



Arizona Geological Society Newsletter

ARIZONA GEOLOGICAL SOCIETY, INC., TUCSON, AZ

MARCH 2010

March 2, 2010 DINNER MEETING

Wayne Ranney will speak on **Ancient Landscapes of the Colorado Plateau**

Sheraton Four Points, Wild Cat Room: 1900 E. Speedway Blvd. in Tucson (Speedway Blvd. at Campbell Ave.).
Cash Bar at 6 pm, Dinner at 7 pm, Talk at 8 pm.

Cost: With reservation, members \$24, guests \$27, Students \$10. Without reservation, \$3 additional.

RESERVATIONS: CALL 520.663.5295 by 5 pm on Feb. 26, 2010. Indicate low-salt, vegetarian, or vegan meal preferences. A coffee/salad/roll/dessert option is also available for \$18.

Please cancel if unable to attend. We cannot guarantee that meals will be available without a timely reservation.

ABSTRACT—Ancient Landscapes of the Colorado Plateau by Wayne Ranney

The Colorado Plateau exposes vast layers of sedimentary strata, which contain a detailed record of the many ancient landscapes that once existed here. Seemingly ordinary layers of sandstone, limestone, and shale tell the history and climate of these past environments. These landscapes were previously “visible” only to professional geologists but with the advent of new technologies, state of the art paleogeographic maps reveal lifelike portrayals of these landscapes. These depictions describe the evolving distribution of the landscape and climate through time.

Paleogeographic maps are made when geologists study a discrete layer of strata and make an interpretation of the specific environment that produced it. Many lines of evidence are scrutinized including rock type, texture, and lateral relationships. Any environment found on planet earth today was also present in the past and making an interpretation for the environment of deposition is a relatively straightforward process. But when geologists perform multiple studies of the same layer through hundreds of miles of exposure, a large-scale geography of a past landscape can be reconstructed. *Ancient Landscapes of the Colorado Plateau* synthesizes voluminous amounts of previously disconnected data, allowing for these landscape reconstructions.

The process in creating the maps begins with images from space of modern features such as mountain ranges, deltas, or eolian dunes. Synthesized data permits these images to be placed in their ancient positions, over the faint outlines of modern reference points such as state, county or international boundaries. In this way, viewers are aided in locating an ancient geography relative to known political boundaries. Since a different map is constructed for each of the 70 or so named strata on the Colorado Plateau, viewing the maps sequentially appears to evolve the landscape through time. Viewers deduce how the landscape changed through time, creating a sense of discovery and awe that satisfies an intellectual and artistic curiosity. In our experience, no one is unaffected after viewing these maps! Ron Blakey has been producing the maps for almost 20 years and his maps are well known and used widely in a variety of professional and popular publications.

Wayne Ranney is a professional geologist and award-winning author of many geology-oriented books, including *Ancient Landscapes of the Colorado Plateau* (with co-author Dr. Ron Blakey), *Sedona Through Time*, *Defining the Colorado Plateau: A Geologic Perspective*, and *Carving Grand Canyon*. Wayne is a popular river and trail guide in the Grand Canyon and teaches geology at Coconino Community College in his hometown of Flagstaff, where he lives with his wife Helen.

Wayne received his Bachelor's and Master's degrees in geology from Northern Arizona University. He has worked as a geologic interpreter on shipboard expeditions around the world including 30 trips to Antarctica, and many others to Africa, the Amazon, Greenland, and Patagonia. His books will be available for purchase at the March dinner meeting.

March Member Spotlight—Donald F. Hammer

Don Hammer was born in 1929 at Casa Grande, AZ, where he grew up. He received a B.S. degree in Mining Engineering from the University of Arizona in 1953, and an M.S. in Geology from the U of A in 1961. During an exciting, 30-year career, Don worked for Magma Copper and traveled the world for Newmont Mining. Don and his wife, Adele, raised 2 children, Demarise and Donald, both of whom reside in the Phoenix area. After retiring from Newmont in 1988, Don consulted for Magma at Superior until 1991. Since then, his consulting work has kept him busier than he ever expected it would. He became an **AGS Honorary Life Member** last April. Don lives in Oracle.



When did you first become interested in geology? Mining and prospecting are a part of my family history. My great grandfather, W.T. Hutchinson, came to Pinal City (near Superior, AZ) in 1879 to work in the concentrator for the Silver King Mine. More directly, the principal of Casa Grande High School, C.C. Smith, was working on a Ph.D. in geology while I was a student at CGHS in 1944-1948. He led field trips to nearby mountains to explain the significance of rocks, structure, and mineral prospects.

