



Arizona Geological Society Newsletter

DECEMBER 2016

December 6, 2016 DINNER MEETING

Who: John W. Ewert will present USGS Responses to Some Volcano Crises and Eruptions around the World

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) by **11 a.m. Friday, December 2nd**. Please indicate Regular (Roast Turkey Breast with Homemade Pan Gravy and Cranberry Orange Relish), Vegetarian, or Cobb Salad meal preference. Please cancel by **Friday, December 2nd at 11 a.m.** if you are unable to attend - no shows and late cancellations will be invoiced.

The December Dinner Meeting is Sponsored by
Clear Creek Associates



The AGS is grateful for Clear Creek Associates' Sponsorship, which helps us offset the increasing costs of our dinner meetings and other activities of the society.

U. S. Geological Survey Responses to Some Volcano Crises and Eruptions Around the World

By John W. Ewert, U. S. Geological Survey. Cascades Volcano Observatory

Active volcanoes are complex natural systems that deliver high-temperature molten rock to the Earth's surface from great depths in sometimes spectacular and deadly fashion. Many factors determine what form the resulting eruptive activity will take, ranging from a passive effusion of lava to cataclysmic explosions that can go on for

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hours or days and launch vast quantities of rock particles high into the stratosphere. Uncertainty surrounds the time prior to eruption onset as volcanologists try to determine not only whether or when an eruption will begin, but the style and magnitude the eruption may attain. Add to these physical uncertainties the human elements of residential populations, critical infrastructure, economic interests, etc., and a volcanic system threatening eruption can easily and quickly become a crisis. Once an eruption is underway, a wide variety of hazards can occur, varying in time and distance from the eruption source.

The United States has within its territory approximately 170 active and potentially active volcanoes (about 11% of the global total) in a variety of geographic settings. The U.S. Geological Survey's Volcano Science Center operates 5 U.S. volcano observatories that monitor activity, assess hazards, and conduct research on the U.S. volcanoes. In cooperation with the U.S. Agency for International Development, the USGS also operates the Volcano Disaster Assistance Program (VDAP) which responds to foreign volcano crises, provides training and consultation with foreign counterparts, develops monitoring infrastructure, and assesses volcano hazards in other countries.

Since 1980, USGS volcano observatories have responded to 115 eruptions and 51 episodes of notable volcanic unrest at 44 U.S. volcanoes. Most of these episodes occurred in Alaska, but the conterminous U.S., Hawaii, and the Commonwealth of the Northern Mariana Islands all have hosted eruptive activity. Recent U.S. eruptions cost human lives, disrupted en route aviation, destroyed homes and infrastructure, and caused billions of dollars in damage. In its 30 years of operation, VDAP has responded to more than 25 major volcano crises, helping counterpart agencies save tens of thousands of lives. VDAP has also fostered the growth and stability of volcano observatories in more than 12 countries, installing monitoring systems, providing computer systems and software, and training staff on a variety of monitoring techniques.

Highlights of eruption responses at volcanoes such as Mount St. Helens and Mount Redoubt, USA, and Mount Pinatubo, Philippines will be covered in the presentation.



The July 12, 1991 eruption column from Mount Pinatubo taken from the east side of Clark Air Force Base, Philippines (Dave Harlow, U. S. Geological Survey).

About the December Dinner Speaker



John Ewert is a geologist with the U.S. Geological Survey, stationed at the Cascades Volcano Observatory in Vancouver, WA, and specializing in volcano hazards mitigation in the United States and around the Pacific Rim. From 1980 to 1986 he worked at Mount St. Helens monitoring and researching eruptive activity there as well as working on projects at other Cascade Range volcanoes. In 1986 he was one of the founding members of the ongoing USAID-USGS Volcano Disaster Assistance Program (VDAP) and worked in VDAP from 1986-

2010 responding to volcanic eruption crises and developing volcano monitoring infrastructure in Latin America, the southwest Pacific and Southeast Asia. In addition to responsibilities with VDAP, in 2005 Mr. Ewert was part of the team that developed the National Volcano Early Warning System (NVEWS) initiative which is being used to guide long-term improvements to the Nation's volcano-monitoring infrastructure operated by the USGS and affiliated. From 2010 to 2015 Mr. Ewert served as the Scientist-in-Charge of the Cascades Volcano Observatory and has recently returned to VDAP and NVEWS projects.

