



THE GEOLOGICAL NEWSLETTER

"NEWS OF THE GEOLOGICAL SOCIETY OF THE OREGON COUNTRY"

VOLUME 75, NUMBER 1
JANUARY 2009

The Geological Society of the Oregon Country

P.O. Box 907, Portland, OR 97207

www.gsoc.org

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VISITORS WELCOME AT ALL MEETING

CALENDAR

JANUARY ACTIVITIES

Friday evening talk, January 9, 2009, at 8 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University: Justin Klure, principal partner with Pacific Energy Ventures, LLC, will speak on **“Wave Energy Projects in Oregon—The Wave of the Future?”** Justin's consulting firm focuses on project development and technology transfer, utility integration, strategic management, and governmental affairs. Justin has spent the last four years positioning Oregon as a leader in the development of wave energy. He was founding member of the nation's first public-private entity to advance wave energy, the Oregon Wave Energy Trust, and served as its Director for the first year of operation. He now works directly with industry and academia.

Join GSOC members at Hot Lips Pizza, 1909 SW 6th Ave., at 6:30 p.m. before the lecture for an informal dinner and conversation.

Wednesday evening seminar, January 14, 2009, at 8 p.m., Room 69, Cramer Hall, Portland State University:

“Surfing the Geology Web,” seminar led by GSOC member Tara Schoffstall. Geology is always in the news. Did you know that much of it can be seen in real time on the web? Learn how to find information, such as online seismograms, volcanocams, and tsunami models—plus much, much more! All ages welcome. (Note: This seminar was originally scheduled for December but cancelled at that time because of the weather.)

FUTURE ACTIVITIES

Friday evening talk, February 13, 2009, at 8 p.m. in Room S17, Cramer Hall. Mark Ferns, Oregon Department of Geology and Mineral Industries (DOGAMI) geologist, Eastern Oregon Section Leader, will discuss **“The Crooked River Caldera”**. For more information about this newly discovered central Oregon volcanic feature, refer to the fall 2006 issue of Oregon Geology at the DOGAMI web site (<http://www.oregongeology.com/sub/quarpub/OrGeo.htm>).

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 6th Aves. and Harrison and Hall Sts. Check the

GSOC web page (www.gsoc.org) for updates to the calendar, or call Beverly Vogt at 503/292-6939.

GSOC SOCIETY DUES PAYMENT SCHEDULE CHANGES

GSOC members, the society has some bad news and some good news for you about the annual membership dues:

Here's the **bad news**:

The Geological Society announces its first increase in annual membership dues since 1996. The new dues schedule will be the following:

Junior/Student memberships..... \$15 (up from \$10)
Individual memberships..... \$25 (up from \$20)
Family memberships..... \$35 (up from \$30)

Here's the **good news**:

These changes to the dues schedule will take effect on February 1, 2009. So, if the society receives your dues payment before that date, you **get your 2009 membership for the old rate**, so don't delay! If you joined the society in fall of 2008, your dues payment includes year 2009 dues, so don't worry!

IN MEMORIAM -

GSOC members mourn one GSOC guest speaker and one long-time member

Terry Norman Toedtemeier: 1947-2008

GSOC members were shocked and saddened by the sudden death of Terry Toedtemeier, curator of photography at the Portland Art Museum and the October 2008 speaker at the society. Toedtemeier collapsed and died after giving a lecture in Hood River on December 10.

Toedtemeier's passions included geology and photography, and his career melded the two to the benefit of society in Portland and the Northwest. After obtaining a degree in earth science at Oregon State University, he helped to establish the Blue Sky Gallery in 1975 with several other artists. In 1980 he began teaching photography at the Pacific

Northwest College of Art. He was photography curator at the Portland Art Museum for more than 20 years while maintaining his own career in photography. In 2007 he was awarded the American Masters Initiative, a challenge grant in support of the Northwest Photography Series by the Oregon Arts Commission and the National Endowment for the Arts.

Toedtemeier's work for the Portland Art Museum included a variety of temporary photography exhibitions as well as a permanent collection of photography. His magnum opus is the show that is currently on display at the museum until January 11 entitled "Wild Beauty: Photographs of the Columbia River Gorge 1867-1957". He also co-produced a book of the same title about the works being displayed in the show.

Toedtemeier's own photographic work has been exhibited throughout the United States. His photos of Oregon and Hawaiian basalt were characterized by an expression of movement in the water coursing through the scenes and in the rock which had flowed to and crystallized at that location. Toedtemeier told his October GSOC audience that his next project was to be a book documenting the journey of Columbia River Basalt from "scorpions and sagebrush down to starfish and anemones". Perhaps some future natural history visionary can complete his dream.

Robert Ernest Richmond: 1913-2008

GSOC fellow Bob Richmond died November 29, 2008 at the age of 95. Bob was a local Portland boy who attended Fernwood Grade School and graduated from Grant High School. Bob served as a block warden during World War II, watching for Japanese planes after the attack on Pearl Harbor. He worked for ESCO and retired as a mechanical engineer after 44 years of employment.

Bob was known to many long-time GSOC members because he was very active in the society in the 1980's and 1990's, after joining in 1978. According to past President Rosemary Kenney, Richmond went on all of the field trips, was very active in the Speaker's Bureau, and was the official photographer at GSOC events such as the annual

banquet. Bob loved anything to do with the outdoor life.

OREGON AGGREGATE MINE PERMITTING: WORKING TOWARDS ECONOMIC AND ECOLOGIC HARMONY

Synopsis of the December 12, 2008 lecture by Ben Mundie, Reclamationist, Oregon Department of Geology and Mineral Industries (DOGAMI) Mineral Land Regulation and Reclamation Program

Our society uses a lot of gravel. We use gravel when we pave roads and sidewalks; we use gravel for building foundations; we use gravel in all concrete structures. Concrete is one part cement (baked limestone), two parts sand (very fine gravel), and 3 parts gravel. At last month's GSOC lecture, Ben Mundie discussed gravel, or aggregate as it is known in industry, and its mining past and future along the rivers of Oregon. According to a former DOGAMI analyst, Oregon's projected use of gravel will increase from 50 million tons in 2000 to 62 million tons in 2050. The use of gravel will probably surge in the near future as economic projects on the rebuilding of infrastructure are to be one of the priorities of the incoming national administration. Although not all gravel comes from riverine sources, Mundie made the case for successful river gravel mining that does not degrade the environment.

Back in the Bad Old Days, pre-1972, when mining was allowed with an "anything goes" attitude, gravel was dredged directly from rivers in Oregon. Some of these old mining operations still exist, as they were "grandfathered in" when permitting for new mines became a requirement. In the early decades of gravel permitting, mines were considered as separate entities with piecemeal permitting, and mines were separated from the rivers using dikes. Deep pits were allowed to be excavated for the extraction of the gravel.

This all changed after the big floods in the winter of 1996-1997. Rivers in Oregon just didn't respect the levees and pits that had been constructed and excavated by the mining operations. Gravel mine

pits were breached along the Clackamas, Molalla, Willamette, Santiam, Umpqua, and Rogue Rivers. In some cases, the rivers changed course directly through the mine pits, destroying expensive equipment and structures. Abandoned channels and flooded pits captured and stranded endangered species of fish. The flooding of deep pits created erosional cascades called headcutting which propagated upstream for thousands of feet. Mundie showed slides of a flooded mine on the Clackamas River that lost about \$1.5 million in damages during the 1996 flood, which does not include the cleanup that was done.

To avoid these "pitfalls", mine permitting changed in the state of Oregon to a more systematic approach, recognizing the tendency for rivers to change their course. Mines are now planned with designed entrance and exit channels should the river rise high enough to flood the mine. Excavations below the depth of the river bed are not allowed in pits that could flood. Instead of killing endangered fish species, mines are planned to provide new habitat for fish after the mining is completed. Also mine exit channels must be deep enough to allow fish to leave before the dry season should the pit be flooded. Mine equipment must not be stored in areas of potential flooding. These guidelines were established in a bi-partisan agreement in a Flood Task Force made up of local, state, and federal agencies.

Of course all this planning requires technical expertise and monetary investments. Mines applying for a permit must first survey the area and provide base-line floodplain data. Hydraulic modeling of the mine is another requirement. Aerial photography of the site is used to help determine the history of the river channel's course. Topographic and man-made constraints are accounted for in the design. Mines must be revegetated with native species.

Mundie showed the GSOC audience examples of successful gravel mines adjacent to rivers in Oregon. One project is located on the Rogue River near Table Rock. Previous piecemeal permits had allowed a string of unrelated pits along the same stretch of the river. In early 1997 the Rogue River

experienced a 600% increase in volume which created massive erosion between the river and the mine pits, and would eventually endanger some very valuable property. With some creative planning and community involvement, this disaster was averted and wildlife habitat increased. A couple of projects along the Willamette River in and near Eugene demonstrated the value of mine operators and communities committed to the improvement of the environment to the construction of wildlife habitat in mined areas. And finally, Mundie showed a project along the Applegate River which has run its course. It was designed with river entrance and exit channels that protected the nearby abutment of a bridge as well as allowing for eventual capture of the mine by the river. The project was flooded and performed as designed, and in fact produced spectacular fishing grounds in the former mine pits.

Because of the successful planning and execution of riverside gravel mines in Oregon since the 1996-1997 floods, Mundie is hopeful for the future of gravel mining in our state. With a bit of planning we can have mines that improve the ecology as well as the economy of Oregon.

BOARD MEETING NOTES

December 13, 2008

GSOC members present included Janet Rasmussen, Carol Hasenberg, Beverly Vogt, Richard Bartels, Jan Kem, Larry Purchase, Tara Schoffstall, Doug Rasmussen, Rosemary Kenney, John Newhouse, Clay Kelleher, and Anne O'Neill.

The Treasurer explained in his report that the GSOC account balance has dropped due to higher printing costs and speaker costs. The Board voted to raise GSOC yearly membership fees by \$5/category, effective February 1, 2009, because we want to be able to continue being able to pay for speakers. The board also voted to raise the Newsletter subscription rates for libraries and institutions.

Carol Hasenberg reported low attendance for the last two December meetings. Several ways of

publicizing the meetings were discussed, and it was agreed to keep track of attendance at the meetings.

The banquet committee discussed plans for the upcoming annual banquet. The banquet date will be March 8, 2009 at the Monarch Hotel near the Clackamas Town Center. The cost should be based on a minimum of 50 people attending.

Fossil Fest, will be February 14th and 15th. Arrangements for the GSOC display table and board meeting time were discussed.

Upcoming field trips were discussed. May and June trip possibilities were discussed. July will be the President's field trip through the western Cascades and central Oregon, and Janet suggested a trip to the Chloride Mine and a hike along Elkhorn Ridge for August or early September.

Next meeting will be 5:15 p.m., Friday, February 13, 2009, at a place that is yet to be determined.

Beverly Vogt, Secretary

NOMINATING COMMITTEE RESULTS

The following slate of officers has been selected by this year's nominating committee:

President **Carol Hasenberg**
Vice President.....**Larry Purchase**
Secretary **Beverly Vogt**
Treasurer **Richard Bartels**
Director, 3 years.....**Anne O'Neill**
Director, 2 years..... **Dave Olcott**
Director, 1 year.....**Jan Kem**

Nominations will be closed for this year's slate of officers after the January meeting of the society. The slate of officers will be voted on and approved at the February monthly meeting.

The Nominating Committee members are Jan Kem, chair, Larry Purchase and Carol Hasenberg. Our thanks to the selected members and members of the Nominating Committee!

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compiled by Carol Hasenberg

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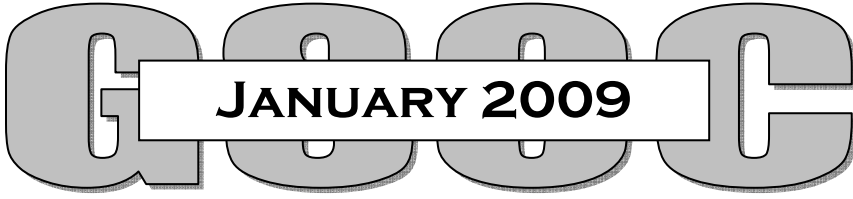
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GSOC MINI-CALENDAR

JANUARY ACTIVITIES

Friday evening talk, January 9, 2009, at 8 p.m. Justin Klure, Partner, Pacific Energy Ventures, LLC “Wave Energy Projects in Oregon – The Wave of the Future?” Cramer Hall S17

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FOR DETAILS, SEE INSIDE

**ANNUAL DUES ARE DUE: SOCIETY
DUES PAYMENT SCHEDULE
CHANGES AND SPECIAL – SEE
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FEBRUARY ACTIVITIES

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

Join GSOC members at Hot Lips Pizza, 1909 SW 6th Ave., at 6:30 p.m. before the lecture for an informal dinner and conversation.

No Wednesday evening seminar is planned for February.

FUTURE ACTIVITIES

GSOC 74th Annual Banquet, Sunday, March 8, 2009, at 8 p.m., 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 page 13 of this newsletter for information and registration.

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 6th Aves. and Harrison and Hall Sts. Check the GSOC website (www.gsoc.org) for updates to the calendar, or call Beverly Vogt at 503/292-6939.

UPCOMING ACTIVITIES FROM OTHER ORGANIZATIONS

This year's **FOSSILFEST 2009** at Hatfield Marine Science Center Visitor Center in Newport, Oregon, will be February 14, 2009 – bring your Valentine! Guy DiTorrice will present "Fossil Hide-&-Seek,"

and Dr. William Orr will present "Oregon Fossils and Paleontology." Entrance to the Visitor Center is by suggested donation. For more information, see the current events webpage for the HMSC Visitor Center:

<http://hmsc.oregonstate.edu/visitor/current.html>

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:

- February 4, 2009 "Geospatial Web Standards for Geology", speaker Dave Percy
- February 11, 2009 "Coastal Loess Deposits on the West Coast", speaker Curt Peterson
- February 18, 2009 "Crystal-scale Evidence for the Dynamics of Magmatic Systems: Examples from Mt. Shasta and Other Arc Volcanoes", speaker Martin Streck
- February 25, 2009 "Learning and Change Through Time", speaker Tom Lindsay
- 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 Academy of Science will be having its annual meeting on February 28, 2009, at Western Oregon University. There will be concurrent seminar presentation sessions for Biology, Chemistry, Economics, Geography, Geology, Health Science, History/Philosophy/Social Study of Science, Mathematics/Computer Science, Physics, Political Science, Psychology, Science Education, and Sociology/Anthropology. Awards will be presented for Outstanding Scientist and Outstanding Teachers for Higher Education and K-12. For application and registration, see the OAS website <http://www.oas.pdx.edu/>. Membership in the OAS is not required to attend the meeting, but participants must be registered.

GENEROUS BEQUEST TO GSOC

The Geological Society of the Oregon Country gratefully acknowledges the bequest of \$1000 by Robert Ernest and Emma Jane Richmond. GSOC fellow Bob Richmond died recently at the age of 95, and the donation was received from their daughter, Jean Richmond, of Vail, Colorado. Bob and "E.J." were very active in the society in the 1980's and 1990's, after joining in 1978. Our thanks again to the Richmond family!

WAVE ENERGY: The Wave of the Future?

Synopsis of the January 9, 2009, lecture by Justin Klure of Pacific Energy Ventures, LLC, Portland, Oregon
by Carol Hasenberg

A good crowd of GSOC members and guests filled the Cramer Hall classroom for the Friday night lecture with Justin Klure, one of the wave energy pioneers in Oregon. Klure began his lecture by stating that there is so much wave energy out there that it is a question of when not if it will be developed. Klure's involvement in the development of wave energy projects is from a regulatory and financing viewpoint where his MBA serves him well. In his lecture to GSOC, he reviewed the origins of wave energy projects in Oregon, the technical aspects of harnessing wave energy including devices and constraints, the current status of projects, and the goals of the current projects.

Before embarking on a plan to develop wave energy, a few basic questions must be asked about the potential of wave or other ocean energy projects. Why wave energy, and why in Oregon? In wave energy projects, the energy of the up and down, and sometimes sideways motion of the surface of the water (i.e., wave motion) is used to push something in a device which then generates electricity. There are also two other types of ocean energy generation – using tidal motion and using ocean currents to generate electricity – that are currently developing outside of Oregon. Wave motion is wind energy that has been stored by the ocean, and it is more predictable and steady than

that of wind motion. Also, since many people live near the shore, it is a supply of energy that is close to its demand. Using wave energy would increase the diversity of energy generation and also it is a type of energy that is available in many parts of the world.

In Oregon, state policy is that 25% of energy must be from a renewable source by the year 2025. There are tax credits in place for such development, it can support and be supported by the academic community, and use the current ports, metals and fabrication industries and the current grid infrastructure. There are less size limitations for transport of wave energy devices, since they can be assembled in the ocean, unlike the transportation problems encountered in the wind energy industry.

Wave energy projects in Oregon got started around 2004, when a California energy think tank, the Electric Power Research Institute (EPRI), identified Oregon as a potentially good place for developing wave energy. At the time, Klure was working for the Oregon Department of Energy as a senior policy advisor. The State of Oregon, Oregon State University (OSU), and EPRI then joined into a collaborative effort for pursuing the development of wave energy in Oregon.

The challenges to developing wave energy projects also must be surmounted for projects to go forward, and these are being addressed by this effort. The ocean surface is a formidable and destructive environment and project components must be durable and capable of staying in place. Wave energy projects must not be toxic to the marine ecosystems where they reside. And wave energy projects must minimize systemic changes from their interaction with the ocean.

Besides the obvious technical and financial barriers to such development are the regulatory and political barriers: ocean development is already full, and beleaguered fisherman are hardly likely to welcome a new rival for space in the areas immediately offshore from Oregon. In addition, there are several state and federal agencies which claim jurisdiction in various offshore zones and a process must be

developed to navigate through the regulatory morass required to develop a project.

Due to all these challenges, the development of wave energy is proceeding slowly and carefully. In 2007 the Ocean Wave Energy Trust was established to administer monies obtained from the Oregon Innovation Council's recommendation. In 2008 several projects applied for licenses with the Federal Energy Regulatory Commission (FERC). Eight projects were originally proposed for the Oregon coast, but currently there are three that are moving forward: Ocean Power Technologies (OPT), a commercial company pioneering the technology, has two projects in the works – one in Reedsport (Gardiner), Oregon, and one in Coos Bay, Oregon. The other project is for Douglas County, Oregon. The first buoy for the Reedsport project is due to be launched in 2009.

Before describing these projects it would be good to go over the types of wave energy generating components now being developed. There are four types of these

1. The point absorber is a device which uses the up and down motion of the water to pump hydraulic fluid that spins a turbine in the device.
2. The attenuator, or "wave snake" is a linear device which uses up and down and sideways motion to pump the hydraulic fluid.
3. The oscillating water column or "blowhole" type device uses crashing water spouting through the device to spin the turbine.
4. The overtopping type of device uses water crashing over the device to spin the turbine.

The Reedsport OPT project will use point absorber type buoys which are 12 meters wide by 12 meters in vertical dimension. They are rated at 150 kW and the total project of 10 buoys will be capable of providing electricity to 500-800 homes. They will be located 3 miles offshore from the beach near Gardiner and take advantage of an abandoned waste pipe from the now defunct International Paper plant to bring the electrical conduit to the shore. The footprint of the project on the ocean floor will cover about one-fourth of a square mile. This project will be much studied by engineers and environmental

scientists to improve the technology and study the environmental effects.

The Coos Bay project proposed by OPT will be more ambitious and benefit from the lessons learned in the Reedsport project. It is planned to use bigger buoys, be about 4 or 5 miles in length and cover about 1 square mile of ocean floor. The start of this project will be at least five years in the future.

Looking further ahead, Klure noted that many problems could be solved if the wave energy projects could be located much farther from shore – there would be fewer conflicts with fisherman and conflicting regulatory bodies, and the environment would be less harsh and less fragile. But there needs to be many studies done and equipment trials before that day is realized.

Additional Reading:
Oregon Wave Energy Trust
<http://www.oregonwave.org/>

EPRI Home Page:
<http://my.epri.com/portal/server.pt?>
The EPRI site has many downloadable documents about the potential and progress of wave energy projects, including those in Oregon.

