



# THE GEOLOGICAL NEWSLETTER

"NEWS OF THE GEOLOGICAL SOCIETY OF THE OREGON COUNTRY"

VOLUME 75, NUMBER 3  
MARCH 2009

## The Geological Society of the Oregon Country

P.O. Box 907, Portland, OR 97207

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VISITORS WELCOME AT ALL MEETING

## CALENDAR

### MARCH ACTIVITIES

GSOC 74th Annual Banquet, Sunday, March 8, 2009, at 1:00 p.m. (doors open 12:30), at the Monarch Hotel, Clackamas, Oregon, Jeff Wynn, USGS Volcano Hazards Team Chief Scientist, Cascades Volcano Observatory, presents "Geologic Clues To The Physics Of A Hypervelocity Asteroid Impact". See the February 2009 *Geological Newsletter* or the GSOC website ([www.gsoc.org](http://www.gsoc.org)) for information and registration, due March 2. *Note correction to time of the meeting from the February newsletter.*

No Wednesday evening seminar is planned for March.

### FUTURE ACTIVITIES

Friday evening talk, April 10, 2009, at 8 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University: Rick Thompson, an Oregon-born artist, entertainer,

writer and self-taught geologist, will present "The Lake Missoula Floods and Their Effects in the Greater Portland/Vancouver Area".

Join GSOC members at **Pizzicato Pizza, 1708 SW 6th Ave.**, at 6:30 p.m. before the lecture for an informal dinner and conversation. *Note new venue!*

**Free parking** is available at Portland State University Friday nights after 5 p.m. in Parking Structure 2 on Broadway Ave. directly across from Cramer Hall and on level one of Parking Structure 1, bounded by Broadway and 6<sup>th</sup> Aves. and Harrison and Hall Sts. Check the GSOC website ([www.gsoc.org](http://www.gsoc.org)) for updates to the calendar.

### UPCOMING ACTIVITIES FROM OTHER ORGANIZATIONS

**Portland State University Geology Department Winter Seminar Series**, theme of "Current Faculty Research in Geology at PSU", Wednesdays at 3:30-4:30 pm in Cramer Hall S17 (for more info and

updates to the schedule see the webpage <http://geology.pdx.edu/node/3>). The public is invited to attend free of charge. The schedule is as follows:

- March 4, 2009 “Silicate-bearing iron Meteorites: A New Paradigm for Asteroid Differentiation”, speaker Alex Ruzicka
- March 11, 2009 “Microbial Biosignatures Detection and Formation in Extreme Ecosystems”, speaker Sherry Cady

**Oregon State University Department of Geosciences 2009 Winter Seminar Series**, “Global Climate Change: Detection, Attribution, Impacts, Adaptation, Mitigation, and Litigation,” Tuesdays, 4:00 pm, 1109 Cordley Hall, unless otherwise noted.

[http://www.geo.oregonstate.edu/events/SeminarSeries/Seminar\\_Current.htm](http://www.geo.oregonstate.edu/events/SeminarSeries/Seminar_Current.htm)

- Friday, February 27, 2009, 1109 Cordley, Eric Rignot, NASA and U. of California, Irvine, “Satellite Studies of the Contribution to Sea Level Rise from Greenland and Antarctica Ice Dynamics”
- March 2, 2009, Gilfillan Auditorium, Steve Susman, Susman Godfrey LLP, “Climate Change Litigation: The Courthouse Effect”
- March 11, 2009, Gilfillan Auditorium, Brian Fagan, University of California, Santa Barbara, “The Great Warming, or the Story of the Silent Elephant in the Room”

**University of Oregon Department of Geological Sciences, Winter 2009 Weekly Seminar Series** Talks are on Wednesdays, 4:00 to 5:20 pm in 110 Willamette Hall. Tea and cookies are served in Cascade 200 beginning at 3:30 p.m.

<http://www.uoregon.edu/~dogsci/news/seminar/seminarw09>

- February 25 - Andrew Lee (The Ohio University), “Bone histology reveals sexual maturity of dinosaurs and evidence of predator-prey growth race”
- March 4 - Greg Wilson (University of Washington), “Dying dinosaurs & exploding

mammals: Hell Creek’s window on the Cretaceous-Tertiary extinction and aftermath”

- March 11 - Ted Fremd (John Day Fossil Beds National Monument), Topic in Mammalian Paleobiology

**Cascades Volcano Observatory Lunch Colloquium, 2009.** Brown bag talks at 11:30 in Mount St. Helens Room, generally on Thursdays. Informal and open to all. Address is 1300 SE Cardinal Court, Building 10, Suite 100, Vancouver, WA.

