



# Arizona Geological Society Newsletter

JUNE 2016

## June 7, 2016 DINNER MEETING

**Who:** Robert S. Hildebrand will present “Collisions, Slab Failure Magmatism, and the Development of Cordilleran Batholiths”

**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 \$30, Guests \$33, Students Members free with on-line reservation (\$10 without).

**RESERVATIONS ARE REQUIRED:** Reserve on the AGS website ([www.arizonageologicalsoc.org](http://www.arizonageologicalsoc.org)) by **11 a.m. Friday, June 3rd**. Please indicate Regular (Chicken Cacciatore), Vegetarian, or Cobb Salad meal preference. Please cancel by **Friday, June 3rd at 11 a.m.** if you are unable to attend - no shows and late cancellations will be invoiced.

## The June Dinner Meeting is Sponsored by Boart Longyear



**The AGS is Grateful for Boart Longyear’s Sponsorship, which helps us offset the increasing costs of our dinner meetings and other activities of the society.**

## Collisions, Slab Failure Magmatism and the Development of Cordilleran Batholiths

**by Robert Hildebrand, University of California, Davis**

Cordilleran batholiths are generally considered to form beneath arc terranes in thickened crust, but a survey of modern continental arcs reveals most to be regions of normal to thinned crust, not zones of crustal thickening.

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**Abstract Continued from Page 1**

Thus, the origin of Cordilleran batholiths is enigmatic. I suggest that these batholiths form mostly during and after arc-continent collision as the result of slab failure. Slab failure is a natural consequence of arc-continent collision, and explains the age difference between continental and oceanic lithosphere, because oceanic lithosphere is readily subducted, whereas continents are buoyant and difficult to subduct. Once the subducting slab tears, rocks of the partially subducted continental margin rise due to buoyancy and the collision zone is exhumed. The failure also allows asthenosphere to upwell through the tear, melt adiabatically, and rise into the collision zone, where it interacts especially with subcontinental lithosphere and crust of the upper plate. Slab failure magmas are geochemically and isotopically distinct from arc magmas because slab failure magmas form from melting of garnet peridotite whereas arc magmas are derived from melting of spinal peridotite.

Cretaceous examples of slab failure magmatism include the La Posta and Sierran Crest magmatic suites of the Peninsular Ranges and Sierran batholiths, which formed due to closure of the Bisbee-Arperos seaway, a marginal basin that opened along the western margin of the Cordilleran Ribbon Continent at about 135 Ma and closed at ~100 Ma. This seaway likely extended from southern Mexico to the Arctic ocean.

Slab failure rocks of the 125-105 Ma Sevier event, which occurred in the Great Basin sector of the US, outcrop in the Omineca belt and Selwyn basin of Canada where they were transported after 70 Ma during the 82-58 Ma Laramide event. The Laramide event also had a period of slab failure magmatism that extended from southern Mexico to Alaska. Slab failure magmas were emplaced into a zone of uplift and exhumation in the Sonoran batholith of Mexico and Arizona, the Transverse Ranges of southern California, the Idaho and Boulder batholiths, and the Coast Range batholith of British Columbia.

Most of the Cretaceous plutons in the North American Cordillera appear to be slab failure bodies, not arc plutons. Commonly associated with slab failure magmatism are porphyry Cu±Au deposits and Li-Cs-Ta pegmatites. Lastly, most of the world's diamonds may owe their origin to subduction and foundering of carbonate on subducted continental margins.

**About the June Dinner Speaker**

Robert Hildebrand is a field geologist who grew up in Marblehead, Massachusetts, and spent his first complete summer working in the high Sierra in 1971. He received a B.A. in geology at UC Santa Barbara and a PhD from Memorial University of Newfoundland. He spent 20 years mapping in the Northwest Territories of Canada for the Territorial Government and the Geological Survey of Canada where he was a research scientist.

Subsequently, he managed gold exploration projects in Venezuela, Mexico, and the Dominican Republic.

