



The Hydrogeologist

Newsletter of the
GSA Hydrogeology Division

October 2007
Issue No. 67

Hydrogeology Division To Offer Exciting Technical Program at Denver Meeting

By Mark Person,
Technical Program
Chair

This year's Hydrogeology Division offerings include a total of 18 Technical and 6 Poster sessions. For your convenience, a copy of the program schedule for our division appears in this issue of the newsletter (page 7). The total number of abstracts submitted this year to hydrogeology division poster and technical sessions was 406 (the highest number of submissions of any Division). That represents 11% of the total abstracts submitted to the annual meeting program. We tried to limit the number of topical sessions

per half day this year. We were only partially successful. There are between 3-5 sessions per half day (median 3.5 sessions per half day). I want to express my deepest appreciation for all the hard work of our topical session chairs: Ben Rostron, Frank Schwartz, Neil Plummer, Kip Solomon, Martin Appold, Steve Ingebritsen, Don Whittemore, Steve Loheide, Johnathan Caine, J.K. Bohlke, Shawn Frape, Chris Duffy, Shemin Ge, Andrew Manning, Emi Ito, Fred Day-Lewis, Tom Burbey, Jonathan Levy, David Kreamer, Warren Wood, Don Sweetkind, Keith Halford, Wayne Belcher, Mary Hill, Mike Fienen, Randy

Hunt, Chris Muffels, Lawrence D. Lemke, Gary Weissman, Bill Simpkins, Joseph J. Donovan, Kenneth Bradbury, Maureen Muldoon, Patsy Moran, James F. Ranville, Philip E. LaMoreaux, M. Bayani Cardenas, David Boutt. Also, a special thanks to Avner Vengosh and John Lane, who organized a special Pardee session entitled "*Middle Eastern Water Resources in Times of Crisis.*" Hats off to Todd

Please see **Denver** on page 15.

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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...



**Scott Tyler, Chair
GSA Hydrogeology
Division**

Dear Hydrogeology Division Members,

As my year as Division Chair winds to a close, I am very much looking forward to seeing all of you in Denver. The Technical Program that Mark Person and Ward Sanford have

put together is outstanding, with an incredible diversity of topics. I really feel that our Division is expanding the boundaries of hydrogeology and our technical sessions reflect this. In addition to our outstanding Topical Sessions, I want to remind you of our Division sponsored Pardee Keynote Symposium entitled "Middle Eastern Water Resources in Times of Crisis" which will be held on Tuesday from 8 AM to 12 Noon. We are also once again honored to have both our own Birdsall-Dreiss lecturer (Dr. Bridget Scanlon) and the AGWSE/NGWA Sponsored Darcy Lecturer (Dr. James Butler).

At our Annual Awards Luncheon on Tuesday, October 30th, you'll be hearing about our plans for the Division's upcoming 50th Anniversary. We have already begun an ambitious 50th Anniversary Campaign to coincide with the 2009 Annual Meeting (our official birthday) and I'm happy to report that we already are making great progress. You can expect some further news at the Luncheon and there will also

be plenty of ways that each of you can help the division reach its objectives of development.

I have truly enjoyed serving as your Division Chair and I've had a wonderful time working with both our members and the GSA staff. One never really appreciates the energy that our members contribute to making the meeting a success until you can see it develop, and I encourage all of you to consider serving the Division as an officer, section representative or one of several other ways to keep the division moving forward. While I'm concluding my year as Chair, I have committed to the Division and the GSA to continue my efforts towards the 50th Anniversary Campaign and you can be assured that you will be hearing from me in the next few years as we ramp up to the Anniversary. Thanks to all of the membership for your support, encouragement and efforts over the past year!



Please support the Birdsall-Dreiss Lectureship!
Donations can be made through the GSA Foundation at: <https://rock.geosociety.org/donate/donate.asp> or by calling Joan Bell, GSA Foundation, (303) 357-1067.

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.

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Deadline, Spring Issue

May 1, 2008

Frape 2007 O.E. Meinzer Award Recipient

By Ed Harvey

The 2007 O.E. Meinzer Award will be presented Dr. Shaun K. Frape of the University of Waterloo's Department of Earth Sciences at the Hydrogeology Division luncheon at the Denver GSA meeting. For more than twenty-five years, Dr. Frape's research has focused on understanding the hydrogeology and hydrogeochemistry of deep crystalline shield rocks and brines and has included the use of major ions, trace metals, stable isotopes and gas chemistry to characterize and trace brine formation and migration.

In support of Dr Frape's Meinzer, three papers were cited (see inset). These papers highlight Dr. Frape's work related to the hydrogeology and hydrogeochemistry of deep crystalline rocks. The first paper describes his original work related to groundwater-rock interactions within the fractured crystalline aquifers of the Canadian Shield. In this paper, Dr. Frape used a combination of major ion chemistry along with stable oxygen and strontium isotopes to differentiate groundwaters of various origins across the shield and to delineate ion sources during their hydrogeochemical evolution. Within the paper, Dr. Frape discusses a number of evolutions histories responsible for the shift of shield brines toward an Ca-Cl end member chemistry, and sets the stage for subsequent research and debate related to brine chemistry and origin that continues today.

