Student Research Grants: Carol Wicks

GSA Council: Don Siegel (disiegel@syr.edu)

Hydrogeology Division Website: <<http://gsahydrodiv.unl.edu/>>
