

# UZIG

September 2013  
Issue 15

## *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](mailto:jtrost@usgs.gov).

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Visit the website

[mn.water.usgs.gov/uzig](http://mn.water.usgs.gov/uzig)

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### Spring 2014 Issue

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## UZIG meeting to take place at GSA

By Amanda Garcia  
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UZIG is planning to meet in association with the Geological Society of America (GSA) at its 2013 annual meeting in Denver, CO, from Oct. 26 to 30. In addition to UZIG sponsored technical sessions and a field trip highlighting unsaturated zone research, UZIG will be hosting a business meeting and informal socials to foster collaboration among members. Details are below and on pages 2 and 3.

### UZIG Business Meeting

Topics to be discussed include the UZIG charter, logo, evaluation of col-locating with GSA, and future meeting places. The meeting will take place at a room yet to be determined at the Hyatt Regency Denver - Colorado Convention Center. Room details will be posted on the GSA website soon. A time slot of 5:30 p.m. on Tuesday, Oct. 29, has been requested and the meeting is expected to last no more than one hour. We plan to provide coffee and snacks at a nominal fee. If you have any comments or suggestions for agenda items please contact Randy Bayless ([ebayless@usgs.gov](mailto:ebayless@usgs.gov)) or Dave Stonestrom ([dastones@usgs.gov](mailto:dastones@usgs.gov)).

### Informal Socials

An informal social will follow the field trip on Saturday, Oct. 26, at 6:30 p.m. at the Rock Bottom Brewery (near the convention center).

An informal dinner social will follow the business meeting on Tuesday, Oct. 29, at 7:30 p.m. Location is still to be determined.

### Technical Sessions

T34. **Advances in Unsaturated Zone Geophysics and Process Understanding**

Oral Session: **Mon. 8 a.m. to 12 p.m.**  
(paper #s 102-1 to 102-13) <https://gsa.confex.com/gsa/2013AM/webprogram/Session32754.html>

T36. **Impacts of Land-Use Change and Disturbances on Unsaturated-Zone Ecohydrology and Process Characterization**

Oral Session: **Mon. 1 p.m. to 5 p.m.**  
(paper #s 168-1 to 168-11) <https://gsa.confex.com/gsa/2013AM/webprogram/Session33053.html>

Continued on page 2. See page 3 for field trip information.

# Letter from the UZIG Chair

By Randy Bayless  
USGS Hydrologist  
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I must admit that it is hard to be objective about judging our level of success when being so deeply involved in the activities, yet not being fully knowledgeable of what has been attained in the recent history of our organization. For that reason, I was happy to hear John Nimmo, our former leader, recently comment that he is impressed by the level of interest and accomplishments of the UZIG Steering Committee during the past 12 months.

Throughout the newsletter you will find information about the accomplishments of the Steering Committee. The most noteworthy accomplishments include – Organizing field trips and topical sessions for the October GSA meeting, drafting and approving a formal UZIG Charter, creating a UZIG logo, publishing an appealing and informative newsletter, creating multi-functional and information-packed website, and initiating a unsaturated-zone webinar series. I can't overemphasize my appreciation for the dedication and motivation of the good folks on our Steering Committee.

As noted, most of the committee's activities focus on facilitating communications among members and prospective members. I recall that for many years as a junior hydrologist I felt somewhat isolated in my unsaturated-zone research interests and project activities. It was only through many years of practice that I gradually became acquainted with a few of you who share my interests. What a delight it was for me to know that UZIG now has more than 500 members! We're a diverse group of individuals who share common interests and, increasingly, we can easily communicate through the tools provided by UZIG.

I hope that you will join us at GSA for a celebration of our accomplishments and take advantage of the opportunity to network. There will be several activities that we have arranged for UZIG and prospective members. Details can be found in this newsletter and on the UZIG website. I can't wait to see you there!

Sincerely, Randy

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## GSA unsaturated zone field trip update

By Dave Stonestrom  
USGS Hydrologist  
dastones@usgs.gov

Catastrophic flooding in September 2013 destroyed roads, properties, and dams all along the Front Range from Colorado Springs to Fort Collins, with Boulder County hardest hit. Starting around Sept. 9, a stalled cold front began interacting with ample moisture from Tropical Storms Manuel (Pacific), Ingrid (Gulf of Mexico), and additional air masses. Upwelling over the Rockies produced heavy rains and catastrophic flooding, with at least one station in Boulder County reporting 230 mm of rain (9 in) on Sept. 12 alone and accumulating 430 mm (17 in) by Sept. 15.