CHECKLIST FOR GEORESEARCHING THE WEB

Suggestions from Tara Schoffstall as presented in the Wednesday, January 14, 2009, GSOC seminar.

Earth Science Office (Weather Satellite Images):
<http://www.ghcc.msfc.nasa.gov/GOES/>

Geology Labs Online:
<http://www.sciencecourseware.com/GLOL/>

Google Earth: <http://earth.google.com>

National Park Service Webcams:
<http://www.nature.nps.gov/air/WebCams/>

Online Imagery: <http://www.terraserver.com/>

Pacific Northwest Seismic Network (PNSN):
<http://www.pnsn.org/>

Portland Lidar:
<http://www.oregongeology.org/sub/lidar/>

Satellite Images:
http://www.windows.ucar.edu/tour/link=/earth/earth_il.html

Schoolyard Geology (USGS)
<http://education.usgs.gov/schoolyard/dinosaurtracks.html>

Science Animations:
<http://science.nhmccd.edu/biol/animatio.htm>

Geology Tutorials:
<http://www.geologyrocks.co.uk/tutorials.php?level=1>

United States Geological Survey (USGS):
<http://www.usgs.gov>

US Volcano Cams:
<http://www.skimountaineer.com/CascadeSki/CascadeWebCams.php>

Websites for Students:
<http://www.sldirectory.com/studf/earth.html>

Worldwide Earthquake Locator:
<http://tsunami.geo.ed.ac.uk/local-bin/quakes/mapscript/home.pl>

Tara recommends using the following key words when “googling” real-time, online, or interactive geological information:

- **webcam** – cameras which broadcast current conditions on the web
- **webicorder** – online seismograph
- **video**
- **animations**
- **virtual**
- **online**
- **tutorial**
- **interactive map**

NOMINATING COMMITTEE RESULTS

The following slate of officers has been selected by this year's nominating committee:

President **Carol Hasenberg**
Vice President.....**Larry Purchase**
Secretary **Beverly Vogt**
Treasurer **Richard Bartels**
Director, 3 years **Anne O'Neill**
Director, 2 years **Dave Olcott**
Director, 1 year..... **Jan Kem**

The slate of officers will be voted on and approved at the February monthly meeting.

The Nominating Committee members are Jan Kem, chair, Larry Purchase and Carol Hasenberg. Our thanks to the selected members and members of the Nominating Committee!

GSOC NEW MEMBERS FOR 2008

Teresa Garretson
William Sullivan
Rik Smoody
Barbara Smoody
Kirben Smoody
Wilven Smoody
Peter Hutkins
Eve Morgan
William Morgan
Anne O'Neill
Susan Walsh
Thomas Walsh

GSOC NEW MEMBERS FOR 2009

Dawn Juliano
Betty Lou Pratt
Julia Lanning
Mark Anderson
Patrick Baker
Dr. William Elliott
David Tozer
Linda Tozar
Jackie Carmack

“SECRETS OF CRATER LAKE”

A meeting at PSU on January 14, 2009, attended by at least half-dozen of our members, included talks by Scott Burns, PSU geologist and GSOC member, and Robert Collier, OSU oceanographer. The speakers discussed the history of the lake and current studies of the lake via submersible and surface mapping techniques. The program was sponsored by Crater Lake National Park Trust (www.craterlaketrust.org). Some of the web sites suggested in the handouts are:

- The science of volcanic lakes, with good links including some for Crater Lake, USA: <http://lawr.ucdavis.edu/faculty/gpast/lakes.html>
- Crater Lake National Park: <http://www.nps.gov/crla> and <http://nps.gov/crla/home.htm>
- Geologic map of Mount Mazama and Crater Lake: <http://pubs.usgs.gov/sim/2832>
- Studies of hydrothermal processes in Crater Lake: <http://chemoc.coas.oregonstate.edu/~bobcollier/CLhydrothermalSite/>
- Lake physics: <http://www.humboldt.edu/~gbc3/CL/> and <http://damp.oce.orst.edu/crater/>
- Long-term limnological monitoring of Crater Lake: <http://fresc.usgs.gov/products/crater/>

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY SEVENTY FOURTH ANNUAL BANQUET

Speaker

The Geological Society of the Oregon Country will be having its 74th Annual Banquet on Sunday March 8, 2009. The program topic will be “*Geologic Clues To The Physics Of A Hypervelocity Asteroid Impact*” by Jeff Wynn (USGS-CVO). The speaker participated in three expeditions into the deep core of the Empty Quarter of Saudi Arabia, the hottest place and largest contiguous sand-dune desert on Earth. There he mapped the Wabar asteroid impact site with Gene Shoemaker, the father of Astrogeology. The mapping and subsequent modeling show that an asteroid the size of your living room can impact the Earth with the devastating explosive event of a Hiroshima-sized atom bomb. A “city buster” like this appears to be far more common in Earth’s recent history than scientists had previously suspected. The speaker will bring some rare samples of the asteroid and the “Insta-Rock” and “Glass” created in and from the sand by the impact shock-wave.

Where and When

Location of the banquet will be at Monarch Hotel, 12566 SE 93rd Ave., Clackamas, Oregon near I-205 and Clackamas Town Center (<http://www.monarchhotel.cc/>). There is ample free parking. Doors to the banquet room open at 12:30 p.m. Dinner at 1:00 p.m. Program and speaker will begin at 2:15 p.m.

Menu

- **Slow Roasted Pot Roast** (accompanied by roasted garlic mashed potatoes and seasonal vegetables)
- **Chicken Piccata** (grilled breast of chicken, finished with a light lemon-caper sauce accompanied by rice pilaf and seasonal vegetables)
- **Pasta Alfredo** (penne pasta and fresh vegetables tossed with Alfredo sauce and topped with parmesan cheese)

All entrees include garden salad with ranch dressing, rolls with butter, chef’s dessert and coffee, tea, decaf or iced tea.

GSOC 74TH ANNUAL BANQUET RESERVATION FORM – clip at line and mail.

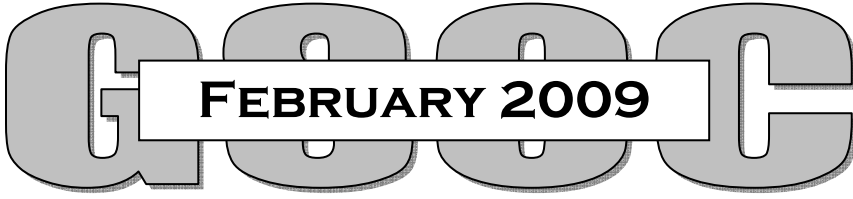
_____ Number of tickets at \$23.50 each (includes gratuity). Please indicate entrée choice.

Names of persons attending and meal choices:

_____	Meal choice (circle one)	Pot Roast	Pasta	Chicken
_____	Meal choice (circle one)	Pot Roast	Pasta	Chicken
_____	Meal choice (circle one)	Pot Roast	Pasta	Chicken
_____	Meal choice (circle one)	Pot Roast	Pasta	Chicken

_____ Amount enclosed. *Reservations must be received by Monday, March 2, 2009.*

Please mail reservations and checks to GSOC, PO Box 907, Portland, OR 97207-0907



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GSOC MINI-CALENDAR

FEBRUARY ACTIVITIES

Friday evening talk, February 13, 2009, at 8 p.m. Mark Ferns and Jason McLaughry, geologists from DOGAMI Eastern Regional office in Baker City, present “The Crooked River Caldera,” Cramer Hall S17, or other classroom as posted on our website www.gsoc.org.

No Wednesday evening seminar is planned for February.

FUTURE ACTIVITIES

GSOC 74th Annual Banquet, Sunday, March 8, 2009, at 1 p.m., Jeff Wynn, USGS Volcano Hazards Team Chief Scientist, Cascades Volcano Observatory, presents “Geologic Clues To The Physics Of A Hypervelocity Asteroid Impact”. Monarch Hotel, Clackamas, OR.

FOR DETAILS, SEE INSIDE

**GSOC ANNUAL BANQUET IS MARCH
8, 2009 – SEE INSIDE FOR
REGISTRATION FORM AND
DETAILS!!!**



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

www.gsoc.org

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Jan Kem (1 year) – 503/246-2275

Dave Olcott (2 years) – 503/695-5219

Anne O'Neill (3 years) - 503/477-7827

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Rosemary Kenney – 503/892-6514

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) 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 6th Aves. and Harrison and Hall Sts. Check the GSOC website (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

- 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:

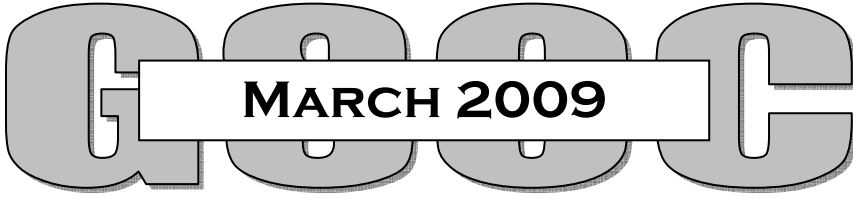
<http://epswww.unm.edu/iom/ident/index.html>

"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 Barga:

http://www.minsocam.org/msa/collectors_corner/id/mineral_id_key11.htm



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No Wednesday evening seminar is planned for March.

FUTURE ACTIVITIES

Friday evening talk, April 10, 2009, at 8 p.m. 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"**.

FOR DETAILS, SEE INSIDE

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



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VISITORS WELCOME AT ALL MEETING

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APRIL 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**". *Note: As of press time, we have applied for a larger room, Cramer Hall Room 71. A sign will be posted on the door of S17 should the room change be made.*

No Wednesday evening seminar is planned for April.

FUTURE ACTIVITIES

Friday evening talk, May 8, 2009, at 8 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University: Dr. William Orr, Professor Emeritus and Curator of the

Condon Collection of fossils at University of Oregon, will present "**New Tools, Taxa, Techniques**".

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 6th Aves. and Harrison and Hall Sts. Check the GSOC website (www.gsoc.org) for updates to the calendar.

GSOC Field Trip, June 19-20, 2009: "Waste, Wind and Water; Tapping Resources East of the Cascades." Led by GSOC Vice President Larry Purchase and Director Dave Olcott, this 1-1/2 day trip, leaving Friday morning, June 19, will examine three operations in northern Gilliam, Sherman, and Wasco Counties: the Columbia Ridge Landfill, Klondike and Biglow Canyon Wind Farms, and ground-water supporting cherry production south of The Dalles.

Transportation will be by car caravan/car pool with participants making their own arrangements. Participants should make their own lodging arrangements for an overnight stay in the Dalles for Friday, June 19. Cost of the trip will be \$25.00 and participation will be limited to the first 20 GSOC members and their guests who have paid for the trip. For more information contact Dave Olcott (daveolcott46@yahoo.com or (503) 695 – 5219). See April and May's GSOC Newsletter and the GSOC website (www.gsoc.org) for more information.

GSOC President's Field Trip, August 1-3, 2009, plus optional August 4: "Geology and Hydrology of the Oregon High Cascades and Deschutes Basin." Join GSOC President Carol Hasenberg, with guest field trip leaders Richard Conrey, PhD, of Washington State University, Pullman, Ken Lite, Jr., RG, of Oregon Department of Water Resources, and Barbara Rich, Environmental Health Scientist, of Deschutes County Planning Department. On our trip we will examine the geology of the High Cascades and Deschutes Basin from Mt. Hood to Bend, the groundwater system of the Upper Deschutes Basin in the La Pine area and the Crooked River Canyon, and groundwater issues of the Upper Deschutes Basin, and visit the High Desert Museum. Some moderate hiking will be done in the Crooked River Canyon. An optional extra day trip on August 4 will be led by GSOC's own Richard Bartels and Beverly Vogt in the Newberry National Volcanic Monument. Transportation will be by car caravan/car pool with participants making their own arrangements. Ogden Group Campsite in Deschutes National Forest has been reserved for the nights of August 1-4. Participants wishing to lodge indoors will need to make their own arrangements for the La Pine area, and suggestions will be presented in the May issue of *The Geological Newsletter*.

UPCOMING ACTIVITIES FROM OTHER ORGANIZATIONS

Portland State University Geology Department Spring 2009 Seminar Series, to be announced. Refer to the department website for more information:
<http://geology.pdx.edu/node/3>

Oregon State University Department of Geosciences 2009 Spring Seminar Series,

Thursdays, 4:00 pm, 108 Wilkinson Hall, unless otherwise noted.

http://www.geo.oregonstate.edu/events/SeminarSeries/Seminar_Current.htm

- April 2, Ilya Bindeman, Geological Sciences, University of Oregon, "Silicic magma genesis and eruption in glaciated areas: insights from Kamchatka, Yellowstone and elsewhere"
- April 9, Peter Lipman, U.S. Geological Survey, Menlo Park, "Subduction-related magmatism in the eastern Cordillera: The Mid-Tertiary Southern Rocky Mountain Volcanic Field and associated caldera-related granitic intrusions, in comparison to the Sierra Madre Occidental and the Central Andes"
- April 16, Anthony Koppers, Marine Geology and Geophysics, Oregon State University, "Generating today's continental crust through whole earth geochemical box modeling"
- April 23, Paul Wallace, Geological Sciences, University of Oregon, "The role of water in subduction zone magmatism: New insights from melt inclusions & geodynamic models for central Mexico"
- April 30, Rick Conrey, Earth and Environmental Sciences, Washington State University, "Propagating rift in the Cascade Range"
- May 7, Mark Ghiorsio, OFM Research, Inc. and, Earth and Space Sciences, University of Washington, "Triggering explosive volcanic eruptions"
- May 14, Kathy Cashman, Geological Sciences, University of Oregon, "Physical controls on shallow magma evolution: the eruption of Paricutin Volcano, Mexico, 1943-1952"
- May 21, Scott Patterson, Earth Sciences, University of Southern California, "Unraveling the growth and evolution of magma chambers: the Tuolumne Batholith experiment"
- May 28, John Pallister, U.S. Geological Survey, Vancouver, TBA
- June 4, Adam Kent, Dept. of Geosciences, Oregon State University, "High resolution crystal records from Mount Hood and Mount St. Helens: The devil's in the details"

University of Oregon Department of Geological Sciences, Spring 2009 Weekly Seminar Series to be announced. Refer to department website for more information:

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

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, April 9, 2009, 11:30, John Barron, USGS Menlo Park, topic to be determined
- Thursday, April 16, 2009, 11:30, Jeffifer Harden, USGS Menlo Park, to be determined

“Dream Bigger Dreams”

A synopsis of GSOC President Hasenberg’s inaugural address, March 8, 2009.

by Carol S. Hasenberg

Ten years ago, I became president of the Geological Society of the Oregon Country. My involvement in the society began in the mid to late 1990’s when I attended several of Richard Bartel’s geological seminars, and then I attended the annual banquet in 1997 or 1998. It was there that now Secretary Beverly Vogt hooked me into the vortex, as it were, by asking if I would be willing to be vice president of the organization for the following year. She told me that the job would not be too difficult as she had already lined up several of the speakers for that year. “OK,” I said, and that began my involvement with this society that has lasted to this day.

It took a long while of observing the workings of the society and its changes over these years to have an understanding of how the society functions, its past and its future. In addition to my 1999-2000 Presidency, I have served the society as its newsletter editor since 2000, helped to plan another president’s field trip, and participated in many of the society’s activities. I have done some sober reflections on the health and future of the society in

preparing this talk. I also want to discuss some of the workings and challenges that the GSOC Board of Directors face to the general membership, since many of these are not generally discussed in the Friday night meetings.

GSOC is not as powerful an organization as it once was. At its heyday in the 1950’s and 1960’s, the club had ~250 member households as opposed to the ~100 that it had in 2008. The club also had a meeting of some sort every Friday night. I speculate that there are several possible reasons for this loss:

- The rise of professional geological societies like Geological Society of America has siphoned off professional geologists from our membership.
- Families do less extra-curricular activities together than they once did.
- American society has become increasingly specialized and people are content to passively observe what the professionals are doing.
- Americans work more than they used.
- Fewer younger people want to join the society as the membership ages.
- GSOC’ers used to pursue bigger ideas – for example, founder Edwin T. Hodges was involved in the establishment of Oregon’s Museum of Science and Industry.

Now, some of you might disagree with some of these reasons but the fact of loss of participation cannot be denied.

In reflecting upon how GSOC might be able to remain a vital organization in today’s world, I asked myself three questions:

- Are we meeting the mission of the founders?
- Are we financially solvent?
- Do we have a vision for the future of the society?

I will devote the remainder of the talk to my reflections on these questions.

Are we meeting the mission of the founders?

The GSOC bylaws state the objectives of the society as

- a) To provide facilities and leadership for members of the society to study geology, particularly the geology of the Oregon Country.

- b) To establish and maintain a library of geological publications.
- c) To support and promote geologic study and research, and to designate, preserve and interpret the important geologic features of the Oregon Country.
- d) [Corporation requirements]

The first objective deals with **benefits of geologic study to the members**. Currently these include *The Geological Newsletter*, for both the information it contains and as a forum for members to explore and discuss the geologic findings of the day. We also have quality geological programs ten months of the year and geological field trips. The society contains a number of opportunities for members to participate and lead others in the study of geology, including the board of directors and planning and publicizing events. So benefits to the members can be considered to be covered by current society practices.

I'd like to go into a bit more detail about what makes the **geological programs** (Friday night lectures and seminars) attractive to the members and the public. It's important for guest speakers to be recognized experts on their topics. The topics must be relevant, and can range between pure geological research, popular local geology, relevant economical applications involving geology, geological aspects of current problems or global climate change and other multidisciplinary research. In addition to having these salubrious characteristics, it is necessary to well publicize the programs. Right now several members of GSOC are involved in publicity, including newspaper announcements, our website, e-publicity, posted newsletters, calendars, and posters. In addition, we encourage all our members to publicize our activities via word of mouth.

GSOC is somewhat successful in supporting **geological education**. We currently are donating \$800 per year to the Portland State University Foundation for geological scholarships. We offer honoraria to our speakers and field trip leaders. Our library, however, is definitely underutilized. Perhaps we need to get some of our library information available on our website. Although we do some educational support, there are many ways

in which we could strengthen our ties to both the geological community and the general public.

The society has not very actively pursued the designation, preservation or interpretation of geologic features in the time I have been a member. Several of our members have been involved outside of the society with the Ice Age Flood National Trail or NARG, which is very commendable. Also we have published some material about some of our field trips on the web, and published hard copies of a few of our President's field trips.

Are we financially solvent?

This past year, the GSOC Board of Directors was in the unenviable position of reversing a money-losing trend. The society spent \$1000 more than it brought in, except that luckily a generous bequest we received in December balanced the budget. GSOC derives its income from membership dues, pay-to-play activities (field trips, the banquet and the picnic), field trip guide and book sales at the banquet, and donations and bequests. Its expenses include administrative fees (liability insurance, corporation fees and minor supplies), newsletter publishing and mailing costs, website domain and ISP fees, scholarships and honoraria, and costs associated with the pay-to-play activities. In the past the membership dues covered everything except the pay-to-play activities, but escalating newsletter costs and fewer membership dues have created an unbalance in the budget.

To face this challenge, the board has considered several alternatives:

- Increasing the society membership, the most desirable way to balance the budget
- Adding overhead fees to the pay-to-play activities
- Additional money raising activities (commemorative sales, book sales, etc.)
- E-publishing the newsletter rather than hard-copy printing and mailing
- Other cost-lowering measures – this year we were able to get free ISP service through a generous donation
- Increasing membership dues

The board will continue to keep up the quality of our activities at the lowest possible cost, but all the

members should be aware of the situation and contribute to the success of the society.

Do we have a vision for the future of the society?

I don't want to let you go thinking that all hope for the future is lost, because it most certainly is not. However, to give the society a brighter future, we all need to contribute to its success! I would also like to leave you with my vision of how we might flourish:

- **Financial stability** – In the short term, we need to find the balance between monetary inflow and outflow by applying some or all of the measures listed above.
- **Expand publicity** – We need to get the word out to others about our club, and strengthen its ties to both the geological community and general public. We all need to engage in this, if only by word-of-mouth.
- **Challenge the membership** to more fully fulfill the objectives of the founders by increasing your participation in one the following ways
 - **Personal growth** – Develop one of your talents to benefit the society
 - **Family engagement** – Bring the family to GSOC activities
 - **Dream Bigger Dreams** – Get involved in establishing public policy or doing projects that designate, preserve or interpret the geologic features of the Oregon Country.

