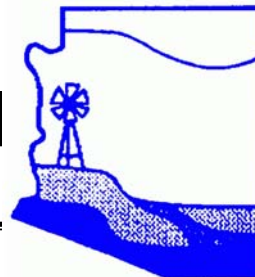


# NEWSLETTER



## Viewpoint: "Fall in Flagstaff"

For over a dozen years, I lived in Flagstaff. Winter mornings I gazed at the Peaks capped with white snow set against a pure blue sky, and every summer I reveled in the coolness of the mountain breezes, but always it was the arrival of autumn that was my favorite season. The colors of the changing leaves, the crispness of the air while the desert still baked in the heat—these things were marvelous and still are.

You can experience these sensations this year at the Joint Meeting of the Arizona Hydrological Society and the American Institute of Professional Geologists, which will be held at the new High Country Conference Center in Flagstaff on September 20-23. The title of this Joint Meeting is "Changing Waterscapes and Water Ethics for the 21st Century."

Following on the success of our partnership with Southwest Hydrology last year, we have combined our efforts with AIPG to put on a bigger and better Annual Symposium than ever held before in Flagstaff. Associated with AIPG, the 3rd International Professional Geologic Conference will be going on at the same time, lending an international flavor to the meeting.

The Flagstaff Chapter is working hard to make sure that your symposium experience will be one of the best you ever had, and we will keep you updated via this newsletter and e-mails. From AIPG, and the new members enrolled last year in Tucson, we expect many visitors from out of state and from outside the United States. The projections are for over 400 attendees. The field trips that have been planned will showcase the best geology and hydrology that northern Arizona can offer. The workshops offer a chance for valuable training. And your opportu-



Alan Dulaney  
AHS Corporate  
Board President  
2008

nities to expand your professional and personal horizons through networking will be greater than ever.

The Website for the meeting can be visited at <http://www.aipg.org/2008/AIPG-AHS-3IPGC.htm> which is hosted by AIPG. On-line registration is now up and running—just click on "Register Online" under the categories to the left. Sign up right away! It will be a spectacular fall in Flagstaff, and you just can't afford to miss it!



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## Member information

### 2008 MEMBERSHIP DUES

If you have not renewed your 2008 AHS Membership you no longer have access to the Members Only area of the Web site. Your membership is very important to us and we hope you will consider renewing promptly.

Dues, payable to AHS (\$45.00, \$15.00 for students) should be sent to:  
Arizona Hydrological Society  
Jeanie Merideth, Association Manager  
PMB 139; 3305 N. Swan Road #109  
Tucson, AZ 85712  
Phone: (520) 299-6787

*Dues may also be paid using our  
"Online Payment" system.  
Go to*

*[www.azhydrosoc.org](http://www.azhydrosoc.org)*

*And click on "Join or Renew Online" and have your credit card ready. AHS accepts Visa, MasterCard and American Express.*

***DON'T DELAY-DO IT TODAY!***

### How to visit the AHS Members Only area:

- Go to: [www.azhydrosoc.org](http://www.azhydrosoc.org)
- Located on the far right side of your screen click on Members Only
- Type in your username and password: Your username is the first initial of your first name and then your last name (i.e. Flo Waters would be FWaters). Your password is your zip code (that we have on file for you).

Once there you have access to documents that are not available on the public site.

**REMEMBER** you must be a currently paid member of AHS to have access.

## Announcing the AHS 2008 Annual Fall Symposium

### Changing Waterscapes and Water Ethics for the 21st Century

American Institute for Professional Geologists Annual Meeting  
Arizona Hydrological Society Annual Symposium  
3rd International Professional Geology Conference  
September 20 -24, 2008  
High Country Conference Center at NAU and Radisson Hotel  
Flagstaff, Arizona

For more information:

<http://www.aipg.org/2008/AIPG-AHS-3IPGC.htm>

## 2008 Annual Symposium

We invite everyone to the 2008 Symposium:

# Changing Waterscapes and Water Ethics for the 21<sup>st</sup> Century and

## Global Geoscience Practice, Standards, Ethics, and Accountability

### Meeting Highlights

- Technical sessions addressing critical water issues
- Professional sessions dealing with regulatory and educational concerns
- Technical tours
- Social events
- 7-day geological raft excursion through Grand Canyon

### 12 Field Trips, including:

- Grand Canyon
- San Francisco Volcanic Field
- Fossil Creek
- Sunset Crater/Wupatki National Monument
- Jerome Mining District/Sedona
- Meteor Crater

### 6 Workshops

- Intro to ArcGIS
- Intro to Arc Hydro
- Writing for the Reader
- Water Education/Project WET
- Students Entering the Profession
- Important Areas of Water Law

### Who Will Attend

This convention will appeal to professionals in technical, education, regulatory, and legal disciplines. Professionals attending from the U.S., Canada, Mexico, and Europe will provide an international perspective to the proceedings.

Hosted by American Institute of Professional Geologists and  
Arizona Hydrological Society

3<sup>rd</sup> International Professional  
Geology Conference

High Country Conference Center and  
The Radisson Hotel, Flagstaff, Arizona

September 20-24, 2008



Arizona  
Hydrological  
Society

**Be sure to register early for this premiere event!**

Go to [www.aipg.org/2008/AIPG-AHS-3IPGC.htm](http://www.aipg.org/2008/AIPG-AHS-3IPGC.htm) for information on registration, sponsorship, exhibit booth, and advertising opportunities—act soon!

