

UZIG

March 2014
Issue 16

unsaturated zone interest group

The semi-annual Unsaturated Zone Interest Group (UZIG) newsletter highlights current topics concerning the unsaturated zone. Its purpose is to enhance communication within UZIG. It is not an official publication and should not be cited. Please contact authors or members of the newsletter committee with any questions, comments, and/or suggestions. Send desired changes in the mailing list to jtrost@usgs.gov.

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Visit the website

mn.water.usgs.gov/uzig/

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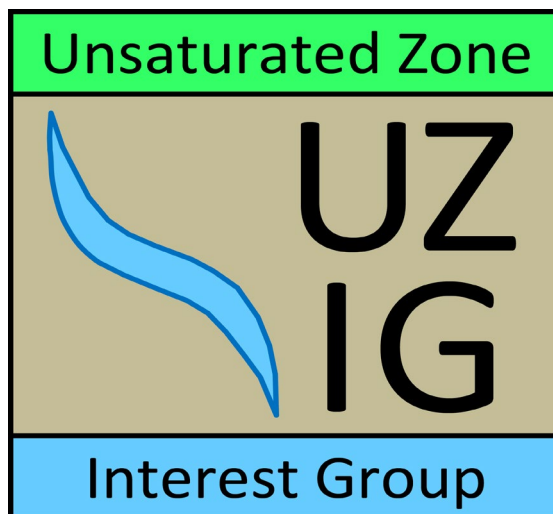
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UZIG logo adopted

By Katie Aurand

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UZIG adopted a logo in February. Andy O'Reilly (USGS - FL) is the creator of the final selection. The inspiration behind the logo is the main hysteresis loop of the soil moisture characteristic curve, which was depicted in more detail on other logo design suggestions. Likewise, the basic layout was inspired by other suggested logos.

"I would consider this final logo a result of the work of everyone who had contributed the designs shown in the fall 2013 newsletter," said Andy. "Interestingly, others have interpreted the logo as suggestive of a preferential flow fracture. This was serendipitous as I had not even thought of that, and it was indicative that the logo accomplished what I intended. The intention was to create a simple symbol recognizable to UZ scientists but not clearly associated with something specific; thus, its meaning is in the eyes of the beholder."

The logo design was discussed at the GSA meeting and voted on after a few minor tweaks by the Steering Committee.

Charter

The UZIG charter is now available online. You can download it at http://mn.water.usgs.gov/uzig/UZIG_Charter.pdf.

Newsletter

The newsletter committee is seeking an additional member. If interested, please contact Katie Aurand at kt.aurand@gmail.com.

Letter from the UZIG Chair: The need for a soil-moisture data network

By Randy Bayless
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At a recent congress on groundwater, I was asked about the coverage and ownership of continuous soil-moisture data in the Midwest. Those present hoped for one-stop shopping where all data were compiled and publically available. As you know, that's not the case, but it made me wonder if the Unsaturated Zone Interest Group (UZIG) wasn't poised to play an important role in this pursuit.

From my Midwestern U.S. point of view, I have seen a new-found interest in soil-moisture data. Some of this is attributable to the drought of 2012 and its impact on agriculture, increasing concerns about climate change, and a public realization (even in water-rich regions) that water supplies are finite and economically valuable. Obviously, those insights were long-ago realized and continue to be front and center in drier regions of the world.

A quick survey indicates that long-term, continuous, spatially distributed networks of soil-moisture (or potential) data are rare. There are examples of national and international efforts to collect or compile data from widely distributed networks, such as the U.S. Department of Agriculture's Soil Climate Analysis Network [<http://www.wcc.nrcs.usda.gov/scan/>] and the International Soil Moisture Network [<http://ismn.geo.tuwien.ac.at/ismn/>]. Some Great Plains states have widely distributed networks [e.g., <http://www.arm.gov/> and <http://www.hprcc.unl.edu/awdn/>].