Thank you!

THE WABAR METEOR CRATER EXPEDITION AND THE LOOMING THREAT OF IMPACT EVENTS

Synopsis of the March 8, 2009, lecture by Jeff Wynn, Chief Scientist for Volcano Hazards of the USGS Cascades Volcano Observatory, Vancouver, Washington

by Carol S. Hasenberg

In 1994-1995, geophysicist Jeff Wynn was a participant in three expeditions to one of the most hostile environments on earth in search of a meteorite crater in Saudi Arabia's Empty Quarter.

Dr. Wynn and fellow researchers, who included the famed astrogeologist Gene Shoemaker, went to explore craters known to exist in the area called "Al Hadida", Arabic for "The Iron Thing". The site was located deep in the Empty Quarter, whose average daily temperatures range between 40°C at night and 55°C during the day (104°F and 131°F, respectively). Transportation in the Empty Quarter is problematic and there are no roads. Flying a helicopter into this desert is not possible due to the high temperatures, and ground vehicles must cross 700 km of desert which includes parallel, continuously evolving 'Irq sand dunes.

The expedition was accomplished with a small fleet of Hummer trucks containing a number of scientists, technicians, guides, Saudi soldiers, and all their gear. The trip was both **interesting and very dangerous**. Hazards included the desert fauna which included a hideous arachnid called a "camel spider" (<http://www.camelspiders.net/>), heat stroke which one day nearly took Jeff's life after doing very modest magnetic survey work in 142°F temperature, and problems crossing the dunes with the vehicles.

The results of the studies gave scientists a lot of information about meteor impacts. WABAR was a low angle, high velocity iron meteorite which is believed to have impacted in 1863. (Thermoluminescence dating indicated an age of less than 250 years, and a fireball had been reported in the area in 1863.) Very little of the meteorite had survived the impact, and only in the back rim of the impact crater. Because the WABAR meteor was composed of iron, it exploded upon impact. **Air burst height** of meteors is related to the yield strength of their compositional material. Stony or chondritic high velocity meteors burst in the air, because the vacuum force created behind the meteor as it passes through the atmosphere literally pulls the material apart. By carefully studying the composition of this and other impact craters, scientists are able to piece together the sequences of events that occur in making the craters. This in turn makes it easier to recognize impact craters.

A **grim revelation** of this research on meteor impacts is that they are fairly common events. The

WABAR incident is one of five “city buster” type meteor impact events that have occurred in the last 150 years. The others are the 1908 Tunguska explosion in Siberia, an explosion over Brazil and Peru in 1930, another explosion over British Guyana in 1935, and another eastern Russian explosion in 1947. Humanity is fortunate that most of the recent impacts have occurred in remote areas and over land. Eighty percent of the world’s population is located close enough to the world’s oceans to be endangered by tsunamis generated in an ocean impact event. We do not have the capability to detect and destroy high velocity asteroids – they are relatively small and are dangerous due to their great kinetic energy (which is proportional to the square of the velocity). Let us hope that we continue to be so lucky.

WEBFERENCES:

Jeff Wynn’s USGS Home Page:

<http://volcanoes.usgs.gov/jwynn/index.html>

The Empty Quarter Expeditions website describes the expeditions in detail:

<http://www.wynn.org/EmptyQuarter/>

The Wabar Meteorite Impact Site, Ar-Rub' Al-Khali Desert, Saudi Arabia

by: Jeff Wynn and Gene Shoemaker (deceased)

discusses the results of the expeditions:

<http://volcanoes.usgs.gov/jwynn/3wabar.html>

Wikipedia “Wabar craters” - The Wabar craters are meteorite impact craters found by accident by an explorer searching for the legendary city of Ubar in Arabia:

http://en.wikipedia.org/wiki/Wabar_craters

Wikipedia “Impact Event”

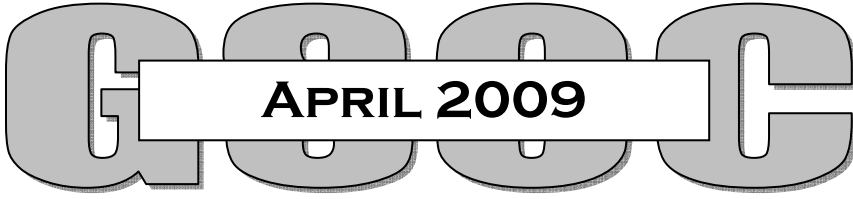
http://en.wikipedia.org/wiki/Impact_event

Saudi Aramco World : The Wabar Meteorite

<http://www.saudiaramcoworld.com/issue/198606/the.wabar.meteorite.htm>

Reference for South American meteor events:

<http://www.xtec.es/recursos/astronom/craters/amazonase.htm>



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GSOC MINI-CALENDAR

APRIL ACTIVITIES

Friday evening talk, April 10, 2009, at 8 p.m. 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"**.

No Wednesday evening seminar is planned for April.

FUTURE ACTIVITIES

Friday evening talk, May 8, 2009, at 8 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University: Dr. William Orr, Professor Emeritus and Curator of the Condon Collection of fossils at University of Oregon, will present **"New Tools, Taxa, Techniques"**.

GSOC Field Trip, June 19-20, 2009: "Waste, Wind and Water; Tapping Resources East of the Cascades."

GSOC President's Field Trip, August 1-3, 2009, plus optional August 4: "Geology and Hydrology of the Oregon High Cascades and Deschutes Basin."

FOR DETAILS, SEE INSIDE



THE GEOLOGICAL NEWSLETTER

"NEWS OF THE GEOLOGICAL SOCIETY OF THE OREGON COUNTRY"

VOLUME 75, NUMBER 5
MAY 2009

The Geological Society of the Oregon Country

P.O. Box 907, Portland, OR 97207

www.gsoc.org

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csh727@comcast.net

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lkpurchase@q.net

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Dave Olcott (2 years) – 503/695-5219

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VISITORS WELCOME AT ALL MEETING

CALENDAR

MAY ACTIVITIES

Friday evening talk, May 8, 2009, at 8 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University: Dr. William Orr, Professor Emeritus and Curator of the Condon Collection of fossils at University of Oregon, will present "New Tools, Taxa, Techniques".

No Wednesday evening seminar is planned for May.

FUTURE ACTIVITIES

Friday evening talk, June 12, 2009, at 8 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University: Dick Pugh, the Cascade Meteorite Laboratory, PSU will discuss his work with meteorites.

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 6th Aves. and Harrison and Hall Sts. Check the GSOC website (www.gsoc.org) for updates to the calendar.

GSOC Field Trip, June 19-20, 2009: "Waste, Wind and Water; Tapping Resources East of the Cascades." Information and registration form for this trip is located on page 34 of this newsletter. See the GSOC website (www.gsoc.org) for updated information.

GSOC President's Field Trip, August 1-3, 2009, plus optional August 4: "Geology and Hydrology of the Oregon High Cascades and Deschutes Basin." Join GSOC President Carol Hasenberg, with guest field trip leaders Richard Conrey, PhD, of Washington State University, Pullman, Ken Lite, Jr., RG, of Oregon

Department of Water Resources, and Barbara Rich, Environmental Health Scientist, of Deschutes County Planning Department. On our trip we will examine the geology of the High Cascades and Deschutes Basin from Mt. Hood to Bend, the groundwater system of the Upper Deschutes Basin in the La Pine area and the Crooked River Canyon, and groundwater issues of the Upper Deschutes Basin, and visit the High Desert Museum. Some moderate hiking will be done in the Crooked River Canyon. An optional extra day trip on August 4 will be led by GSOC's own Richard Bartels and Beverly Vogt in the Newberry National Volcanic Monument.

Transportation will be by car caravan/car pool with participants making their own arrangements. The trip will begin on the morning of August 1 near Timberline Lodge on Mt. Hood. Ogden Group Campsite in Deschutes National Forest has been reserved for the nights of August 1-4. Participants wishing to lodge indoors will need to make their own arrangements for the La Pine area. We suggest the following motel:

Best Western Newberry Station, 16515 Reed Rd and US Route 97, La Pine, Oregon. The motel is 14 minutes and 6.3 miles away south west of Ogden campground. The cost for a room is \$74.95 for two queen beds. Call (541) 536-5130 to reserve a room or reserve online at:

<http://www.bestwesternoregon.com/hotels/best-western-newberry-station/>.

Seven rooms have been set-aside for August 1 to August 4 under the GSOC name. Make your reservations soon, because any remaining GSOC rooms will be released to the public on July 1. Many other week-ends are already booked up at the motel.

UPCOMING ACTIVITIES FROM OTHER ORGANIZATIONS

Portland State University Geology Department Spring 2009 Seminar Series, Cramer Hall S17, 3:30-4:30 p.m.. Contact Martin Streck, 503/725-3379, streckm@pdx.edu, for further information, or refer to the department website:

<http://geology.pdx.edu/node/3>

- May 6, "Crustal magmatic systems: Dynamical causes and consequences of magma chamber evolution", Joe Dufek, Georgia Institute of Technology, Atlanta

- May 13, Thesis proposal presentations
- May 20, Topic "TBA", Ed Medley, Richard Jahns National Lecturer, GSA/AEG
- May 27, "A new look at the volcanic products of the Yellowstone hotspot trace", John Wolff, Washington State University, Pullman
- June 3, "Insights into the formation of basaltic magmas from the study of silicate melt inclusions", Adam Kent, Oregon State University, Corvallis

Oregon State University Department of Geosciences 2009 Spring Seminar Series, Thursdays, 4:00 pm, 108 Wilkinson Hall, unless otherwise noted.

http://www.geo.oregonstate.edu/events/SeminarSeries/Seminar_Current.htm

- April 30, Rick Conrey, Earth and Environmental Sciences, Washington State University, "Propagating rift in the Cascade Range"
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- May 21, Scott Patterson, Earth Sciences, University of Southern California, "Unraveling the growth and evolution of magma chambers: the Tuolumne Batholith experiment"
- May 28, John Pallister, U.S. Geological Survey, Vancouver, TBA
- June 4, Adam Kent, Dept. of Geosciences, Oregon State University, "High resolution crystal records from Mount Hood and Mount St. Helens: The devil's in the details"

University of Oregon Department of Geological Sciences, Spring 2009 Weekly Seminar Series t 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.. Refer to department website for more information:

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

- May 6 - Mark Ghiorso (University of Washington), "Triggering Explosive Volcanic Eruptions"
- May 13 - Unscheduled
- May 20 - Mike Oskin, topic TBA
- May 27 - Hubert Studigel (Scripps Institution of Oceanography), topic TBA

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, May 7, 2009, Steve Ingebritsen, USGS Menlo Park, "Hydrogeochemical monitoring in the Cascades"
- Thursday, May 14, 2009, Nick Beeler, USGS/EHZ (could be moved or cancelled), "Constraints on earthquake nucleation from laboratory faulting experiments and small earthquakes"
- Thursday, May 21, 2009, Geoff Plumley, USGS Denver, topic to be determined (something regarding ash leachates)
- Thursday, May 28, 2009, Juliet Crider, Western Washington University, "Deformation and Gravity at Mount Baker"

The Effects of the Ice Age Floods on the Portland Region

Synopsis of the April 10, 2009, lecture by geologic enthusiast Rick Thompson with assistance from spouse Sylvia Thompson
 by Carol S. Hasenberg

Kudos for arranging this talk should go to GSOC Vice President Larry Purchase, who timed it well with the **congressional approval for the Ice Age Floods National Geologic Trail**, a project which has been at least ten years in the making, with participation by several GSOC members. Speaker

Rick Thompson has also been active in the Ice Age Floods Institute, and has studied the effects of the floods on the Portland region for a number of years. He is also writing a book about his research which will be released soon.

The Ice Age Floods are referred to in the literature by a number of **different names**. They are often called the Bretz Floods in reference to J. Harlan Bretz, who first proposed and defended the idea of a catastrophic flood creating the scablands of Washington in 1923. They are also frequently referred to as the Missoula floods, because the Ice Age lake responsible for the floods is called Lake Missoula after its location near Missoula, Montana. The name adopted by the National Park Service is Ice Age Floods, so this terminology for now seems to be the more official one.

The Ice Age Floods occurred around 13,000 to 15,000 years ago. There were **many repetitions** of the flood event, although it is believed that the first flood was the biggest and most destructive, since it carried the most debris with it. GSOC has done several field trips looking at Ice Age Floods features in the last ten years, including trips to the Columbia Gorge, Wenatchee, Washington, Camassia Nature Preserve, Erratic Rock State Park, etc. The Ice Age Floods Institute (www.iafi.org) is having a field trip this month (May 2) which was announced at the meeting. Refer to their website for other upcoming events.

Thompson began his talk by describing the **overall path of the Ice Age Floods** and the geological/geographic setting. The floods happened because a lobe of the continental glacier which covered Canada during the last ice age blocked the Clark Fork River in Montana, creating a huge lake. The level of Glacial Lake Missoula rose until the lake's surface approached that of the glacier, about 2000 feet deep. Then the ice dam was destabilized by its tendency to float, and broke free, and the huge lake behind it spewed out across the plains of eastern Washington.

The water roared out of its outlet with a violence that is too grand to imagine, creating enormous flood features that can only be appreciated for what

they are from an airplane or from space. The path that it followed was across the plains of eastern Washington to the Grand Coulee, and south through a 1500 foot elevation drop to Wallula Gap, a constriction in the Columbia River pathway that the water took two weeks to escape. Then the water went westward down the Columbia River pathway to the ocean. During this process the water was constricted at the Wallula Gap northeast of Hermiston, Oregon; the Columbia River Gorge; and the Kalama Gap northwest of Portland. Each time it was constricted the water backed up into an enormous but very temporary lake. It backed up 100 miles eastward into the Snake River valley, and down the Willamette Valley to Eugene, Oregon. The water sculpted the Columbia River Gorge and elsewhere with its palette of 540 cu. mi. of water, 20-40 cu. mi. of ice from the glacier, and 50 cu. mi. of debris.

The **action of the flood on the Portland landscape** was profound. Effects from the floods included water-carved channels and cliffs, huge boulders dropped by flood water and icebergs in the flood, huge gravel bars located far above the level of today's rivers, and scablands where soil was stripped from higher areas and heavy deposits of sediment. Water poured out of the Columbia River Gorge and fanned out in the Portland valley. Rocky features at the mouth of the gorge such as Cape Horn were exposed by water rushing past at 60 miles per hour and five hundred feet deep.

Channels were carved between the harder rock features, such as Rocky Butte and Mt. Tabor, due to water rushing into the Portland valley. Subsequently the water backed up at Kalama and the rising waters found gaps to flow further south into the Willamette Valley. Additional channels were carved where Lake Oswego now sits, the current Tualatin River channel, the Carver gap, and Oregon City. Thompson showed the audience many diagrams of the carved channels with their steep sides. The Tonquin channel near Sherwood was carved particularly deeply by an underwater tornado-like feature called a kolk. As the floodwaters cleared the Kalama Gap, the floodwater lake in the Willamette valley traveled back through the Portland area and on to the Pacific Ocean.

Channels were carved from the passage of these waters in a different orientation from the first group. The steep base of the Tualatin Mountains in downtown Portland is one of these features.

As the waters slowed and then receded in the Willamette and Portland valleys, they left behind enormous quantities of **sediment and debris**. The rich topsoil in the Willamette valley was deposited there by the floods after being stripped from flooded regions of eastern Washington. Many icebergs were stranded in the valleys and when they melted, they left behind the rocky debris they had carried from their Canadian origins. Unusual granite boulders and even meteorites scattered throughout the region are legacies of the floods. The Willamette meteorite is one such "glacial erratic". Gravel bars such as the Alameda Ridge in Portland are also flood deposits. The floods were so deep and devastating in the Portland region that there are few areas that were not entirely reworked during these events.

References and Additional Reading:

Ice Age Floods Institute website includes information about the Ice Age Floods National Geologic Trail:

<http://www.iafi.org/>

David Alt, Glacial Lake Missoula and Its Humongous Floods, Mountain Press Publishing Company, Missoula, Montana, 2001.

BOARD MEETING NOTES

April 10, 2009

GSOC members present included Carol Hasenberg, Larry Purchase, Beverly Vogt, Richard Bartels, Jan Kem, Dave Olcott, Clay Kelleher, and Rosemary Kenney.

The board reviewed field trip policies for the upcoming trips. Field trips are limited to GSOC members only, and liability waivers will be required. Our policy for minor attendees was also reviewed. Because the upcoming June trip has a limited attendee requirement, it was felt that having

a registration form and deadline was necessary. Other preparations for the field trips were discussed.

A possible third field trip for late August was discussed and is being researched.

Tara Schoffstall announced that there will be no Wednesday night seminars until summer, and then she will probably schedule for them earlier in the day, and possibly on Fridays instead of Wednesdays.

The Board members discussed putting the Newsletter on the website, and concerns were raised that doing that might keep people from joining. It was pointed out that younger people get their information from the internet, and posting the newsletter there may get more of them interested in GSOC. The matter will be resolved at the next meeting. Comments from the general membership are welcome about this issue.

Publicity was discussed. Tara is working on a GSOC bulletin board website www.gsoc2.proboards.com that members can use and will help her be able to contact media outlets around the state. She will explain more about it at a later meeting when we have enough time. Jan prints out the calendar and posters for Rosemary and sends out copies of the calendar to the Oregonian. Rosemary puts the calendar and posters at PSU and DOGAMI, and Larry posts info at BPA.

The next Gem and Mineral show is scheduled for Sept. 18-20 at Hillsboro Fair Grounds, and GSOC will have a table there.

Next Board meeting is 10 a.m., June 6, 2009, at Bev and Bart's house (4841 SW 60th Place). NOTE CHANGE OF LOCATION.

Beverly Vogt, Secretary

VOLCANIC NEWS FROM ALASKA

Redoubt Volcano news from USGS Alaska Volcano Observatory:

<http://www.avo.alaska.edu/activity/Redoubt.php>

The latest bulletin from the website reads:

“Redoubt Volcano Latest Observations
2009-04-17 09:52:40

“The 2009 eruption of Redoubt continues. Seismicity remains elevated and satellite images continue to see a thermal signal from the lava dome. Clouds currently obscure the web cameras. Based on yesterday's clear views, a plume of water vapor, volcanic gas, and possibly very minor ash is likely rising above the volcano.

“AVO will have two field crews working in the vicinity of the volcano today.

The volcano remains at aviation color code ORANGE and alert level WATCH. Renewed explosive activity could resume with little warning, likely generating an ash plume and a lahar.”

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

Waste, Wind and Water Field Trip – June 19-20, 2009

GSOC Director Dave Olcott and Vice President Larry Purchase, trip co-leaders

Trip Participation Policies: If you plan on participating in this trip, please contact Dave Olcott by phone at (503) 695-5219, or email at daveolcott46@yahoo.com, to determine whether the trip roster is still open **AND** send in your registration form by June 12th. The trip is limited to 20 participants, and the participation list will only consider those registrants who have paid for the trip. **There will be no refunds after June 12th. All participants must be GSOC members or their guests.** Minor participants under 18 years of age are required to have permission in writing from a parent or legal guardian; and **minors must be accompanied by a responsible adult GSOC member** designated by their parent or legal guardian. Letter of permission must be attached to this registration form. Participants must fill out and sign a liability/medical waiver at the meeting point before proceeding on the trip. Minor participants will need the signature of a parent or legal guardian to participate.

Fee: \$25, includes trip reading packet, guest speakers and entry into the site tours. All meals, lodging and transportation arrangements and costs will be the responsibility of the participants.