<http://vulcan.wr.usgs.gov/News/Announcements/CVOLC.html>

- Thursday, February 26, 2009, 11:30, Steve Henderson, WSU-Vancouver, "Why there are beaches"
- Thursday, March 5, 2009, 11:30, Judy Fierstein, USGS Menlo Park, "South Sister"
- Thursday, March 12, 2009, 11:30, Robert Harris, Oregon State University, "Thermal structure of the Costa Rica Margin along the Middle America Trench"
- Thursday, March 17, 2009, 11:30, Matt Patrick, HVO, topic to be determined
- Thursday, March 26, 2009, 11:30, Ilya Binderman, University of Oregon, topic to be determined (isotopes / petrology volcanic systems)

## BOARD MEETING NOTES

For the February 13, 2009 board meeting of the Geological Society Of The Oregon Country

The meeting was called to order by President Janet Rasmussen in the GSOC Library, Cramer Hall, PSU, Portland. Board and GSOC members present included Janet Rasmussen, Carol Hasenberg, Beverly Vogt, Richard (Bart) Bartels, Jan Kem, Larry Purchase, Doug Rasmussen, and Dave Olcott.

The banquet committee discussed plans for the upcoming Annual Banquet. The banquet will be on March 8 at the Monarch Hotel. Doors open at 12:30 p.m. There will be a sales table at the banquet. Because the February 2009 *Geological Newsletter* had a mistake in noting the starting time

of the banquet, Bart will contact former attendees who have not yet sent in reservations before the deadline for reservations for the banquet.

Publicity duties and stratagems for the meeting were discussed. We are currently publicizing the meetings in the A & E section of the Oregonian, at different locations on the internet, and with publicity posters at the PSU Geology Department and the Nature of the Northwest.

Carol discussed money-raising ideas including T-shirts manufactured by Café Press. The Board authorized Carol to try having one produced for the next President's Field Trip. A link to the GSOC page in the Cafe Press site will be made from the web site.

Upcoming field trips were discussed. Dave Olcott agreed to serve as Field Trip Chair. Dave Olcott and Larry Purchase will schedule the wind farm tour to eastern Oregon for mid-June, tentatively the weekend of June 19-20. August 1, 2, and 3 will tentatively be the President's field trip through the western Cascades and central Oregon. Janet has decided to defer her trip to the Chloride Mine and a hike along Elkhorn Ridge until next year.

Larry discussed the possible speakers he has been considering. Larry reported that 43 people attended the January GSOC Friday night meeting.

The board decided to try scheduling the next pre-lecture (April 10) dinner location at Pizzacato, 1708 SW 6th Avenue. Time is approximately 6:30, after the board meeting.

Next meeting is 5:15 p.m., April 10, 2009, in the GSOC library. Please be prompt.

Beverly Vogt, Secretary

## A Tale Of Two Calderas

Synopsis of the February 13, 2009, lecture by Mark Ferns and Jason McClaughry of DOGAMI's Baker City Field Office, Baker City, Oregon

by Carol Hasenberg

Mark Ferns and Jason McClaughry started the presentation of their recent Crooked River geologic mapping project with a surprise twist - instead of discussing one newly discovered Oligocene caldera, they were going to talk about two of them! McClaughry, a field geologist for the State Department of Geology and Mineral Industries (DOGAMI), began the presentation with a discussion of the caldera locations, volcanic stratigraphy and evolution, time frames and relation of the calderas to the existing topography and familiar geological features of the area. The geological mapping project includes mapping work done by Ferns, McClaughry and fellow geologist Caroline Gordon of the Ochoco National Forest and was partially funded by the U.S. Geological Service under the National Cooperative Geologic Mapping Act. It includes 6 full USGS quadrangles and some additional areas. A geological map of the area is forthcoming.

The research team believes that the volcanic output from these features represent a continuity between the volcanic eruptions of the Clarno and John Day Formations of central Oregon. The age of the eruptions of the Wildcat Mountain Caldera, the older of the two, begins during the final part of the Clarno eruptions, about 40 million years ago. The eruptions of the Crooked River Caldera are in the 28-32 million year range in age. Each of the calderas had a lifecycle that began with a doming episode where rhyolitic magma filled a chamber below the area. A series of eruptions would then spew rhyolitic tuff about and form a caldera with a ring fracture zone at its edges. Later eruptions would intrude rhyolite into the fracture zone, and resurgent granitic intrusions into the magma chamber below the caldera. Because the rhyolitic rock of the caldera is lower in density than that of the surrounding country rock (overlapping andesite

and dacite domes), the calderas are characterized by low gravity anomalies.