The second paper, part of a classic and highly cited collection of papers edited by Dr. Frape and his colleague Dr. Peter Fritz, describes geochemical trends for groundwaters from the Canadian Shield. This work, documented the stark differences of shield brines from those found in sedimentary basins or hydrothermal environments, and noted a different origin for groundwater and dissolved solutes. Contrary to accepted sedimentary basin brine emplacement theories of the day, the paper suggests an autochthonous salt source and stresses the importance of water-rock interaction in the formation of brine chemistry as evidenced by a lack of non-equilibrium mixing or dilution.

The third paper, a collaboration with strontium isotope researcher, Robert McNutt, demonstrated the utility of using $^{87}\text{Sr}/^{86}\text{Sr}$ ratios to study groundwater in crystalline



Shaun K. Frape enjoys lunch at a cafe in Cape Town, South Africa. Table Mountain rises in the background. (Photo by Randy Stotler)

rocks. The paper presented ratios indicative of water-rock interaction with feldspars, and mixing of brines having different origins as well as mixing with meteoric waters. Subsequent to this paper, this method has become a standard for identifying solute sources and mixing in not only brine studies, but also in studies investigating the origin of salts in regional freshwater aquifers such as the Great Plains (Dakota) and High Plains (Ogallala) aquifers, for example.

These cited works have served as the basis for many subsequent regional geochemical groundwater studies and have become standard reading in the brine hydrogeochemistry community and required reading in water chemistry courses. Given his vital contributions to hydrogeology and his unique and original insight into the understanding of groundwater flow in crystalline rocks the Dr. Frape is this years recipient of the GSA Hydrogeology Division's O.E. Meinzer Award.

Papers Cited For The Meinzer Award:

Water-rock interaction and chemistry of groundwaters from the Canadian Shield, 1984, Frape, S.K., P. Fritz, and R.H. McNutt, *Geochimica et Cosmochimica Acta*, 48(8), 1617-1627.

Geochemical trends for groundwaters from the Canadian Shield, 1987, S.K. Frape and P. Fritz, p. 19-38, in *Saline Water and Gases in Crystalline Rocks*, P. Fritz and S.K. Frape editors, Geological Association of Canada, Special Paper 33, 259 p.

The Sr-87/Sr-86 values of Canadian shield brines and fracture minerals with applications to groundwater mixing, fracture history, and geochronology, 1990, McNutt, R.H., S.K. Frape, P. Fritz, M.G. Jones, and I.M. MacDonald, *Geochimica et Cosmochimica Acta* 54(1), 205-215.

Herman Receives Distinguished Service Award

By Carol Wicks

The 2007 Award for Distinguished Service is presented to Dr. Janet S. Herman in recognition of her exceptional service to the profession of hydrogeology. The award specifically acknowledges her avid membership and



Janet Herman in Slovenia. (Photo by Carol Wicks)

enthusiastic leadership of the Hydrogeology Division and its Management Board.

Herman is a distinguished scientist whose research melds seamlessly the fields of geochemistry and hydrogeology. She has long been a leader in the area of chemical hydrogeology. Her present research involves investigating the multitude of processes controlling the fate of agricultural chemicals in a highly heterogeneous soil

underlain by deeply weathered and fractured limestone and elucidating the surface water-groundwater interactions that modify the chemical character of natural and contaminated water resources. Her professional service extends across the fields of geochemistry and hydrogeology as well. Dr. Herman served as an Associate Editor of *Ground Water*, published by Association of Ground-water Scientists and Engineers (1985–1989); *Applied Geochemistry*, published by the International Association of Geochemistry and Cosmochemistry (1992–2003); *GSA Bulletin* (1993–2001); and *Water Resources Research*, published by the American Geophysical Union (2000–present).

Her first presentation at a GSA Annual Meeting was in 1979, and she has since presented more than a few talks and posters. A member since 1984, she has served the Division in a variety of roles. Her official status in the GSA Hydrogeology Division began with her election to the Management Board in 2003. In her own words, “the three most important functions of the Division are to promote its programs, to work to insure its future, and to recognize the outstanding professional accomplishments of our peers.” Dr. Herman has pushed forward on each of these fronts by energetically soliciting a large and diverse Technical Program for the Annual Meeting, welcoming young researchers into the Division, encouraging the membership to support the Graduate Student Research Awards through the Historical Mug sales, and orchestrating a highly successful Student Reception. During her tenure as Hydrogeology Division Chair in 2005, she was responsible for a campaign to nominate deserving members of the Division as Fellows of GSA. That effort resulted in 15 outstanding hydrogeologists being selected as Fellows in 2006. She has been a staunch supporter of the Birdsall-Dreiss Distinguished Lecture tours and both exhorted the membership to contribute and has herself given annually to that GSA fund.

Few have worked as hard as Dr. Janet S. Herman has for the long-term health of the Hydrogeology Division and the promotion of its goals. Therefore, the Division honors and acknowledges her outstanding professional accomplishments by presenting her the Geological Society of America Hydrogeology Division’s Distinguished Service Award for 2007.