Itinerary: GSOC board members Dave Olcott and Larry Purchase will be leading a 1 1/2 day field trip examining three operations in northern Gilliam, Sherman and Wasco Counties. We will visit Columbia Ridge Landfill, Klondike and Biglow Canyon Wind Farms, and ground-water supporting cherry production south of The Dalles, noting geologic connections to and constraints of each operation. Friday morning we will travel up Phillipi Canyon, viewing the Phillipi cataract and Bretz flood deposits in the John Day River Canyon. Since this field trip will travel through prime dryland wheat and sweet cherry producing areas, we will incorporate some educational stops focusing on these crops (maybe a few samples of the latter). The car caravan will **depart from Lewis and Clark State Park** (off of I – 84 on the east side of the Sandy River) at 7:00 am(sharp!!!) on June 19th and spend the night in The Dalles. We will start Saturday's trip at 8:45 am, meeting at Safeway beneath the Starbucks sign(520 Mt. Hood St., The Dalles). Richard Bartels will lead a time of geologic reflection and contemplation at The Mint urban winery on Friday evening.

Needs and Things to Do if you plan to go:

- Call/email Dave Olcott **AND** send in registration form and payment
- Bring appropriate clothing and footwear – may be hot, cold, wet, muddy and/or windy
- Bring water, sunscreen, sunglasses, and hat, and sack lunch/snacks for Friday and Saturday
- Make carpool arrangements, meal arrangements and lodging arrangements (lodging for Friday night June 19)
- Join GSOC if you are not a member and want to participate (paper work will be available Friday morning)

REGISTRATION FORM FOR WASTE, WIND AND WATER FIELD TRIP 2009 June 19-20, 2009

NOTE: Fill out one registration form for each participant.

Participant name _____ minor? _____

If participant is not a GSOC member, name GSOC sponsor _____

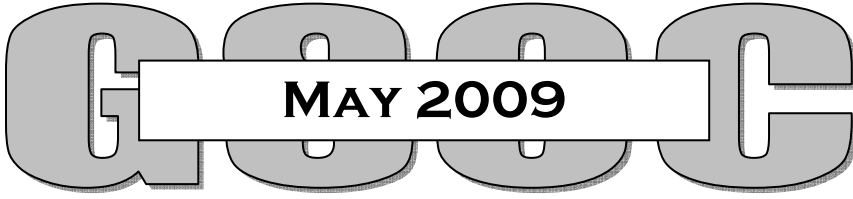
If participant is a minor, name designated GSOC accompanier _____

Address of participant _____

City _____ State _____ Zip _____ - _____

Phone (____) _____ - _____ Email address _____

Fee: \$25, includes trip reading packet, guest speakers and entry into the site tours. All meals, lodging and transportation arrangements and costs will be the responsibility of the participants. Send this form and payment to:
GSOC, PO Box 907, Portland, OR 97207-0907, by **June 12, 2009**.



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GSOC MINI-CALENDAR

MAY ACTIVITIES

Friday evening talk, May 8, 2009, at 8 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University: Dr. William Orr, Professor Emeritus and Curator of the Condon Collection of fossils at University of Oregon, will present "New Tools, Taxa, Techniques".

No Wednesday evening seminar is planned for April.

FUTURE ACTIVITIES

Friday evening talk, June 12, 2009, at 8 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University: Dick Pugh, the Cascade Meteorite Laboratory, PSU will discuss his work with meteorites.

GSOC Field Trip, June 19-20, 2009: "Waste, Wind and Water; Tapping Resources East of the Cascades."

GSOC President's Field Trip, August 1-3, 2009, plus optional August 4: "Geology and Hydrology of the Oregon High Cascades and Deschutes Basin."

FOR DETAILS, SEE INSIDE

Registration for Waste, Wind and Water Field Trip Inside



THE GEOLOGICAL NEWSLETTER

"NEWS OF THE GEOLOGICAL SOCIETY OF THE OREGON COUNTRY"

VOLUME 75, NUMBER 6
JUNE 2009

The Geological Society of the Oregon Country

P.O. Box 907, Portland, OR 97207

www.gsoc.org

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Dave Olcott (2 years) – 503/695-5219

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Rosemary Kenney – 503/892-6514

VISITORS WELCOME AT ALL MEETING

CALENDAR

JUNE ACTIVITIES

Friday evening talk, June 12, 2009, at 8 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University: Dick Pugh, the Cascade Meteorite Laboratory, PSU will discuss his work with meteorites.

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 6th Aves. and Harrison and Hall Sts.

No Wednesday evening seminar is planned for June.

FUTURE ACTIVITIES

The next Friday night meeting of the society will be announced in the July newsletter. Check the GSOC website (www.gsoc.org) for updates to the calendar.

GSOC Field Trip, June 19-20, 2009: "Waste, Wind and Water; Tapping Resources East of the Cascades." Information and registration form for this trip was in the May 2009 *Geological Newsletter*. Your registration form is due June 12, 2009. See the GSOC website (www.gsoc.org) for updated information.

GSOC President's Field Trip, August 1-4, 2009: "Geology and Hydrology of the Oregon High Cascades and Deschutes Basin." More information and registration form are on page 41 of this newsletter. Expanded itinerary:

Saturday, August 1: We will study stratigraphy and land forms from Mt. Hood to the Bend area with guest leader Richard Conrey, PhD, of Washington State University, Pullman, Washington, following the field trip guide "SOTA Field Trip Guide: State of the Cascade

Arc: stratocone persistence, mafic lava shields, and pyroclastic volcanism associated with intra-arc rift propagation,” by Richard Conrey, Department of Geology, Washington State University, Anita Grunder, Department of Geosciences, Oregon State University, and Mariek Schmidt, Department of Geosciences, Oregon State University. Published as DOGAMI Open File Report O-04-04.

Sunday, August 2: We will view hydrological characteristics of the Deschutes River Basin with guest leader Ken Lite, Jr., RG, of Oregon Department of Water Resources, following the field trip guide “Hydrogeology of the Upper Deschutes Basin, Central Oregon: A Young Basin Adjacent to the Cascade Volcanic Arc,” by David R. Sherrod, U.S. Geological Survey, Marshall W. Gannett, U.S. Geological Survey, and Kenneth E. Lite, Jr., Oregon Water Resources Department. Published in Moore, G.E., ed., “Field guide to geologic processes in Cascadia,” Oregon Department of Geology and Mineral Industries Special Paper 36, p. 109-144. Some moderate hiking will be done in the Crooked River Canyon.

Monday, August 3: Morning talk will be with guest speaker Todd Cleveland, Deschutes County Planning, presenting “Deschutes Groundwater Pollution: Problems and Solution”. Monday afternoon, GSOC field trip leaders Bev Vogt and Richard Bartels will take us to see Crooked River Caldera, the newly recognized 29.5 million-year-old caldera that was the source of some of the ash of the John Day Formation. Because this caldera is one of the largest known in Oregon, to see it we will cover some spectacular scenery, with stops at Peter Ogden Wayside, Smith Rock State Park (be prepared to pay a \$3 day use fee for your car), Ochoco Wayside, and either Ochoco or Prineville Reservoir.

Tuesday, August 4: We will explore Newberry Volcano, the huge-25-mile wide and 40-mile-long shield volcano near Bend with GSOC field trip leaders Bev Vogt and Richard Bartels. During its almost half a million years lifetime, it had several caldera collapses and erupted basalt, basaltic andesite, dacite, and rhyolite, in the form of flows, tuffs, and ash, including the famous Big Obsidian Flow that we will examine, along with Paulina Peak, East Lake, Paulina Lake, the Central Cone, the Pumice Desert—and many other strange and wonderful things and places that are a part of Newberry Volcanic Monument.

Special Note: Participants wishing to lodge indoors will need to make their own arrangements for the La Pine area. We suggest the following motel:

Best Western Newberry Station, 16515 Reed Rd and US Route 97, La Pine, Oregon. The motel is 14

minutes and 6.3 miles away south west of Ogden campground. The cost for a room is \$74.95 for two queen beds. Call (541) 536-5130 to reserve a room or reserve online at:

<http://www.bestwesternoregon.com/hotels/best-western-newberry-station/>.

Seven rooms have been set-aside for August 1 to August 4 under the GSOC name. Make your reservations soon, because any remaining GSOC rooms will be released to the public on July 1. Many other weekends are already booked at the motel.

UPCOMING ACTIVITIES FROM OTHER ORGANIZATIONS

Portland State University Geology Department Spring 2009 Seminar Series, Cramer Hall S17, 3:30-4:30 p.m.. Contact Martin Streck, 503/725-3379, streckm@pdx.edu, for further information, or refer to the department website:

<http://geology.pdx.edu/node/3>

- May 27, “A new look at the volcanic products of the Yellowstone hotspot trace”, John Wolff, Washington State University, Pullman
- June 3, "Insights into the formation of basaltic magmas from the study of silicate melt inclusions", Adam Kent, Oregon State University, Corvallis

Oregon State University Department of Geosciences 2009 Spring Seminar Series, Thursdays, 4:00 pm, 108 Wilkinson Hall, unless otherwise noted.

http://www.geo.oregonstate.edu/events/SeminarSeries/Seminar_Current.htm

- May 28, John Pallister, U.S. Geological Survey, Vancouver, TBA
- June 4, Adam Kent, Dept. of Geosciences, Oregon State University, “High resolution crystal records from Mount Hood and Mount St. Helens: The devil’s in the details”

University of Oregon Department of Geological Sciences, Spring 2009 Weekly Seminar Series t 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.. Refer to department website for more information:

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

- May 27 - Hubert Studigel (Scripps Institution of Oceanography), topic TBA

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, May 28, 2009, 11:30, Juliet Crider, Western Washington University, "Deformation and gravity at Mount Baker"

A NEW PERSPECTIVE ON OREGON FOSSILS

Synopsis of the May 9, 2009, lecture by Dr. William Orr, emeritus professor of the University of Oregon and curator of the Thomas Condon Fossil Collection

by Carol S. Hasenberg

Dr. Orr led the GSOC audience into his talk obliquely from a discussion which started by a remark that he was wearing his "gangster outfit" as described by his grandchildren. Which reminded him of the time that they asked him if he had voted for Abraham Lincoln for President. Which reminded him that Abraham Lincoln and Charles Darwin were born on the same day. And so, the topic of evolution having been arrived at, the discussion continued to the point in which Orr quoted that "life will find a way" from the film *Jurassic Park*.

And so his lecture began, the lion's share devoted to new material for the next edition of *Oregon Fossils*, which he has co-written with his wife Elizabeth L. Orr since 1999. Included in the upcoming edition will be several important pre-Tertiary fossil finds that have been made in Oregon in the last few years. They include the Jurassic crocodylian found by the

North American Research Group (NARG). A plesiosaur was also found in Eastern Oregon, where there are a number of rock outcrops of the age of the dinosaurs. Except for a minor hadrosaur find on the Oregon coast, no dinosaur fossils have been found in Oregon. This is mainly because there has not been a concerted effort to find them, asserted Orr.

Also of pre-Tertiary age, Oregon contains the fossils of some small trilobites from the Permian, shortly before they all perished from the world. Orr stated that the massive Permian extinction, which destroyed 95% of terrestrial species at that time, was probably not caused by a meteor. A huge volcanic eruption occurred at this time, which created the Siberian Traps, that may have been involved.

One important aspect of the upcoming edition, much requested by *Oregon Fossils* readers, was illustrations which portray fossil animals in the flesh. Several such illustrations have been done, and this will help readers visualize what the ancient ecosystems were like.

Fish fossils have been extensively researched and will appear in the upcoming edition. Species differentiation is important in determining the environment in which they lived, so paleontologists have categorized fish scales and calcitic otoliths (fish ear bones) to determine fish species.

In recent years, paleontologists have been very involved in determining, not only the existence of discrete fossil species, but ecosystems of the past. This, in turn, tells information about past climatic conditions, the changing conditions of biodiversity, and other important aspects of the evolution of life on earth. Past climatic conditions in Oregon have been researched in a number of ways. An example described by Orr in his lecture was how certain marine fossil indicator species are used to determine where Oregon shorelines were in the Eocene, Oligocene, and Miocene epochs. Species selected, including gastropods and crinoids, show locations of shallow water, deep still water, and offshore knolls.

Another indicator species group that is prominently used today is nannofossils (refer to the definitions given on page 39 of this newsletter). These one celled forms have the advantage of being ubiquitous and characteristic for a particular time. However, since an electron microscope is needed to examine them, their use is somewhat limited. For that reason, some larger calcareous remnants, such as those of ostracods (seed shrimp) or sea cucumbers, are used.

Using these and other advanced dating methods, the dates for Oregon Cenozoic formations have been revised since the first edition of Oregon Fossils. The Oregon Cenozoic stratigraphy chart (p.127 of the first edition) will be updated in the upcoming edition.

Another idea that will be emphasized in the upcoming edition will be the link between Oregon's highly volcanic past and the existence of the fossils themselves. Without these catastrophic events, the fossil record in Oregon would be much more sparse.

Oregon is a famous location for mammalian "missing links" as discovered in the John Day fossil beds. Important fossils of horse and camel evolution have been found in Oregon, and other mammal species. The upcoming edition of Oregon Fossils will contain a new time/location chart of horse species, showing species locations in North America, South America, Europe, and the transition from browsing to grazing species.

Other large mammals from the Cenozoic will be discussed in the upcoming edition along with their paleoenvironments. Super-predators, such as the Pleistocene short-faced bear *Arctodus*, the *Smilodon*, which is a kind of huge bobcat, and the Clarno *Hemiposalodon*, will appear, as well as the jokingly named *Paleoparadoxia*, a marine mammal which somewhat resembles a manatee. More information on transitional forms of whales will also be addressed.

The final moments of Orr's lecture concerned the future of Oregon paleontology. Areas of research will include dinosaur fossils in the state, finding and analyzing Oregon amber, and DNA research of

fossils. Insects, spiders, and mites are ubiquitous and will be researched for their evolution and use as indicator species. Pleistocene lakes in the basin and range province will continue to yield a lot of information about those times. Miocene lakes, produced by the blockage of large northwest rivers by lava flows will also be valuable. There needs to be more research done to determine how many of the Pleistocene mammals became extinct in North America. More work needs to be done on the Shotwell Miocene fossils from the Thomas Condon Collection of Fossils, and the John Day National Monument. Some of this work may be done by the two new paleontologists at the University of Oregon – Assistant Professor Samantha Hopkins and Instructor Edward Davis. They will be adding to the rich history of fossil research in which Dr. Orr has been a key contributor.

References and Additional Reading:

Elizabeth L. Orr and William N. Orr, Oregon Fossils, Kendall/Hunt Publishing Company, Dubuque, Iowa, 1999

Nannotax: Enabling nannofossil research, supported by International Nannoplankton Association, Gulf Coast Section of SEPM, The Micropalaeontological Society, has many photos of these indicator species:
<http://nannotax.org/>

John Day Fossil Beds National Monument Clarno Assemblage website describes activities of Hemiposalodon and other Clarno critters:
<http://www.nps.gov/joda/naturescience/clarno-assemblage.htm>

Wikipedia - *Arctodus simus*, the giant short-faced bear:
http://en.wikipedia.org/wiki/Short-faced_bear

Wikipedia – *Paleoparadoxia*:
<http://en.wikipedia.org/wiki/Paleoparadoxia>

WHAT'S A NANNOFOSSIL?

*Editor's note: I noticed in Dr. Orr's lecture that the spelling was **nannofossil**, and according to the Glossary of Geology this is the official spelling for the word, and also nannoplankton and nannobacteria. I am not the only person, however, that is inclined to misspell the prefix similar to nanometer or nanosecond, derived from the Greek nanos meaning "dwarf"). See the Wikipedia definitions below for an example.*

From the Glossary of Geology, 5th edition, by Neuendorf, Mehl, and Jackson, American Geological Institute, 2005:

“**Nannofossil** – a) A collective term for fossil **discoasters** and **coccoliths**, both primarily calcareous microfossils, mostly rather near the limit of resolution of the light microscope and hence best studied with electron microscopy. b) A term sometimes used in a more general sense for other extremely small marine (usually algal) fossils, smaller than **microfossils**.

“**Microfossil** – A fossil too small to be studied without the aid of a microscope, e.g. an invertebrate such as a *foraminifer* or an *ostracode*. It may be the remains of a microscopic organism or a part of a larger organism.”

From Wikipedia
<http://en.wikipedia.org/wiki/Nanofossil>, with links to <http://en.wikipedia.org/wiki/Coccolithophore> and <http://en.wikipedia.org/wiki/Foraminifera>.

“**Coccolithophores** (also called coccolithophorids) are single-celled algae, protists and phytoplankton belonging to the division haptophytes. They are distinguished by special calcium carbonate plates (or scales) of uncertain function called coccoliths

(calcareous nanoplankton), which are important microfossils. Coccolithophores are almost exclusively marine and are found in large numbers throughout the surface euphotic zone of the ocean. An example of a globally-significant coccolithophore is *Emiliana huxleyi*.”

“The **Foraminifera**, ("Hole Bearers") or forams for short, are a large group of amoeboid protists with reticulating pseudopods, fine strands of cytoplasm that branch and merge to form a dynamic net. They typically produce a test, or shell, which can have either one or multiple chambers, some becoming quite elaborate in structure. These shells are made of calcium carbonate (CaCO₃) or agglutinated sediment particles.”

And from Wikipedia
<http://en.wikipedia.org/wiki/Discoaster>:

“**Discoaster** is a genus of fossil alga comprising 166 species.”

IN MEMORIAM – EWART BALDWIN

Dr. Ewart Baldwin, born in 1915 and a member of GSOC since 1944, died May 2, 2009. This prolific and much-loved professor emeritus taught geology at the University of Oregon and also did extensive geological mapping of southwestern Oregon for the United States Geological Survey. He was the original author of the Geology of Oregon (1959). He received the Outstanding Scientist of the Year award from the Oregon Academy of Sciences in 2005.

A memorial site has been posted about Dr. Baldwin on the University of Oregon website at:
<http://www.uoregon.edu/~dogsci/news/archive/ewart?s=ewart%20baldwin>

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

President's Field Trip – August 1-4, 2009

GSOC President Carol Hasenberg, trip leader

Trip Participation Policies: If you plan on participating in this trip, please send in your registration form by July 17th. **All participants must be GSOC members or their guests.** Minor participants under 18 years of age are required to have permission in writing from a parent or legal guardian; and **minors must be accompanied by a responsible adult GSOC member** designated by their parent or legal guardian. Letter of permission must be attached to this registration form. Participants must fill out and sign a liability/medical waiver at the meeting point before proceeding on the trip. Minor participants will need the signature of a parent or legal guardian to participate.

Fee: \$65, includes trip reading packet, guest speakers, campground. Fee for adult member accompanied by a minor is \$100 total. Meal arrangements and costs will be the responsibility of the participants. Transportation will be by car caravan/car pool with participants making their own arrangements. Indoor lodging will be the responsibility of the participants if they choose this option. State and National Park entry fees are also the responsibility of the participants

Itinerary: Join GSOC President Carol Hasenberg, with guest field trip leaders Richard Conrey, PhD, of Washington State University, Pullman, Ken Lite, Jr., RG, of Oregon Department of Water Resources. We will also have a guest speaker, Todd Cleveland, of Deschutes County Planning Department. On our trip we will examine the geology of the High Cascades and Deschutes Basin from Mt. Hood to Bend and the groundwater system of the Upper Deschutes Basin in the La Pine area, the Crooked River Canyon, and the Crooked River Caldera. Some moderate hiking will be done in the Crooked River Canyon. A day trip on August 4 will be led by GSOC's own Richard Bartels and Beverly Vogt in the Newberry National Volcanic Monument.

The trip will begin on the morning of August 1 near Timberline Lodge on Mt. Hood. Details will be given in the July *Geological Newsletter*. Ogden Group Campsite in Deschutes National Forest has been reserved for the nights of August 1-4 (4 nights). Participants wishing to lodge indoors will need to make their own arrangements for the La Pine area.

Needs and Things to Do if you plan to go:

- Send in registration form and payment
- Bring appropriate clothing and footwear – may be hot, cold, wet, muddy and/or windy
- Bring camping gear unless you have arranged indoor lodging
- Bring water, sunscreen, sunglasses, hat, and mosquito repellent
- Make carpool arrangements, meal arrangements and lodging arrangements (unless you plan to camp with us)
- Join GSOC if you are not a member and want to participate (paper work will be available first morning of the trip)

REGISTRATION FORM FOR GSOC PRESIDENT'S FIELD TRIP 2009

August 1-4, 2009

NOTE: Fill out one registration form for each participant.