The technological feasibility and growing interest in real-time continuous stations that integrate groundwater, surface-water, and water quality data are paving the way for more agencies to begin focused efforts to collect soil-moisture data. More than 10,000 real-time soil-moisture records could be collected if only a single sensor was added to each of the current USGS real-time stations. Of course, there is also a tremendous value in the disparate project datasets that many of you have filed away on your local servers.

One way to increase visibility and increase inclusion of the unsaturated-zone component in hydrologic studies is to make the data known and readily accessible. I wonder if UZIG, with more than 500 researchers throughout the U.S. and abroad, doesn't have a role to play in the collection and compilation of links to existing soil-moisture datasets. I believe that the UZIG Charter would support and encourage us to explore these activities.

Would you please email me your thoughts about the virtues, pitfalls, and paths to creating such a compilation? I'm also interested in knowing about your datasets and their availability for such a project.

Thanks as always for your interest and participation,

Randy

Coming soon: a communication forum for UZIG

By Andy O'Reilly
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A UZIG listserv service hosted at the University of Florida has been developed by Rafa Muñoz-Carpena and Jared Trost. The listserv will be tested by the Steering Committee and, if deemed effective, made available to all members of UZIG who will have opted-in in response to an initial invitation to join. Advantages include maintaining an email list of members, enabling the posting of messages by participating members to those who have elected to receive threads, the organization of threads by

subject, and a searchable archive of threads.

Jared and Rafa investigated the pros and cons of both Google Groups and listserv, and recommended that the Steering Committee consider the listserv as its primary tool to manage UZIG's membership and communications. The Steering Committee concurred and launched a testing period. One of the main goals of UZIG is to foster collaboration between UZ scientists; the listserv is envisioned as an effective means of accomplishing this.

New soils group at GSA sponsors 2014 Vancouver sessions

By Dave Stonestrom (with input from Michael Young)
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The Geological Society of America (GSA) is organized into 17 long-standing Divisions including Hydrogeology, Environmental and Engineering Geology, Quaternary Geology and Geomorphology, and

Soils IIG

Interdisciplinary Interest Group



Geobiology and Geomicrobiology. None of the existing divisions has soils or unsaturated zones as its central focus.

To highlight and promote cross-Divisional interactions, GSA last year approved the creation of Interdisciplinary Interest Groups (IIG). The first such IIG was proposed by a group led by Michael Young, Dani Or, and others in October and approved on December 4. Titled the “Soils and Soil Processes Interdisciplinary Interest Group,” or “Soils IIG” for short, the group is seeking new members who are interested in sustaining the group and leading interdisciplinary activities. The group has been active, co-sponsoring 13 technical sessions at the GSA annual meeting in Vancouver, British Columbia, 19–22 Oct. 2014.

Sessions include T47, “Soil as a Controller and Integrator of Geological Processes,” T156, “Agricultural Impacts on Water Quality,” and T49 “Soil Development and Pedogenesis in Geosciences.” The abstract submittal window will open in early April, with a hard submission deadline of 29 July. To see session descriptions and submit an abstract, go to <http://www.geosociety.org/meetings/2014/>.

UZIG Steering Committee seeks two new members

By Randy Bayless
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The Steering Committee for the Unsaturated Zone Interest Group (UZIG) is seeking two new members. Ben Mirus and Jonathon Baumgarner requested to not renew their term and serve during 2014-15. New work demands required Jonathon’s attention and Ben recently accepted a position as assistant professor at the University of North Carolina. UZIG commends and thanks them for their service and contributions during their 2012-13 terms.

The UZIG Charter requires that the Steering Committee membership include 18 individuals that commit to serve two-year terms. Steering Committee members generally participate in one or more Working Groups that manage the organization’s membership,

governance, newsletter, web page, webinars, meetings, and equipment; these tasks are not onerous and do not require much personal time. Steering Committee members are also responsible for electing the UZIG Chair and participating in a quarterly teleconference that lasts 1-2 hours. A distinct benefit of participating on the Steering Committee is the opportunity to network with some incredible scientists that share a common interest in the unsaturated zone.