Division Reception Offers Students Chance to be “King of the Hill”

By Kip Solomon & Janet Herman

Once again the Hydrogeology Division’s annual Student Reception was a big hit at the GSA Annual Meeting in Philadelphia. Our generous donors provided more than \$26,000.00 in prizes including 75 books, 20 software packages, 109 student memberships in professional societies, and 3 historical mugs. A new approach was used with the multiple objectives of supporting networking among students and professionals, providing opportunities to meet and work together, and rewarding knowledge of the field of hydrogeology with the door prizes generously donated by our many sponsors. Each person – professional and student alike – was randomly assigned to one of three teams upon entering the reception. After everyone had access to the bar, the teams gathered together to develop a team name, interact with a professional “coach”, and choose a team leader to be “King of the Hill.” Each team sent forth one student at each turn to go head-to-head with the other teams to answer a technical “trivia” question that had previously been submitted by professional members of the Division. Todd Halihan moderated the affair while Rene Price, Vitaly Zlotnik, Laura Toran, Bill Simpkins, and Denis LeBlanc

served as impartial judges. By the end of the evening, we had enjoyed lively conversation and energizing intellectual competition. Many thanks to Janet Herman for organizing such a successful event!

This year promises to be another fun filled evening and will occur on Tuesday, October 31, 5:45 to 7:30 at the Colorado Convention Center Four Seasons Ballroom (immediately following the Birdsall-Dreiss lecture.) Be sure to mark on this on your calendar and join both professional and student members of the Division for a few hours of fun and networking.



McKay To Tour As 2007 Birdsall-Dreiss Lecturer

By Larry McKay



Larry McKay, Jones Professor of Hydrogeology in the Department of Earth and Planetary Sciences at the University of Tennessee, was selected as the 2008 Birdsall-Dreiss Distinguished Lecturer. The lecture tour is sponsored by the GSA Hydrogeology Division and interested institutions can request one of the three talks Dr. McKay has prepared for the tour.

Dr. McKay received a Bachelor's degree (1981) in Geological Engineering from the University of British Columbia and a PhD in Earth Sciences at the University of Waterloo in 1992. He's been a faculty member at the University of Tennessee since 1993 and his main areas of research are groundwater flow and contaminant transport in fractured clays, as well as fate and transport of pathogens and fecal indicators in streams and groundwater. Dr. McKay has strong collaborative ties with researchers at the UT Center for Environmental Biotechnology and many of his graduate students apply molecular microbiological methods (qPCR and gene sequencing) to solving environmental problems. He's also involved in environmental community outreach through the NIH-funded Chattanooga Creek Environmental Health and Justice Collaborative.

To request a visit to your institution, contact Dr. McKay by email at Lmckay@utk.edu **The deadline for requests is November 30, 2007.** Additional information on the lecture tour and Dr. McKay's schedule will be posted on his website at <http://web.utk.edu/~hydro>. The GSA Hydrogeology Division is especially interested in including liberal arts colleges in the itinerary and one of Dr. McKay's talks (Chattanooga Creek) is aimed at multi-disciplinary undergraduate audiences. GSA and UT will pay expenses for travel and the host institution will provide local accommodation and meals.

LECTURE TITLES AND ABSTRACTS

Cracks in the Clay: The Role of Fractures and Macropores in Critical Zone Hydrology

Fine-grained geologic deposits often contain extensive networks of fractures, root holes and other macropores which can strongly influence groundwater flow and contaminant transport. The extent and depth of these features varies greatly according to the origin and geologic/pedologic history of the material. Rootholes typically persist to depths of only a few meters, although in some clays they can be found at much greater depths. Desiccation fractures, which are common in glaciolacustrine deposits, also tend to rapidly decrease with depth, but fractures caused by sub-glacial stresses may be pervasive throughout thick till sequences. Recent research in weathered clay-rich residuum developed on sedimentary rocks in east Tennessee show evidence of fractures and fracture-induced flow to depths of up to 40 m. Fractures and macropores can also act as pathways for transport of natural and anthropogenic constituents to underlying aquifers. Solutes are transported by advection along the fractures/macropores but can also be strongly attenuated by diffusion into the fine pore structure. In contrast, mineral colloids and microorganisms, are largely size-excluded from the fine-pore structure and hence can travel at much faster rates than solutes. Field tracer experiments in fractured clays in Canada, Denmark and Tennessee showed colloid transport rates of a few m/day to >100 m/day at sites where solute tracers were transported at rates that were 100s of times slower. Immiscible phase liquids, such as industrial solvents or coal tar, can enter some fractures or macropores, even in relatively low hydraulic conductivity materials and can lead to extensive contamination. These immiscible liquids dissolve and diffuse into the fine pore structure, where they can act as long term sources of contamination to adjoining streams or underlying aquifers. Although there has been substantial progress over the past 25 years in developing a better understanding of the role of fractures in controlling flow and transport in clay-rich deposits, considerable work remains to be done. This includes better education of geo-environmental researchers and professionals, as well as development of better conceptual and numerical models of fracture origin, vadose and saturated zone flow, and contaminant transport.

Please see **Lecturer** on page 16.