What was your first job? I worked for Don June, a Chinese grocer, in his Casa Grande store part-time for about three years, starting when I was 11 years old. I stocked shelves, bagged potatoes, and carried boxes and bags of groceries to horse-drawn wagons of the Papago Indians, who drove to Casa Grande from the reservation to shop for groceries on Saturdays.

What was your first job as a geologist? I rustled a job with Magma Copper Co. at the Magma Mine in Superior after grad school in 1958. I worked underground—mapping, sampling, logging drill core, and measuring contract advances. Rock falls, cave-ins, mine fires and labor strife added to the excitement of the job. Later I conducted geologic studies of the Pioneer Mining District and the Magma Mine. I joined Newmont in 1970, where I exercised considerable influence in guiding exploration at Superior.

What is your most memorable field experience? I have many, but possibly the most dangerous was the time, while mapping near the Table Mountain Mine in the Galiuro Mountains, when I found myself surrounded by a herd of javelina, maybe as many as 35 or 40 in a ring. . .with me in the center. It was one of those situations when no movement was the best movement.

What do you consider your greatest professional achievement? Management of Newmont's Western U.S. Exploration for most of the 1980s. This provided opportunity to work with many of the best people in the mineral exploration business., both my superiors in Newmont's senior management and my peers (including those who worked for me). Many of these associates have become lifetime friends.

What do you consider your greatest achievement EVER? Geologic studies at Superior that defined the fascinating subsurface geology (the down-dropped block that hosts the Resolution deposit and is covered by post-mineral volcanics), and spotting the drill hole that first penetrated sericite-pyrite altered rock above the Resolution porphyry copper system in 1991. Further drilling by Magma to test this intercept penetrated the Resolution ore body.

What are your hobbies? At various times in my life, photography, mineral collecting, auto mechanics, carpentry, and horticulture.

Water, whiskey, or wine? Wine—red with lots of flavinoids!

Thank you, Don!

Do you know someone who would be an interesting subject for a "Member Spotlight" column? Email his/her name and contact information to ajones@clearcreekassociates.com.

Announcements

The **2010 Society for Mining Metallurgy, and Exploration (SME) Meeting** will convene in Phoenix February 28 through March 3. SME meets in Phoenix every five years. This meeting is expected to have a large attendance and over 450 exhibitors of state-of-the-art products and services. More information at www.smenet.org.

The 2010 **Arizona Hydrological Society Symposium** will be held September 1-4 at the Westin La Paloma in Tucson, Arizona. The theme is Dryland Hydrology: Global Challenges / Local Solutions. More information at <http://azhydrosoc.org>.

Mike Alter, R.G., former AGS President (2002) has moved with his family to Leesburg, VA, where he started a new office for Clear Creek Associates. He would be happy to hear from his AGS friends. You can email him at malter@clearcreekassociates.com.

REMINDER to ALL MEMBERS: Send in your annual AGS dues using the form on the back page of this newsletter!

WELCOME NEW AGS MEMBERS:

Frank Kaupa, Phoenix, AZ and **Matthew Nation**, Senior Scientist, Brown and Caldwell, Phoenix, AZ.

Upcoming AGS Dinner Meeting Speakers

April 6, 2010 Rachelle Wagner, *NAU Courtright Scholar* **Topic:** Miocene fault and basin analysis along the Boulevard and Dry Wash faults, northern Frenchman Mountain, Lake Mead domain, Nevada

May 4, 2010 Dick Tosdal, *Thayer Lindsey Lecturer for 2009* **Topic:** Tectonic transitions between porphyry and epithermal ore deposits

Journey to El Pinacate Volcanic Field—Part II

By Doug Shakel, AGS VP of Field Trips

Resuming an account of our recent AGS foray into the Pinacate volcanic field of northwestern Sonora as reported in the January Newsletter...

After several hours at Crater Elegante it was time for lunch. Our group took advantage of the newly built bus-capable paved parking area near the rim for our meal. Clearly the Mexican agency responsible for managing this “biosfer reserva” expects increased use of this site!