## 2008 Annual Symposium Cont.

### AIPG/AHS/3<sup>rd</sup> IPGC 2008 Symposium PROGRAM

Wednesday, September 17, 2008		Monday, September 22, 2008 (continued)	
9:00 am Depart	3-Day Backpack Trip (9/17-9/19)	7:00 am - 8:00 am	AESE - Surveys Breakfast Meeting
Saturday, September 20, 2008		7:00 am - 9:00 am	AIPG - Past President's Breakfast
7:00 am - 5:00 pm	Registration at Radisson	8:30 am - 5:30 pm	AESE - Sessions
7:00 am - 8:00 am	AIPG - Executive Committee Breakfast	8:30 am - 10:00 am	Plenary Session/3 <sup>rd</sup> IPGC
8:00 am - 12:00 pm	AIPG - Executive Committee Meeting	8:00 am - 5:00 pm	Exhibits Open
12:00 pm - 1:00 pm	AIPG - Foundation Luncheon	10:00 am - 5:00 pm	Technical Sessions/3 <sup>rd</sup> IPGC
1:00 pm - 4:00 pm	AIPG - Advisory Board Meeting	11:30 am - 1:00 pm	AESE - Business Meeting Luncheon
4:00 pm - 5:30 pm	AIPG - Joint Executive Committee Meeting and Business Meeting	12:00 pm - 1:00 pm	AHS - Awards Luncheon
8:00 am - 5:00 pm	Field Trip - San Francisco Volcanic Field	5:00 pm - 6:00 pm	AHS - Membership Meeting
8:00 am - 5:00 pm	Field Trip - Lake Mary/Walnut Creek Watershed	8:00 am - 5:00 pm	Field Trip - Grand Canyon Sightseeing
9:00 am - 4:00 pm	Workshop - Writing for the Reader: Strategies for Communicating Technical Information Effectively	8:00 am - 5:00 pm	Field Trip - Jerome Mining District/Sedona
9:00 am - 4:00 pm	Workshop - Water Education - Project WET	6:00 pm - 8:00 pm	Dinner and Cultural Entertainment Event at Radisson
9:00 am - 4:00 pm	Workshop - GIS I - Introduction to ArcGIS for the Earth Scientist	Tuesday, September 23, 2008	
Sunday, September 21, 2008		7:00 am - 6:00 pm	Registration at Radisson Hotel
7:00 am - 5:00 pm	Registration at Radisson Hotel	7:00 am - 4:00 pm	Registration at High Country Conference Center
12:00 pm - 8:00 pm	Registration at High Country Conference Center	7:00 am - 8:00 am	AESE - Freelancer's Breakfast
12:00 pm - 4:30 pm	Workshop - GIS II - Introduction to ARC Hydro	8:00 am - 3:00 pm	Exhibits Open
12:00 pm - 4:30 pm	Workshop - Students, Your First Steps in the Profession and the Future	8:00 am - 5:00 pm	Technical Sessions/3 <sup>rd</sup> IPGC
2:00 pm - 5:00 pm	AESE - Board Meeting	8:30 am - 5:30 pm	AESE - Sessions
7:00 am - 5:00 pm	Field Trip - Fossil Creek	12:00 pm - 1:00 pm	Luncheon with Speaker
8:00 am - 5:00 pm	Field Trip - Grand Canyon/South Rim	8:00 am - 5:00 pm	Field Trip - Sedona
8:00 am - 5:00 pm	Field Trip-Sunset Crater/Wupatki	8:00 am - 5:00 pm	Field Trip - Meteor Crater
5:00 pm - 6:00 pm	AHS - Foundation Board Meeting	6:30 pm - 8:30 pm	AESE - Awards Banquet
6:00 pm - 8:00 pm	Welcome Reception	6:30 pm - 8:30 pm	Reception/Awards at the Museum of Northern Arizona
6:00 pm - 8:00 pm	Exhibit Area Open	Wednesday, September 24, 2008	
Monday, September 22, 2008		8:00 am - 9:00 am	Registration at Radisson Hotel
7:00 am - 6:00 pm	Registration at Radisson Hotel	7:00 am - 8:30 am	AESE - Board Meeting
7:00 am - 6:00 pm	Registration at High Country Conference Center	8:30 am - 4:00 pm	Workshop - Important Areas of Law-What Does the Future Hold?
		8:00 am - 5:00 pm	Field Trip - Grand Canyon/South Rim
		8:00 am - 5:00 pm	Field Trip - Flagstaff's Water Supplies: Past, Present, and Future
		8:00 am - 5:00 pm	Field Trip - Montezuma Castle National Monument and Well
		9:00 am Depart	3-Day Backpack Trip (9/24-9/26)

# Changing Waterscapes and Water Ethics for the 21st Century

## Global Geoscience Practice, Standards, Ethics, and Accountability



### CALL FOR ABSTRACTS

American Institute of Professional Geologists  
 Arizona Hydrological Society  
 3<sup>rd</sup> International Professional Geology Conference



September 20 – 24, 2008  
 Flagstaff, Arizona, USA

<http://www.aipg.org/2008/AIPG-AHS-3IPGC.htm>

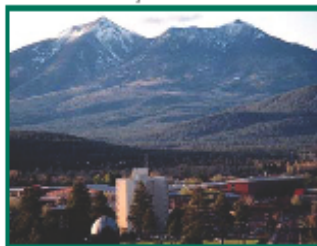
#### CALL FOR ABSTRACTS Important Dates

May 10, 2008.....Abstracts due  
 May 15, 2008.....Authors notified  
 July 1, 2008.....Final abstracts/  
 papers due

**Y**ou are invited to participate in the symposium on Changing Waterscapes and Water Ethics for the 21<sup>st</sup> Century and Global Geoscience Practice, Standards, Ethics, and Accountability. This milestone event is organized by a committee of the American Institute of Professional Geologists (AIPG), Arizona Hydrological Society (AHS), and the 3<sup>rd</sup> International Professional Geology Conference (3<sup>rd</sup> IPGC). Sponsors include: AIPG, AHS, AESE, AAPG-DPA, ASBOG, CCPG, EFG, IYPE, NAU, NGWA, and USGS.

The symposium will be held in Flagstaff, Arizona from September 20-24, 2008. Presentations and Poster Sessions will be held September 22 and 23, 2008.

The symposium Steering Committee is lead by General Chairperson Barbara Murphy, RG, CPG, Clear Creek Associates, and Vice Chairmen Dr. Aregai Teclé, Professor of Hydrology, School of Forestry, Northern Arizona University (NAU), and Dr. David Best, Professor of Geology, College of Engineering and Natural Sciences, NAU.