2007 GSA Annual Meeting Program Schedule Hydrogeology Division

Saturday October 27	Sunday October 28	Monday October 29	Tuesday October 30	Wednesday October 31
7:00 a.m. - noon	7:00 a.m. - noon	7:00 a.m. - noon	7:00 a.m. - noon	7:00 a.m. - noon
<p>Field Trips 6:00 am Departure</p> <p>Short Courses 8:00 am - 5:00 pm</p>	<p>President's Student Breakfast (FREE) 7:00 - 8:30 am (CCC Four Seasons Ballroom 2/3)</p> <p>Technical Sessions 8:00 am - 12:00 pm</p> <p>Hydrogeology Div. Management Board Meeting 11:00 am - 1:00 pm (Hyatt: Mineral Hall F)</p>	<p>Technical Sessions 8:00 am - 12:00 pm</p> <p>Exhibits Open 9:00 am - 5:30 pm</p> <p>Ground Water Journal Editors Meeting 11:00 am - 1:00 pm (Hyatt:Capitol Ballroom 3)</p>	<p>Technical Sessions 8:00 am - 12:00 pm</p> <p>Exhibits Open 9:00 am - 5:30 pm</p>	<p>Hydrogeology Division Management Board Meeting 7:00 - 11:45 am (Hyatt: Mineral Hall F)</p> <p>Technical Sessions 8:00 am - 12:00 pm</p> <p>Exhibits Open 9:00 am - 2:00 pm</p>
Luncheon:			<p>Hydrogeology Division Luncheon, Awards, Business Meeting Noon - 3:00 pm (Hyatt: Centennial Ballroom D)</p>	
1:30 - 5:30 p.m	1:30 - 5:30 p.m	1:30 - 5:30 p.m	1:30 - 5:30 p.m	1:30 - 5:30 p.m
<p>GSA Presidential Address & Awards Ceremony 7:00 - 9:00 pm (Hyatt: Centennial Ballroom DE)</p>	<p>Technical Sessions 1:00 - 3:30 pm</p> <p>Welcoming Party & Exhibit Hall Opening 5:30 - 7:30 pm</p>	<p>Technical Sessions 1:30 - 5:30 pm</p> <p>NGWA Darcy Distinguished Lecture 4:40 - 5:40 pm (CCC 708/710/712)</p>	<p>Technical Sessions 1:30 - 5:30 pm</p> <p>Hydrogeology Division Luncheon, Awards, Business Meeting noon - 3:00 pm (Hyatt: Centennial Ballroom D)</p> <p>Birdsall-Dreiss Distinguished Lecture 4:30 - 5:30 pm (CCC 708/710/712)</p>	<p>Technical Sessions 1:30 - 5:30 pm</p> <p>GSA Annual Meeting Ends at 5:30 pm</p>
Receptions:		<p>Alumni Night: Various University Receptions</p>	<p>Hydrogeology Division Student Reception 5:45 - 7:30 pm (CCC Four Seasons Ballroom Foyer)</p>	

Hydrogeology Division Sponsored Technical Program Schedule for the 2007 Denver Meeting

Session Title	Day	Time	Room
Hydrogeology	SU	8:00 AM - 12:00 PM	CCC 704/705
T38. Springs and Spring Deposits	SU	8:00 AM - 12:00 PM	CCC 708/710/712
T39. Hydrogeology of Mountainous Terrains	SU	8:00 AM - 12:00 PM	CCC 705/707
T49. Groundwater Mining and Population Growth	SU	8:00 AM - 12:00 PM	CCC 702
T13. Sources, Transport, Fate, and Toxicology of Trace Elements in the Environment II	SU	1:30 PM - 5:30 PM	CCC 503
T27. Inverse Methods in Practice: Perspectives and Future Directions	SU	1:30 PM - 5:30 PM	CCC 705/707
T31. Innovations and New Technologies for Measuring and Characterizing Groundwater-Surface Water Interaction	SU	1:30 PM - 5:30 PM	CCC 704/706
T33. Innovative Uses of Environmental Isotopes in Hydrology	SU	1:30 PM - 5:30 PM	CCC 709/711
T60. Esker Systems: Processes, Deposits, and Models for Aquifer Development	SU	1:30 PM - 5:30 PM	CCC 603
T148. The Science of Groundwater Recharge, Coal Mine Hydrology/Geochemistry, Stream Restoration and its Application to the Public Good: In Honor of Mary W. Stoertz	SU	1:30 PM - 5:30 PM	CCC 702
T146. Geologic Mapping: Innovations and Interoperability (Posters)	SU	6:00 PM - 8:00 PM	CCC Exhibit Hall E/F
T13. Sources, Transport, Fate, and Toxicology of Trace Elements in the Environment II	MO	8:00 AM - 12:00 PM	CCC 503
T34. Regional Groundwater Flow I: In Honor of Jozsef Toth	MO	8:00 AM - 12:00 PM	CCC 704/706
T50. Hydrogeology in the Desert: A Tribute to Ronit Nativ and Mahdi Hantush	MO	8:00 AM - 12:00 PM	CCC 708/710/712
T51. The Spatial and Temporal Variability of Groundwater Recharge	MO	8:00 AM - 12:00 PM	CCC 705/707
T14. Innovative Approaches to Uranium Mining and Groundwater Restoration	MO	1:30 PM - 5:30 PM	CCC 503