After lunch it was time to head for the other signature “maar” crater of the Pinacates – Cerro Colorado. “Cerro Colorado” translates to “red hill” and its reddish-orange countenance is usually a very evident landmark in the northeastern part of the Pinacates. But the skies were unusually grey during our trip, and its appearance wasn't very spectacular as we drove up to it from the south.

Casual visitors to the region are often surprised to find that there's a crater associated with Cerro Colorado (Photo 1). The hill is composed of ejecta from the crater that mostly wound up being deposited on the south side of the crater. The Cerro Colorado vent was on the very margin of the basalt flows of the Pinacate field in general, with just the least bit of one or two flows being exposed within the crater in its western floor.

The ejecta from the Cerro Colorado vent are replete with rather rounded igneous rocks, mostly granitic (Photo 2). The location is very close to the present course of the Sonoyta River and it's an easy speculation that most of those stones are from the alluvium of that watercourse.

Although the phreatic eruptions that make maar craters are usually inferred to originate from the mantle, the steam is usually thought to originate from the superheated mass of whatever the mantle is sending up having intersected the regional groundwater from below. The Rio Sonoyta would have been a perfect source. (CONTINUED p. 4)

Journey to El Pinacate Volcanic Field—Continued

In some places the resulting “tuffisite” in the ejecta blanket is deformed by “drop stones”. The presumption is that this stuff was wet mud (although very hot mud!) while it was being deposited. Today, a lot of this tuffisite at Cerro Colorado is susceptible to “taffoni” weathering. That's what all those little cavelets represent (Photos 3, 4).

Those of us who'd been to the Pinacates before but not in recent years were impressed that the “Reserva” people had gone to considerable effort to post interpretive signs at various locations in the area, including at the Escudo Volcánico – or Volcanic Shield – that is Sierra Santa Clara (Photo 5). “Santa Clara” is the name bestowed on this feature back in Father Kino's time. Trip organizer Doug Shakel often tells that Padre Kino used to take visitors up to the top of Sierra Santa Clara to show that California was NOT an island. But trip leader Dan Lynch claims you can't see California from up there! Is there anyone reading this who's actually been up there who wants a piece of this controversy?

After our visit at Cerro Colorado on Saturday afternoon we returned to the Tecolote campground. In spite of the day's gray clouds, we had a fine sunset !

On Sunday morning, Dan cooked another breakfast for all, to prepare us for a hike over to the Tecolote volcano (Photo 6). Tecolote produced some six discrete lava flows and in the course of that activity had a complex history of volcano destruction. Dan's interpretation of the sequence of geologic events here formed the main content of his Ph.D. Dissertation.

1—Interior view of crater at Cerro Colorado, looking southwest.



2—Plutonic rocks dominate “tuffisite” ejecta layers



3—“Taffoni” weathering in the ejecta blanket of Cerro Colorado.



So after breakfast Dan took great pleasure in leading most of our group over to the base of the Tecolote cone. The traverse of the Tecolote flows took several hours, but upon its conclusion it was time to head home.

We arrived at the Estación Biologica at about 1:30. The Estación is the de facto headquarters for the park, and the admission fees are collected here. Use these days is charged at US \$4.00 per person per day, or 40.00 pesos per person per day.

The drive back to the US border took about an hour and much to our surprise there were less than a half-dozen vehicles waiting for entrance through the border when we got there (Photo 7).

After an uneventful drive home, there was a moment of anxiety when it was discovered that the

Journey to El Pinacate Volcanic Field—Continued

three private vehicles we'd left in the University parking lot behind the USGS building had UA parking tickets on their windshields! Relief soon followed when it turned out all were warning tickets! Interestingly, all three tickets were dated just MINUTES after we'd left the lot on Friday afternoon. One could only conclude that we'd probably been watched as we loaded the van to launch the trip, and then the tickets were issued! But all-in-all, it was agreed that we'd had a very fine trip.



← **4—Cerro Colorado crater and the ejecta blanket, courtesy of Dan Lynch.**

5—Dave Boyer checks out the English language side of this sign about the Escudo Volcánico – or Volcanic Shield – that is Sierra Santa Clara.



← **6: Dan (at right of center) leads our group to Cono Tecolote, the high cone on the skyline.**

7--An uncrowded border station.



USGS: Mineral Production Significantly Declines in 2009

The value of U.S. mineral production significantly declined in 2009, according to an announcement by the U.S.G.S on February 16, 2010.