Northern Arizona University Campus and the San Francisco Peaks

#### Location

The symposium itself will take place at the High Country Conference Center at the Northern Arizona University campus and the Radisson Hotel in picturesque Flagstaff. Field trips will be offered to the Grand Canyon, the San Francisco volcanic field, the Jerome mining district, to the red rocks of Sedona, Walnut Canyon Anasazi cliff dwellings, and many more exceptional geology and cultural sites.



Grand Canyon

#### Symposium Highlights

The symposium includes technical sessions, poster sessions, workshops, welcome reception, technical tours, and field trips.

#### How to Submit an Abstract

To have your abstract considered for a presentation or poster session, please submit a one-page abstract and the Abstract Submittal Form by May 10, 2008. Abstracts must be typed, in WORD, single-spaced, 12-point type and should not exceed one page. Please include the presentation title and primary speaker/author at the top of the abstract and submit with the Abstract Submittal Form. Select two abstract subject areas under which you would like to have your abstract considered. Authors will be notified of abstract acceptance by May 15, 2008.

Abstracts must be received no later than  
 May 10, 2008.

For more detailed information or to register for the symposium please go to:  
<http://www.aipg.org/2008/AIPG-AHS-3IPGC.htm>



Lake Mead / Hoover Dam

#### Abstract Subject Areas

- ARR Artificial Recharge
- AQR Aquifer Restoration
- CRB Colorado River Basin Climate, Hydrology and Ethics: Past, Present and Future
- ENE Energy
- EWE Energy/Water/Ethics: Moderated Discussion
- EWM Ethics of Water Use in Mining: Case Studies
- EWP Ethics vs. Water Policies
- FWM Forest Watershed Management
- GIS GIS and Water Resources
- GIE Groundwater Issues and Ethics
- GR Groundwater Restoration
- HEN Human vs. Ecosystem Needs
- ICP International Cooperative Programs and Practice Issues
- MDE Models, Data and Ethics
- PE Professional Ethics
- PUW Politics of Urban Water Management
- QLE Quality of Life vs. Ethics of Water
- RTA Re-Use Technologies and Approaches
- REC Riparian Ecosystems in Changing Waterscapes
- SUB Land Subsidence
- SWP Southwest Water Policy Issues
- SWG Surface Water – Groundwater: A Shared Resource
- TWP Tribal Water Practices, Policies, and Ethics
- URW Urban and Rural Water Policies and Practices
- WEC Water Ethics in a Changing Global Climate
- WEM Water Ethics in the 21st Century: Moderated Discussion
- WKN Water Knows No Boundary: Border Conflicts
- WL Water Law
- WOP Water Ownership: Public vs. Private
- WQM Water Quality of Mining Operations: Old Problems - New Solutions
- WQS Water Quality: Science, Policy, and Ethics
- WSP Water Supply vs. Public Policy: Ethics Under Pressure

# 2008 Annual Symposium Cont.

## Changing Waterscapes and Water Ethics for the 21<sup>st</sup> Century

*Global Geoscience Practice, Standards, Ethics, and Accountability*

### Abstract Submittal Form

Use this form or submit online at  
<http://www.aipg.org/2008/AIPG-AHS-3IPGC.htm>



**American Institute of Professional Geologists**  
**Arizona Hydrological Society**  
**3<sup>rd</sup> International Professional Geology Conference**



**September 20 – 24, 2008**  
**Flagstaff, Arizona, USA**



**High Country Conference Center and the Radisson Hotel**

Submit a one-page abstract with this completed form by **May 10, 2008.**

Submittal can be made via fax, e-mail, or mail:

**Cathy Duran**  
Professional Services Manager  
AIPG  
1400 W. 122<sup>nd</sup> Ave., Suite 250  
Westminster, CO 80234  
Phone: (+1) 303-412-6205  
Fax: (+1) 303-253-9220  
E-mail: [clid@aipg.org](mailto:clid@aipg.org)

Presentation/  
Paper Title: \_\_\_\_\_

Submitted for:  Oral Presentation or  Poster Presentation

Subject Area: 1<sup>st</sup> Choice:    2<sup>nd</sup> Choice:

[Use the 2 or 3-digit Abstract Subject Area Codes listed on the Call for Abstracts]

Primary Speaker/Author: [All Symposium-related correspondence will be directed to this individual]

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Organization: \_\_\_\_\_

Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

E-mail: \_\_\_\_\_

Co-authors: \_\_\_\_\_

Will this or a similar paper be published or presented before September 2008?

No  Yes If yes, where:

\_\_\_\_\_  
Date this work/project/program will be completed:

#### Agreement

By submitting an abstract, a potential presenter agrees to prepare an oral presentation or poster presentation, if selected. Selected presenters are encouraged to prepare an extended abstract or paper for publication in the conference proceedings. If not selected for an oral presentation, you will be encouraged to prepare a poster for the poster sessions. Individuals must meet all deadlines to have a paper or extended abstract included in the symposium proceedings.

## TUCSON CHAPTER NEWS

### April Tucson Chapter Meeting Summary - Marla Odom, Tucson Chapter Secretary

On April 8<sup>th</sup>, the Tucson Chapter hosted a meeting at the offices of Errol L. Montgomery and Associates. Twenty-two people attended "Chemical and Isotopic Traces of Groundwater Recharge and Flowpaths in the Middle San Pedro Basin, AZ", presented by Jennifer McIntosh, an Assistant Professor in the Department of Hydrology and Water Resources at the University of Arizona. Dr. McIntosh's areas of expertise include hydrogeochemistry and isotope hydrology. Also present to answer questions was Candice Adkins, a master's degree student at the U of A. The research presented is the basis of Candice's master's thesis.

The project is being funded by the USGS in conjunction with ADWR as part of the Rural Watershed Initiative. The purpose is to assess current water resources in the middle San Pedro Basin, as well as to further constrain a hydrogeologic framework model being developed by the USGS, and to better understand long-term effects of groundwater use.

The middle San Pedro Basin is experiencing rapid population growth, and water is primarily provided by pumped groundwater. The San Pedro River is one of the last free-flowing rivers in the southwest, and is a vital riparian corridor.

#### The study is focused on answering the following research questions:

Where is groundwater being recharged? Is recharge primarily mountain-front or direct precipitation?

What component of discharge comes from eastern versus western sides of the basin?