The Crooked River Caldera (CRC) has been publicized recently and its location is somewhat familiar, being approximately bounded on the northwest by Smith Rock, on the southwest by Powell Buttes, on the southeast by the Prineville Reservoir and on the northeast by the hilly region north of the city of Prineville. The Wildcat Mountain Caldera (WMC) lies to the northeast of the CRC. It has a well defined ring that still surrounds and defines the caldera margin and is subject to landslides. Inside the WMC is a resurgent dome structure. Both of the calderas have large deposits of relatively impermeable tuff within their boundaries and near the surface, making water scarce in these regions. McClaughry presented the idiosyncrasies of the geochemistry of the ash flows which allowed the caldera volcanism to be distinguished from surrounding volcanism and grouped as cohesive volcanic regions.

There are five calderas from this age in Oregon which have been mapped by DOGAMI. They roughly align with the Klamath-Blue Mountains Lineament. The calderas are relatively rare features in Oregon but more may have been buried by younger rock (Columbia River Basalt). (*Comment by Mark Ferns: Frankly, there are many more Miocene and Paleogene calderas in Oregon. The detailed geologic mapping and research needed to define them has not been done.*)

Ferns began his part of the presentation in describing the objectives of the research. Although the interesting geology is a consequence of making the maps, the driving force behind the research is the human value, potential, and hazards associated with the geology. In particular, the scarcity of groundwater in the region, when the nearby Deschutes Basin is full of water, is a puzzle that the local residents would like to have solved. By doing the geological mapping, studying well logs and other historic data, and overlaying these various sources using GIS digital mapping, it is possible to get a comprehensive picture of the resources available and geological hazards present in the region.

The ring fracture zones of the calderas represent a potential resource as well as areas which are prone to landslides. The research team investigated the potential for the mining of minerals such as gold, mercury and uranium in these areas. Historically both gold and mercury have been mined in the region. The calderas have also produced high quality banded picture jasper and thundereggs, as well as some zeolite minerals which are of interest to collectors. The calderas are not a good resource for crushed rock because the tuff rock disintegrates too easily.

The most pronounced geological hazard in the calderas, especially the WMC, is landslides along the ring fracture zone. Although there are a number of small faults within the calderas, seismic hazards from these are low.

An unexpected resource provided by the calderas is the educational opportunity that they represent. They have an excellent cross section and preserved structure for these types of systems. A Geological Society of America field trip is planned in the region for fall 2009. We look forward to the upcoming geological map release as well.

#### ADDITIONAL READING:

Jason D. McClaughry and Mark L. Ferns, "Field trip guide to the geology of the Lower Crooked River Basin, Redmond and Prineville areas, Oregon", *Oregon Geology*, Volume 67, Number 1, Fall 2006, pp. 15-23. Available online from the DOGAMI website at:

<http://www.oregongeology.com/sub/quarpub/OrGeo.htm>

# Is It A Meteorite (or a Meteor-Wrong)?

by Carol S. Hasenberg



*This article was written to get you warmed up for this year's banquet program. I welcome comments on this article, my mineralogy skills being pretty limited, and perhaps we can publish an addendum or revised version of this article at a later date. Also, I'll bring the rock to the banquet for comparison.*

This past month near Tucson, Arizona, I found a black, heavy, shiny rock. It is pictured above with a long dimension of 3 ½ inches. I assumed that what I had found was magnetite, but in the interest of scientific discovery, I decided to do a little research and experimentation to determine what it was I had. Of course, the first thing that leaps to your mind when you find such a rock is, "Could this be a meteorite?" So, I discovered a couple of websites which addressed the problem of meteorite identification and also touched on the identification of iron-rich terrestrial rocks.

To identify a meteorite, these are the characteristics you need to observe:

**Density** – Meteorites come in two basic varieties. The most common variety, stony meteorites (chondrites), contain stone as well as iron and nickel. The other type, iron meteorites, are composed mostly of iron and nickel. The specific gravity (i.e., density compared with that of water)

for stony meteorites is at least 3.5 and for iron meteorites is 8. Since most terrestrial rocks have a specific gravity less than 3.5, meteorites will feel heavy in comparison. Iron meteorites will be very heavy, like a solid chunk of steel. The terrestrial mineral magnetite, which is iron oxide, also is heavy with a specific gravity of 5.2.

