



# Arizona Geological Society Newsletter

AUGUST 2014

## August 5, 2014 DINNER MEETING

**Who:** Jamie Molaro will speak about "Thermal Stress Weathering in the Inner Solar System".

**Where:** Sheraton Tucson Hotel and Suites, 5151 East Grant Road, (at the intersection of Grant and Rosemont on the North side of Grant in the *PIMA BALLROOM* (enter at northwest corner of the building) and go upstairs to the meeting room.

**When:** Cash Bar at 6 p.m.—Dinner at 7 p.m.—Talk at 8 p.m.

**Cost:** Members \$27, Guests \$30, Students Members free with online reservation (\$10 without).

**RESERVATIONS ARE REQUIRED:** CALL (520) 663-5295 or reserve on the AGS website ([www.arizonageologicalsoc.org](http://www.arizonageologicalsoc.org)) by 11 a.m. by Friday, August 1st. Please indicate regular (Chicken Alfredo), vegetarian, or Cobb salad meal preference. Please cancel by Friday, August 1st at 11 a.m. if you are unable to attend—no shows and late cancellations will be invoiced.



AGS is grateful for our sponsors, who have helped us to offset  
dinner meeting costs during 2014

## Abstract

### Thermal Stress Weathering in the Inner Solar System

by Jamie Molaro

Thermomechanical processes such as fatigue and shock have been suggested to cause or contribute to rock breakdown on Earth, particularly in arid environments where other weathering processes are slow. The formation and propagation of microfractures in rocks can occur due to expansion and contraction caused by changes in temperature, and by mismatches in thermal expansion behavior of adjacent mineral grains. Debate over the efficacy of this process began nearly a century ago, and has recently become an area of renewed interest,

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particularly in the planetary science community. Airless bodies may provide an environment uniquely suited to this process, as they may experience larger diurnal temperature ranges and/or rapid rotation rates. Understanding where in the solar system thermomechanical breakdown may occur has important implications for regolith production rates, surface ages and crater degradation rates, and landscape evolution over time. It may also provide invaluable information for future human exploration endeavors. I will present research exploring thermoelastic behavior of rock surfaces throughout the inner solar system (particularly the Moon, Mercury, and near earth asteroids), and discuss the implications for rock breakdown and landscape evolution on these bodies.

**About the August Dinner Speaker**

Jamie Molaro was raised in Grass Valley, California, located in the foothills of the Sierra Nevada Range. She did her undergraduate studies at San Francisco State University in Physics from 2004 until 2009. Before moving on to graduate school, she worked as a research assistant at the NASA Ames Research Center.

Jamie Molaro is presently a PhD candidate at the University of Arizona's Lunar and Planetary Laboratory. In addition to research, she organizes the department's annual Art of Planetary Science art show, and is teaching a course called Intro to Planetary Science for Teachers. Her research interests include thermomechanical surface processes, weathering in desert environments, and fluvial erosion processes on Earth and Titan. Tonight's talk is the subject of her thesis research.

**2014 AGS Member Directory Coming in September**

Directory compilation is in progress so submit your company ads and photos to Directory Coordinator, Cori Hoag, [choag@srk.com](mailto:choag@srk.com) through Aug. 15th. [See our website for advertising size/cost details](#) – payment accepted by check in advance, or secure credit card online.

**Members – please ensure we have your up-to-date contact info including a correct mailing address.** The directory will be sent by bulk mail and will not be forwarded. Thanks to all our Advertising Sponsors for their on-going support of the Arizona Geological Society!

**Geological Society of Nevada 2015 Symposium****Call of Papers**

The Geological Society of Nevada has announced a [call for papers](#) to be presented at its 2015 Symposium, which will be held at John Ascuaga's Nugget in Reno/Sparks, Nevada on May 14-24, 2015. Co-hosts for this event include the Society of Economic Geologists, Nevada Bureau of Mines and Geology and the U. S. Geological Survey. Its theme is New Concepts and Discoveries. Anyone wishing to present a paper at this meeting needs to submit a draft abstract no later than October 1, 2014. [For more information on this event visit this link.](#)

# November 2014 Dinner Meeting

The Arizona Geological Society invites everyone to its November 4, 2014 dinner meeting, where Isabel Fay, of the University of Arizona, will present “Ores in synorogenic veins in the Central African Copperbelt: Remobilization or addition?” This event will be held at the Sheraton Phoenix Airport Hotel, located at 1600 South 52nd Street in Tempe, Arizona.