How compartmentalized are deep versus shallow aquifers? Is there evidence for vertical mixing?

Is there any evidence for discharge of deep basin groundwater into the middle San Pedro River?

#### Isotopic sampling strategy is as follows:

Sample various points in the basin, targeting predetermined transects with available geologic cross-sections, as well as washes and in wells along rivers.

Sample baseflow of the river throughout the year.

Collect isotopic signature for varying elevations in the basin.

Sample wells of varying depths to target the relationship between deep confined and shallow alluvial aquifers.

Samples are analyzed for major cations, anions, tritium, carbon-14, and sulfur isotopes. This data will be compiled along with previous groundwater studies from the USGS, ADWR, and the U of A.

Initial results from sampling show varying major ion chemistries throughout the basin, as well as variation with depth between the upper and lower alluvial aquifers. This variation with depth reflects interaction with differing geologies of the basin. Waters high in  $\text{CaHCO}_3$  are due to carbonate dissolution. Waters high in  $\text{NaHCO}_3$  are due to cation exchange with clays. Waters high in  $\text{CaSO}_4$  are due to gypsum dissolution. Gypsum is generally buried at depth in the area, with several outcrops present locally. A plot of calcium vs. sulfate indicates that gypsum dissolution is the source of high sulfate waters.

Residence times of recharged water are still under investigation. Most of the study data plots in winter and summer on the local meteoric water line. Known alluvial aquifer groundwater is dominated by summer monsoon recharge on the meteoric water line, as expected.

Tritium can be used to determine groundwater residence times for recharge dates between the 1950's and 1990's. Humans put tritium into the atmosphere in the 1950's and half-life decay of atmospheric tritium became negligible in the 1990's. So, any detectable tritium values in samples indicate a recharge date between 1950 and the late 1990's. For older recharged

## Tucson Chapter continued

*(Continued from page 7)*

water, carbon-14 is useful. Numerous corrections need to be made for the diluting of "dead" carbon from carbonate dissolution in water, but approximate age can be determined. Most sites are at the detection limit for tritium, and only a few sites have significant tritium values.

The study is still in progress, and additional sampling for cations, anions, tritium, carbon-14, and sulfur isotopes will continue through the 2008-2009 school year to try and answer the questions posed above.

---

### Tucson Chapter Monthly Meeting

May 13, 2008

7:00 Social half-hour

7:30 speaker

Location: Offices of Errol L. Montgomery & Associates, Inc

1550 E Prince Rd, Tucson, AZ

Speaker: Todd Shipman

Topic: Cracks in Arizona

Earth fissures are fractures or cracks that form in alluvial basins due to substantial groundwater overdrafts that produce local subsidence (Holzer, 1976; Jachens and Holzer, 1979; Larson and Péwé, 1986). The state's first earth fissures, reported in the 1920's near the Picacho Mountains of Pinal County (Leonard, 1929), were confined to agricultural lands, where they were merely a nuisance to local farmers. The proliferation of earth fissures through the last half of the 20<sup>th</sup> century, particularly in Maricopa and Pinal Counties, coincided with exponential growth juxtaposing expanding population centers and earth fissures. As a result, the impact of earth fissures on the people of Arizona, their property and infrastructure, is on the rise.

The most accepted model for explaining earth fissure formation is differential compaction of sediments. In this model, heavy groundwater extraction results in deflation of the aquifer, leading to subsidence of basin-fill sediments.

Subsidence reduces elevation of the earth's surface by as much as several meters. Where basin subsidence is complemented by bedrock geometry – i.e., where bedrock drops off sharply -- the resulting differential compaction leads to horizontal strain of basin sediments culminating in earth fissures (Holzer, 1976; Jachens and Holzer, 1979).

The surface expression of earth fissures vary greatly from cracks, to small circular depressions, to gullies that are harder to distinguish from natural drainages and washes. Cracks are narrow, with sharp, steep sides, and a hidden, or ill-defined fissure floor. Circular depressions may be shallow or deep, with either gently sloping, rounded edges, or steep, sharp edges, and may occur as a discontinuous linear series. Gullies are fissures, enlarged due to erosion of sidewalls during capture of surface runoff. Newly formed or younger gullies tend to have steep and well-defined sidewalls, while older gullies present more rounded, gently sloping sidewalls produced by erosion and widening of the cavity. A fissure may exhibit any combination of surface expressions along its length. A common sequence, however, is crack - circular depressions - gully - circular depressions - crack.

Earth fissures are expressed continuously or discontinuously at the surface. Discontinuous earth fissures are insipient expressions of earth fissures below the surface. Insipient earth fissures are expressed at the surface by circular depressions and punctuated cracks or gullies. Continuous earth fissures are expressed at the surface as continuous openings, which in some cases have captured surface drainage creating gullies.

In the field, earth fissures may be confused with giant desiccation cracks. Giant desiccation cracks can be distinguished from earth fissures by differences in surface expression. Desiccation cracks commonly form polygons, whereas fissures tend to form linear fractures. Earth fissures extend deeper in the subsurface than giant desiccation cracks, which are confined to the near surface. Nonetheless, distinguishing

*(Continued on page 9)*



## Tucson Chapter continued

(Continued from page 8)

fissures from desiccation cracks by visual inspection alone is sometime difficult, and requires more in-depth investigation to make the classification. Trenching is a common and successful approach because giant desiccation cracks bottom out several meters down, while earth fissures continue for as much as hundreds of meters into the subsurface.

In June 2006, a new Arizona law tasked the Arizona Geological Survey (AZGS) with comprehensive mapping of earth fissures throughout the state. The timing of Arizona Revised Statute ARS 27-152.01.11 reflects a growing concern that earth fissure hazards represent a risk to the people and infrastructure of Arizona. Detailed mapping of earth fissures is the first best strategy for mitigating the risks associated with the hazards of earth fissures (Strange, 1983). Four counties in Arizona are especially prone to fissuring; in order from greatest to least number of reported fissures: Pinal, Maricopa, Cochise, and Pima Counties (Shipman, 2007).