If you are interested in participating on the UZIG Steering Committee, please contact Randy Bayless (ebayless@usgs.gov) or any Steering Committee member (<http://mn.water.usgs.gov/uzig/direct.htm>).

Updates from the UZIG October business meeting

By Wes Henson
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The Unsaturated Zone Interest Group had a fruitful business meeting at the Geological Society of America Meeting in October, 2013. At the meeting, we presented the UZIG Golden Tensiometer Award to John Nimmo, for his 22 years of service to UZIG. We are truly thankful for his contributions to our group. The meeting was a great opportunity for our membership to meet face-to-face.

We discussed co-locating our next meeting with another society and perhaps saving on meeting space costs. Our group has no formal dues that can pay these costs. Dave Stonestrom was instrumental in setting up the meeting space, providing our snacks and covered much of

our costs. He was essential in many aspects of our UZIG meeting. Thank you Dave.

We discussed our charter document, our webinar series, the website, the newsletter, our logo and our methods for communication and interaction among members. There has been a lot of progress toward getting infrastructure set up for UZIG over the past two years. This newsletter includes updates about the latest UZIG developments. Details about the meeting, can be obtained on the UZIG website, <http://mn.water.usgs.gov/uzig/meetings.htm>.

Golden Tensiometer award presented to John Nimmo

John Nimmo has been instrumental in providing leadership to the Unsaturated Zone Interest Group (UZIG) since its inception in 1988. Starting with the 2001 UZIG meeting in Idaho Falls, John served as lead organizer of UZIG events, greatly expanding UZIG's membership within and beyond the USGS. From August 2012 to February 2013 John served as the de facto UZIG chair, overseeing rebirth of the organization into its present vibrant structure of working groups that form the moving parts of a governing steering committee and chair. In appreciation for John's outstanding service to the organization, Dave Stonestrom created the award and presented it to John at the October 29, 2013, UZIG Business Meeting in Denver, Colorado.

"Thirty some years ago I constructed an electronic tensiometer John used in his early work at the USGS developing the steady-state centrifuge technique for K_{θ} (psi, theta) determination, so the idea of a tensiometer suggested itself," said Dave.

UZIG extends a thank you to John for his continued involvement and support and to Dave for his initiative establishing the award.



Golden Tensiometer Award. John Nimmo received the Golden Tensiometer Award for his 22 years of service promoting UZIG. Dave Stonestrom constructed the award.

UZIG - related highlights from the GSA meeting

By John Nimmo (with contributions from session conveners)

USGS Research Physicist

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Impacts of Land-Use Change and Disturbances on Unsaturated-Zone Ecohydrology; Recent Advances in the Theory, Characterization, and Modeling of Unsaturated Zone Processes (combined sessions)

Conveners included Kim Perkins, Amanda Garcia, Michael Young, Dave Stonestrom, Dave Bedford, and Darren Sandquist.

Sponsored by the GSA Hydrogeology Division, UZIG, IAH, and GSA Geology and Society Division. The talks in this session examined how land-use change impacts unsaturated-zone biotic and hydrologic processes such as subsurface moisture dynamics, infiltration and runoff, sedimentary erosion and deposition, biodiversity, and ecological function. This well-attended session consisted of eleven presentations (four invited) on recent work in assessing unsaturated zone process changes and related effects. Talks covered diverse topics including disturbance effects on ecohydrologic function, cropland abandonment, grassland afforestation, native species restoration, ecohydrological response to global change, changes in subsurface gas composition, transitional biomes, and recent advances in numerical modeling. Place-based studies spanned a wide variety of environments including desert, semiarid rangeland, dryland forest, and coastal regions.