Flooding, gulying, and sediment deposition have impacted all sites on the field trip; however, we expect to regain access to key sites or suitable analogs by Oct. 26. An additional topic of discussion during the field trip will be the role of antecedent conditions on runoff generation. Safety and enjoyment will be our top priorities; however, it should be noted that additional walking over uneven terrain will likely be required and that the majority of sites may not be wheelchair accessible. We encourage everyone

interested in participating to register, at <http://community.geosociety.org/2013AnnualMeeting/Home>. Note: As of Sept. 29, only 7 seats out of 25 were still available.

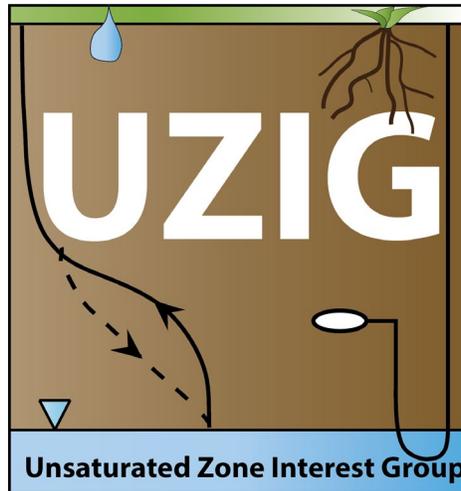
**Rocky Mountain Unsaturated Zones – Exploring Fire-Earth-Sky Connections** (Session # 414)  
Date/Time: **Saturday Oct. 26**, Check-in at 7:15 a.m.,  
Field trip from 7:45 a.m. to 5:30 p.m.  
Cost: \$68. Lunch will not be provided. The restaurant that was planned for the lunch stop is closed indefinitely so we will likely carry in a lunch.  
Check-in location: **Colorado Convention Center Lobby F, Field Trip Check-In Desk**

The field trip will include visits to four sites including the Fourmile Canyon Fire Site, the Boulder Creek member of the NSF-sponsored Critical Zone Observatory (CZO) network, an instrumented short-grass prairie site at the Rocky Flat National Wildlife Refuge, and the Rocky Flats industrial site. For more information, visit <https://gsa.confex.com/gsa/2013AM/webprogram/Session32374.html>.

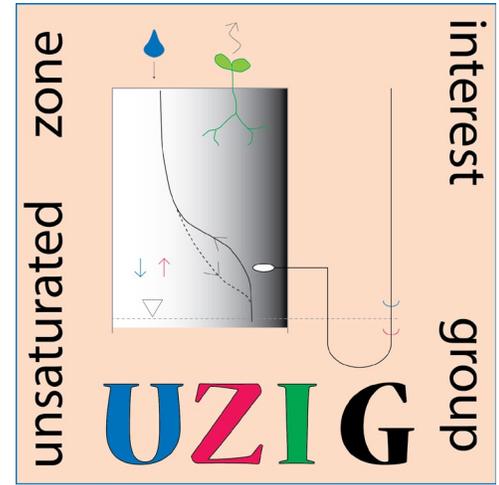
# UZIG seeks logo ideas

By Dave Stonestrom  
 USGS Hydrologist  
 dastones@usgs.gov

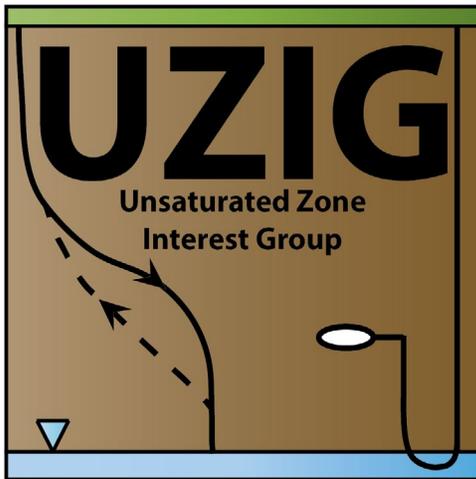
UZIG is searching for a logo. Submissions received by Thursday, Oct. 24, will be reviewed and critiqued at the Oct. 29 UZIG business meeting in Denver. Criteria are as follows: (1) dimensions of the logo shall be 1.25 inches square, (2) the acronym “UZIG” shall be featured prominently, and (3) all elements of the logo shall be easily seen and grasped when the logo is printed without enlargement. Examples from Amanda, Dave, Katie, and Monty are shown here. Please send additional candidates (as 300 dpi jpegs) to dastones@usgs.gov.