Session Title	Day	Time	Room
T30. Ecohydrology of Riparian Zones	MO	1:30 PM - 5:30 PM	CCC 708/710/712
T34. Regional Groundwater Flow II: In Honor of Jozsef Toth	MO	1:30 PM - 6:00 PM	CCC 704/706
T42. Remote Sensing and Geophysical Approaches for Regional Aquifer Characterization and Monitoring	MO	1:30 PM - 5:30 PM	CCC 705/707
T105. The Chesapeake Bay Impact Structure: Results from the 2005-2006 ICDP-USGS Deep Drilling Project (Posters)	MO	1:30 PM - 5:30 PM	CCC Exhibit Hall E/F
T148. The Science of Groundwater Recharge, Coal Mine Hydrology/Geochemistry, Stream Restoration and its Application to the Public Good: In Honor of Mary W. Stoertz (Posters)	MO	1:30 PM - 5:30 PM	CCC Exhibit Hall E/F
P3. Middle Eastern Water Resources in Times of Crisis	TU	8:00 AM - 12:00 PM	CCC 605/607
T32. Numerical Modeling of Hydrothermal Fluids	TU	8:00 AM - 12:00 PM	CCC 704/706
T35. Solute Plume Conceptual Models: Processes, Predictions, and Paradigms	TU	8:00 AM - 12:00 PM	CCC 705/707
T45. Advances in Understanding and Detection of Groundwater-Stream Water Interactions Across Temporal and Spatial Scales	TU	8:00 AM - 12:00 PM	CCC 708/710/712
T86. New Perspectives on the Rio Grande Rift: From Tectonics to Groundwater	TU	8:00 AM - 12:00 PM	CCC 703
T46. Climate Change Hydrology	TU	1:30 PM - 5:30 PM	CCC 708/710/712
T52. Inland Waters, Playas and Saline Lakes: More Than Mini-Oceans	TU	1:30 PM - 5:30 PM	CCC 703
T105. The Chesapeake Bay Impact Structure: Results from the 2005-2006 ICDP-USGS Deep Drilling Project	TU	1:30 PM - 5:30 PM	CCC 405
Hydrogeology (Posters)	TU	1:30 PM - 5:30 PM	CCC Exhibit Hall E/F
T28. Geologic Controls on Chemical Migration in Fractured and Carbonate Aquifers (Posters)	TU	1:30 PM - 5:30 PM	CCC Exhibit Hall E/F
T31. Innovations and Advances for Measuring and Characterizing Groundwater-Surface Water Interaction (Posters)	TU	1:30 PM - 5:30 PM	CCC Exhibit Hall E/F

Session Title	Day	Time	Room
T33. Innovative Uses of Environmental Isotopes in Hydrology (Posters)	TU	1:30 PM - 5:30 PM	CCC Exhibit Hall E/F
T35. Solute Plume Conceptual Models: Processes, Predictions, and Paradigms (Posters)	TU	1:30 PM - 5:30 PM	CCC Exhibit Hall E/F
T38. Springs and Spring Deposits (Posters)	TU	1:30 PM - 5:30 PM	CCC Exhibit Hall E/F
T40. The Role of Sediments in Hydrology and Hydrogeology: Streams, Springs, Karst Systems, and Hyporheic Zones (Posters)	TU	1:30 PM - 5:30 PM	CCC Exhibit Hall E/F
T86. New Perspectives on the Rio Grande Rift: From Tectonics to Groundwater (Posters)	TU	1:30 PM - 5:30 PM	CCC Exhibit Hall E/F
T28. Geologic Controls on Chemical Migration in Fractured and Carbonate Aquifers I	WE	8:00 AM - 12:15 PM	CCC 705/707
T41. High-Resolution Geophysical Methods for Hydrogeologic Site Characterization	WE	8:00 AM - 12:00 PM	CCC 702
T43. Hydrogeological Research, Capacity Building, and Teaching in the Developing World I	WE	8:00 AM - 12:00 PM	CCC 703
T47. Models and Other Tools for Managing Surface and Groundwater Resources and Informing Policy Makers I	WE	8:00 AM - 12:00 PM	CCC 708/710/712
T105. The Chesapeake Bay Impact Structure: Results from the 2005-2006 ICDP-USGS Deep Drilling Project II	WE	8:00 AM - 12:00 PM	CCC 405
T106. Geologic Structures, Fluid Flow, and Ore Deposits	WE	8:00 AM - 12:00 PM	CCC 504
T28. Geologic Controls on Chemical Migration in Fractured and Carbonate Aquifers II	WE	1:30 PM - 5:30 PM	CCC 705/707
T43. Hydrogeological Research, Capacity Building, and Teaching in the Developing World II	WE	1:30 PM - 5:30 PM	CCC 703
T47. Models and Other Tools for Managing Surface and Groundwater Resources and Informing Policy Makers II	WE	1:30 PM - 5:30 PM	CCC 708/710/712



Want to know what's going on within the GSA Hydrogeology Division?