About 10 years ago he turned his attention to the North American Cordillera and has published his research in several journal articles and two stand-alone GSA special papers on the Cordillera.

Hildebrand is a Fellow of the Geological Society of America, was a Visiting Scholar at the University of Arizona and is currently a Research Associate at the University of California, Davis.

## The Future of the Arizona Geological Survey is Uncertain

With the approval of the Agency Consolidation Budget bill (SB1530) by Governor Ducey, funding for the Arizona Geological Survey (AZGS) was eliminated and the duties of the Survey were transferred to the University of Arizona, effective July 1, 2016. In spite of being assured by Governor Ducey's staff that this was the best option for the Arizona Geological Survey's survival, the future of one of the best state geological surveys in the nation that has served the citizens of Arizona since 1888 is now uncertain. Modest resources that were vital for the Survey to carry out its core mission were eviscerated by budget cuts and related costs resulting from Governor Ducey's efforts to consolidate state government.

The Arizona Geological Survey will vacate its state offices on West Congress by June 30 and move to the Arid Lands Building on the east end of the University of Arizona campus. This office space is considerably smaller than that of the West Congress office. The Arizona Experience retail store will be closed. The Phoenix office of the AZGS has to vacate its current office by June 30 and its staff will be laid off because the Survey has no place for them to go.

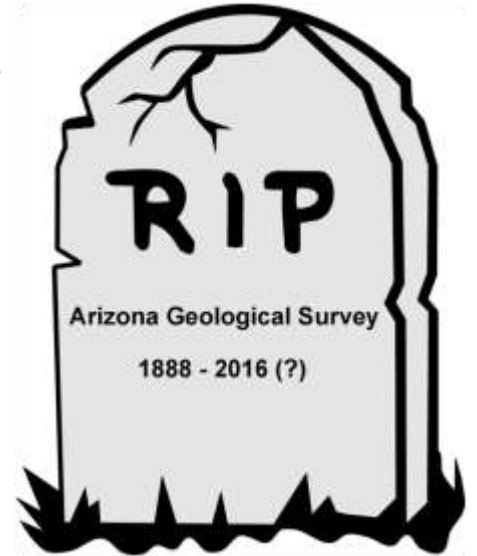
The former Arizona Mining and Mineral Museum in Phoenix will also be transferred from the Arizona Historical Society to the Arizona Geological Survey in August 2016. However, the building cannot be occupied until \$700,000 to \$900,000 in repairs are made and will require approximately \$2.86 million over the next five years to make it like new. However, there is no funding available for these renovations and the possibility of obtaining private funding is slim due to a clause in the legislation that returns the museum to the Arizona Historical Society if it is not refurbished and open by July 1, 2018. The museum will be used to store files, library materials and core contained in the AZGS repository. Otherwise, they would all be disposed.

The Arizona Geological Survey will operate as a research center in the University of Arizona College of Science. The State appropriation to the Arizona Geological Survey will end June 30, 2016. The University of Arizona will provide \$941,000 for the 2017 Fiscal Year as a part of the transition. After that, the Arizona Geological Survey will be required to fund 100% of its budget from grants and contracts. The University of Arizona has plans to develop a fee for services program to help underwrite its activities.

Without a state appropriation or funding provided by the University of Arizona, it will be very difficult for the Arizona Geological Survey to generate the matching funds it requires to obtain many outside grants. Furthermore, the Arizona Geological Survey will also be required to give up most of its overhead on existing and future grants to the University of Arizona. These funds have been historically used to help support the Survey's core mission.

As a result of these cut backs, the Arizona Geological Survey has notified some members of its staff that their jobs will be eliminated as July 1, 2016 due to the loss of funding. The Survey is committed to keeping other members of its affected Tucson staff at least one more month. Others have decided to take early retirement.

The Arizona Geological Society wishes Lee Allison and surviving members of his staff well as they work to overcome the hardships resulting from Governor Ducey's efforts to consolidate state government. To those who have lost their jobs, we wish you well in your future endeavors.