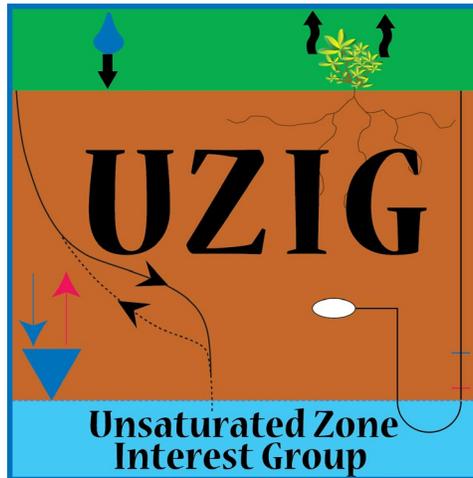
Combination of initial ideas  
 Compiled by Dave



Designed by Dave



Designed by Katie



Designed by Amanda



Designed by Monte

## Unsaturated zone - themed GSA events (cont'd from front page)

### T38. Vadose Zone Flow and Transport in Natural or Engineered Systems

Oral Session: **Tues. 8 a.m. to 12 p.m.** (paper #s 201-1 to 201-12) <https://gsa.confex.com/gsa/2013AM/webprogram/Session32869.html>

### Poster Sessions

Poster Session: **Tues. 9 a.m. to 6:30 p.m.** (paper #s 232-1 to 232-4) <https://gsa.confex.com/gsa/2013AM/webprogram/Session34210.html>

Additional UZIG-related posters will be presented on Sun. 9 a.m. to 6 p.m. in the Hydrogeology, Environmental Geoscience, Recent Advances in Clastic Sediment Research, and Quaternary Geology and Geomorphology sessions.

# UZIG web seminar (webinar) series begins

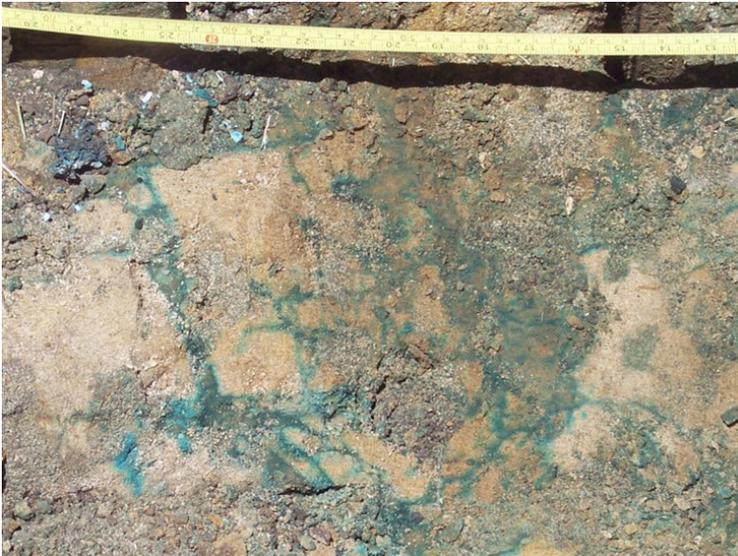
By Mindy Erickson  
USGS Hydrologist  
merickso@usgs.gov

In September 2013, USGS began hosting a bi-monthly UZIG web-based seminar series (webinar). The purpose is to provide an easily-accessible (and virtually free) forum for UZIG members to introduce themselves to one another and to share their research results. Ever-changing government travel restrictions and increasing travel costs are making conference attendance more challenging than in the past. But keeping in touch and keeping up with current research is critical – and personal connections and knowledge of current work are crucial for building collaborations. So, please mark your calendars for upcoming UZIG Webinars.