Then visit our website at <<http://gsahydrodiv.unl.edu>> to catch up on the latest events or find out how you can become more involved with our activities.

Hydrogeology Related Field Trips

Field Trip	Day	Time
414. Hydrology and Geochemistry of the Boulder Creek Watershed	SAT, Oct 27	10:00 AM - 6:00 PM
419. Kirk Bryan Field Trip: Fluvial-Hydraulic Processes in the Colorado Front Range	TUE, Oct 30	8:00 AM - 5:00 PM
430. Aquifer Stratigraphy in the Denver Basin	FRI, Nov 2	8:00 AM - 6:00 PM

Hydrogeology Related Short Courses

Short Course	Day	Time
503. Three-Dimensional Geologic Mapping for Groundwater Applications	SAT, Oct 27	8:00 AM - 5:00 PM
510. Teaching Field Methods in Hydrogeology	SAT, Oct 27	8:00 AM - 5:00 PM



Photo by Ed Harvey

Ground Water Resource Management on National Forest System Lands

By Christopher P. Carlson and Joseph T. Gurrieri, USDA Forest Service

Adequate availability of high quality fresh water is or is becoming the single most significant natural resource issue in many areas of the country. The USDA Forest Service manages more than 193 million acres of forests and grasslands in the National Forest System (NFS), including the headwaters and recharge areas for many local and regional stream and aquifer systems across the country. Ground water underlying national forests and grasslands represents a major reserve of the Nation's fresh water, has a strong influence on the health and diversity of plant and animal species on and adjacent to those lands, and provides drinking water to hundreds of communities around the country.



Spring complex with a protective grazing exclusion fence on the west flank of the Elk Mountains in the Gunnison National Forest in Colorado. Photo by Christopher Carlson.

One of the principal reasons for establishment of the National Forest System was for the management of water resources on the country's public lands. Increasing demands for safe drinking water, requirements to maintain healthy ecosystems, and complex social and scientific questions about how to assess and manage water resources on NFS lands have clarified the need for a more comprehensive approach. As a result, the Forest Service has initiated development of a ground water program and established a national program leader position. This effort will result in direction and guidance to all levels of the agency on the science, methodology, policy, and legal framework for Forest Service ground water resource management. The Forest Service recently published a Technical Guide to Managing Ground Water Resources (FS-881, May 2007), available on the Internet at <http://www.fs.fed.us/biology/resources/pubs/watershed/index.html>.

The program is designed around managing the ground water resources on NFS lands in cooperation with the States as a natural resource interconnected with the other natural resources the Agency is charged to manage in the public interest. The fundamental goal of the program is sustaining

and protecting ground water-dependent ecosystems (e.g., springs; wetlands; shallow water table areas; ground water-fed streams/lakes; cave/karst systems) and the ground water systems that support them. The Agency intends to focus its ground water-management efforts on those portions of the ground water system that if depleted or contaminated would have an adverse effect on surface resources, or present or future uses of ground water.

With the mission to sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations, it is imperative that Forest Service professionals, as well as the public, understand the distribution, quality, yield, and biological values of aquifers on public land. To this end the Forest Service has begun developing policy on ground water, staffing of ground water professionals, conducting technical training sessions, and building awareness among managers. The agency is positioning itself to meet growing water resource management challenges in an ecologically sustainable manner.



Poetry in Hydrogeologic Expression

By Harry LeGrand

There is a tendency for hydrogeologists to adhere to precision-oriented statements as much as possible, even though many imprecise and spirited statements may often be more meaningful. Can poetry often help the public understand and appreciate our work? The following poem, having concise realistic content, was recently drafted to determine if it has educational value for the public and especially for teachers and students. All who have read the poem agree on the potential value for a livened poetic method to express hydrogeologic features. This poem applies to the Piedmont and Mountain region underlain by igneous and metamorphic rocks of the Southeastern States.

Listen To the Aquifers

*With elegant awe we view piedmont and mountain land
And its underground counterpart we try to understand.
The animated hidden ground water has much to say.
Looking closely, we see how the water game will play.*

*Beneath all of the slopes of every mountain valley
And under more Piedmont slopes than we can tally,
Ground water moves at its preferred pace.
Never interested in some competitive race.*

*Under the soil and into rock's winding fractures,
Always seeking springs and lowland apertures,
Trickling below elusively for hundreds of weeks,
Ground water moves steadily toward nearby creeks.*

*The aquifers are bounded by hilltops and adjacent streams.
Further limited by deep unfractured rocks, each seems
Ready to cope with global warming and our water need,
But our greedy habits don't abide by the aquifers' creed.*

*In a trough between adjoining aquifers is each river or creek.
Aquifers nourish and pamper them and try not to let them leak.
Furnishing water to streams during long periods without rain
Is a big responsibility that aquifers try to maintain.*

*A true environmental pulse is each aquifer's water table
Down in dry weather and up in wet weather is a nice label.
As each aquifer is small, modest in yield, and not tightly connected
Over-pumping of ground water regionally is not to be expected.*

