



AGS NEWSLETTER

ARIZONA GEOLOGICAL SOCIETY, INC. NOVEMBER 2006

DINNER MEETING SPEAKERS NOVEMBER 14, 2006

ROBERT H. WEBB, U.S. GEOLOGICAL SURVEY & **ERICK PYTLAK**, NATIONAL WEATHER SERVICE

Debris Flows & Record Floods from Extreme Mesoscale Convective Thunderstorms over the Santa Catalina Mountains

ABSTRACT: Ample geologic evidence indicates early Holocene and Pleistocene debris flows from the south side of the Santa Catalina Mountains north of Tucson, but few records document historical events. On July 31, 2006, an unusual set of atmospheric conditions aligned to produce record floods and an unprecedented number of debris flows in the Santa Catalinas. During the week prior to the event, an upper-level area of low pressure centered near Albuquerque, New Mexico generated widespread heavy rainfall in southern Arizona. After midnight on July 31, a strong and widespread complex of thunderstorms developed over the Mogollon Rim in central Arizona in a deformation zone that formed on the back side of the upper-level low. High atmospheric moisture (50 mm of precipitable water) coupled with cooling aloft spawned a mesoscale thunderstorm complex that moved southeast into the Tucson basin. These thunderstorms interacted with a low- to mid-level zone of atmospheric instability to create an initial wave of rainfall across the Tucson metropolitan area in the early morning hours. A second wave of thunderstorms and heavy rain developed over the Santa Catalina Mountain near dawn. A 15-20 knot low-level southwesterly wind developed with a significant upslope component over the south face of the Santa Catalina Mountains advecting moist and unstable air into the merging storms. NEXRAD radar indicates that a swath of 75-150 mm of rainfall occurred over the lower and middle elevations of the southern Santa Catalina Mountains in three increments: (1) from 2-6 AM, moderate intensity rainfall up to 65 mm; (2) from 6-7 AM, intensities up to 75 mm in 45 minutes; and (3) a final burst approaching 50 mm in 45 minutes from 8-9 AM.

This intense rain falling on saturated soil triggered multiple debris flows in four adjacent canyons. Sabino Canyon, a heavily used recreation area administered by the U.S. Forest Service, was the epicenter of mass wasting where at least 18 debris flows removed structures, destroyed the roadway in multiple locations, and closed public access for months. *Continued on Page 2*

Dinner Meeting Schedule:

Note: Second Tuesday of the Month this meeting only

Inn Suites Hotel: 475 N. Granada Ave. in Tucson

Cash Bar @ 6 pm Dinner @ 7 pm Talk @ 8 pm

Cost: With reservation: Members \$20, Guest \$22, Students \$7 Without reservation \$2 additional. Please call (520) 663-5295 by 5 pm before **November 10**. Indicate if a low-salt or vegetarian meal is required. Please cancel if you are unable to attend.

CALENDAR OF EVENTS:

- Dec. 5, Dinner Meeting, Steven Semken, ASU, Topic: Ethnogeology & Geoscience Teaching
- Jan. 2, Dinner Meeting, Madan Singh, ADMMR, Topic: Sustainable Development
- Feb. 6 Dinner Meeting, David John, USGS, Topic: Hydrothermal alteration - Cascade Volcanoes



Member News:

Welcome to new members **Bruce Veek**, Asarco Mission and **Steve Domingo**, TD & Associates Exploration. Our condolences to the family of former AGS member **Jim Chapman** who passed away Oct. 23 at age 45 from a heart attack in Palmer, Alaska. He was a geologist and GIS specialist and had worked for Newmont, Echo Bay, Gold Fields, Placer Dome, American Resources, Phelps Dodge, and Bema.

To the west in Rattlesnake Canyon, a similar number of debris flows coalesced to travel several kilometers down the channel washing out the roadway, debouching into Sabino Creek, and contributing to a net 5-7 m of deposition within Sabino Creek. The debris flows were followed by streamflow floods which eclipsed the record discharge in the 75-year gaging record of Sabino Creek. The floods reworked most of the debris-flow deposits in or adjacent to the channel or buried them beneath coarse, sandy deposits.

Co-authors include Christopher S. Magirl, U.S.G.S, Tucson, Craig Shoemaker, Nat. Weather Service, Tucson, Mike Schaffner, Nat. Weather Service, and Peter Griffiths, U.S.G.S.