## Arizona Geological Society Spring Field Trip

Over the April 30-May 1st weekend, Arend Meijer lead a small but enthusiastic group of geologists on a very informative field trip that examined the Paleoproterozoic Pinal Schist of southeastern Arizona. Our VP of Field Trips, Robert Hildebrand did a superb job organizing this trip. Copies of this field trip guidebook can be purchased at our dinner meetings.



Group photo of Participants on the AGS Spring Field Trip.



Arend Meijer leads group discussion of geology.



Milky quartz in the Pinal Schist.

## Impact of AZGS's Reorganization on the Arizona Geological Society

The transfer of the Arizona Geological Survey to the University of Arizona will also have an impact on the Arizona Geological Society. Although the Survey will continue to have a retail area in the Arid Lands Building, it will be considerably smaller than the Arizona Experience retail store. Lee would like to continue to carry the AGS Digests, but sales will be few and far between. The Arizona Geological Society may have to find another outlet to market its publications. Over the last several years, the Arizona Geological Survey has graciously allowed the Arizona Geological Society to store the electronic version of many of its publications on its server. The Arizona Geological Society may also have to find another place to store this information.

## Former AGS Members Who have Recently Passed Away

### Chet Oakley (1947-2015)

Chet Oakley, who began his professional career at Miami with Cities Service in 1968, passed away on November 9, 2015. Chet Oakley was born and raised in New York City and received a B.S. degree in Geology from Arizona State University in 1968. He undertook graduate studies at the University of Arizona. Besides Cities Service, Chet also worked for the Duval Corporation, Union Oil, Anamax Twin Buttes, Amax and BHP Exploration. When mining declined in 1982, Chet started a second career in law enforcement, working as a deputy for the Pima County Sheriff's Department and later as an Arizona Highway Patrol officer. In 1991, he resumed working as a geological consultant reporting on LUST (Leaking Underground Storage Tanks) sites and later worked for the Arizona State Land Department (1996-2006), Silver Bell Mining LLC, and the Bureau of Land Management in Ely, Nevada.



### Frank Nelson (1935-2016)

Frank Nelson passed away in Tucson on May 16, 2016 after a long struggle with Parkinson's disease. He was born in Brooklyn, New York in 1935. After serving two years in the US Army, Frank earned a B.S. degree in geology at Syracuse University and a M.S. degree in geology at the University of Arizona. He began his professional career working as an exploration geologist for the Anaconda Copper Company (1964-1967). In mid-1967, he joined the Freeport Exploration Company with whom he was employed as an exploration geologist for until September 1990. While working with Freeport, he was credited with the discovery of two world-class ore deposits, the Mount Keith nickel deposit in Western Australia in 1971 and the Ertsberg East copper deposit in Papua, Indonesia in 1975. While working in Chile (1981-1986) he directed an exploration program that discovered the Fachinal gold-silver deposit in 1985. He was also credited with the discovery of the Iroco gold deposit in Bolivia in 1989. From 1990 until September 2000, Frank continued to work for Freeport as an exploration consultant.



## The Arizona Geological Society Needs Your Support

Over the last several months attendance to the Arizona Geological Society's monthly dinner meetings has declined by approximately 25%. Contractual obligations with the Sheraton Tucson Inn and Suites require us to average 50 attendees for the year. Through the May 2016 dinner meeting we are well below this level. If we are unable to meet our obligations, there will be a substantial penalty in December.

I encourage the AGS membership to make an effort to attend our monthly dinner meetings. Our Vice President of Programs has scheduled a number of outstanding speakers, who will make a presentations on a wide range of topics over the coming months. Even if you find the topic of a presentation uninteresting, our dinner meetings offer an excellent opportunity for our members and guests to get to know one another, renew old friendships and have a good time with others, who have similar interests. Our dinner meetings also offer our student members an excellent opportunity to meet and interact with established professionals in their field, who can help mentor the next generation of geologists as they prepare to begin their chosen careers.