**Appearance of the surface** – There are a number of observations you can make about your mystery rock which will indicate the rock's origin. The surface of a meteorite will often have a fusion crust, formed in the heat of entry into the atmosphere. It may have flow lines which form when the crust is in a hot molten state in its passage. The interior of stony meteorites will be lighter in contrast to the fusion crust. However, weathering or other rock formation processes can form crusts on rocks which can confuse the issue. The surface of a meteorite is also generally smooth or indented with thumbprint-like features called regmaglypts. Deeply pitted surfaces generally rule out the meteorite possibility; meteorites do not contain vesicles (gas bubble holes formed in volcanic rocks).

**Composition** – Most meteorites contain some iron and nickel. The presence of these elements can easily be tested with a magnet (iron, cobalt, and nickel are common ferromagnetic elements). Other metals (such as aluminum) will not attract magnets. Of course, terrestrial rocks with magnetite or hematite will also attract magnets, so must be further tested. The streak test and also a test kit for nickel can be used. Stony meteorites generally are composed of grain-like nodules called chondrules, which are not present in terrestrial rocks. Meteorites are not radioactive.

**Streak** – Mineralogists perform a streak test in identifying minerals. If you have a rock with an iron-rich composition, and you rub it on a piece of unglazed tile, you might get a black colored streak, which will indicate magnetite. A rust colored streak will indicate hematite (another iron oxide). Iron meteorites will generally not leave a streak, or leave a light grey streak. You will not find pure iron on a terrestrial rock because the atmosphere of planet earth is just too caustic.

OK, now back to my rock from Tucson. First I tested it for iron composition with a magnet from my refrigerator. The magnet is strongly attracted to the rock. So it could either be magnetite or some other ferromagnetic-rich mineral, or a meteorite. Similarly, I checked the density, using a spring scale and a measuring cup. The rock weighed 380 grams with a water displacement of about 100 ml. So the specific gravity was about 3.8. This is a bit light for pure magnetite, but I can see some other minerals peeping out of the strongly pitted surface (darn, it's NOT a meteorite!) and there are likely holes within the rock (vesicles). Also, because I didn't want to give it all away at once, I can now tell you that these black heavy rocks are pretty common in this part of Arizona (I have found several of them in this area), which discourages the possibility of it being a meteorite. O. Richard Norton also mentions (p. 171) that "The most popular "meteor-wrong" is magnetite, a common terrestrial mineral often found lying on the surface in the deserts of the American Southwest." And lastly, I gave my rock the old streak test on the bottom of a tile trivet in my kitchen, and sure enough it left a black streak. So, it's likely that this rock contains a lot of magnetite. Voila!

#### REFERENCES:

O. Richard Norton, Rocks from Space, Second Edition, published by Mountain Press Publishing Company, Missoula, Montana, 1999.

Simon & Schuster's Guide to Rocks and Minerals, edited by Martin Prinz, George Harlow, and Joseph Peters of The American Museum of Natural History, published by Simon & Schuster, Inc., New York, New York, 1978, translation of Minerali e Rocce by Annibale Mottana, Rodolfo Crespi, and Giuseppe Liborio.

"How To Identify A Meteorite" by the Institute of Meteoritics, University of New Mexico:

<http://epswww.unm.edu/iom/ident/index.html>

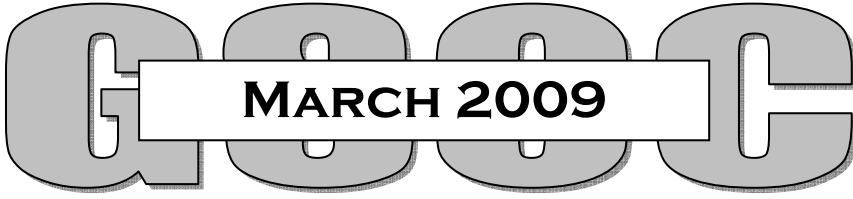
"What To Do If You Find Or Have Found A Meteorite, A Comprehensive Guide to Meteorite Identification," by Aerolite Meteorites:

<http://aerolite.org/found-a-meteorite.htm>

Mineralogical Society of America Identification Key II by Alan Plante, Donald Peck & David Von Bargen:

[http://www.minsocam.org/msa/collectors\\_corner/id/mineral\\_id\\_keyi1.htm](http://www.minsocam.org/msa/collectors_corner/id/mineral_id_keyi1.htm)





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**GSOC MINI-CALENDAR**

**MARCH ACTIVITIES**

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**FOR DETAILS, SEE INSIDE**

**BANQUET REGISTRATION IS DUE  
MARCH 2!!! DETAILS IN FEBRUARY  
2009 NEWSLETTER**