Since we will not have a meeting in Tucson in November, we are currently working to organize car pools to make it more convenient for our Tucson members to attend this event. Anyone who might be interested in driving to Phoenix for this meeting, contact David Briggs at [secretary@arizonageologicalsoc.org](mailto:secretary@arizonageologicalsoc.org).

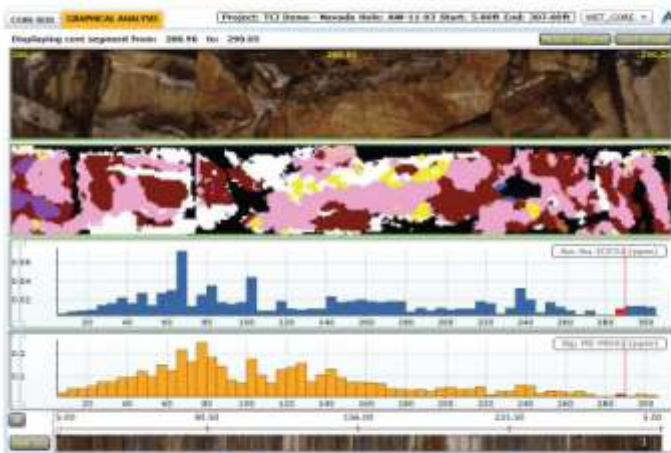
## AIPG/AHS National Conference

The American Institute of Professional Geologists (AIPG) and the Arizona Hydrological Society (AHS) will hold the 2014 Water and Rocks, the Foundations of Life National Conference in Prescott, Arizona from September 13-16, 2014, at the Prescott Resort & Conference Center in Prescott, Arizona.

Field trips, workshops, exhibitor setup, poster setup, the AHS Foundation Meeting, and the icebreaker/reception will take place Sunday, September 14, 2014. Technical sessions, workshops, and more field trips will take place Monday and Tuesday, September 15 and 16. For more information about this event please visit their web site at <http://aipg.org/Events/2014/AIPG-AHS.html>.



# New ALS Facility Tucson, Arizona



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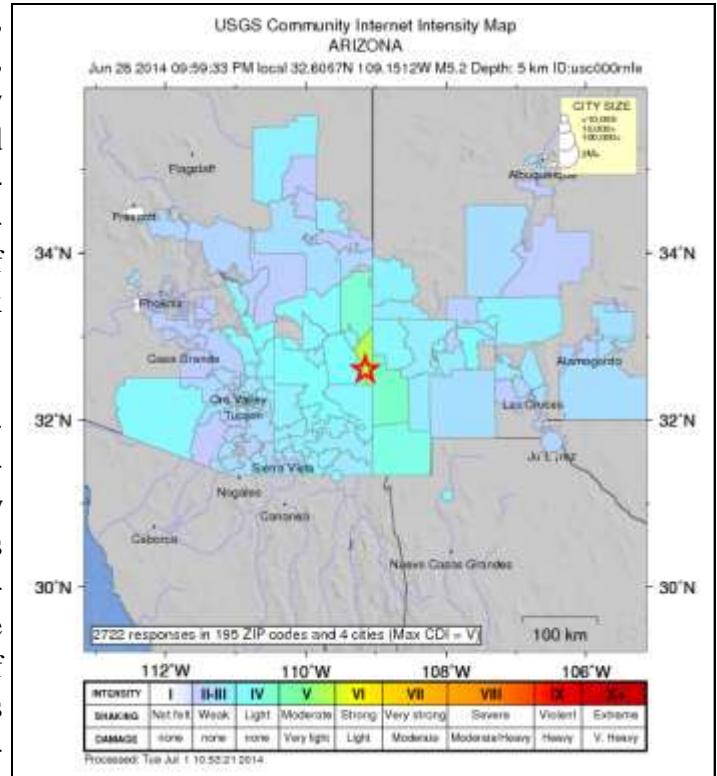