Calendar of Events

November 30, 2016 - [Public Meeting Lower Santa Cruz River Basin Study](#), Pima Association of Governments, 1 East Broadway Blvd., Tucson, 4th Floor Santa Rita Room, 4:00 - 5:30 PM, Sign and Refreshments at 3:40 PM.

December 1, 2016 - Ken Ridgeway, Purdue University, [Mesozoic and Cenozoic Tectonic Development of the Northern Cordillera: an Alaskan Prospective](#). Geosciences Colloquium Series, 4:00-5:00 PM, Saguaro Hall, Room 101, University of Arizona, (Refreshments served at 3:30 PM in the Gould-Simpson Lobby).

December 3, 2016 - [Mineral, Fossil, Jewelry Art and Craft Sale](#), Tucson Gem and Mineral Society, 3727 East Blacklidge, Tucson, 9:00 AM - 4:00 PM.

December 4 - 5, 2016 - [SME Arizona Conference 2016](#), Society of Mining, Metallurgy and Exploration, JW Marriott Tucson Star Pass Resort and Spa.

This Holiday Season Please
Remember to Support the
Arizona Geological Society
With your Donations

2016 Scholarship Winners

The Arizona Geological Society Scholarship Committee has chosen these students to receive the 2016 scholarships. The awards will be presented at the December AGS dinner meeting.

AGS Scholarship and Executive committees would like to thank all the students, who applied for the scholarships. Thanks to generosity of everyone, who donated to these scholarship funds; your donations help make these scholarships possible. To learn more about the Arizona Geological Society's scholarship program and how to make a tax-deductible contribution, please visit the [AGS website's student outreach page](#).

J. Harold Courtright Scholarship

Harold Courtright had a life-long interest and career in mining and geology in the Cordillera of North and South America. His field mapping skills and exploration expertise led to the discovery of now well known porphyry copper deposits in Arizona and Peru. The scholarship fund, set up after his death in 1986, is designed to promote graduate research in the Cordillera and, while the Society may support exciting studies in any geologic discipline, we do place special emphasis on field geology, economic geology, and the study of ore deposits.

Daniel A. Favorito **2016 Courtright Scholarship** **Recipient (\$3,000)**

Daniel (Dan) received his B.S. in Geology from the Richard Stockton College of New Jersey in 2014, his M.S. in Geosciences from the University of Arizona in 2016, and currently is pursuing a Ph.D. in Geosciences at the U of A. Dan was Valedictorian of his class at Richard Stockton College and is on the verge of publishing the results of his M.S. thesis in Geosphere. In research for his dissertation, "Characterization and Reconstruction of Laramide Contractional Deformation Near Porphyry Copper Deposits in Southeastern Arizona", Dan is trying to

better understand the character of Laramide contractional deformation and the space-time relationships between contraction and porphyry copper formation in this region. Dan is conducting detailed field investigations along the San Pedro River Valley where the Laramide structure has been strongly overprinted and dismembered by Tertiary extensional structures and associated sedimentation. By determining the initial orientations, timing, and kinematics of Laramide structures within multiple field locations along the San Pedro River Valley, Dan will use geologic markers and piercing points to palinspastically restore displacements and tilting along the Tertiary normal faults, then further map Laramide reverse faults and folds, intrusive bodies, and other geologic features, to better constrain palinspastic reconstruction of the Laramide reverse faults. Dan's ultimate goal is to develop an enhanced model for understanding pre-ore and post-ore deformation in this segment of the Laramide porphyry copper belt.