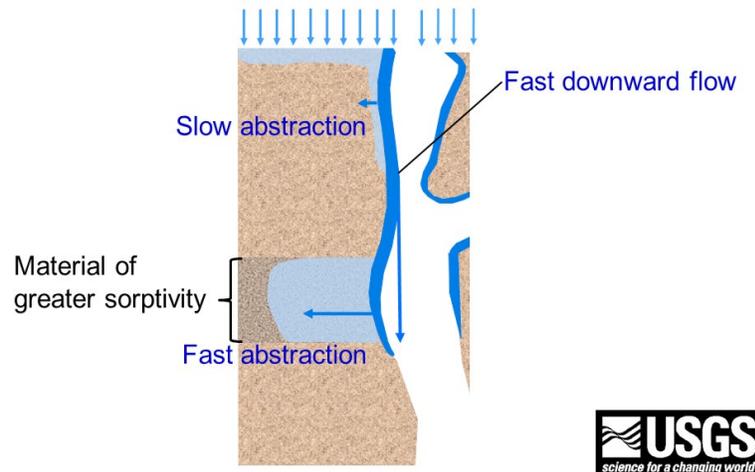
UZIG webinars will be advertised via email announcement prior to each talk. The UZIG webinar series is coordinated by Minnesota Water Science Center hydrologist and groundwater specialist Mindy Erickson (merickso@usgs.gov). If you would like to present your work at an upcoming webinar – or to suggest 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.

John Nimmo gave the first webinar in the series on September 13. The presentation was about preferential flow and ways to predict its effect on aquifer recharge and the spread of contaminants. At least 62 people attended from 40 locations. Excerpts from his presentation are presented here.



**Photograph of a soil profile exposed by excavation after infiltration with blue-dyed water.** Preferential flowpaths, which involve little of the medium but much of the flow, can be seen in irregular patterns. Photo from John Nimmo’s September webinar presentation.



**Dynamics of combined preferential and diffuse flow in a macroporous medium.** A plausible explanation why infiltrated water sometimes appears in deep portions of the soil before shallower portions. Key elements are flow in films lining macropore walls, nonequilibrium conditions in the soil matrix, and variation of properties among soil layers. Figure from John Nimmo’s September webinar presentation.

# Webinar schedule

## November

Friday, Nov. 15, 2013      Noon Central Time (18:00 UT)

“Design and testing of a process-based groundwater vulnerability assessment (P-GWAVA) system for predicting the concentrations of agrichemicals in groundwater across the conterminous United States.”

Dr. Jack Barbash, USGS

Over the past three decades, many systems have been devised for predicting the vulnerability of shallow groundwater to surface-derived contamination, but few have based their predictions on simulations of contaminant transport and fate, or compared their predictions against actual contaminant concentrations measured in groundwater. This presentation will describe the design of a process-based groundwater vulnerability assessment (P-GWAVA) system that uses computer simulations to predict the concentrations of agrichemicals in shallow groundwater anywhere in the conterminous United States. The results from a comparison of the P-GWAVA predictions against measured concentrations of selected agrichemicals in shallow groundwater within the Corn Belt will also be presented.

## January

Friday, Jan. 10, 2014      Noon Central Time (18:00 UT)

“Seasonal variations in hydrocarbon natural attenuation rates: what can we learn from snapshot samples?”

Natasha Sihota, University of British Columbia  
Jared Trost, USGS

Estimating natural attenuation rates of hydrocarbons is important for managing contaminated sites, however these rates are difficult to reliably quantify under field conditions. Monthly measurements of surficial CO<sub>2</sub> fluxes and unsaturated zone gas compositions, and periodic determinations of radiocarbon content of unsaturated zone gas, were used to evaluate hydrocarbon natural attenuation rates at a subsurface crude oil spill site near Bemidji, Minnesota. These snapshot measurements indicate seasonal variability in hydrocarbon natural attenuation rates, an important consideration for estimating longer-term natural attenuation rates and contaminant mass losses.