Advances in Unsaturated Zone Geophysics; Anomalies, Surprises, Irregularities, and Contradictions in Variably-Saturated Subsurface Flow (combined sessions)

Conveners included John Lane, Kamini Singha, Ben Mirus, Brian Ebel, and John Nimmo.

Sponsored by the GSA Hydrogeology Division, GSA Geophysics Division, UZIG, and IAH. This two-part session focused on field-to-numerical scale studies where traditional concepts provided unsatisfactory results, and highlighted several methods for quantifying unsaturated zone processes. The first part of the session had a complementary blend of field observations,

laboratory experiments, theoretical advances, and numerical modeling of fluid and contaminant transport. Presentations covered arid to humid climates and included soil and fractured rock porous media, suggesting that non-expected behavior in the unsaturated zone should, perhaps, be more expected. The second part of the session included new work using electrical resistivity, distributed temperature sensing, nuclear magnetic resonance, and geophysically-monitored tracer tests. Problems addressed included contaminant transport from waste disposal and mining, hyporheic-zone flow, and the ecohydrology of fractured rock-water dependent ecosystems. The session demonstrated the importance of understanding observed irregularities in the unsaturated zone, embracing rather than dismissing unusual observations, and the value of newly advanced methods of investigation.

Vadose Zone Flow and Transport in Natural or Engineered Systems Under Extreme Conditions; Bottoms Up! Shallow Water Table Influences on Vadose Zone Biogeochemistry and Ecohydrology (combined sessions)

Conveners included Fred Zhang, Hui-Hai Liu, Julian Zhu, Wes Henson, and David Kaplan.

Sponsored by the GSA Hydrogeology Division, UZIG, IAH, and the GSA Environmental and Engineering Geology Division. Session talks examined theory and experiments of flow and solute transport at low water content, in very coarse materials, in low-permeability media, in fractured systems, in soil-gravel mixtures, and across soil texture interfaces. Sessions talks also explored the influence of shallow water table conditions on hydrologic and biologic processes that control the unsaturated zone's biogeochemistry, contaminant fate and transport, and ecological community structure and composition. The nine talks discussed a wide variety of topics concerning contaminant transport and waste disposal (especially in semiarid locations of the western US), unsaturated flow affected by materials such as weathered bedrock and slickensides, and fundamentals of such phenomena as anisotropy and the hydrostatics and flow of water in films.

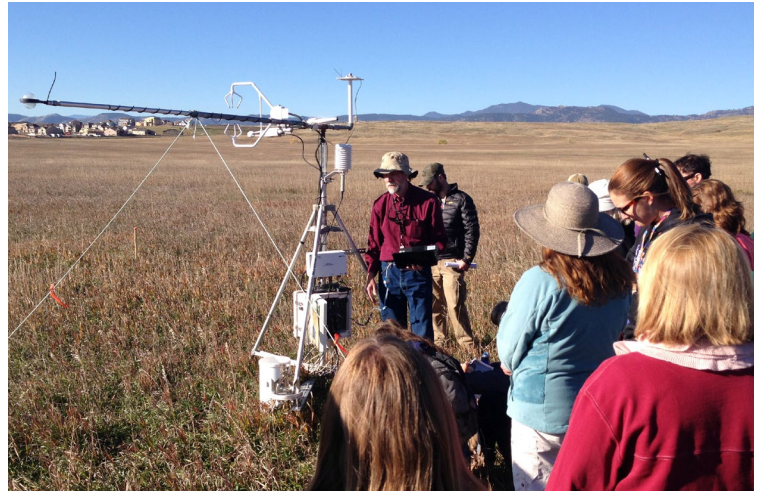
GSA field trip 414: Rocky Mountain unsaturated zones

By Dave Stonestrom
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Two large van loads of unsaturated-zone explorers plus a small convoy of private cars driven by instructors and volunteers wended their way along the Colorado Front Range and then ascended Boulder Canyon to visit research sites stretched like a string of pearls from prairie grasslands southeast of the iconic Flatirons hogbacks to high-altitude montane forest in the upper reaches of Fourmile Canyon watershed. Despite severe flooding in September that temporarily cut off access to every one of the intended stops, and a five-day forecast for moderately heavy snow immediately prior to the trip, the group of 13 students, 11 professionals, and 7 field trip leaders and facilitators was greeted by brilliantly crisp clear weather and restored, albeit rugged, access to nearly all sites.