Participant name _____ minor? _____

If participant is not a GSOC member, name GSOC sponsor _____

If participant is a minor, name designated GSOC accompanier _____

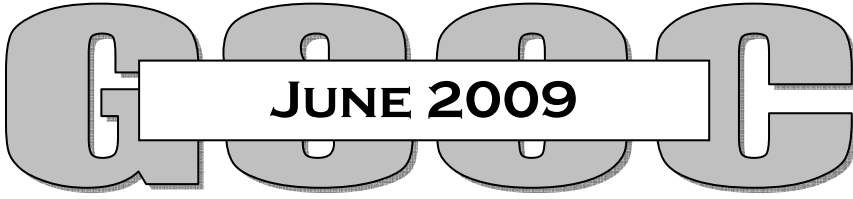
Address of participant _____

City _____ State _____ Zip _____ - _____

Phone (____) _____ - _____ Email address _____

Fee: \$65, includes trip reading packet, guest speakers, campground. Fee for adult member accompanied by a minor is \$100 total. Meal arrangements and costs will be the responsibility of the participants. Transportation will be by car caravan/car pool with participants making their own arrangements. Indoor lodging will be the responsibility of the participants, if they choose this option. State and National Park entry fees are also the responsibility of the participants. Send this form and payment to:

GSOC, PO Box 907, Portland, OR 97207-0907, by **July 17, 2009**.



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GSOC MINI-CALENDAR

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GSOC President's Field Trip, August 1-4, 2009: "Geology and Hydrology of the Oregon High Cascades and Deschutes Basin."

FOR DETAILS, SEE INSIDE

***Registration for 2009 GSOC
President's Field Trip Inside***



THE GEOLOGICAL NEWSLETTER

"NEWS OF THE GEOLOGICAL SOCIETY OF THE OREGON COUNTRY"

VOLUME 75, NUMBER 7
JULY 2009

The Geological Society of the Oregon Country

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Assistant Business Manager:

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VISITORS WELCOME AT ALL MEETINGS

CALENDAR

JULY ACTIVITIES

No Friday night meeting is planned for July. Next meeting is tentatively set for September.

No Wednesday evening seminar is planned for July.

GSOC Field Trip , Saturday, July 11, 2009:

“Geology of Silver Falls.” Join GSOC Past President Clay Kelleher for a field trip to Silver Falls State Park, southwest of the town of Silverton and east of Salem. Registration will be at Silver Falls State Park. Cost of the trip is \$10 per adult member or their guest. Cost is \$10 for an adult member accompanied by a minor. In addition to the GSOC field trip fee, there is a \$3 parking fee for the state park, good all day.

Meet at the South Falls Parking area at 8:30 a.m. Go to the “South Falls, Day Use Area”, and meet at the Lodge. Do NOT go to “Park Office”. This trip

will involve a fair amount of easy to moderate hiking. We will hike the “Trail of Ten Falls”, stopping for lunch along the trail, and concluding at about 3:00 pm. There are no rest rooms along the trail.

Wear appropriate footwear and bring insect repellent and sunscreen. Bring camera, handlens (if you have one), binoculars and your sack lunch. Directions from Portland are to head south on I-5, east on Oregon 22 at Salem for about 5 miles, then east on Oregon 214 about 10 miles to the park. Driving time from Portland (I-205 & Stark Street) is about 1:30.

To participate you must be a member of GSOC or a guest of a member. Minors under 18 must be accompanied by an adult GSOC member designated by their parents or guardians. Registration will include signing a liability waiver for all participants. You may register as a GSOC member at the park.

A 5 ½ page article Geology of Silver Falls State Park was published in the March 1998 Geological

Newsletter. Copies will be included with the field trip guide at the site.

A meeting place map will be posted on the GSOC website. Check the GSOC website (www.gsoc.org) for updates to this information.

FUTURE ACTIVITIES

The next Friday night meeting of the society will be announced in the July newsletter. Check the GSOC website (www.gsoc.org) for updates to the calendar.

GSOC President's Field Trip, August 1-4, 2009: "Geology and Hydrology of the Oregon High Cascades and Deschutes Basin." Information and registration form for this trip was in the June 2009 *Geological Newsletter*. Your registration form is due July 17, 2009. See the GSOC website (www.gsoc.org) for updated information.

Needs and Things to Do if you plan to go:

- Send in **registration form and payment**. The form can be found online in the June 2009 edition of *The Geological Newsletter*. (<http://www.gsoc.org/Archives.html>)
- Bring appropriate clothing and footwear – may be hot, cold, wet, muddy and/or windy
- Bring camping gear unless you have arranged indoor lodging. We've reserved the Ogden Group Campground in Deschutes National Forest for the nights of August 1, 2, 3 and 4.
- Bring water, sunscreen, sunglasses, hat, and mosquito repellent.
- Make carpool arrangements, meal arrangements and lodging arrangements (unless you plan to camp with us). If you are riding with someone, be sure to arrange to pay your share of gas, entrance fees, etc. Carpool arrangements can be facilitated by contacting Carol Hasenberg at cs727@comcast.net or 503/522-4249 and letting her know if you have room for riders or would like a ride.
- **Join GSOC** if you are not a member and want to participate (paper work will be available first morning of the trip)
- If you are driving, it is highly recommended that you purchase either a **U.S. Forest Service Annual Northwest Forest Pass** (\$30) or a

National Park Senior Pass (\$10 lifetime fee for persons 62+ years in age – formerly called Golden Age Passport). These are good for entrance into Newberry National Volcanic Monument and several of the other sites where we will be parking. Otherwise, bring lots of \$5 bills, since you will need them for the daily entrance/parking fees. See <http://www.fs.fed.us/r6/passespermits/nwfp.shtm> for more information.

- We may (or may not) be able to have campfires at Ogden Group Campground during our stay. We will call ahead the previous week to verify this, and post on the GSOC website a few days prior to leaving.

Expanded itinerary:

Saturday, August 1: Meet at the Government Camp rest area along U.S. 26 (see <http://www.tripcheck.com/Pages/RAentry.asp>) between 7:30 and 8:00 a.m. for check-in. You will need to report to President Carol Hasenberg for check-in and to fill out a liability waiver form to continue on the trip. You will be given a trip packet when you turn in your liability form. We will be leaving the rest area promptly at 8:30. We will study stratigraphy and land forms from Mt. Hood to the Bend area with guest leader Richard Conrey, PhD, of Washington State University, Pullman, Washington, following the field trip guide "SOTA Field Trip Guide: State of the Cascade Arc: stratocone persistence, mafic lava shields, and pyroclastic volcanism associated with intra-arc rift propagation," by Richard Conrey, Department of Geology, Washington State University, Anita Grunder, Department of Geosciences, Oregon State University, and Mariek Schmidt, Department of Geosciences, Oregon State University. Published as DOGAMI Open File Report O-04-04. We will be eating a picnic lunch somewhere en route (tentatively at Cline Falls west of Redmond), so pack your lunch food.

Sunday, August 2: Assemble at the Ogden Group Campground at 8:30. We will need to consolidate carpooling today. We will view hydrological characteristics of the Deschutes River Basin with guest leader Ken Lite,

Jr., Registered Geologist, of Oregon Department of Water Resources, following some of the stops on the field trip guide "Hydrogeology of the Upper Deschutes Basin, Central Oregon: A Young Basin Adjacent to the Cascade Volcanic Arc," by David R. Sherrod, U.S. Geological Survey, Marshall W. Gannett, U.S. Geological Survey, and Kenneth E. Lite, Jr., Oregon Water Resources Department. Published in Moore, G.E., ed., "Field guide to geologic processes in Cascadia," Oregon Department of Geology and Mineral Industries Special Paper 36, p. 109-144. Some moderate hiking will be done in the Crooked River Canyon. We will be eating a picnic lunch at Peter Skene Ogden Wayside (the Crooked River Gorge bridges) so pack your lunch food.

Monday, August 3: We will meet at 8:30 a.m. at the DeArmond room of the Deschutes County/State building at 1300 Wall St, Bend, Oregon.

Morning talk will be with guest speaker Todd Cleveland, Deschutes County Planning, presenting "Deschutes Groundwater Pollution: Problems and Solution". After the talk, we will drive north to Culver, Oregon, where we will meet at the EarthH₂O bottling facility at 7th and C Streets. Our tour will be from 11:30 a.m. to 1:00 p.m.

After the tour, we will proceed to Smith Rock State Park (be prepared to pay the \$3 entrance fee) and there we plan to eat a picnic lunch. After lunch, GSOC field trip leaders Bev Vogt and Richard Bartels will begin a tour at Smith Rock of the newly recognized 29.5 million-year-old Crooked River Caldera that was the source of some of the ash of the John Day Formation. Because this caldera is one of the largest known in Oregon, to see it we will cover some spectacular scenery. Time permitting, they will take us to Crooked River Caldera stops of Ochoco Wayside near Prineville, and either Ochoco or Prineville Reservoir.

Tuesday, August 4: We will meet at 8:30 a.m. at the Ogden Group Campground.

We will explore Newberry Volcano, the huge-25-mile wide and 40-mile-long shield volcano near Bend with GSOC field trip leaders Bev Vogt and Richard Bartels. During its almost half a million years lifetime, it has had several caldera collapses and has erupted basalt, basaltic andesite, dacite, and

rhyolite, in the form of flows, tuffs, and ash, including the famous Big Obsidian Flow that we will examine, along with Paulina Peak, East Lake, Paulina Lake, the Central Cone, the Pumice Desert—and many other strange and wonderful things and places that are a part of Newberry Volcanic Monument. Bring a sack lunch.

We've reserved the Ogden Group Campground for the night of the 4th so you can remain and camp after the close of the field trip.

GSOC Annual Picnic will be on August 30 in Mt. Tabor Park in Portland. Details will be forthcoming in the August newsletter and online.

The Cascadian Graben

Richard Conrey's April 30 Seminar at OSU Geology focused on this topic, which will also be discussed on Day 1 of the GSOC President's Field Trip:

There is a spreading rift zone running down the center of the Western Cascades from near the Three Sisters in Oregon to its apex near Mt. Adams in Washington. The rift propagation model integrates geochemistry, tectonics, and structural evidence for features of Cascade volcanism. The Yellowstone plume may have initiated and fueled the rift, which began 7-8 million years ago near the western terminus of the Brothers Fault Zone.

The effects of rifting, which include diverse magmas, blurred stratocone foci, and hotter crustal temperatures, are more prominent at the older, southern end. South Sister, for example, has a broader dome field, thus is less steep than Mt. Hood, which has a single dome. The lavas from the Sisters are more diverse than the lava from Mt. Hood and Mt. Adams, because the degree of mantle melting declines northward along the rift.

Subsidence is greater in the southern end, where it began about 5.5 million years ago, at about 3 km depth by borehole studies, whereas subsidence is about 1 km between Mt. Hood and Mt. Jefferson. In northern Oregon, the subsidence began about 4 million years ago. Along the rift are complex

graben structures, with tilting of fault blocks about 10° to the east.

Janet Rasmussen

METEORITES ON THE ROAD

Synopsis of the June 12, 2009, lecture by Dick Pugh, field scientist at Cascadia Meteorite Laboratory

by Evelyn Pratt with edits by Melinda Hutson

Portland State University is proud of having the only meteorite lab in the Pacific Northwest. The Cascadia Meteorite Laboratory was established in 2003 as part of the Department of Geology. In 2005 it became an official repository for type specimens of newly-classified meteorites. The laboratory is run by Melinda Hutson, Alec Ruzicka, and Dick Pugh. It now has slightly under 500 meteorites.

What is the difference between an asteroid, a meteoroid, a meteor, and a meteorite? If it is in space and you can see it with a telescope, it's called an asteroid; if it is in space and you cannot see it with a telescope, it's called a meteoroid. A meteoroid may be traveling at 25,000 mph when it hits the atmosphere 90 miles high. Once a meteoroid enters the Earth's atmosphere, its exterior becomes hot enough to glow and it is called a meteor or a fireball. By 50 miles above Earth, most meteors break up into pieces. A desk-size meteoroid entering the atmosphere has the power of 50 tons of TNT. If a piece of the meteor hits the ground and can be picked up, then it's called a meteorite.

Mr. Pugh showed many examples of meteorites. On February 19, 2008, Providence Hospital photos showed a fireball 250 miles away that traveled from the Canadian Border to La Grande. It landed somewhere in the Blue Mts. at 5:31 a.m.

In October 1992, the town of Peekskill, N.Y., was hit by 70 fragments of an incoming meteoroid, from basketball to marble size. One meteorite hit an old car that had been for sale for \$300, transforming it into a car worth \$10,000.

On Aug. 10, 1972, a daytime photo showed an object estimated at 9 to 50 feet in diameter that skipped in and out of the atmosphere, about 37 miles up. Fortunately that large of a meteoroid didn't land.

The meteor crater that we are most familiar with, Barringer Meteor Crater in Arizona, formed when a nickel-iron meteor hit 25,000 to 50,000 years ago. The resulting crater is about ¾ mile in diameter, and almost 600 feet deep. Most meteorites come from the asteroid belt. Jupiter is close enough that every now and then its gravity forces a meteoroid out of orbit. Meteorites tend to be heavier than Earth rocks, are often attracted to magnets, and irregularly shaped. Also, most have "thumbprint" pits and are covered with a thin black or brownish fusion coating. If they've been around a while, the coating may be rusty. They often contain native iron-nickel.

There are many different kinds of meteorites, including multiple groups made entirely or mostly of rock (stony meteorites), some made of a mixture of rock and metal (stony-irons), and some made almost entirely or iron-nickel alloy (irons). Only 6% of all meteorites are irons, but these are the easiest to find.

One percent of meteorites are stony-irons. There are two types. One is a pallasite, where olivine crystals float in a matrix of nickel-iron. The other is a mesosiderite, which is a mixture of half metal and half rock.

Ninety-three percent of all meteorites that fall are stony meteorites, including chondrites and achondrites. There is an average of one on every square mile of earth. Chondrites are by far the most common, and contain olivine-pyroxene and iron sulfide. Often they are filled with rounded bits called chondrules that look like frozen tapioca pudding. The fusion coating on these meteorites is rarely thicker than a fingernail. A few rare stony meteorites aren't chondrites, and are called achondrites (meaning not a chondrite). These include rocks from the asteroids, our Moon, and

Mars. Some of these are distinguished by having an unusual waxy/shiny fusion crust.

Cutting, polishing, and etching an iron meteorite reveals what is called a Widmanstätten pattern, which looks like cross-sections of many triangular crystals. In order for this texture to be large enough to be visible to the naked eye, this meteorite must have cooled very slowly, about 3 degrees every million years. Cutting these nickel-iron-cobalt-steel objects is not easy.

Graphite is not uncommon in meteorites, and it can be metamorphosed into diamonds. A common myth is that meteorites start fires when they land--they don't. In space, a meteoroid is cold. Only a very thin layer is heated during the few seconds that the meteor is incandescent. At about 20 miles up, friction has slowed the meteor down enough that its exterior is no longer hot enough to glow. By the time a meteorite hits the ground, it is somewhere between slightly warm to very cold. People have seen frost forming on a freshly fallen meteorite.

At 8 or 9 feet by 5 feet, the largest known single-piece meteorite on the Earth's surface is the Hoba meteorite in Namibia. It weighs over 60 tons.

Man's first use of meteorites was for weapons and tools. 1500 years ago, long before the Industrial Age, the sword Excalibur must have been stainless steel from a meteorite.

One of the best "scientific instruments" to find meteorites with is a plow. Kansas is flat and plowed; it also lacks dark rocks, so it is a good place to find meteorites easily. Meteorites are harder to locate in Oregon, where black basalt and black meteorites have enough iron in them so both rust.

Many meteors tumble as they come through the atmosphere, but some don't, coming in with one side facing forward the whole time. These meteorites become cone shaped. This fusion-crust cone is often criss-crossed with cooling fractures.

Carbonaceous chondrites are rare. They are high in carbon, and also may contain water, amino acids,

and ketones. They are 4.6 billion years old, and some may have originated in comets.

The meteorites from our Moon contain a lot of different rock types, including basalt, anorthite, and peridotite rocks blasted out from the lunar mantle. Martian meteorites are basalts or peridotites. In 1996, researchers at the Johnson Space Center claimed to have found possible evidence for Martian microbes in these meteorites. This launched a heated debate, and most scientists now find the evidence unconvincing.

Only four meteorites have ever been found in Oregon. One was found in Sam's Valley, north of Medford, Oregon, in 1894; since then, a few more pieces of this iron meteorite have been recovered.

The most famous is the 15.5 ton Willamette Meteorite, found in West Linn in 1902. A local farmer took 3 months to move it from Oregon Iron and Steel land $\frac{3}{4}$ mile to his own land. The heavily-loaded wagon left easily-followed tracks. Oregon Iron and Steel men followed them, then lost a lawsuit attempting to get the meteorite back. People started trying to take off souvenir pieces of it. Next it was barged to Portland and exhibited in the 1905 World's Fair here. An Eastern lady bought it for \$26,000 and gave it to the Natural History Museum in New York City, where it reposes today. It was probably a glacial erratic, brought down on a really big iceberg during a Missoula flood.

The Klamath Falls iron meteorite was found in 1952 in southern Oregon.

In May of 1981 a chondrite hit a house at 1:05 in the morning in Salem. The Salem meteorite is the only one of the four Oregon meteorites that is not an iron meteorite. It is not surprising that the Salem is a chondrite, as most observed meteorite falls are of chondrites.

BOARD MEETING NOTES

June 6, 2009

GSOC members present included Carol Hasenberg, Larry Purchase, Beverly Vogt, Richard Bartels, Jan

Kem, Dave Olcott, Clay Kelleher, Anne O'Neill, and Janet Rasmussen.

The minutes of the February 13, 2009, Board meeting were approved after the addition of the sentence "A Publicity Committee consisting of Larry Purchase, Rosemary Kenney, Jan Kem, and Tara Schoffstall was appointed". The treasurer's report was discussed and approved.

Equipment for the upcoming field trips was discussed and coordinated. Loose ends for the upcoming President's Field Trip were discussed.

Summer activities are as follows: Meteorite lecture is on June 12. Field trip to wind farms etc. is on June 19 and 20. No July lecture. Clay Kelleher will lead a field trip to Silver Falls State Park on July 11. President's Field Trip is August 1-4. Annual Picnic is at noon on August 30, with board meeting preceding it at 10 a.m. at Carol's house. Bart is exploring a possibility for a September field trip. Fall activities include speakers on September 11 and October 9, and the Gem and Mineral Show on September 20.

For the GSOC annual picnic, Larry will see if the covered area at Mount Tabor can be reserved for the 30th. If not, we can eat in a nearby picnic area that is generally available. The picnic will be a potluck, with the same alphabetic breakdown on what to bring as last year. There will be no children's activities.

To save money, the board voted to make the newsletter bimonthly next year, with a single sheet calendar of upcoming events sent out on alternate months. The board also approved by majority vote to have each issue of the newsletter to be put on the website.

Jan requested that he be sent the calendar, newsletter, posters, and mailing labels by the 20th

of each month so he can get information to the A and E section of the Oregonian in time for it to publicize our Friday night lectures. Also Clay is to send an updated membership list in Word format to board members; and Carol, Janet, Bev, and Bart also want the membership list as an Excel file. Janet will make a list of all GSOC members with email addresses for Tara.

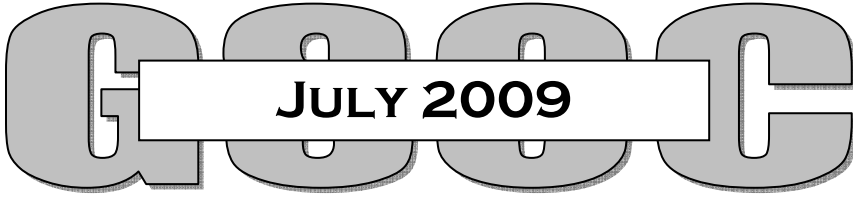
Next Board meeting is 10 a.m., August 30, 2009, at Carol's house prior to the annual picnic. Note change of location.

Beverly Vogt, Secretary

DECEASED GSOC MEMBER LED QUIET BUT INTERESTING LIFE

Some long-time GSOC members may remember Marilyn Lum, who used to do all the calligraphy for GSOC certificates. Marilyn died recently at the age of 71. Marilyn was a Portland native whose parents came from Canton, China. An in-depth memoir has been published on the Oregon's website of her life, and can be viewed at http://blog.oregonlive.com/lifestories/2009/06/_marilyn_lum_wanted_to.html#more.