TRIP REPORT -AGS FALL FIELD TRIP

Thanks go to Phelps Dodge for an absolutely fantastic field trip this last weekend to Silver City, New Mexico where 28 AGS members were treated to an excellent tour of the **Tyrone Mine** on Saturday, November 4 and of the **Santa Rita Mine** (Chino) on Sunday. We had a great overview and trip stop discussions by leaders **Ralph Stegen, William Seibert III** and **Jeff Gerwe** at Tyrone and **Robert North, Mark Thoman, Andy Lande,** and **Jeff Gerwe** at Chino before getting out into the mines and surrounding area. The guidebooks gave us great background information on the geology, structure, mineralization, and alteration of the mines and also provided maps and tour stop comments. The range of stops was incredible at both locations and we saw a full suite of host rocks and mineralization types from stockwork chalcocopyrite-molybdenite vein systems, supergene copper oxide and native copper, to magnetite-pyrite-chalcocopyrite skarns. We had good conversation, geologic fellowship, and a few beers at the Copper Crest Country Club on Saturday night. The hospitality of the operations was superb, we enjoyed a sack lunch on Saturday and tasty lasagna/salad on Sunday, and the weather was perfect! Extra copies of the guidebook will be available for sale at the dinner meetings. Please contact Rich Brown at rbrown@clearcreekassociates.com if you are interested in purchasing a copy by mail order.



Left: Discussing Mine and regional geology at the pit overview at the Tyrone Mine. L to R: Eric Seedorff (UA) Erik Flesch (Phelps Dodge Morenci), Tim Hayes, (USGS), and Madan Singh (ADMMR), and Ralph Stegen (Phelps Dodge).

Lower Left: Linda Dufek and Victor Espinoza, (Phelps Dodge Mexico) collecting examples of biotite and K-feldspar veins at Townsite Island, Santa Rita Deposit.

Lower Right: Karen Bolm (USGS), Anna Domitrovic (Arizona-Sonora Desert Museum), and Coleen Brown (Red Cross).



Overlook at south side of the Santa Rita Mine. Leach dumps on the horizon with the pit lake in the foreground.



Soaking up the sun and fascinating mineralization at Santa Rita Deposit (Chino).

OTHER GEOSCIENCE & FIELD TRIP NEWS

The 24th annual **American Mining Hall of Fame Awards Banquet** sponsored by the **Mining Foundation of the Southwest** will be held at the Tucson El Conquistador Resort on Saturday, December 9. The inductee this year is Jack Thompson, Jr., former CEO of Homestake Mining, former Vice Chairman of Barrick Gold, and director of Phelps Dodge. Tickets and additional information are available by calling (520) 577-7519 or by E-mail at mfs@dakotacom.net.



The next committee meeting for the **AGS Ores & Orogenesis Symposium for September 2007** is scheduled for 5:30 pm, November 15th at E.N.R.B room 335 on the UA campus. Please come and get involved. Many thanks go to our newest **Copper Sponsor Skyline Assayers & Laboratories** for their generous symposium support.

Thanks go to Bill Phillips at the **Arizona Portland Cement Plant** for giving AGS members a chance to tour the Plant and Quarry facilities on October 14. As always it was a fascinating experience and we had a great view from the top.

AGS members shown below include **Bill Peachey, Kevin Horstman, Cori Hoag, Ann Pattison, Madan Singh, and Nyal Niemuth**.





ARIZONA
GEOLOGICAL SOCIETY

P.O. Box 40952
Tucson, AZ 85717-0952

Phone: (520) 663-5295
www.arizona Geological Soc.org

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For info on ordering AGS
publications, visit
www.arizona Geological Soc.org.
AGS books & maps are sold at the
dinner meetings and by the
Arizona Geological Survey.

Current membership stands at 371. As always, please keep us up-to-date as you move, change jobs, or email addresses. Thanks to all our wonderful Membership Directory Sponsors for a great directory.

2007 AGS MEMBERSHIP APPLICATION OR RENEWAL FORM

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

Dues (check box) 1 year: \$15; 2 years: \$30; 3 years: \$40; full-time student (membership is free)

Name: _____ Position: _____

Company: _____

Mailing Address: _____

Street City State Zip Code

Work Phone: _____ Home Phone: _____

Fax Number: _____ Cellular Phone: _____

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If registered geologist/engineer, indicate registration number and State _____

Enclosed is a _____ tax-deductible contribution to the J. Harold Courtright Scholarship Fund.

Enclosed is a _____ tax-deductible contribution for the 2007 AGS Symposium.