The first visit was to an operating short-grass prairie flux station, where University of Colorado Ph.D. candidate Katherine Powell and USGS research hydrologist Dean Anderson are exploring soil-carbon—soil-water interrelations and terrestrial carbon storage at the soil-plant-atmosphere interface. The station is one of a transect of stations extending from metropolitan Denver to the Rocky Mountain crest.

The second visit was to the site of a former nuclear warhead-component manufacturing facility at Rocky Flats, where Colorado School of Mines Emeritus Professor Bruce Honeyman discussed his group's research into environmental controls on the speciation and movement of plutonium contamination within and away from the officially cleaned-up, empty, but still secured site.



GSA 'UZIG' Field Trip Stop 1. Fluxes and stores of energy, water, and carbon are being investigated by Dean Anderson (shown here downloading data) and Katherine Powell at a short-grass prairie site undergoing land-use change from suburban sprawl.

After warming up over a congenial lunch arranged by Brian Ebel, the third visit was to the NSF-supported Boulder Creek Critical Zone Observatory (CZO), where CZO director and University of Colorado Professor Suzanne Prestrud Anderson discussed the interplay between geology, weathering, incision, life, and hydrologic processes at a previously instrumented unsaturated-zone borrow-pit exposure at a break in slope between steeply eroded canyon side-wall and more stable forest higher up.

The fourth and final visit was to an unsaturated-zone research site within areas burned during the 2010 Fourmile Canyon fire, where Cooperative Institute for Research in Environmental Sciences- (CIRES-) and USGS affiliate Dr. Brian Ebel discussed hydrologic responses to fire, and controls on sediment production and vegetation recovery.

Many thanks are due to all of the field-trip attendees, instructors, and facilitators for making the entire day an exhilarating exchange of observations and ideas about the important role of Rocky Mountain unsaturated zones in processes ranging from fires to floods to environmental quality and greenhouse gas exchange. Special thanks to Katherine Powell and Geoff Delin for safely driving the impressively large vans from downtown Denver to subalpine altitudes and back.



GSA 'UZIG' Field Trip Stop 4. Brian Ebel (center, facing camera) discusses research into the hydrologic impacts and aftermath of the Fourmile Canyon fire.

UZIG web seminars scheduled for spring

UZIG webinars are advertised via email announcement prior to each talk. The UZIG webinar series is coordinated by Minnesota Water Science Center hydrologist and groundwater specialist Mindy Erickson (merickso@usgs.gov). If you would like to present your

work at an upcoming webinar – or to suggest someone else as a possible webinar presenter – please contact Mindy. A webinar schedule, with presenter and topic information, is provided at <http://mn.water.usgs.gov/uzig/webinars.htm>.

We look forward to ‘seeing’ you at future webinars.

March

Friday, Mar. 28, 2014 Noon Central Time (17:00 UT)

“Development of a Regulatory Model For Estimating Pesticide Concentrations in Groundwater”

Dr. Dirk Young, US EPA

This presentation will review PRZM-GW’s conceptualization, its mathematical and computer implementation, its parameterization, and its on-going evaluation. Dr. Young will review the critical inputs to PRZM-GW and the development of “standard” US groundwater scenarios. Presentation will cover the requirements for a USEPA regulatory model (as opposed to a research model) for the particular case of estimating pesticides in groundwater that could be used as a human drinking water source.

May

Date TBD, May 2014 Noon Central Time (17:00 UT)

Title TBD

Professor Greg Olyphant, Indiana University

Humor corner



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