The value of raw, nonfuel minerals mined in the United States was \$57.1 billion in 2009, a decline of 20 percent over the past year. The value of materials domestically processed and refined from these raw minerals was \$454 billion in 2009, a 25 percent decline from that of 2008.

Also over the past year, U.S. dependence on foreign sources for minerals has increased, continuing a trend that has been evident for more than 30 years. The United States relied on foreign sources to supply more than 50 percent of domestic consumption of 38 mineral commodities in 2009, and was 100 percent reliant on imports for 19 of those.

Minerals are a fundamental component to the U.S. economy. Final products, such as cars and houses, produced by major U.S. industries using mineral materials made up approximately 13 percent (more than \$1.9 trillion) of the 2009 gross domestic product.

The U.S. Geological Survey recently released the Mineral Commodity Summaries 2010, and this annual report addresses events, trends, and issues in the domestic and international mineral industries and includes statistics on about 90 mineral commodities. The report is used by public and private sector analysts regarding planning and decision making for government and business.

“Over the last year, there has been reduced production of almost every mineral commodity and lower prices for most metals,” said USGS Mineral Resources Program Coordinator Kathleen Johnson. “This report allows for timely research and analysis of our nation’s minerals sector.”

A decline in the U.S. housing market during 2009 caused reductions in the production and consumption of construction materials. Declines in automobile and durable goods manufacturing resulted in reduced production and consumption of metals including copper, iron, steel, lead, and platinum-group metals.

Gold was one notable exception to the downward trend in metal prices, reaching an all time high of \$1,215.21 per troy ounce in early December 2009. Iron ore was among the largest to decline and decreased by nearly 50 percent in production quantity and value over the last year.

The USGS is the sole federal provider of objective assessments on mineral resources, production, consumption, and environmental effects. The USGS collects, analyzes, and disseminates current data on mineral commodity industries in the United States and about 180 other countries.

The USGS report “Mineral Commodity Summaries 2010” is available at <http://minerals.usgs.gov/minerals/pubs/mcs/>.

REMINDER: *Students must renew annual membership to continue receiving emailed newsletters. Membership is FREE for full-time students! Such a deal!*

FIELD TRIPS!!

Plans are in the works for Spring and Fall field Trips. Please go to the website for more information.

Arizona Mining and Mineral Museum to become Arizona Centennial Museum

Governor Jan Brewer announced the planned change from the Arizona Mining & Mineral Museum to the Arizona Centennial Museum at a press conference on February 12, 2010 at the Arizona Mining and Mineral Museum in Phoenix. The press release can be seen at the following website:

http://azgovernor.gov/dms/upload/PR_021210_CentennialMuseum.pdf.

The museum will display the “5 Cs” of Arizona history in equal measure: cotton, citrus, cattle, climate (tourism), and copper. The Arizona Centennial Museum will be administered by the Arizona Historical Society. The change will be permanent with no plans to return the building to a mining and mineral museum after the Arizona centennial in 2012.

Fund raising (\$9 million, with \$1 million expected from each of the 5 C industries and the additional funds from matching grants from foundations and the federal government) is expected to take about 9 months, with construction completed sometime in 2012.

Conceptual designs for the Arizona Centennial Museum indicate that the amount of mining and mineral-related exhibits will be significantly reduced when the change takes place. The existing mineral exhibit, with 3500 specimens, and the outside mining exhibits do not appear on the conceptual designs. The fates of these exhibits are unknown at this time.

To accomplish this change, the legislature must amend Arizona Revised Statute 27-102 regarding the duties of the Department of Mines and Mineral Resources regarding the Mining and Mineral Museum, which currently states in part B: *“The department shall maintain a mining and mineral museum as the state depository for collecting, cataloging and displaying mining artifacts and specimens of various ores, gemstones, lapidary material and other valuable mineral specimens...”* This change of the Arizona Mining and Mineral Museum to a Centennial Museum requires that a bill or amendment to a pending bill have a hearing before a house or senate committee, and then it will go on to a vote by the legislature. This will be an opportunity to comment and write to the legislators regarding the change.

The Arizona Mining and Mineral Museum receives daily school tours of 100 to 300 school children, their teachers and chaperones, for a total of 25,000 school children each year. In addition to the school children, 20,000 visitors from every state and most nations also tour the museum annually. Tour guide salaries are paid from the profits from the gift shop. The museum is currently listed on the “Ten Best” website (www.10Best.com/Phoenix,AZ/).