### References

Jachens, R.C. and Holzer, T.L., 1979, Geophysical investigations of ground failure related to ground-water withdrawal Picacho basin, Arizona: *Ground Water*, v. 17, no. 6, p. 574-585.

Holzer, T.L., 1976, Ground failure in areas of subsidence due to ground-water decline in the United States, *International Association of Hydrological Sciences*, no. 121, p. 423-433.

Larson, M.K. and Péwé, T.L., 1986, Origin of Land Subsidence and earth fissuring, Northeast Phoenix, Arizona, *Bulletin of the Association of Engineering Geologists*, v. 23, n. 2, p. 139-165.

Leonard, R.J., 1929, An earth fissure in southern Arizona, *Journal of Geology*, v. 37, no. 8, p. 765-774.

Strange, W.E., 1983, Subsidence monitoring of the State of Arizona, U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service, 74p.

Shipman, T.C., 2007, Pinal County, Arizona Earth fissure planning map: Arizona Geological Survey Open-File Report 07-01, v.1, Sheet 1,

1:250,000 scale

Shipman, T.C., 2007, Maricopa County, Arizona Earth fissure planning map: Arizona Geological Survey Open-File Report 07-01, v.1, Sheet 2, 1:250,000 scale

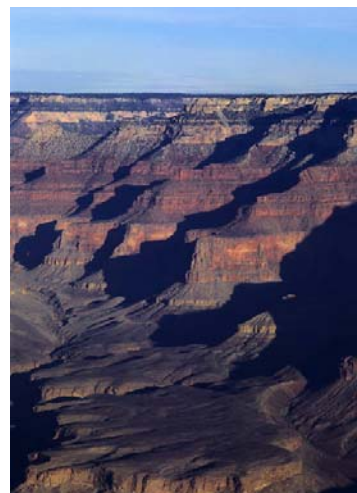
Shipman, T.C., 2007, Cochise County, Arizona Earth fissure planning map: Arizona Geological Survey Open-File Report 07-01, v.1, Sheet 3, 1:250,000 scale

Shipman, T.C., 2007, Pima County, Arizona Earth fissure planning map: Arizona Geological Survey Open-File Report 07-01, v.1, Sheet 4, 1:250,000 scale

### About Todd Shipman

Raised in Washington D.C. suburbs  
Bachelors of Science Geosciences University of Arizona  
Masters Geology Northern Arizona University  
PhD. Geosciences University of Arizona  
Working at the AZGS for 5 years

Todd has done research on Mesozoic sediments on the Colorado plateau for my masters. His dissertation work was conducted on late Triassic rocks in Argentina, investigating ties between tectonic and climate signatures in the rock record. While working at the AZGS he has mapped surficial deposits through out the state and most recently been placed in charge of the earth fissure mapping program.



# Tucson Chapter continued

## Tucson Chapter Officers

President (General Chapter Information)	Jeff Gawad Errol L. Montgomery & Associates (520) 881-4912 <a href="mailto:jgawad@elmontgomery.com">jgawad@elmontgomery.com</a>	Chapter Director (Chapter records and web page)	Dan Guido Errol L. Montgomery & Associates (520) 881-4912 <a href="mailto:dguido@elmontgomery.com">dguido@elmontgomery.com</a>
Vice-President (Monthly speaker organization)	Robert McGill hydroGEOPHYSICS (520) 647-3315 <a href="mailto:rmcgill@hgiworld.com">rmcgill@hgiworld.com</a>	<b>Tucson AHS Corporate Board Representatives:</b>	
Secretary (Monthly meeting records)	Marla Odom Errol L. Montgomery & Associates (520) 881-4912 <a href="mailto:modom@elmontgomery.com">modom@elmontgomery.com</a>	Corporate Treasurer	Michael Geddis Water Management Consultants, (520) 319-0725 <a href="mailto:mgeddis@watermc.com">mgeddis@watermc.com</a>
Treasurer (Chapter finances)	Mike Mahan Arizona Geological Survey (520) 770-3500, ext. 211 <a href="mailto:mmahan@email.arizona.edu">mmahan@email.arizona.edu</a>	Corporate Board Member	Nick Melcher U.S. Geological Survey (520) 670-6671, ext. 221 <a href="mailto:nickpaulame@msn.com">nickpaulame@msn.com</a>

### MARK YOUR CALENDARS

Enjoy great music in a beautiful venue while supporting a wonderful cause!

roth d'lux and Combo Westside are teaming up once again for a benefit concert for "Water for People".

The evening will begin on Saturday, May 17 at 7:30 pm at Old Town Artisans, in downtown Tucson.

Don't miss it - see attached flyer for event details!



More on the bands:  
[www.rothdlux.com](http://www.rothdlux.com)  
[www.myspace.com/combowestside](http://www.myspace.com/combowestside)

More on Water For People:  
[www.waterforpeople.org](http://www.waterforpeople.org)

### Sonoran Spa and Water For People Invite you to Relax and Renew at

**Westward Look Resort  
 245 East Ina Road, Tucson, AZ**

**on the 3<sup>rd</sup> Thursday of the Month  
 5:30 p.m. to 7:00 p.m.**

**for a Healthy Planet Happy Hour to  
 Benefit Water For People**

**\$50 Donation and Choice of Three for  
 your 1 ½ Hour Spa Session  
 Chair Massage, Mini-Facial, Nail Care,  
 Yoga, or Health Consult**

**Call (520) 917-2467 to Reserve your  
 Spa Session and Choices**

## PHOENIX CHAPTER NEWS

### April Meeting Summary

Our April speakers were Gavin Fielding from Arizona Department of Military Affairs and Kirk Creswick from EEC. They discussed different types of subsurface site characterization tools and the value of a geologist.

Gavin's talk stressed the value of basic, low-tech structural geological investigations for well drilling even in the face of sophisticated modeling and sampling technology. Using a resistivity survey at a gas plant in buried karst topography as an example, Gavin showed that by using "entry level" geological skills (looking around the area for homologous terrains, basic structural mapping) he was able to form a more complete map of the area than the computer modeling. More importantly, he was able to save his client a significant amount of money in remediation costs. He argued that sometimes a company's greatest asset is the lowest level scientist who more readily applies still-remembered skills from school that more seasoned investigators often forget to employ.