## March

Date TBD, March 2014      Noon Central Time  
(17:00 UT, if after Mar. 9)

“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

# Articles address soil water sensors and measurement technologies

By Andy O'Reilly  
USGS Hydrologist  
aoreilly@usgs.gov

Soil water controls a wide range of local to global scale hydroclimatic and biogeochemical processes. Thus, its measurement is a critical component for understanding and predicting these processes. Application of the variety of sensor technologies available today, however, presents both opportunities and challenges. A Special Section in the May 2013 issue of Vadose Zone Journal (<http://vzj.geoscienceworld.org/content/12/2.toc>) presents nine articles on in-situ and remote technologies for measuring soil moisture content at a variety of spatial and temporal scales. Three articles address regional to global scale soil moisture networks, including assessments of network quality-control considerations and methods for estimating

soil moisture from network derived measurements at a scale appropriate for comparison with satellite-based measurements. Four articles address in-situ sensor measurements of soil moisture, focusing on the need for field calibration of sensors related to confounding effects such as temperature, soil texture and type, and salinity. Two articles address geophysical techniques, including numerical simulations of the effects of soil moisture evaporation inferred from ground penetrating radar data and a laboratory application of time-lapse electrical conductivity measurements for estimating soil moisture content.

## Upcoming conference of interest

### Soil's Role in Restoring Ecosystem Services

March 6-9, 2014

Sheraton Grand Hotel, Sacramento, CA

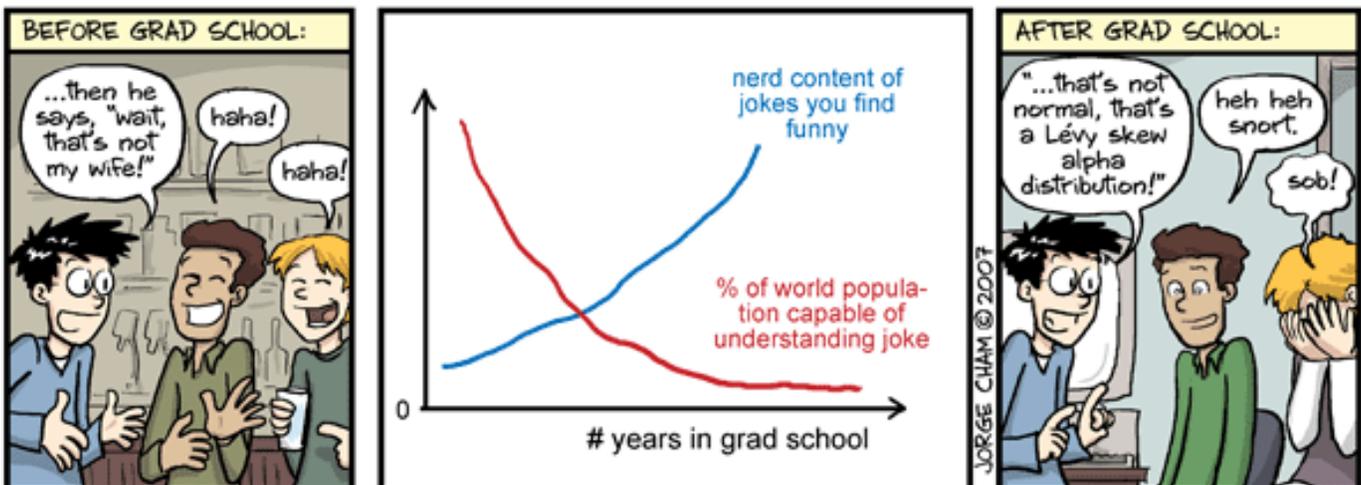
Primary sponsor: Soil Science Society of America

Soil sustains life and is one of our most important natural resources. This conference will address soil and its biodiversity as providers of ecosystem services that benefit humankind. Strengths and weaknesses in the state of our knowledge will be evaluated, cross-disciplinary synergies will be encouraged, and research needs will be prioritized to gain understanding of soils' roles in of

1) climate change adaptation and mitigation, 2) food and energy security, 3) water protection, 4) biotechnology for human health, 5) ecological sustainability, and 6) slowing of desertification. The purposes of this conference will be to evaluate knowledge strengths and gaps, encourage cross-disciplinary synergies to accelerate new learning, and prioritize research needs. The Soil Science Society of America and its co-sponsors invite you to join us at this unique interdisciplinary conference. For the preliminary program and conference details, please check the following link: <https://www.soils.org/meetings/specialized/ecosystem-services>.

## Humor corner

### YOUR SHRINKING SENSE OF HUMOR FROM CHEEKY TO GEEKY IN JUST SEVEN YEARS



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