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M. Lee Allison Scholarship

Lee Allison began his career in the oil industry but soon transitioned to a career in public service. Before his life was tragically cut short in August 2016, Lee served with distinction as State Geologist in Utah, Kansas, and Arizona, successively. A dynamic and visionary leader and a gifted mentor, Lee combined innovative scholarship and consummate people skills with enthusiasm and optimism to drive his passion for making geologic information available to the public and for rendering it understandable. He was an articulate spokesman on scientific issues of societal importance and was dedicated to communicating their significance and impact in ways that resonated locally, regionally, nationally, and internationally. As a measure of his far-reaching public service efforts, Lee was honored by the American Association of Petroleum Geologists, the Association of Women Geologists, and the American Institute of Petroleum Geologists.

In recognition of his many contributions, the AGS Geosciences Scholarship was renamed in Lee's honor following his death. Fittingly, the M. Lee Allison Scholarship is awarded to students who demonstrate exceptional achievement in pursuit of degrees in the earth sciences and who show balanced records exhibiting academic excellence, a passion for research, outstanding professional and general community involvement, and leadership in all of these areas.

Anna Katharina Schuh

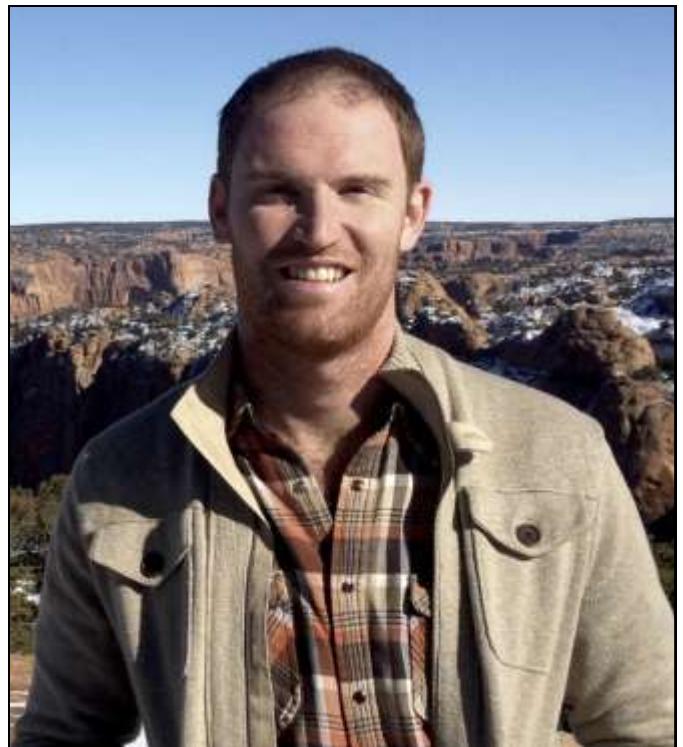
2016 M. Lee Allison Scholarship Recipient (\$3,000)

Anna is a senior in the University of Arizona Honors College, where she is pursuing concurrently a Bachelor of Science in Geosciences, a Bachelor of Business Administration in Management Information Systems, and a Minor in German Language. To broaden her geologic experience and to expand her cultural awareness, Anna spent a semester abroad at the University of Canterbury in New Zealand and participated in their geologic field camp. While there she conducted research on correlation of Oligocene tephra deposits and their relation to a super-eruption from the Taupo Volcanic Zone. She refined methodology for separation of volcanic glass, then ran XRF, XRD, and grain-size analyses to help distinguish three separate phases of the super-eruption. Anna plans on continuing this research this year as part of her senior thesis. She also is as a research assistant in the U of A's Environmental Isotope Lab. Anna anticipates combining her interests in geology, business, and language in an international career in Environmental Geo-Hazards. She is a member of AGS and AIPG, Vice President of the Society of Earth Science Students, and participates in the Tucson Gem and Mineral Show and the Tucson Festival of Books (Science City). She is also a member of the Delta Sigma Pi Professional Business Fraternity and the Management Information Systems Association. Anna tutors through the U of A German Students Society, is a leader with the U of A Wishmakers-On-Campus student organization, and volunteers with Ben's Bells.