Kirk's talk detailed the science behind and technology available for electromagnetic surveys. He described two types of EM survey: Frequency Domain Electromagnetics, or FDEM, and Time Domain Electromagnetics, or TDEM, and talked about many different survey devices, their capabilities, and their limitations. He then brought in some of his previous survey data to show environmental "mysteries" that were solved using EM survey, including detailing a buried dump site at Phoenix Indian School, finding buried and burned munitions caches, and finding probable underground storage tanks at a gasoline station. He stresses that EM can be a very useful and cost-effective tool for environmental survey.

We'd like to thank Gavin and Kirk for sharing their time and insights with the Phoenix Chapter.

### May Meeting Announcement

Our speaker will be Doug Wolfe, Principal Investigator for the Zuni Basin Paleontological Project, Adjunct Curator for the New Mexico

Museum of Natural History & President of Renaissance Environmental Management, L.L.C.

### Abstract

At least 4 new dinosaur species, rare "middle" Cretaceous (Turonian)-age track sites, fossil plants, vertebrate micro-sites, and sedimentary features are recognized following over 10 years of study in the rocks of the Zuni Basin near the Arizona-New Mexico border. Most of these were found within a localized area of well-dated and correlated inter-fingering marine and terrestrial strata comprised by the Atarque Sandstone, the overlying Moreno Hill formation, and laterally correlative formations. Discerning the preservation history (taphonomy) and paleoenvironmental setting of the Zuni dinosaurs requires discrimination of subtle features within laterally variable mud- and sandstone facies deposited in a former coastal floodplain that was the southwestern margin of the Cretaceous Western Interior Seaway.

Specific fossil indicators of hydrogeologic conditions include the taphonomic and geographic relationships of:

- Multiple disarticulated dinosaur skeletons intertwined with carbonized trees forming a fossil "logjam" (bonebed) of bones and wood, the likely product of flotsam accumulated at a "point bar" during flood-stage stream channel migration.
- Nearby well-preserved dinosaur tracks and trackways show large and small animals walking in soft mud, then firmer substrate upon drying, and in shallow water marine sands (beach) at other locations.
- Fossil trees preserved as in-situ rooted stumps, transported logs, driftwood, charcoal, leaf impressions, and coal deposits indicating laterally adjacent emergent and submergent areas.
- Large crocodile teeth and swim traces, bones exhibiting tooth impressions, and extensive tetrapod burrow networks (probably turtle) and turtle remains indicate habitation in at least seasonally habitable riparian/wetland conditions

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## Phoenix Chapter continued

(Continued from page 11)

over many seasons.

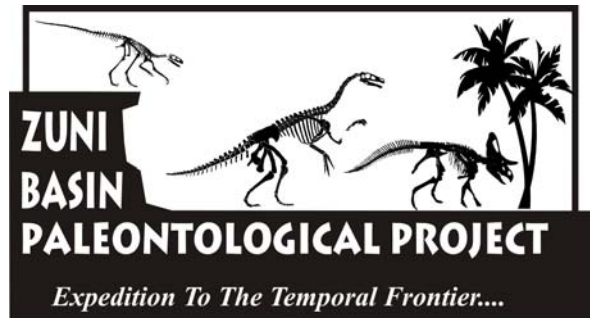
- Mixed micro-vertebrate/rip-up clast assemblages, IHS ("inclined heterolithic strata") bedding and associated tree stumps suggest at least locally extensive debris flows of sediment and aquatic biological material onto the surrounding floodplain, channel margin collapse, and channel abandonment, both creating and destroying local habitats.

These and other sedimentologic/stratigraphic relationships indicate the Zuni Dinosaurs roamed a coastal floodplain comprised of heterogeneous and shifting microenvironments alternating between temporary stabilization of aquatic and emergent areas, followed by large scale reorganization after fires (drought) and flood, possibly due to seasonal cyclones. Overall the Turonian Moreno Hill Formation paleoenvironment appears much wetter than the underlying Cenomanian carbonates, red-bed clastics and marine sands that occupied the area as sea-levels rose to peak transgression in the early Turonian. The Turonian transgression of the worlds' oceans is associated with a dramatic rise in atmospheric carbon dioxide, geochemical phenomena resulting from ocean anoxia and world-wide extinction of numerous marine taxa. The Zuni Basin dinosaurs and associated fossil indicators show that climate was generally wetter and dynamic in the area during peak "greenhouse" conditions. The Zuni Basin dinosaur fauna is now known to extend to southern and central Utah and has prompted discovery and recognition of new therizinosaurs and basal horned ceratopsians - possibly a distinct biogeographic realm - in the southwestern U.S. much earlier and more diverse than originally expected.

Please join us May 13th at El Penasco at Mill & Broadway in Tempe. Hope to see you there!

Location: El Penasco Mexican Kitchen  
19 E. Broadway Road  
Tempe, AZ 85282

Speaker: Doug Wolfe, President, Renaissance Environmental Management, L.L.C.



Paleohydrogeology of the Cretaceous Zuni Basin Dinosaurs - Tales from a Wetter World

Chapter Board Meeting: 4:30 PM – 5:40 PM  
Happy Hour & Dinner: 5:45 PM – 7:00 PM  
Dinner Speaker: 7:00 PM – 8:00 PM

Cost: \$15 member, \$20 non-member, \$5 student

RSVP with Beth Proffitt at [bproffitt@caslab.com](mailto:bproffitt@caslab.com) or 602-437-0330.

All chapter members (and non-members) are welcome to attend the board meeting too!

### 2009 AHS Annual Symposium

The 2009 Annual Symposium will be held at The Westin Kierland Resort & Spa August 30 through September 2, 2009 in Scottsdale. For those of you who enjoyed the 2007 Symposium at the La Paloma Resort, that too was a Westin property. We are planning to meet and hopefully exceed that excellent experience. The event will be a joint symposium with the 2009 national conference of the American Institute of Hydrology (AIH). We have also selected a theme – "Managing Hydrologic Extremes". With the help of AIH and all our AHS volunteers and participating sponsors, we hope to put on a fabulous, successful event at a super venue. We are also planning to organize a published volume of the proceedings papers. AIH normally produces published proceedings and we are looking to continue their tradition for 2009. So if you or someone you know is interested in seeing their paper in print, here's your chance. Start thinking of those paper ideas now! Look

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## Phoenix Chapter continued

(Continued from page 12)

for more details as the 2009 planning continues...