*As the aquifers are sensitive to abuse by us,
They spitefully fight back and raise a fuss.
When water is overused or contaminants are in its path,
An aquifer has several ways to boldly express its wrath.*

*Not easily adaptable to human regulations,
Aquifers behave with their own deliberations.
The aquifers are talking, but do we listen?
Are there valuable lessons we are missin'?*

*Our forefathers expected pristine ground water everywhere.
Now, the hidden sea of ground water is pocked here and there
With a plume of contaminated ground water from each waste site.
Spreading and mixing of good and bad water is now a sorry plight.*

*Local aquifers refuse to cooperate with urban sprawl.
Dense population creates waste, and aquifers have gall.
Some aquifers are poisoned each month and can never come back.
Sustainability of good ground-water supplies is not on track.*

*In emergencies that may arise with unforeseen disaster
Places for special pure water we may need to get faster.
Here and there is a pristine spring in a u-shaped valley
For us to appreciate and around which we can rally.*

*Aquifers can maneuver water to level land,
Where wetlands may be alive and grand.
Wetlands display some habitats to appreciate
And are lands on which humans negotiate*

*Hill and dale, linked mini-aquifers everywhere surround us
Translations of landscape and geologic thoughts are a plus.
Topographic maps help us to view aquifers in a splendid way.
We now see how each aquifer's underground game can play.*

*The underground landscape offers new scenic views,
And exploring with aquifers offers a creative cruise.
To look under ground with art in virtual reality,
One can see nature's handiwork and its vitality.*

*Harry E. LeGrand
July 5, 2007*

Denver from page 1.

Halihan for organizing the pre-meeting field course on hydrogeology field methods. These are the people who have made this meeting possible and rich. If you run into Nancy Wright at the GSA booth or David Bush from University of SouthWestern Georgia, please express your thanks for all their work organizing the entire meeting. Nancy tirelessly worked to move abstracts around during the week following July 10, 2007.

As in the past, the Hydrogeology Division will host both the Bidsall-Dreiss and Darcy Lectures in Denver. This year, we are running both of these presentations at the end of two topical sessions:

Darcy Lecture, Jim Butler: *What the Heck Is a Phreatophyte*, Topical Session T30, Monday, Oct. 29, 4:40-5:30 pm, Colorado Convention Center Room 708

Birdsall Dreiss Lecture, Bridget Scanlon, *“Implications of Climate Variability for Groundwater Resources and Waste Disposal in Semiarid Regions*, Topical Session T46, 4:30-5:30 pm, Colorado Convention Center Room 708

Be sure to attend. Also, don't forget to encourage your students to attend both the hydrogeology division luncheon on Tuesday and the student reception later that day at 5:45 pm in the Colorado Convention Center's Four Seasons Ballroom. We are looking forward to seeing you all there in Denver in three weeks.

Cheers,

Mark Person (Technical Program Chair 2007)

Ward Sanford (Technical Program Chair 2008)

Scott Tyler (Hydrogeology Division Chair)



Darcy Book Sales Benefit Hydrogeology Division Scholarship Fund

Henry Darcy's book *The Public Fountains of the City of Dijon* will be on sale at GSA and a portion of the proceeds will go to the Hydrogeology Division Scholarship Fund.

The English translation of Darcy's book will be available at the International Association of Hydrogeologists booth, # 511.

The Public Fountains of the City of Dijon, written in 1856 near the end of Darcy's life, is a description of the water supply system he built in 1834 - 44 and an encyclopedia of Darcy's water knowledge. Appendix D is a discussion of filtration that includes the description of the water experiments that led to Darcy's law. A 28-plate atlas of engineering drawings, originally published separately, is included in the English translation.

The price of the book is \$99 and 10% of the proceeds from GSA sales will go to the Hydrogeology Division Scholarship Fund.

The translator, Patricia Bobeck, will sign books at the IAH booth. For those interested in Darcy's life and work, Patricia will give a talk on "Darcy's Law, Filtration and Public Health" (Paper No. 2-15) at 11:45 a.m. Sunday, and Bob Ritzi will present a poster session entitled "Darcy's Public Fountains of the City of Dijon, Past and Present" (Paper No. 174-26) from 1:30 to 5:30 p.m. Tuesday.

WANTED: NEWSLETTER EDITOR - WEBSITE ADMINISTRATOR

The Hydrogeology Division is seeking a volunteer to assume the duties of Editor of the Division's newsletter "The Hydrogeologist" and to manage the Division's website. The newsletter is published twice a year and is currently assembled using Adobe PageMaker. The website is updated several times a year. The new editor would be responsible for transitioning away from the current PDF/paper copies to a HTML format. If you are interested, please contact Scott Tyler <tylers@unr.edu>. Questions about the duties and time commitment should be directed to Ed Harvey <feharvey1@unl.edu>.