## News from the Arizona Geological Survey

### M5.2 Earthquake and aftershocks rattle eastern Arizona

Tucson, Arizona. At 9:59 p.m. (MST) on June 28, 2014, a magnitude (M) 5.2 earthquake near Duncan, Arizona, rocked eastern Arizona and western New Mexico (Fig. 1). The U.S. Geological Survey's "Did you feel it" survey tool received more than 2,700 reports of ground shaking (Fig. 2). Strong ground shaking was reported near Duncan, while reports of ground shaking rolled in from as far west as Phoenix and as far east as Alamogordo, New Mexico.

Since the M5.2 event, the USGS reported 18 aftershocks ranging from M2.8 to M4.1 (Fig. 3). The largest aftershock, at M4.1, occurred at 7:48 p.m. on July 11. Hundreds of smaller magnitude aftershocks, less than ~ M3.0, have occurred since the onset of activity, and most went largely unfelt. According to the U.S. Geological Survey, the depth and mechanism of the earthquake are consistent with shallow (~ 3 miles deep) normal faulting along a NE-striking, steeply-dipping fault plane.



In a news release on July 11, the Arizona Geological Survey (AZGS) cautioned people in southeastern Arizona to prepare for additional M3.0 to M4.0 earthquakes over the next weeks or month. The AZGS has already deployed five portable seismometers, with three additional seismometers scheduled for deployment on the week July 21. According to Dr. Jeri Young, AZGS geophysicist, this network of portable seismometers should help greatly in "learning more about the behavior of the earthquakes and faulting in the region." The portable seismometers complement broadband seismometers of the Arizona Broadband Seismic Network operated by the AZGS.

According to Jon Spencer, Senior Geologist at the Arizona Geological Survey, "The recent Duncan earthquake occurred because Earth's crust in southern Arizona and northern Sonora is gradually extending in an east-west direction."

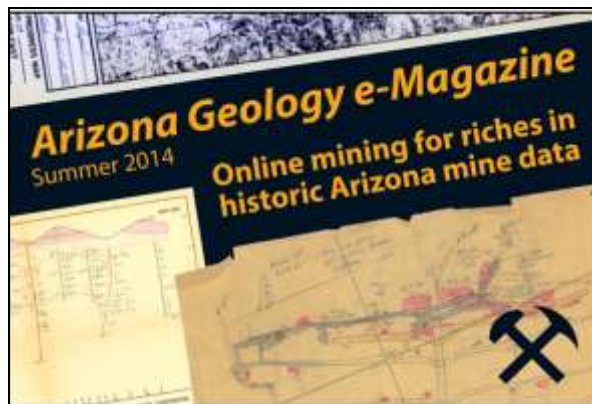
The largest historical earthquake in the region was the M~ 7.5M event in May 1887 on the Pitaycachi fault of northern Sonora, Mexico, about 25 miles south of Douglas, Arizona. This is considered the largest earthquake likely to occur in this region. A M5.5 earthquake occurred on August 17, 1938, near Buckhorn, New Mexico, and M4.5 events occurred soon after in the Duncan and Clifton areas. In May 2010 and October 2012, small earthquake swarms, with earthquake events ranging from M2.0 to M4.1, occurred about 45 miles north-northeast of Duncan, in the Morenci-Clifton area of northern Greenlee County.

**Online Resources.** The Arizona Geological Survey hosts a number of online resources relevant to earthquakes and earthquake hazards in Arizona:

- [Natural Hazards in Arizona](#) Active Faults | Earthquake Epicenters themes
- [Earthquakes in Arizona 1852-2011](#) – Time lapse video showing locations and magnitudes of earthquake events in Arizona. Length: 90 seconds.
- [Arizona is Earthquake Country](#) – Forty-four page primer on earthquakes, earthquake hazards and mitigation in Arizona.
- [Great Arizona ShakeOut](#) – Online earthquake preparedness information and drill.
- [AzEIN](#) – Earthquake Preparedness page from Arizona Emergency Information Network.