### Planning for 2009 Symposium continues

Planning for the 2009 AHS Symposium continues and we will be meeting regularly to hammer out details of program, speakers, sponsorship, marketing, proceedings, workshops, field trips, etc. If you are interested in helping with the planning process or just listening in, please contact Ted Lehman at [ted@jefuller.com](mailto:ted@jefuller.com) or 480-222-5709, Lee-Anna Walker at [LeeAnna.Walker@arcadis-us.com](mailto:LeeAnna.Walker@arcadis-us.com) or Christie O'Day at [coday@acstempe.com](mailto:coday@acstempe.com) or 480-894-5477.

### Third Annual AHS-AEG Student Night

AHS held its 3rd Annual Student Night with the Arizona Chapter of the Association of Engineering Geologists (AEG) on Thursday evening April 17<sup>th</sup> at the University of Arizona Memorial Union. The event brought together about 60 students and professionals to share interests, network, and discuss employment opportunities. A mini-career fair was followed by dinner and four presentations by students of their work.

The presenters at this year's event were;

Taylor Feiereisel – ASU School of Earth & Space Exploration

Melinda Shmizu – ASU School of Earth & Space Exploration

Philip Stokes – UA Mining & Geological Engi-



### Phoenix Chapter Officers

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neering Department

Candice Adkins – UA Geosciences Department

*AHS-AEG Student Night Presenters – from left to right Philip Stokes, Ted Lehman, Taylor Feiereisel, Candice Adkins, Melinda Shmizu, and Randy Post*

Cash awards were given to all our participants in recognition of their efforts! Candice was awarded the \$200 first prize. Melinda received the \$100 second prize and Philip and Taylor each were awarded \$50.

We'd like to thank Randy Post, Pancho Garza,

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## Phoenix cont.

*(Continued from page 13)*

and Heather Hespeler with AEG for all their help organizing and advertising for the event. We are looking forward to another successful event with AEG next year.

### **Surface Water Issues Workshop – SOLD OUT!**

The Phoenix Chapter's second Technical Session on May 15, 2008 is filling up quickly. Only a few seats remain.

The session will take place at the Arizona Department of Water Resources in Phoenix. The session will focus on Surface Water Issues. Specific speakers and topics are still being confirmed, but so far we expect to hear from:

Lisa Logan – ADWR - Discussion of Arizona surface water rights and claims and legally available water supplies

Lisa Spahr – EEC

SWPPP MS4 current permitting issues

Construction General Permit Changes

Tom Carr – ADWR – Colorado River Compact update

Michael Ford (Attorney) - Bryan Cave, LLP  
"Water Quality Improvement Grants" from ADEQ of over \$700G to help a charity/owner donated the site clean up a century of mining impacts by removing 100G tons of ore/waste rock, and installing a permeable reactive barrier "The Carlota Decision" and its implications for NPDES permitting

Ken Houser - SWCA - Developments in the Clean Water Act

Nick Melcher - USGS Retired - Stream Gauging Field Methods

USGS speaker TBD – Grand Canyon Experimental Flood #3

Dr. Hari Sundararaghavan - JE Fuller Hydrology and Geomorphology – Sediment transport modeling

Dr. Roland Wass – Wass-Gerke + Associates – Salt River restoration overview

Charlie Ester – Salt River Project - Reservoir Calculations and Predictions

Jeanmarie Haney – The Nature Conservancy – Environmental flows

The technical session will be a full day event (8:00 – 4:30) and will include lunch. Registration is \$75 per person. Registration can be made online at [www.azhydrosoc.org](http://www.azhydrosoc.org) or by mail. Registration will be limited to the first 50 persons. As of April 18<sup>th</sup> we had 44 registrants. Register online today to get you spot!

We are also seeking sponsors. For a \$200 donation, sponsors will receive recognition at the seminar and one complimentary registration. So far we have four paid sponsors and two in-kind sponsors. The Phoenix Chapter extends our thanks to:

Lewis & Roca,  
Errol L. Montgomery Associates,  
PBS&J,  
Golder Associates,  
EEC,  
Arcadis,  
& ADWR for their sponsorship.

There's still room for more sponsors too! Each sponsorship comes with one paid registration. You can even sign up as a sponsor online at [www.azhydrosoc.org](http://www.azhydrosoc.org). The proceeds from the session will all go to support the Herman Bouwer Internship program. So sign up and help out the Bouwer Internship program. Last year we raised over \$2,000 on behalf of the Internship program.

Lee-Anna Walker is spearheading this effort and would be delighted to have your help, input, or sponsorship. Lee-Anna can be reached at [LeeAnna.Walker@arcadis-us.com](mailto:LeeAnna.Walker@arcadis-us.com) or (602) 659-3230.

### **2008 Event Calendar**

May 13 - Doug Wolfe – [Dinosaur Fossils in the Zuni Basin](#)

May 15 – Surface Water Issues Seminar, ADWR  
June 10<sup>th</sup> - Bruce Robinson, ATC – Perchlorate contamination – health and economic issues - the bigger picture

## FLAGSTAFF CHAPTER

### Flagstaff Chapter Officers

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Corporate Board Representative:  
AREGAI TECLE

Corporate Board Member at Large:  
Margot Truini

### Phoenix Chapter continued...

#### Herman Bouwer Intern selected.

Ms. Cheri Topel is a senior in Environmental Technology and Geological Sciences at Arizona State University. She will be attending the Surface Water seminar on May 15<sup>th</sup>, attending a HAZWOPER training course in early June, and interning with several area employers this summer.

Did you know that AHS has a

# JOBS

page on our web site? Visit:

[www.azhydrosoc.org](http://www.azhydrosoc.org) and then click on JOBS to view the most recent postings. If you would like to post an opening just email it to [jgmerideth@aol.com](mailto:jgmerideth@aol.com) and Jeanie will post it for you.