Marilyn had several university degrees, including the fields of education, library science, and occupational therapy. She worked in all these fields, invested well, and retired early. In her retirement, she pursued many activities, including gardening, spinning and weaving, fly fishing, music, astronomy, ham radios and geology. She was a volunteer who worked on projects for a number of causes. According to Joan Harvey of the Oregonian, she "packed several lifetimes into her 71 years."



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GSOC MINI-CALENDAR

JULY ACTIVITIES

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No Wednesday evening seminar is planned for July.

GSOC Field Trip , Saturday, July 11, 2009: "Geology of Silver Falls."

FUTURE ACTIVITIES

The next Friday night meeting of the society will be announced in the July newsletter. Check the GSOC website (www.gsoc.org) for updates to the calendar.

GSOC President's Field Trip, August 1-4, 2009: "Geology and Hydrology of the Oregon High Cascades and Deschutes Basin." Registration form is due July 17, 2009

GSOC Annual Picnic will be on August 30 in Mt. Tabor Park in Portland.

FOR DETAILS, SEE INSIDE

Details on July 11 Field Trip to Silver Falls State Park Inside



THE GEOLOGICAL NEWSLETTER

"NEWS OF THE GEOLOGICAL SOCIETY OF THE OREGON COUNTRY"

VOLUME 75, NUMBER 8
AUGUST 2009

The Geological Society of the Oregon Country

P.O. Box 907, Portland, OR 97207

www.gsoc.org

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VISITORS WELCOME AT ALL MEETINGS

CALENDAR

AUGUST ACTIVITIES

No Friday night meeting is planned for August. Next meeting is tentatively set for September.

No Wednesday evening seminar is planned for August.

GSOC President's Field Trip, August 1-4, 2009:
"Geology and Hydrology of the Oregon High Cascades and Deschutes Basin." Information and registration form for this trip was in the June 2009 *Geological Newsletter*. See the GSOC website (www.gsoc.org) for updated information.

Needs and Things to Do if you plan to go:

- Registration was due July 17, 2009.
- Bring appropriate clothing and footwear – may be hot, cold, wet, muddy and/or windy

- Bring camping gear unless you have arranged indoor lodging. We've reserved the Ogden Group Campground in Deschutes National Forest for the nights of August 1, 2, 3 and 4.
- Bring water, sunscreen, sunglasses, hat, and mosquito repellent.
- Make carpool arrangements, meal arrangements and lodging arrangements (unless you plan to camp with us). If you are riding with someone, be sure to arrange to pay your share of gas, entrance fees, etc. Carpool arrangements can be facilitated by contacting Carol Hasenberg at cs727@comcast.net or 503/522-4249 and letting her know if you have room for riders or would like a ride.
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for persons 62+ years in age – formerly called Golden Age Passport). These are good for entrance into Newberry National Volcanic Monument and several of the other sites where we will be parking. Otherwise, bring lots of \$5 bills, since you will need them for the daily entrance/parking fees. See <http://www.fs.fed.us/r6/passespermits/nwfp.shtm> for more information.

- We may (or may not) be able to have campfires at Ogden Group Campground during our stay. We will call ahead the previous week to verify this, and post on the GSOC website a few days prior to leaving.

GSOC Annual Picnic, Sunday, August 30, 2009:

At this year's annual picnic, GSOC plans to have a Board Meeting at 10:00 am, followed by the picnic at noon. This year the picnic will be at Mt. Tabor City Park in Portland. Take 58th Street exit if heading east on I-84, or the Stark Street exit if coming from I-205. There is no fee to use the area. A map of the park showing the picnic location will be posted on the GSOC website (www.gsoc.org).

GSOC will supply the paper plates, napkins, paper cups, and utensils. We will not be grilling this year, but just having a potluck meal. Attendees bring their own beverages. If your last name begins with A through G bring a side dish or salad; H through P bring a dessert; Q through Z bring a main dish. Alcoholic drinks are not permitted within the park. For park policies, refer to the Portland Parks and Recreation [website](http://www.portlandonline.com/parks/index.cfm?a=93268&c=38301)

As there are only 2 picnic tables in the area where we will be picnicking, those of you attending who have portable tables and chairs may want to bring them.

We will be hiking around the park after the picnic, and looking at historical icons, including the famous 1952 GSOC plaque, geology of the park including the cinder cone and many examples of the Troutdale Formation, and other park features.

FUTURE ACTIVITIES

The next Friday night meeting of the society will be announced in the September newsletter. Check the GSOC website (www.gsoc.org) for updates to the calendar.

A Trip to The Dalles

synopsis of the June 2009 Waste, Wind, and Water Field Trip led by GSOC Director Dave Olcott and GSOC Vice President Larry Purchase

Editor's Note: GSOC would like to extend a huge thanks to the hard work of Dave and Larry for developing this trip and making it such a success. You'll be able to see how rich and interesting it was from the following article. Also, keep posted in the Field Trip Revue section of the GSOC website for an upcoming link to a virtual tour and slide show of the trip. This will probably appear in late August or September, after all the summer GSOC activities.

Day 1: Waste, Wind, and Wine

The field trip actually began with a bit of geology and natural resources. The GSOC group carpooled east on Interstate 84 to Celilo Park, about 12 miles east of The Dalles, where leader Dave Olcott introduced us to some of the wildlife issues of the Columbia River. He mentioned that on the way to the stop we had passed one of the two salmon smolt barges on this stretch of the river, which transport the juvenile salmon through the dams from the Snake River to below the Bonneville Dam. The barges dump the smolt in the early morning hours so that ring-bill gulls will be less likely to feed on the vulnerable smolt. The dams also have been increasing their spillage to benefit the passage of the smolt.

Olcott also discussed Celilo Falls, which lies buried under Lake Celilo, created by The Dalles Dam in 1957. Recently, the area was explored by sonar to confirm that Celilo Falls still exists in the riverbed, because rumors had circulated that it had been destroyed by the U.S. Army Corps of Engineers as part of the construction of the lake. Also, the U.S. government has recently provided some river access

to native tribes in the area, which had been promised as part of the dam construction agreement but slow to be honored.

After leaving Celilo Falls, the group was advised to look for the rookery east of Miller Island and north of the mouth of the Deschutes River. This rocky outcrop is nearly white with the excrement of bird predators, predominantly ring-bill gulls, that feed on salmon smolt at this critical junction. Also, a herd of California bighorn sheep, reintroduced into the area in 1993, can often be seen on the slopes above the mouth of the John Day River.

The GSOC group next stopped at Phillipi Canyon at exit #123, which was the prehistoric outlet to the John Day River. The John Day now parallels the Columbia River to an outlet about 10 miles west of Phillipi Canyon. Phillipi Canyon, one of several breaches in the south wall of the Columbia Gorge, was the site of an eddy in the Ice Age Floods. A huge eddy bar deposited on the east side of the mouth of the canyon can be viewed from the road passing up the west side of the canyon near the freeway exit. J Harlen Bretz visited Phillipi Canyon in 1927, and it was information gathered here and similar sites which were the basis of his 1928 paper which provided further evidence for catastrophic flooding in the Columbia River basin. During the floods, an estimated quantity of 176 million cubic feet of water per second (ft^3/s) coursed through the Columbia Gorge, as opposed to an average of 599 thousand ft^3 , measured prior to the installation of the dams on the river.

Further up Phillipi Lane, the group drove through a cataract of the Ice Age Floods and then stopped to view another bar deposited 9.5 miles from the mouth of the John Day River on relatively high ground. The flood elevation at this point in the Columbia Gorge is estimated to be about 1140 feet. Several of the Ice Age Floods backed up extensively into the John Day River. For example, at river mile 18, geologists have counted 14 different flood deposits.

The GSOC tour then proceeded east on Heritage Lane, through dry-farmed areas to Blalock Canyon, and down Blalock Canyon Road to Alkali Canyon.

At a short stop along Heritage Lane, at an elevation of about 1050 feet, the group paused briefly to examine some diorite erratics in a farm field which were deposited there by the Ice Age Floods.

The GSOC tour then proceeded to the Waste Management's Columbia Ridge Recycling and Landfill, known to most of us Oregonians as the Arlington Landfill. If you live in Portland, Seattle, Sandpoint, the Tri-Cities, or several other towns in the northwest, this is where your non-recycled garbage ends up. There are actually two landfills in the area that are run by Waste Management. One of them is a general landfill and the other is a hazardous waste landfill (excluding radioactive material). The construction of the two are similar, except that the hazardous waste landfill has more lining layers underneath.

The Arlington Landfill is constructed atop a nearly 200 foot thick layer of the Selah Member of the Ellensburg Formation, lake bed sediments which formed above Columbia River Basalt flows. This layer of silty and clayey composition has low permeability. Below the Selah lie the Priest Rapids Member, the Frenchman Springs Member, and Grande Ronde Formation of the Columbia River Basalt Group. Water for home use is generally drawn from the Frenchman Springs Member and for irrigation projects is drawn from the Grand Ronde Formation. The landfills are lined with a liner fabric and loaded with compacted garbage. A protective layer of clayey soil is applied daily over the working area. When an area is loaded to capacity, the cover layer applied is somewhat thicker than the daily cover. Collection pipes are laid horizontally and vertically within the waste to collect methane and other gases which are created by the decomposing garbage.

The GSOC group toured around the site in a Waste Management tour bus, under the leadership of two Waste Management employees – Joe Kephart, an environmental engineer, and Vince Gullette, who described himself as “not a geologist.” We first visited the unloading area for the garbage shipped by train from Seattle. Each container holds about 30 tons of compacted garbage. Portland garbage is transported there from the METRO sorting center

by truck. Then the group visited the currently used “cell” of the site, which is being developed in two halves with 17 cells in the first half. At the current rate of use, the landfill should be filled in over 100 years. Filling a landfill becomes a huge dirt-moving enterprise. Waste Management maintains its own equipment onsite, since repair shops are quite a distance from the area. The municipal landfill employs about 100 people, and the hazardous waste landfill employs about 60.

The GSOC group was most interested in the gas harvesting project from the landfill. The gases are collected and used to power a burner. The company plans to use the burner to generate electricity. We toured the burner and power plant area, and also the leachate pond of water collected from the waste. The collected leachate water is recirculated through the waste to further promote decomposition of the garbage. Each waste pile will produce enough methane to fire a burner for 40-45 years. The company is working to find the optimum speed to pull out the gases from the landfill so that the burner does not burn too rich.

At the landfill site’s main office is a giant tortoise fossil found on the site in 1971. The tour made a special trip back to the office to view the fossil. The remains included most of the plastron (belly shield), part of the carapace (back shield), some of the leg bones, and some dermal ossicles (skin armor). The specimen was found at a quarry site in the north wall of Alkali canyon in ash tuff layers that are interbedded with Columbia River Basalt of about 12 to 13 million years in age. The approximately one meter-length specimen most probably was that of *Geochelone orthopygia*, the last of a line of turtles that lived in North America during the Oligocene. It evolved into larger forms and then died out in the Pliocene when the climate cooled.

After leaving the landfill, the GSOC group made a short stop in Alkali Canyon to view a large delta complex produced by the largest of the Ice Age Floods. Alkali Canyon was an overland channel during this time. Traveling north through the town of Arlington, the group also stopped to view some erratic boulders on some of the properties there.

From Arlington, the group headed west to join the afternoon’s guest leader, Sandy Macnab of the Sherman County Extension Office, in the town of Rufus.

Macnab introduced the group to Sherman County by discussing his own fifth-generation roots there. According to Macnab, the county was named after Civil War General William Tecumseh Sherman in 1888 by an Oregon legislator that was disappointed that General Sherman didn’t come to visit the area. Other residents wanted to name the county after the Fulton family. Macnab also showed the group some of the effects of the 1964 flood on the town of Rufus. To reduce the amount of damage from similar flooding, the city has installed “trash traps” in the ravine leading down to the town from the gorge walls. Large storms will bring down loose material from the Ice Age Floods into the town.

Next Macnab took the group up to the plateau south of the Columbia River Gorge to describe some of the dry, or non-irrigated, grain farming techniques that are used in the area. Macnab told the group that very few farmers in Sherman County irrigate their crops. Dry farming is all about the wise utilization of the available rainwater. Land is farmed one year and lies fallow the next. Mulching and killing spurious growth in the field during fallow periods is very important for water retention and minimizing wind erosion, and Macnab described different techniques that are used. Modern fallow techniques can dramatically increase grain yields. In a good year, a field may produce 80 to 85 bushels per acre, but in a bad year, it may only produce 25 bushels per acre. The timing of rainstorms really effect the yields. A good rain in June is described by the wheat farmers as “million dollar rain”. The nearby cherry growers, however, are not happy with June rains as they split the cherries.

The farmers in Sherman County have gotten to be very high tech in their methods. They grow a variety of different grains (wheat varieties, triticale and barley) and rotate crops. They monitor their fields very intensely so that the application of fertilizers, pesticides and herbicides is kept to an absolute minimum. Their tractors have GPS-linked

controls so that the monitoring data are utilized in the application of these amendments. This is economical for the farmer as well as healthy for all of us. Most Sherman County farms are family-owned. In a typical farm, the family owns about one-third of the land it farms and leases the rest.

These days, farmers are planting a new crop of wind generators amongst the wheat in their fields and harvesting a crop of electricity along with the wheat. Hundreds of windmills have sprouted on both north and south ridges of the Columbia River gorge, and many more are planned. Macnab took the GSOC group to the Biglow Canyon and Klondike wind farms. We got to examine examples of the 131 foot blades lying on the ground at the Klondike field office. There was also a nacelle to examine, which houses the controls and the electrical generating unit. These 100,000 pound units sit atop the towers, hold the blades, and generate the electricity. The nacelles are kept heated in the winter to maintain the viscosity of the turbine oil as well as for the benefit of the maintenance workmen. So far, the wind-generated electricity has been an important cash crop for the land owners in the area.

After such an action-packed day, you'd think that the GSOC group would have had enough. Surprise! We all met later that night at Erin Glenn Winery at The Mint in The Dalles. We arranged with the owner and vintor, Tim Schechtel, to have a wine tasting and dinner at his establishment. We learned a lot about the history of The Mint and its relationship to a famous historic shipwreck, the Brother Jonathan, which sank off the California coast near Crescent City in 1865 on its way to Portland. Amongst the dead passengers of the ill-fated vessel was William Logan, who was coming to supervise the U.S. Mint, whose branch in The Dalles had been commissioned in 1864 by Congress. After the loss of the superintendent, and also because the gold rush in Oregon had begun to peter out, the U.S. Mint project was never completed.

Another victim of the Brother Jonathan sinking was a famous San Francisco madam, Roseanna Keenan, who Tim Schechtel believes was the famous

“Velvet Ass Rose”. He has dedicated a delicious rosé wine made from Barbera grapes to her memory, calling it “Velvet Ass Rosé”. Tim says that a large percentage of the grapes that he uses are grown locally in The Dalles region. He does obtain some grapes from other areas of Oregon and Washington, too. All in all, the dinner at Erin Glenn was a very interesting way to end the day.

Carol S. Hasenberg

Editor's Note: This article will be continued in the September issue of The Geological Newsletter.

References and Additional Reading:

“Waste, Wind, and Water Field Trip Guide,” edited by Larry Purchase & Dave Olcott contains the trip itinerary and many exhibits obtained from the guest speakers as well as the editors.

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Waste Management Site – Columbia Ridge Recycling and Landfill
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OSU Extension slide show “Windustry: The Good, The Bad and the Ugly” by Sandy Macnab:
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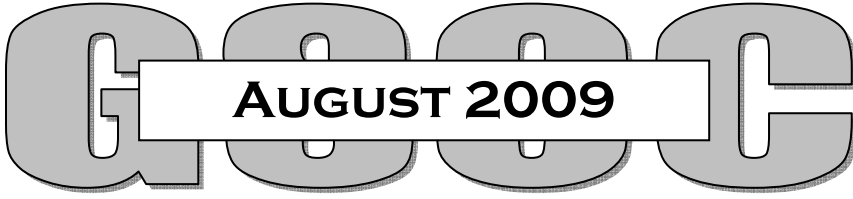
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Erin Glenn Winery, The Dalles site:
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GSOC MINI-CALENDAR

AUGUST ACTIVITIES

No Friday night meeting is planned for August. Next meeting is tentatively set for September

No Wednesday evening seminar is planned for August.

GSOC President's Field Trip, August 1-4, 2009: "Geology and Hydrology of the Oregon High Cascades and Deschutes Basin." Registration form was due July 17, 2009

GSOC Annual Picnic will be on Sunday, August 30, 2009, in Mt. Tabor Park in Portland.

FUTURE ACTIVITIES

The next Friday night meeting of the society will be announced in the September newsletter. Check the GSOC website (www.gsoc.org) for updates to the calendar.

FOR DETAILS, SEE INSIDE

***Details on Annual Picnic at Mt. Tabor
Park in Portland Inside***



THE GEOLOGICAL NEWSLETTER

"NEWS OF THE GEOLOGICAL SOCIETY OF THE OREGON COUNTRY"

VOLUME 75, NUMBER 9
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VISITORS WELCOME AT ALL MEETINGS

CALENDAR

SEPTEMBER ACTIVITIES

Friday evening talk, September 11, 2009, at 8 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University: Patty and Roger Silver, amateur spelunkers and educational speakers for the Oregon Grotto (local chapter) of the National Speleological Society (NSS), will present "Overview of Caving."

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

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 6th Aves. and Harrison and Hall Sts.

No Wednesday evening seminar is planned for September.

GSOC Field Trip, Saturday, September 26, 2009: "The Buried Forests of Mt. Hood." Join GSOC member Ken Cameron of the Oregon DEQ for a field trip which will examine the eruptive history of Mount Hood and the effect of its eruptions on coniferous forests covering valley floors and lower slopes of the mountain. Field trip participants are to meet at 9:30 a.m. in the parking lot at the Hoodland Plaza located at Welches on Highway 26 on the way to Mount Hood. The meeting place has a Thriftway grocery store and a 76 gas station.

To participate you must be a member of GSOC or a guest of a member. Minors under 18 must be accompanied by an adult GSOC member designated by their parents or guardians. Registration will include signing a liability waiver for all participants. You may register as a GSOC member at the registration site. Bring your lunch, wear good walking shoes, and plan for the trip to last until 3:30 to 4:00 p.m. Cost is \$5 for all participants. Registration for the trip will be done at the meeting place. If you plan on attending or have

questions, contact Richard Bartels (503/292-6939 or bartbartels@comcast.net).

The trip is based on an article "Prehistoric buried forests of Mt. Hood," by Ken Cameron and Patrick Pringle, which appeared in the March 1991 issue of *Oregon Geology*. The article is available online through the DOGAMI website (www.oregongeology.org). Copies of the article will also be available at the registration site.

FUTURE ACTIVITIES

Friday evening talk, October 9, 2009, at 8 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University: Rudy Tschernich, curator of the Rice NW Museum of Rocks and Minerals, and author of "Zeolites of the World," will present "Occurrence and Origin of Zeolites."

Check the GSOC website (www.gsoc.org) for updates to the calendar.

A Trip to The Dalles, cont.

synopsis of the June 2009 Waste, Wind, and Water Field Trip led by GSOC Director Dave Olcott and GSOC Vice President Larry Purchase

Editor's Note: Here is part 2 of the article begun in the August 2009 Geological Newsletter:

Day 2: Water

Saturday morning the GSOC group gathered at the Safeway parking lot in The Dalles, fresh for a new adventure. Our guest leader for the day was Tom Bailey, co-owner of Orchard View Farms, Director of The Dalles Irrigation District, and President of the Wasco County Pioneer Association. Tom's family grows cherries on the hills surrounding The Dalles. This was made possible in the mid 1960's when The Dalles Irrigation District was formed, since the area only gets approximately 10 to 12 inches of natural rainfall per year. The Dalles Irrigation District provides water to the farmers in the region surrounding the city. The water is pumped to an elevation of 1800 feet. The cherry-growing district around The Dalles has 5800 acres of orchards which are irrigated from the Columbia

River and an additional 2000 acres which are well-irrigated.