**2016 Scholarship Winners continued on page 6**

2016 Scholarship Winners continued from Page 5**Phillip K. McFarland
2016 M. Lee Allison Scholarship
Recipient (\$3,000)**

Phillip (Phil) graduated from the University of Arizona in 2013, receiving his B.S. in Applied Mathematics with a Minor in Geosciences. He is now pursuing his Ph.D. in Geosciences at the University of Arizona. His dissertation research focuses on using space geodesy (GPS and InSAR) to measure active deformation in the Puna Plateau region of the Central Andes, where active subduction of the Nazca Plate is accompanied by shortening of the South American crust. Innovatively, he has been able to partition components of the shortening rate that result in permanent deformation (30%) vs. elastic strain (70%) that eventually will be released in megathrust seismic events. Following completion of his Ph.D., Phil plans to pursue a career in using geodesy to investigate active tectonics, beginning with postdoctoral



research, perhaps at one of the USGS Volcano Observatories. Ultimately, he anticipates a career with the USGS or at a research university where he will continue working on geoscience problems that allow him to make use of his background and considerable skills in Applied Mathematics. Phil has earned scholarships from the U of A, ARCS Foundation, Conoco Phillips, NASA, and NSF. He has served as President of the Associated Graduate Council for the U of A College of Science, as GeoDaze co-chair, co-chair of the College of Science teaching assistant training workshop, and Dept of Geosciences Graduate Student Rep to the faculty. Phil has tutored math and science at the Las Artes Arts and Education Center, mentored a young science writer at Bear Essentials Young Reporters, guest-lectured on the mathematical derivation of the seismic wave equation in the Introduction to Seismology course. Fluent in Spanish, he has tutored at a school in an under-performing, primarily Hispanic school district. He is a member of AGS and AGU.

A Short Note of Thanks from the News Letter Editor

Over the last three years, I have served as AGS Secretary and editor for the news letter. This will be my final news letter as Alison Jones will take over this job in January.

My tenure as editor has been both challenging and awarding. But I could never have performed my duties as well as I have without the assistance and suggestions that I have received from many of our members, including Mike Conway, Bob Kamilli, Alison Jones, Carl Bowser, Bob Powell, Don Applebee, Ann Pattison, Charles Ferguson, Sarah Baxter, Jan Rasmussen and others. I thank you for help. You made my job a lot easier. I encourage you to continue helping our Secretary Elect, Alison Jones during 2017.

Donations to the Arizona Geological Society (December 2015 - Present)

Donations to the Arizona Geological Society are used to fund the Courtright and M. Lee Allison Scholarship programs. The Arizona Geological Society is grateful for the generosity of the following individuals, whose contributions will help students achieve their professional goals.

William Berridge	Jeff Cornoyer	Ronald LaPoint	Mary McMachen
Thomas Biggs	Donald Hammer	Diane Legg	Eric Seedorff
David Briggs	Alison Jones	Paul Lindberg	Christopher Seligman
Shelby Cave	Bob Kamilli	Dennis McMacken	Joann Stock



LOWELL INSTITUTE FOR
MINERAL RESOURCES



Mining Leadership Program - February 7-10, 2017

We are pleased to announce that the University of Arizona Lowell Institute for Mineral Resources and Vanto Group are jointly sponsoring a Mining Leadership Program. The inaugural offering of the four-day program "Leadership: Inventing the Future, A Breakthrough Leadership Program for the Mining Industry and Its Stakeholders," will be February 7-10, 2017, in Tucson, Arizona, and will be led by executives of the Vanto Group. Please go to the IMR home page at <http://imr.arizona.edu>, click on the Featured Project (Mining Leadership Program), then download the Information Packet for further information and instructions regarding registration. Please contact Rocío Brambila by e-mail at brambila@email.arizona.edu to register.