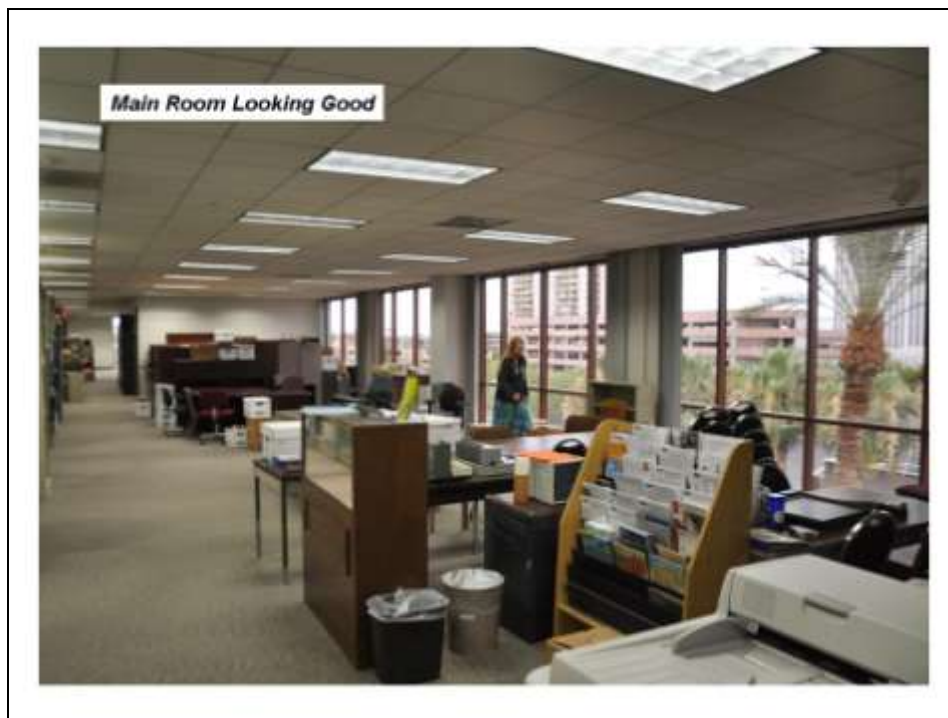
The James Doyle Sell collection of more than 800 Arizona mine file records were added to the Arizona Geological Survey Mining Data online repository on July 2, 2014.

James Sell was a native Arizonan, born in Casa Grande in 1930; he passed away on February 18, 2011. He worked for ASARCO for 32 years, where he served for some years as their Southwestern Exploration Manager. Jim was also a highly respected member of the Arizona Geological Society and the Society of Mining, Metallurgy and Exploration.



## What's New at the Arizona Geological Survey

The **Phoenix Branch** office of Arizona Geological Survey has moved to new office located on the 4th floor at [3550 N Central, Phoenix, AZ 85012](#). Phone and fax numbers remain the same.



## ANNOUNCEMENTS

### Welcome New AGS Members

Ravindra Dwivedi      Arin Haverland      Joshua Larsen      Grant Kornrumpf      Kevin Seery  
 Samantha Edmiston      Nicholas Hillemeier      Rajarshi Mukherjee      Stephen Smith  
 Joseph Gerencher      Chak Hau Michael Tso      Laura Nakolan      Monica Spencer

**Arizona Geological Society is grateful to Freeport-McMoRan Copper and Gold for their generous support of our student members!**



**Freeport-McMoRan is sponsoring student dinners for the 2014 AGS monthly meetings.**

### 2014 AGS MEMBERSHIP APPLICATION OR RENEWAL FORM

Please mail check with membership form to: Arizona Geological Society, PO Box 40952, Tucson, AZ 85717

Dues (check box)  1 year: \$20;  2 years, \$35;  3 years: \$50;  full-time student (membership is free)

NEW MEMBER or RENEWAL? (circle one)      Date of submittal \_\_\_\_\_

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

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

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