Bailey, another pioneer descendant, relayed to us part of his family's history that involves the acquisition of water in the area. When Bailey's grandfather was a boy, his family lived on Seven Mile Hill just west of The Dalles. They had a homestead well that tapped into the perched water table about 35 feet below the surface. This layer had a very small saturated zone, so the children were told to fill up their bucket a cupful at a time. Bailey's grandfather and his brother became frustrated with this chore, and unbeknownst to their father, resolved to deepen the well. They took turns lowering each other into the well while their father was away and dug the bottom deeper. Although this helped the filling of the bucket on the first day, their well and all their neighbors' wells dried up overnight, because the boys had drilled through the impermeable layer and drained the aquifer. The families were forced to move to Chenoweth to get water. Bailey's grandfather confessed to this deed only after he became an old man.

Bailey took the group to the heights above the downtown and around to several orchard locations. He explained how the technology of cherry farming has evolved since the 1960's. Cherry trees used to be planted at wide spacings and irrigated with big impact sprinklers. This proved to be horribly inefficient in The Dalles area, which is very dry. Fifty to sixty percent of the irrigation water was lost before it reached the ground. Today the trees are planted close and irrigated with drip or micro sprinkler heads. Each tree is monitored for moisture and the water is applied as needed to keep the root zone moist. The district uses all the water it can get (or else lose the water rights) in the most efficient way possible.

Bailey also explained the amount of planning that goes into selecting sites on which the cherry orchards are planted. Slope, elevation, orientation, wind patterns, and soil all play a role in cherry production. Bailey explained that cherry trees are never planted in valley bottoms because that is where it frosts. Cold air drains down with respect to warmer air. Also, hilltops rarely contain deep

enough soil for the root zones of the trees. So the cherries are planted on the slopes of the hills. Cherry trees may live up to one hundred years and older, but their peak production occurs between the ages of 8 and 35 years. Most of the trees planted in the 1960's have been replaced once, and improvements have occurred in the cherry varieties planted and the root stock types.

Another resource that the cherry growers streamline is the labor force that picks and processes the cherries. In order to do this, the orchards must be planned so that the cherries ripen in a continuous sequence throughout the season. This is done two ways: by varying the types of cherry trees planted, and varying the elevations on which the trees are planted. What is referred to as "Bing" cherries by the public are actually a whole suite of cherry varieties that are harvested at slightly different times. "Chelan" is an early ripening variety and "Bing" is one of the primary mid-season varieties. In recent years, "Rainier" cherries have gotten very popular, and we saw many millions of these ripening in the orchards. Also for every 200 to 300 feet gain in elevation, the ripening date is retarded a day or two.

Bailey defended the labor force used by The Dalles' cherry growers from anti-immigration attacks. Although many of the cherry laborers are Hispanic, they are American citizens and valuable, skilled workers. The packing line workers are local residents, and often to maximize labor efficiency, packing lines will be shared with other cherry growers in the area. The orchard workers hail from central California, and undergo special training for their jobs. The orchard workers are so valuable that the growers have special school programs for the children and provide good housing for the migrant families.

The packing, shipping, and marketing of the cherries are very critical to "making it or breaking it" in the business. The most important markets for the cherries are ones that will pay a maximum price for each box. This is compounded by the problem of how to ship the cherries long distances while maintaining the quality. Amazing enough, the most important buyers of The Dalles' cherries live in the

U.S. East Coast, Dubai and the Middle East, Taiwan, Scandinavia, and England, and not the U.S. West Coast. The long distance buyers will pay 2 or 3 times more for premium quality cherries than the residents of our state.

How is the distance/quality problem solved by the cherry growers? Bailey explained that unlike many other crops, cherries do not ripen, that is, produce more sugar, after they are picked. So, cherries must ripen on the tree until they reach about 16-18 brix of sugar, then they are picked. The growers have found that cherries kept between 32 °F and 36 °F in a high carbon dioxide environment will not decompose during shipping. So they select the largest, finest fruit, hydro-cool it to the optimal temperature, pack it in plastic lined boxes, inject a nitrogen-carbon dioxide mixture into each box, and ship by water within two to two-and-one-half weeks anywhere in the world. Smaller fruit are sorted out from the premium sizes and sent to flavor ice cream or to be made into maraschino cherries. The patented packing procedure, using no unnecessary chemicals, has made their international reputation. As part of the company's commitment to quality, a company representative travels to major shipment sites to view the condition of the off-loaded fruit.

On the tour Bailey took us over to Omeg Orchards on Three Mile Road south of The Dalles to view the well-watered orchard operations and listen to a bit of cutting edge cherry growing expertise from General Manager and Mike Omeg. Omeg discussed the planning and drilling operations necessary to provide water to the orchards that have been planted fairly recently in this area. Water wells for these orchards can be over 1000 feet deep and come from a variety of aquifers. The well water may be geothermally heated and may contain undesirable alkalinity and other chemical problems.

The chemical composition of the water is very important to the growth of the cherry trees. Cherries also need to contain calcium to be crisp and firm. So, the well water goes through a series of monitors and chemical injectors on its way out to the orchard. Fertilization of the trees is also accomplished with "fertigation," that is, by injecting the fertilizer into the water, and this reduces the

amounts of fertilizer chemicals needed. These orchards are highly monitored for moisture. A consultant comes in once a week with a “neutron probe” to make a moisture profile of the top 36 inches of the soil. Weather conditions are also monitored by a network of weather stations located in the orchards. Because the cherry growers in this region pay higher rates for power, and it takes power to pump water, the growers work hard to minimize water usage.

Omeg has been involved in experimenting with mulching methods used to conserve water, limit the growth of weeds, and limit pests in the orchards. Geotextile fabrics were tested, but not found to be very successful for two reasons. The fabric actually aided the spread of voles in the orchards by hiding the creatures from their natural avian predators. Voles will girdle the trees if allowed to proliferate. Also the textiles are not sustainable to natural systems. Omeg Orchards has returned to using straw mulch for this reason. In addition to its mulching function, straw replenishes the soil by adding organic matter and it does conserve 10% of the irrigation water.

Despite the heavy emphasis on viewing and talking about cherry production, Dave Olcott managed to get in some information about geology on this day of the tour. The first stop on the hill to the south of the downtown area (Sirosis Park) overlooked the town, the Columbia River, and north into Washington state. From this vantage point, it is very easy to see how much of a “kink” exists in the Columbia River at this point. This is believed to be caused by the action of the Laurel Fault to the east of The Dalles and the Chenoweth Fault to the west of the Dalles. Along the Chenoweth Fault the Frenchman Springs Member of the Wanapum Formation occupies a small butte while the adjacent scabland and the top of the butte is of the Priest Rapids Member. The Columbia River has had its current course for about the last 6 million years. To the west of town, the outcrop along the highway contains the Frenchman Springs Member of the Wanapum Formation of Columbia River Basalt along its bottom and the Priest Rapids Member (also Wanapum) on its top.

From Sirosis Park, the GSOC group traveled along a drive which follows the base of a landslide scarp. Several of the homes here had new foundation work as a result of continued movement of the slide. Traveling up to the top of the scarp on Dry Hollow Road, we observed an outcrop of the Chenoweth Formation in the form of a pebble-cobble conglomerate in a road cut there. The Chenoweth Formation is The Dalles Basin section of what used to be called The Dalles Formation. It consists of deposits of water-borne sediments, lake sediments and volcanic tuff that occurred atop the flows of Columbia River flood basalts some 12 to 13 million years ago. This pebble conglomerate contains 38% exotic material which were brought to the area by ancestral streams and 62% Cascadian volcanics. In the 1980’s geologists revised the formation names to reflect the drainage basins in which they occurred. Rocks in the Chenoweth Formation may be conglomerates, lithic sandstones, or tuffs. Heading toward the orchards, the group stopped briefly at a lahar deposit in a road cut on Skyline Road. This lahar occurs lower down in the Chenoweth and is Cascadian in origin.

Carol S. Hasenberg

References and Additional Reading:

“Waste, Wind, and Water Field Trip Guide,” edited by Larry Purchase & Dave Olcott contains the trip itinerary and many exhibits obtained from the guest speakers as well as the editors.

Orchard View Farms website:

<http://www.orchardviewfarms.com/>

Omeg Orchards website:

<http://www.omegorchards.com/#>

SOTA Revisited

2009 President’s Field Trip Synopsis

August 1-4, 2009

by Carol S. Hasenberg

Well, folks, we’re getting to the end of another GSOC field trip season and it’s been a good one. We had our Presidential field trip a bit early this year because we

did not want our guest speakers to be conflicted with the upcoming GSA annual meeting being held in Portland in October. This year's trip explored the High Cascades Graben and the hydrology of the Deschutes River basin. The majority of the participants camped at the Ogden Group Campground of the Deschutes National Forest, and a good time was had by all there. We successfully weathered two thunderstorms in the area, including one of the worst thunderstorms I have ever been in (and driven through) on the evening of Sunday, August 2.

For a number of reasons, I am keeping the trip synopsis short this year. Most of the reference papers are available online. The SOTA field trip guide is available on CD from DOGAMI, and the Robert Jensen book is available from DOGAMI or other outlets. There was so much information on these papers and given at the trip stops that I could only take notes on a fraction of it. Many of the references include field trips that the readers can explore in their leisure. There is also a slide show of the trip available online; there is a link through the GSOC website (www.gsoc.org).

So, happy reading and exploring the eastern High Cascades and Deschutes Basin! Also, special thanks to GSOC field trip participants Antonella Mancini and Evelyn Pratt for opening the metal gates to the campground in that thunderstorm (don't tell Ralph)!

Day 1, Saturday, August 1: SOTA Field Trip Revisited with Guest Speaker Richard Conrey of Washington State University in Pullman, Washington:

Conrey was joined by visiting igneous petrologist Dr. Gene Yogodzinski from the Department of Earth and Ocean Sciences, University of South Carolina, and graduate students "Shawn" and "Josh". At Stop 1, the rock quarry on Timberline Road at Mt. Hood, Conrey handed out D.E.M. printouts to the GSOC group as a reference. A D.E.M., or digital elevation model, is a computer-generated elevation map. It was easy to see the High Cascades graben, and other features of interest, in the overall elevation trends of the state. Conrey told the group that what he'd like to convey in the field trip are the structural setup of the Cascade Arc, the spacing and longevity of the stratocones in the arc, and a sense of the complexity of the arc environment. He described the graben, or down-dropped block, that exists from the Three

Sisters to north of Mt. Hood. The oldest section is between the Three Sisters and Mt. Jefferson, then the section between Mt. Jefferson and Mt. Hood, and then the section north of Mt. Hood. The rifting which created the graben is up to 8 million years and 3 kilometers deep in the oldest block, up to 5 million years and 1 kilometer deep in the next block, and up to 2 million years and 600-700 meters deep in the hinged block north of Mt. Hood. In the High Cascade arc, the stratocones of Mt. Hood, Mt. Jefferson and the Three Sisters are spaced about 70-80 kilometers apart. All the Cascade stratovolcanoes are associated with plutonic bodies which attest to their longevity; for example, we have the Spirit Lake Batholith near Mt. St. Helens.

Next stop on the trip occurred in Mill Creek Flat on the Warm Springs Reservation. Conrey pointed out the characteristics of Mt. Hood and Mt. Jefferson. Mt. Hood is particularly characterized by having few satellite cones – there is one central pipe, and eruptions occur like radial spokes on a wheel around the pipe. It has a large volume of material – about 50 cu. km. Mt. Jefferson is shorter with a smaller volume – about 30 cu. km. – and more volcanism in the surrounding area. Conrey mapped the varied satellite volcanism – which consisted of mafic, andesitic, and rhyo-dacitic types – for his PhD thesis, which took 7 years to complete. The two stratocones vary in their compositional range; Mt. Hood produces magma that is 55-65% silicic and Mt. Jefferson produces magma 50-70% silicic.

Conrey also explained that in addition to the High Cascade volcanism that you see in and around and between the stratocones, there is also volcanism related to the arc rifting that created the High Cascades Graben. On the eastern side of the High Cascades, the Tygh Valley, Shitike, and Deschutes Formations, north to south along the eastern graben edge, are rift-related volcanic and related sedimentary deposits, and the formations get progressively older from north to south. On this field trip the GSOC group observed the Shitike and Deschutes Formations. These formations contain a variety of magmatic compositions, from rhyo-dacite to mafic, which can be distinguished by their trace element signatures from High Cascade volcanism.

Stop 3 on the trip was at an overlook for Cove Palisades State Park, where the GSOC group looked at different basalt flows in this dramatic setting. While standing on an outcrop of Tetherow Butte Basalt on the east rim of the gorge, we observed the Canadian Bench Basalt on the west rim. A younger, intra-canyon basalt flow forms The Island, a tongue of land at the confluence of the Crooked and Deschutes Rivers. Conrey also pointed out to the group many Cascades features on the western horizon, which were either stratocones, mafic or silicic arc volcanism around or between the stratocones, or rift-related volcanism. Most prominently of the latter is Green Ridge, which defines the eastern rift edge between Camp Sherman and Mt. Jefferson. Conrey explained how many lava and ash flows of the Deschutes formation filled in paleo-drainage ways, and how the rock of the Deschutes formation is more volcanic to the west and more sedimentary to the east.

Unfortunately due to road construction, the group was not able to get to McKenzie Pass and Belknap Crater, so Stop 4 of the GSOC trip was Stop 6 from the SOTA field trip guide. The stop is located at a viewpoint on Highway 20 about halfway between Sisters and Bend, and provides a good view of the Bend Highland, a volcanic plateau to the south and east of the Three Sisters. Around the Three Sisters, there is such great activity that there are three stratocones, and a lot of other arc volcanism. Conrey pointed out all along the trip how the character of the High Cascades changes as one travels south. These differences cause geologists to wonder about the mechanisms and character of the underlying arc which creates them.

For the final stop, Conrey took the GSOC group to see some rocks at a pumice quarry near the town of Tumalo. This area has an outcrop of Desert Springs Tuff (~630,000 years old) and Bend Pumice/Tumalo Tuff (~440,000 years old). These hot deposits came from sources in the Bend Highland. Some very nice stretched pumice can be found in the quarry.

The GSOC group then thanked Conrey for his interesting presentation, and for presenting the geologic “groundwork” for studying the Deschutes River with Ken Lite on the following day. Thank you again, Rick!

To be continued next month...

References And Additional Reading:

Richard Conrey, Anita Grunder, and Mariek Schmidt, *SOTA Field Trip Guide*, “State of the Cascade Arc: stratocone persistence, mafic lava shields, and pyroclastic volcanism associated with intra-arc rift propagation,” State of Oregon Department of Geology and Mineral Industries Open File Report, OFR O-04-04, 2004.

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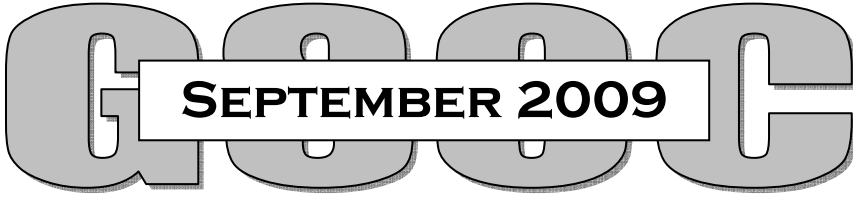
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GSOC MINI-CALENDAR

SEPTEMBER ACTIVITIES

Friday evening talk, September 11, 2009, at 8 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University: Patty and Roger Silver, amateur spelunkers and educational speakers for the Oregon Grotto (local chapter) of the National Speleological Society (NSS), will present "Overview of Caving."

No Wednesday evening seminar is planned for September.

GSOC Field Trip, Saturday, September 26, 2009: "The Buried Forests of Mt. Hood." Registration will be at the meeting site.

FUTURE ACTIVITIES

Friday evening talk, October 9, 2009, at 8 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University: Rudy Tschernich, curator of the Rice NW Museum of Rocks and Minerals, and author of "Zeolites of the World," will present "Occurrence and Origin of Zeolites."

Check the GSOC website (www.gsoc.org) for updates to the calendar.

FOR DETAILS, SEE INSIDE

Details on "Buried Forests of Mt. Hood" field trip Inside



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VOLUME 75, NUMBER 10
OCTOBER 2009

The Geological Society of the Oregon Country

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lkpurchase@q.com

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UPCOMING ACTIVITIES FROM OTHER ORGANIZATIONS

SCIENCE PUB-MissionTheater

Mission Theater & Pub, 1624 NW Glisan, Portland, Tuesday, October 20, 2009

7:00 p.m. to 9:00 p.m. Doors open at 5:00 p.m.

Come early for food, drink, and to get a seat!

<http://www.geosociety.org/meetings/2009/SciencePub.htm>

“Serial Crimes of Subduction: Giant Earthquakes and Tsunamis in Oregon's Past and Future”

Co-Speaker Brian Atwater is a U.S. Geological Survey geologist based at the University of Washington. He is lead author of The Orphan Tsunami of 1700 which lays out North American and Japanese clues to the 1700 Cascadia earthquake. His current research on earthquakes and tsunamis focuses on Indonesia and the Caribbean.

Co-Speaker Yumei Wang is a geotechnical engineer at the Oregon Department of Geology and Mineral Industries (DOGAMI) and seeks to reduce future losses from earthquakes, landslides, and tsunamis. She made the nation's first statewide estimates of future earthquake damage, and her influence on public policies includes improvements to the seismic safety of schools and the reliability of energy facilities.

CAVING IN OREGON

Synopsis of the September 17, 2009, talk by Patty and Roger Silver of the Oregon Grotto of the National Speleological Society

The new lecture season for the Geological Society of the Oregon Country was kicked off last month with a talk by veteran cavers Patty and Roger Silver. The preferred term is cavers, not spelunkers. Their talk was geared to discussions chiefly about caving in Oregon and the Pacific Northwest. Although Oregon does not contain appreciable quantities of the limestone found in many classic caverns, there are numerous opportunities for caving here, because there are many type of caves.

In Oregon, we have ice caves, where a heavy overburden, north facing entry, and lack of air flow keep the temperature near freezing year-round. Arnold Ice Cave near Bend is a good example of this type of cave. Ice from the cave was mined in the 1800's to keep the beer in Bend cold when the Deschutes River did not ice over. We also have numerous lava tubes, where drainage channels in fresh lava harden as tube features. A notable local example of this type of cave is Ape Cave near Mt. St. Helens. Oregon examples including lava tubes in Boring lava near St. Vincent's Hospital and Owyhee River Cave.

Littoral caves, produced by wave action on rock, grace existing and past shores in Oregon. Examples of these are Hug Point Cave and Fort Rock Cave. Other Oregon cave types mentioned in the talk include talus caves, piping caves formed by rivers underground, genuine ice caves in glaciers, and eolian caves. The Oregon Caves is a cave system located in marble which has been intruded with granite.

The Silvers also showed the GSOC audience photos of their favorite cave critters. Some of the animals were cave-adapted, and have no eyes or skin coloring. They included bats, cats, packrats, salamanders, crickets, spiders and rattlesnakes. Yes, so watch out where you're placing your hands while exploring a cave.

And about that exploration thing, it works a whole lot better when you cave safely. Never, ever, cave alone (or just with your dog!). Bring at least three SOURCES of light, not just spare batteries. Have good equipment and know how to use it. Wear warm clothing, because most caves are cold, even in the summer. Have sturdy shoes. Take some energy bars and plenty of water.

Roger demonstrated the use of some caving equipment to the delight of the audience. He strapped on his climbing harness and showed the audience how various clips and racks help the caving climbers to descend or ascend into a cave. He also showed (but not demonstrated) the audience his carbide lamp and how he uses it. Carbide lamps

are very bright, but they use a lot of fuel. Modern cavers are switching to LED lamps.

The Silvers also discussed cave conservation and the responsibility of cavers to keep the caves as they found them. They showed some slides of how vandalism, graffiti, garbage, and even muddy footprints on a pristine formation can ruin our enjoyment of these wonderful worlds. So enjoy caving and let others do the same!