Lecturer from page 6

Germ and Geology: Emerging Issues in Waterborne Pathogen Research

This lecture will address how recent hydrological research and development of new analytical methods in molecular microbiology can combine to change how we detect, monitor and predict the exposure of human populations to waterborne pathogens. Much of our understanding of waterborne pathogen occurrence and transport is based on conceptual models and investigative methods that have changed little in the past 30-50 years. Traditional paradigms for waterborne pathogens can be described with terms as simple as coliforms=pathogen-risk, surface-water=bad, groundwater=good, karst=bad, sand=good, true-groundwater=good, and groundwater-under-the-direct-influence-(GWUDI)-of-surface-water=bad. Recent investigations at UT and many other institutions challenge the existing paradigms. For example, a study of community water supply wells in karst aquifers in east Tennessee indicated that enteric viruses are common and can occur even in wells that don't exhibit other indicators of fecal contamination. Other studies at UT show that very rapid transport of bacteria and viruses can occur in fractured clay-rich sediments and in partially-saturated soils, both of which are settings where slow transport of pathogens is usually expected. There is a great need for additional field-based studies of pathogen occurrence and transport, as well as better collaboration between hydrologists, microbiologists and the public health community. Development of faster or easier to use microbial assays, as well as better sample collection and concentration methods, are providing hydrological researchers with improved tools to help carry out this research. Chief amongst these tools is the development of molecular assays, such as qPCR, which detect pathogens or other fecal microorganisms based on their DNA or RNA signature. Investigators at UT have developed a series of qPCR assays for *Bacteroides* (a major constituent of feces), which can be used to rapidly and inexpensively determine both the fecal concentration in a water sample and the likely source (human, cattle, horse, etc.). These assays have been

used to delineate contaminant sources in watershed studies and have the potential for use in field experiments, allowing bacteria from different fecal sources to be traced throughout a flow system.

Chattanooga Creek: How 30,000 tons of Coal Tar Brought Together Scientists, Social Workers and a Community (this talk is especially suitable for undergraduate institutions or programs)

Chattanooga Creek flows through a mixture of low income urban neighborhoods, commercial developments and old industrial sites. One of the largest contaminant sources in the area is a former manufactured gas/coke plant, which is typical of many of the thousands of such sites found across the U.S. Researchers at the University of Tennessee (UT) investigated distribution and transport coal tar compounds (mostly PAHs) in the soils at the coke plant site and in laboratory experiments. The studies show that immiscible tar and dissolved PAHs can readily penetrate fractures and macropores in the fine-grained soils and are transported through groundwater at substantially higher rates than previously expected. However, contamination is also widespread in the creek, which was the principal concern of local residents. In response to community concerns, we shifted our research to focus on transport and persistence of PAHs in the streambed and floodplain, as well as investigations of the residual contamination that remains after typical excavation-based cleanup measures. In conjunction with the scientific research, we've worked with the UT College of Social Work and local community groups to establish an Environmental Health and Justice Collaborative, which is funded by the National Institute for Environmental Health. Activities for the collaborative include environmental education for residents, health and wellness training, mentoring of high schools students and collaboration with environmental health researchers. The point of this story is that successfully dealing with environmental problems often requires collaboration between a variety of different groups, including local residents, community activists, scientific researchers and regulatory agencies.



Do you have an interesting idea for a short scientific article? Perhaps an opinion on a new policy or technique? Any exciting news in your professional life? Upcoming conference? An announcement of interest to the hydrogeological community? If so, why not publish it in *The Hydrogeologist*? Send your submission ideas to feharvey1@unl.edu.

BULLETIN BOARD

Plan Now For the 2008 GSA Annual Meeting

When: October 5-9
Where: Houston, TX.
For more information visit the GSA webpage at <http://www.acsm meetings.org/2008>

2007 NGWA Ground Water Expo & Annual Meeting

When: December 4-7.
Where: Orlando, FL. For more information visit the NGWA webpage at <http://www.ngwa.org/expo2007/main.efm>.

Groundwater Quality 2007: Securing Groundwater Quality in Urban & Industrial Environments

When: Dec. 2-7
Where: Fremantle, Western Australia. For information visit <http://www.clw.csiro.au/conferences/GQ07/>

AGU 2007 Fall Meeting

When: Dec. 10-14
Where: San Francisco, CA. For information see the AGU web site at: <http://www.agu.org/meetings/fm07/>.

2007 AWRA Annual Conference

When: Nov. 12-15
Where: Albuquerque, NM
For more information visit the AWRA webpage at http://www.awra.org/meetings/New_Mexico2007/index.html.

Groundwater Foundation Conference

When: Nov. 28-30
Where: Lakewood, CO. For more information visit the GF webpage at <http://www.groundwater.org/>

From The Editor...

It is with sadness that I, as your outgoing editor, publish this, my final edition of the newsletter. My term is over, and I now move on to other duties within the Division. I want to thank the Hydrogeology Division for the opportunity to serve in this capacity, and I especially want to thank the various Chairs who lead the Division during my time as editor (Bill, Bob, Chris, Janet, Kip, and Scott) for their assistance and support during my tenure as editor. I have greatly enjoyed this position, and I recommend it to anyone as a terrific way to give back to our discipline, our Society and our Division. As always, I also want to express my gratitude to everyone who contributed to this issue. **THANK YOU ALL!**

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



Hydrogeology Division Contacts

2007 Management Board

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National Ground Water Association - Vicki Kretsinger

International Assoc. of Hydrogeologists - Jack Sharp

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: Jean Bahr

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