[For more information see Announcement.](#)

Arizona Geological Society Membership Stats (11/25/2016)

Total Membership	Professional Members	Student Members	Organizational Members
407	349	51	7

Up-coming Arizona Geological Society Dinner Meetings

Date	Speaker	Title of Presentation
1/3/2017	Dave Sawyer	Regional Aquifer Hydrogeology and Petroleum Geology of the Central Rio Grande Rift, Northern New Mexico
2/7/2017	Daniel Hummer	Mineral Ecology: Predicting and Discovering New Mineral Species
3/7/2016	Derek Thorkelson	The Precambrian Tectonic Connection between Yukon and Arizona



**Short Course on Cu, Mo,
and Au Porphyry Deposits
December 6-15, 2016**

The Lowell Program in Economic Geology at the University of Arizona is pleased to announce the opening of registration for the 13th annual offering of our popular Porphyry Short Course, which will take place December 6-15, 2016, in Tucson, Arizona. We now alternate between the two formats of the course, and this year we are offering the version entitled “Cu, Mo, and Au Porphyry Deposits.” This short course is designed for members of the industry and graduate students and will be led by Eric Seedorff, Mark D. Barton, and others. It has a focus on exploration geology and will include 3½ days of lectures and 2 days of labs in Tucson, as well as 3½ days of field trips to representative ore systems in Arizona. [For more information see flier and a registration form.](#) To request further information or to register, contact Rocío Brambila by e-mail at brambila@email.arizona.edu.

Geology in the News

[High Grade Uranium and Copper Intercepts at the Canyon Mine, Coconino County, Arizona.](#) by Mike Conway, Arizona Geology, November 14, 2016.

[How did Climate and Humans Respond to Past Volcanic Eruptions?](#) by Matthew Toohey, Francis Ludlow and Allegra LeGrande, EOS Earth and Space News, November 10, 2016.

[Where, and When, Will the Next Volcano Erupt?](#) by Gary Strauss, National Geographic, November 21, 2016.

[South American Volcanoes let off Some Spectacular Ash Puffs.](#) by Erik Klemetti, Wired Science, November 21, 2016.

[How a Ring of Mountains Forms Inside a Crater.](#) By Thomas Sumner, Science News, November 17, 2016.

[Massive ‘Lake’ Discovered under Volcano that could Unlock Why and How Volcanoes Erupt.](#) by University of Bristol, EurekAlert!, November 8, 2016.

[How Long did it Take for Life to Rebound after the Death of the Dinosaurs?](#) by Sarah Kaplan, Washington Post, November 7, 2016.

Gold Mine in the Clouds

Here is an excellent video on the exploration and development of Freeport-McMoRan’s Ertsberg-Grasberg Copper-Gold mine in the province of Irian Jaya, Indonesia, located in the western half of the island of New Guinea. It is one of the great man-made wonders of the world. Interestingly, this video includes short clips containing AGS members Frank Nelson, his wife, Eleanor Nelson, and Steve Van Nort.

Arizona Geological Survey News Brief

On Saturday, November 19, 2016, members of the geological community and friends gathered at Tohono Chul Park to celebrate Lee Allison's Life. Friends of Lee Allison and the Arizona Geological Survey thank the following groups for their financial support of this successful event: Arizona Geological Society, American Institute of Professional Geologists, Association of Environmental & Engineering Geologists, Arizona Rock Products Association, Mining Foundation of the Southwest, USGIN Foundation, Inc., and Southern Arizona Business Coalition.

Recently Released Publications

Skotnicki, S. J., 2016, [Geologic Map of the McDowell Mountains](#). Arizona Geological Survey Contributed Map CM-16-A.

Gruber, D. G., Skotnicki, S. J., and Gootee, B. F., 2016, [Citizen-Scientist Digitization of a Complex Geologic Map](#). American Geophysical Union Fall 2016 Poster Presentation.

Bezy, J. V., 2012, [A Guide to the Geology of the Sedona and Oak Creek Canyon Area](#). Arizona Geological Survey Down to Earth DTE #20, 42 p.

Briggs, D. F., 2016, [History of the Copper Mountain \(Morenci\) Mining District, Greenlee County, Arizona](#). Arizona Geological Survey Contributed Report CR-16-C, 77 p., 2 appendices.



Announcements

Welcome New AGS Members

James Ballard

Ronald Graichen

Forest Sherman

Jennifer Burgos

Max Larkin

John Williams

Riley Burkart

Benjamin Murphy

Dario Escobar

Brady Nock

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 M. Lee Allison Scholarship Funds.