Call for Papers - CAP Award for Water Research

**First Place Award:** \$1,000

**Second Place Award:** \$500

Papers are now being accepted for the CAP Award for Water Research. Papers should focus on water issues that affect central and southern Arizona and the Colorado River, including legal, economic, political, environmental, or water management issues, as well as any other issue that might be of interest to CAP or Arizona water users. Winners will present their research at the Arizona Hydrological Society's annual symposium.

The CAP Award is available to students at any college or university in the State of Arizona. To apply, submit your complete paper online at [www.cap-az.com](http://www.cap-az.com).

**Deadline: June 1**

Get more information on the web at [www.cap-az.com](http://www.cap-az.com)

## Grand Canyon Monitoring Research Center, USGS

### Glen Canyon Dam High-Flow Experiment Preliminary Results

On March 5, 2008, Secretary of the Interior Dirk Kempthorne opened jet tubes at Glen Canyon Dam to release about 41,500 cubic feet per second of Colorado River water into Grand Canyon for a 60-hour period. The experimental release was undertaken to learn more about how to enhance natural, cultural, and recreational resources found in Grand Canyon National Park, and how this complex natural system is affected by high flows.

The U.S. Geological Survey's (USGS) Grand Canyon Monitoring and Research Center is responsible for coordinating research associated with the 2008 high-flow experiment. USGS scientists, who are working cooperatively with researchers from other Federal and State agencies and universities, will attempt to answer a wide range of scientific questions. In addition to determine if high-flow releases are capable of rebuilding and maintaining sandbars used by wildlife and hikers over time, scientists are working on research projects that can help managers better manage critical resources ranging from the endangered humpback chub to archaeological sites.

In the nearly two months since the experiment took place, USGS scientists have been in the field gathering data. Preliminary findings about how the experiment affected sand resources indicate that the results were mixed but generally encouraging. For example, time-lapse photographs taken at river miles 3 and 45 show two very different outcomes. At river mile 3, the photographs reveal the loss of a large sandbar (fig. 1). However, farther downstream at river mile 45, photographs show the creation of an extensive sandbar in response to the release (fig. 2). A more interesting detail revealed by the river-mile-45 images was the erosion suffered by the newly created sandbar in the approximately 2 weeks following the surge.

Given the size and diversity of the Colorado River ecosystem found below Glen Canyon

Dam, it is unsurprising that the overall response of sandbars to the high-flow release was complex.

"It's just impossible at this point to say whether it was a net positive or a net negative," according to Dr. Ted Melis, deputy chief of the USGS Grand Canyon Monitoring and Research Center in Flagstaff, Ariz.

The 2008 test was similar to the previous experiments conducted in 1996 and 2004, but the amount of sediment available was considerably larger. Tributaries below the dam provided more sand to the system in 2007 and early 2008 than had been available at any time since 1998. The volume of sand available in 2008 was about two times greater than the supply that preceded the 2004 experiment. This larger sand supply was also distributed throughout downstream reaches to a greater extent than in 2004.

"With more than 100 Federal, State and university researchers collecting data on behalf of this experiment, it will take some time to interpret the data and reach final conclusions on what has been learned," adds John Hamill, chief of the USGS Grand Canyon Monitoring and Research Center. "The effects of the high-flow experiment on various resources in Glen and Grand Canyons will be evaluated in the field through the fall of 2008."

USGS anticipates that initial reports from the experiment will be provided to the public in late 2008 and 2009; with a complete synthesis of the results including comparisons with the 1996 and 2004 tests to be provided in 2010.

Preliminary findings, including images and time-lapse videos are available at [www.gcmrc.gov](http://www.gcmrc.gov)

Captions and locations of photos:

Figure 1a. Photograph of sandbar near Cathedral Wash (river mile 2.5 on left) taken before the high flow on March 2, 2008. The view is

*(Continued on page 17)*



# Grand Canyon Monitoring cont.

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from the canyon rim on river right, with the water flowing from left to right in the photograph.

Figure 1b. Photograph taken from same location following the high flow on March 28, 2008.

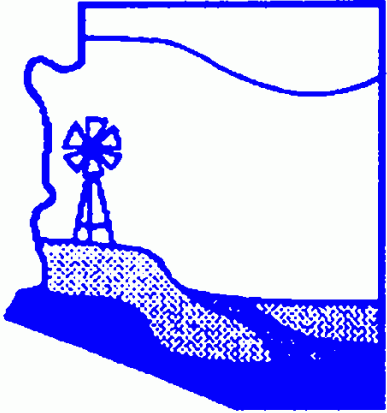
Figure 2a. Photograph of sandbar at river mile 45 taken before the high flow on March 4, 2008. The view is from river right and the river is flowing from left to right in the photograph.

Figure 2b. Photograph taken from same location following the high flow on March 10, 2008.

Figure 2c. Photograph taken from same location several weeks after the high flow on March 31, 2008.



# MEMBERSHIP APPLICATION



## Arizona Hydrological Society

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**ARIZONA HYDROLOGICAL SOCIETY** c/o Jeanie Merideth Association Manager  
PMB #139; 3305 N. Swan Rd #109, Tucson, AZ 85712  
Membership Application (Dues: 1 year \$45, \$15 for students)

Name: \_\_\_\_\_ Position: \_\_\_\_\_

Company: \_\_\_\_\_ Email: \_\_\_\_\_

Mailing Address: \_\_\_\_\_

Work Phone: \_\_\_\_\_ Home Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

*In addition to my dues, I am enclosing*

\$ \_\_\_\_\_ Herman Bouwer Intern Scholarship fund (Phoenix),  
\$ \_\_\_\_\_ Leonard C. Halpenny Intern Scholarship fund (Tucson),  
\$ \_\_\_\_\_ for the SARSEF Scholarship fund,  
and/or \$ \_\_\_\_\_ for the state-wide AHS General Scholarship fund.

Total amount enclosed: \$ \_\_\_\_\_

Chapter Affiliation:

\_\_\_\_\_ Tucson

\_\_\_\_\_ Phoenix

\_\_\_\_\_ Flagstaff