## Geology in the News

[Geologist's Amended De-Licensing Bill Sent to Governor](#): by Lee Allison, Arizona Geology, May 9, 2016.

[Report: Rosemont Mine Won't Affect Endangered Species](#): by Tony Davis, Arizona Daily Star, May 3, 2016.

[Idaho Silver Mine Shaft Sunk to Final Depth of 9,587 feet](#): by Frik Els, Mining.com, May 24, 2016.

[The Volcano Today: Active, but in a Normal Way](#): Associated Press, The Seattle Times, May 18, 2016.

[California Earthquake Map Collection](#): Geology.com, May 17, 2016.

[Arizona Mining Scams "Alive and in Good Standing"](#): by Lee Allison, Arizona Geology, May 15, 2016.

[Arizona State Geologist Lee Allison Explains an Earth Quake Swarm](#): Arizona Daily Star, May 25, 2016.

## Arizona Geological Society Membership Stats (5/26/2016)

Total Membership	Professional Members	Student Members	Organizational Members
460	377	76	7

## Up-coming Arizona Geological Society Dinner Meetings

Date	Speaker	Title of Presentation
7/5/2016	Don Applebee	Geology and Genesis of the Chilito Porphyry Copper Deposit, Hayden, Arizona
8/2/2016	Lee Allison	The Politics of Geology in Arizona
9/6/2016	Keith Long	No Bonanza from Cheap Oil

## How the Santa Rita Mountains Got its Name



A large, natural cliff face of white, marbled Escabrosa Limestone forms a prominent landmark along the western flank of the Santa Rita mountain range just north of the abandoned mining camp of Helvetia. Visible for miles along the western slope of the range, this landmark reminded the first Spanish missionaries to visit the Santa Cruz Valley of Saint Rita of Cascia (1381-1457), an Italian nun, who bore a small wound on her forehead. Portions of this exposure are now a part of the Santa Rita Marble quarry.

## Arizona Geological Survey News Brief



[Arizona Mining Review](#) (AMR) e-Video Magazine - Wednesday, 25 May 2016

- Survey of Mining Companies and the state of mining in Arizona w/ Ken Green, Ph.D., Sr. Director of Natural Resource Study, Fraser Institute
- IDEA 2016 – A role for Tucson in the global mining economy w/ Mr. Alan Levin, Port of Tucson

### AWARDS!

AZGS's Steve Richard, Chief, Geoinformatics Section and long time member of the AGS was awarded the International Union of Geological Sciences (IUGS) *Science Excellence Award 2016 in Geosciences Information*.

The award will be conferred on 29 August 2016 during the celebration of the 35<sup>th</sup> International Geological Congress in Cape Town, South Africa (28 August – 3 September 2016).

The Arizona Geological Survey is moving to the Arid Lands Building (1955 East. 6<sup>th</sup> Street, Tucson) at the University of Arizona, effective July 1, 2016.



# ANNOUNCEMENTS

## Welcome New AGS Members

Paula Allen

Chad Kwiatkowski

**Arizona Geological Society is grateful to Freeport-McMoRan, Inc. for their generous support of our student members!**



# FREEPORT-McMoRAN

**Freeport-McMoRan sponsors student dinners for the 2016 AGS monthly meetings.**

### 2016 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: \_\_\_\_\_

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

Street: \_\_\_\_\_ City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

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

Fax Number: \_\_\_\_\_ Cellular Phone: \_\_\_\_\_

E-mail: \_\_\_\_\_ Check this box if you do not have an email address

*All newsletters will be sent by email. If you do not have an email address, we will mail a hard copy to you, but we cannot guarantee timeliness.*

If registered geologist/engineer, indicate registration number and State: \_\_\_\_\_

Enclosed is a \_\_\_\_\_ tax-deductible contribution to the  J. Harold Courtright or the  Arizona Geological Society Scholarship Funds.