Carol S. Hasenberg

National Speleological Society website:

<http://www.caves.org/>

NSS Oregon Grotto: <http://www.oregongrotto.com/>

LONG-TIME GSOC MEMBER

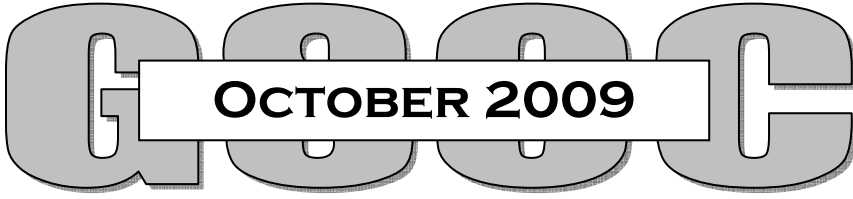
DON BARR DIES

Don Barr, long-time GSOC member, science teacher, former GSOC president, and frequent field trip leader and chief organizer of many GSOC activities for almost forty years, died September 11, 2009.

He was born January 19, 1920, in St Paul, Minnesota and married to his beloved wife Dorothy for many years until her death in 1999. He and Dorothy joined GSOC in 1964, and he became President in 1968, leading his President's Trip to Coos Bay. He was also the editor of the GSOC Newsletter from 1992 to 1997.

In his professional life as a teacher, he taught science at Hayhurst Elementary School and Marshall and Jackson High Schools. His passion for geology, love of teaching, and encyclopedic knowledge of the geology of the Oregon Country showed in all of his GSOC activities, because he organized and ran numerous field trips, making sure everyone on his trips saw and understood what he was seeing. He organized and ran legendary three-day work parties the end of each April to OMSI's Camp Hancock—where one day was spent traveling and getting set up; one day doing hard physical labor such as cleaning, painting, and actual construction on the buildings; and one day taking field trips led by Don himself. He was also an excellent photographer and used his slides to illustrate talks that he gave both at Friday night lectures and at the noon programs GSOC used to have.

Both Don and Dorothy Barr loved the out of doors and both were Mazamas. Don was an avid skier and had boundless energy and enthusiasm. Don and Dorothy were quite a team—he was an expert on fossils, and she loved flowers, both living and fossilized. He was active in GSOC until problems with his knees kept him from doing the things he had loved so much. During his many years with GSOC, he was one of the vital members who really shaped the character of the society. When he realized his hiking, field-trip-leading, and talk-giving days were over, he gave his annotated collection of slides to GSOC member Clay Kelleher, who he knew would see that they were preserved and made available to others. Don is survived by his daughter Heather Whitney, son Alan Barr, and granddaughter Christine Whitney.



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

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- October 28, 2009, “Geology and Wine in Missouri: Spatial Analyses of Terroirs Using a Geographical Information System and Remote Sensing”, Kathryn Barnard, Ph.D. Student, Dept. of Geology, PSU
- November 4, 2009, “A Petrologic Investigation of Mafic Inputs Into the Augustine Volcano (Alaska) Magma System over the Past 2200 Years”, Arron Steiner, Ph.D. Student, Dept. of Geology, PSU,
- November 18, 2009, Graduate Student Thesis Proposals
- December 2, 2009, “Wenchuan Earthquake in China, May 12, 2008, One of World’s Most Destructive Earthquakes”, Scott Burns, Professor of Geology, Portland State University

Oregon State University Department of Geosciences 2009 Fall Seminar Series, Thursdays, 4:00 pm, 108 Wilkinson Hall, unless otherwise noted. Refer to department website for more information:

http://www.geo.oregonstate.edu/events/SeminarSeries/Seminar_Current.htm

- October 29, Ian Madin, DOGAMI, “Lidar in Oregon: New Data Promises, Exciting Discoveries and Lots of Fun “
- November 5, Doug Kennett, University of Oregon Department of Anthropology, “Climate Change and the Collapse of Classic Maya Society “
- November 12, Julia Jones, Oregon State University “Chaiten Volcano, Southern Chile: Eruption Chronology and Geomorphic, Ecological and Social Impacts “

- November 19, Qusheng Jin, University of Oregon Department of Geology, “Groundwater Arsenic Contamination in Southern Willamette Basin “
- November 26, No class
- December 3, Phil Mote, OSU OCCRI, “New Ways of Imagining Future Climate”

University of Oregon Department of Geological Sciences, Fall 2009 Weekly Seminar Series, 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.. Refer to department website for more information:

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

- October 28 - Margaret Mangan (USGS Menlo Park, CA), “Fire and Ice and the Alaskan Peninsula”
- November 4 - Frank Ramos (New Mexico State University), “Baitoushan Volcano: Evaluating the Complex Relationships of Crystals in Rhyolites”
- November 11 - Olivier Bachmann (University of Washington), “What controls the explosivity of volcanic eruptions?”
- November 18 - Benjamin Ellis (University of Leicester, UK), “Styles and Scales of Snake River-type volcanism”
- November 25 - No Seminar—Thanksgiving Week
- December 2 - Cindy Werner (USGS Cascades Volcano Observatory), topic TBA

EXCURSIONS INTO ZEOLITE COUNTRY

Synopsis of the October 9, 2009, lecture by Rudy Tschernich, Curator of the Rice Museum in Hillsboro, Oregon

Zeolite minerals, whose name is derived from the Greek word “to boil”, were the topic of Rudy Tschernich’s lecture to GSOC last month. Tschernich (pronounced CHER-nick) opened the talk by telling the audience that his 1992 magnum opus, *Zeolites of the World*, was available for free download at the mindat.org website. He did this to

foil scalpers who had been trying to sell the out of print reference for as much as \$400 over the internet.

Zeolites are minerals that have an aluminosilicate ((Al, Si)O₄) three-dimensional framework. Zeolite frameworks are constructed of AlO₄ or SiO₄ tetrahedra which form tubes or other openings. Water or other substances can be captured in these openings by their attraction to the oxygen ions in the tetrahedra. Elements captured in zeolites include Ca, Na, K, Li, Cs, Sr, Ba, and Mg.

Zeolites are used extensively in industry. They have the useful industrial properties of being molecular sieves, facilitating cation exchange, acting as catalysts, and being light in weight. Both natural and synthetic zeolites are used. Specific uses for zeolites include water softening, radioactive waste cleanup, ammonia absorbing products such as kitty litter and feed lot cleaning products, catalysts in oil refining, scrubbers for SO₂ in smokestacks, landfill gas removal, lightweight aggregate in concrete and brick, and many other uses.

Zeolites are formed naturally in several environments characterized by volcanic rock reacting with alkaline groundwater. In a hydrothermal alteration environment water heated at depth over a magma chamber migrates upward and forms minerals in cavities in the volcanic rock above. This is the case for zeolites found in Goble, Oregon. The vertical faults in the rock there provide a path for water to come up and deposit zeolites in vesicular lava flows.

Another environment for forming zeolites is when river valleys fill with basalt. The river water creates a lot of pockets in which zeolites can form. Sodium and potassium migrate into the pockets. Zeolites also can form in contact hydrothermal metamorphic environments and in pegmatites.

Zeolites that are commercially mined are usually found in areas where volcanic ash fell into saline lakes. The salty water over time converted the silicates in the ash into zeolite minerals such as heulandite and analcime. Zeolites can also form in

seawater, but the temperature of the water makes the reactions occur very slowly.

Tschernich's expertise is in finding and identifying natural zeolites. Tschernich displayed a zeolite map of the Pacific northwest to discuss with the GSOC audience. In general, zeolites are not found in the stratovolcanoes of the High Cascades because those formations are too young. But there are lots of older volcanic rocks in Oregon that are rich in zeolites. For example, the Eocene deposits in the Coast Range are excellent hunting grounds. Also, zeolites can be found in the older volcanic areas surrounding the stratovolcanoes. The deserts of eastern Washington are generally not good hunting grounds, because there wasn't enough water to deposit the minerals.

One of the highlights of the Rice Museum is the collection of zeolites that Tschernich found in a quarry near Pe Ell, Washington. The quarry contained several lava tubes that were lined with huge zeolite crystals. Tschernich obtained 90 boxes of zeolites that are now on display at the museum. Another very rich zeolite deposit can be found at a roadcut near Goble, Oregon, near the site of the old Trojan nuclear power plant. Several new species of zeolite minerals were discovered there, including the mineral Tschernichite which was named after Rudy. Several quarries in the Goble area also are rich in zeolites.

Agates and zeolites often form together depending on the amounts of silicate and aluminum that are present in the parent rock. Tschernich has found zeolites in the thunderegg beds in Richardson Ranch near Madras, Oregon.

Tschernich has a research idea for a geology graduate student. He would like to see someone study the zeolites found above and below the water level on the cliff at Oceanside to determine the effect of the ocean water on the zeolite mineralogy. He has noticed calcium rich zeolites above and sodium rich zeolites below in this area.

During the question and answer period, someone asked Tschernich how zeolite species are different and how different species are determined. The

main considerations in a zeolite species are its structure and its dominant cations. The structure can be determined using X-ray diffraction techniques. Zeolite species have a characteristic silicon to aluminum ratio. They can be chemically analyzed for cation content.

There are so many types of and uses for zeolites that it is clear we've only had a brief glimpse of this

fascinating topic. You can download Tschernich's book for a free glimpse of the world of zeolites – it's a meaty 237Mb file. Also, stop by the Rice Museum in Hillsboro to see the fabulous zeolite collection and a whole lot more.

Carol Hasenberg

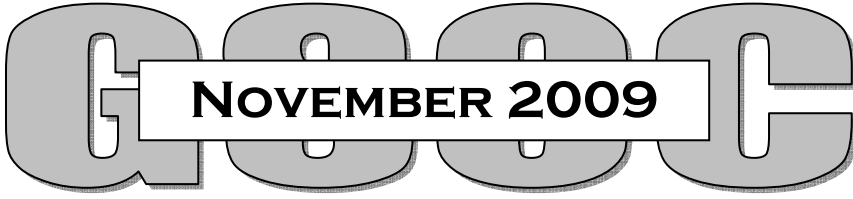
Nominating Committee Results

The following slate of officers has been selected by this year's nominating committee:

President.....	Larry Purchase
Vice President.....	Rik Smoody
Secretary.....	Beverly Vogt
Treasurer.....	Richard Bartels
Director, 3 years.....	Paul Edison-Lahm
Director, 2 years.....	Anne O'Neill
Director, 1 year.....	Dave Olcott

Nominations will also be open at the December club meeting on Friday, December 11, 2009. Consent of the nominees must be secured prior to their nomination. Nominations will be closed after the December meeting. Final nominations will be published in the January newsletter. The slate of officers will be voted on and approved at the February monthly meeting.

The Nominating Committee members are Larry Purchase, chair, Jan Kem and Anne O'Neill. Our thanks to the selected members and members of the Nominating Committee!



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- December 2 - Cindy Werner (USGS Cascades Volcano Observatory), topic TBA

BOARD MEETING NOTES

November 14, 2009

Board and GSOC members present included Carol Hasenberg, Larry Purchase, Beverly Vogt, Richard ‘Bart’ Bartels, Jan Kem, Dave Olcott, Clay Kelleher, Janet Rasmussen, Doug Rasmussen, Paul Edison-Lahm, Tara Schofstall, Dawn Juliano, Rosemary Kenney, and Evelyn Pratt.

The treasurer’s report was discussed. For this year, the organization has been able to meet its expenses with dues and other activity fees. Bart and member Dawn Juliano will meet in December for auditing the GSOC books.

Field trips were discussed. The GSOC board will find out details about the Fossil Fest usually held in February, The President’s Field Trip to eastern Oregon is scheduled for June. Another field trip is planned to Bull Run for July, and another overnight field and camping trip for the Gorge and Phillip Canyon in August. The GSOC board will see if we can hold two other trips in August or September.

Jan Kem gave the report of the Nominating Committee. The slate of next year’s officers is Larry Purchase, President; Rik Smoody, Vice President; Beverly Vogt, Secretary; Richard Bartels, Treasurer; Dave Olcott, one-year term Director; Anne O’Neill, two-year term Director, and Paul Edison-Lahm, three-year term Director; and Janet Rasmussen and Carol Hasenberg, Past Presidents.

The December meeting plans were discussed. The program, a review of the year’s field trips, will be held in Cramer Hall, and the Board voted to use a PSU facility for the post-meeting get-together, with several members volunteering to pay for the rental cost of \$165. This year’s speakers will receive special invitations to the get-together. The program will consist of four speakers, each of which will have 15 minutes for his/her presentations: Carol, the President’s trip; Dave, Waste, Wind, and Water trip; Clay, Silver Falls trip; and Bart, Crooked River/Newberry part of President’s trip. Bart and Bev will bring left-over field trip guides of the Mount Hood buried forests trip and a copy of Ian Madin’s new geologic map of Oregon, and Tara will prepare a poster of John Day fossil hunting.

For future publicity, GSOC will work on getting on the Portland Tribune’s email event publicity as well as the PSU calendar of events. GSOC will continue to try to get into the Oregonian.

The newsletter editor is considering making the Newsletter a quarterly publication, and GSOC will

consider ways of doing the monthly calendar differently so she won't have to have monthly deadlines. The newsletter editor is also looking for volunteers to prepare an issue or two of the newsletter each year. She also will make some revision to the newsletter format at the first of the year.

Bart, Rosemary, Dave, and Carol are the Annual Banquet committee. The banquet will be at the Monarch Hotel. There will be no sales table unless there are donations (no rocks or text books more than five-years old). GSOC will research use of Café Press for making novelties to sell and report on it at the next meeting.

The GSOC board is researching renting or purchasing a digital projector in time for the annual banquet. The Board approved spending \$500-\$700 on a projector, and the committee will report on such a purchase at the next meeting. The Board also authorized Bev and Bart to purchase a reduced price new GSA field trip guide for the GSOC library by the next meeting. The Board also voted to suspend the Wed. night seminars because of poor attendance.

The next meeting is scheduled for 10 a.m., Saturday, January 9, 2010, at Rosemary's house. Meeting adjourned.

Respectfully submitted,
Beverly Vogt, Secretary

Donations for GSOC Annual Banquet

Rosemary Kenney will be accepting donations of books, maps and other geology/natural history related items for the sale at the upcoming Annual Banquet.

Rosemary asks that you do NOT donate the following:

- NO rocks
- NO textbooks older than 5 years

For more information call Rosemary at 503/892-6514.

CATAclysms ON THE COLUMBIA

Synopsis of the November 13, 2009, lecture by Dr. Scott Burns, Portland State University Department of Geology

Based upon Dr. Burns' new book, The Great Missoula Floods, rev. 2nd Edition. by John Allen, Marjorie Burns, and Scott Burns

Great Enthusiasm! And a really interesting story - that's what made Dr. Scott Burns' talk so memorable. Of course, there was a remark about the Burns & Allen show, which those of us over a certain age connect with radio and TV. But for the most part the presentation dealt with updating John Eliot Allen's book, first printed twenty three years ago. Scott Burns has added better pictures, many taken by award winning photographer Darryl Lloyd, and extensive updated information.

Co-author Marjorie Burns of Portland State University English Department describes, in the first two chapters, how geologists think, write, and do detective work to figure out how our planet lives and changes. She also tells J Harlan Bretz' story - his growing realization of how colossal floods must have swept over much of the Pacific Northwest and his struggle to convince the highly skeptical geologic community of the same.

Some new features: The floods are now called the Missoula Floods, rather than the Bretz Floods. Calendar years are used in this edition rather than radiocarbon years before present. Color photos and improved shaded relief maps have been added. The history of the floods, the science of understanding them, and current thinking has been thoroughly elaborated.

Bretz evidently wasn't the soul of modesty. One photo shown was of "Five great men in one picture, four don't show." It was a snapshot of Bretz at Mount Rushmore, though the sculptured features of the presidents were not visible.

Maps of the Pend Orielle lobe, show that Glacial Lake Missoula's 530 cubic miles of water was held

back by 50 cubic miles of ice. The first and largest flood emptied the lake in three days. Ninety floods reached Spokane, with forty of those reaching as far up the Willamette Valley as Eugene. In order to create gravel bars as large as the ones we see today, flood water must have been flowing 50 to 60 miles per hour.

Bretz made presentations about the floods from 1923 to 1927. In 1927 five famous geologists invited Bretz to give a talk, with the secret agenda of pushing the Uniformitarian's point of view, and proving Bretz wrong. Joseph Pardee, who'd been mapping in Montana, worked under one of the five. He said quietly to another member of the audience, "I know the source of the water," but failed to make a point of it considering his junior position. During the next thirteen years, alternate theories were pushed to explain the floods. Eventually some geologists began to see the merit of Bretz's ideas. In 1940 Pardee retired, and pointed out ripples 50 feet high and spaced up to 500 feet apart, "from an ancient flood." The beauty of the story is that Bretz lived to be 98 years old, and outlived all his detractors. He saw his ideas vindicated and was honored for all his hard work.

A present-day geologist, Vic Baker, added mathematical calculations and studied more areas in the world where floods occurred, as well as pointing out flood features on Mars. Richard Waitt of the Cascades Volcano Observatory made huge contributions to Missoula Floods knowledge. In 1982-83 he proved and dated multiple floods. Brian Atwater noted rhythmites with varves between, showing where lakes had lain between floods. Jim O'Connor studied the Bonneville Flood, which flowed from the present-day, Great Salt Lake.

The Missoula Floods took place between 15,000 and 18,000 years ago. The ice dam that held back Glacial Lake Missoula probably broke from water seeping through the ice. A nine-mile section shows palely colored river sediments and fifty eight darkly colored varves.

As the floods commenced, five hundred-foot-deep Glacial Lake Missoula added its waters to Glacial Lake Columbia. The Cheney-Palouse scablands was one result. When the floodwaters reached mile-wide Wallula Gap, they were hydraulically dammed and formed Lake Lewis. After the last Missoula flood, 24 cubic miles of material formed the Corfu landslide on Saddle Mountain. Glacial erratic have been found 50 miles up the Deschutes River. Beacon Rock is a relatively recent 56,000 year old Boring lava formation.

Floods poured into the Portland area at about 40-60 miles per hour. Boulders ice-rafted into the Willamette Valley probably included the famous Willamette meteorite, now in the American Museum of Natural History in New York. It was found at the 400 foot level, which is about the floods lake level in the Willamette Valley. In Newberg, one slope shows 150 feet of level rhythmites. Sands from the Missoula Floods have been found on the ocean seafloor all up and down the coast as far south as Mendocino, California.

There is recent evidence supporting the fact that there have been even more ancient floods. In a road cut five miles south of The Dalles, evidence for a 600,000 year-old flood has been found. More work is coming on older cataclysmic floods, some from all over the world.

What hasn't been written about until now are catastrophic floods dating back much further than 18,000 years. Evidence exists for floods dating as far back as 2.6 million years. We found a buried boulder outside Corvallis with 40 rhythmites (layers of sediment) on top of it. It is on top of eroded soil and was weathered through. It was ice rafted in on floods that occurred more than 2 million years ago.

The nation's next national park will be the "Ice Age Floods Trail," which will feature 13 or more visitor centers. Stay tuned!

Evelyn Pratt

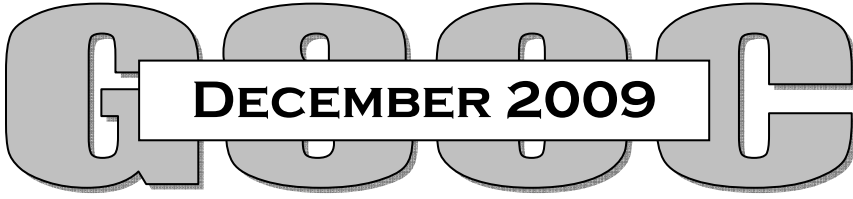
Nominating Committee Results

The following slate of officers has been selected by this year's nominating committee:

President.....	Larry Purchase
Vice President.....	Rik Smoody
Secretary.....	Beverly Vogt
Treasurer.....	Richard Bartels
Director, 3 years.....	Paul Edison-Lahm
Director, 2 years.....	Anne O'Neill
Director, 1 year.....	Dave Olcott

Nominations will also be open at the December club meeting on Friday, December 11, 2009. Consent of the nominees must be secured prior to their nomination. Nominations will be closed after the December meeting. Final nominations will be published in the January newsletter. The slate of officers will be voted on and approved at the February monthly meeting.

The Nominating Committee members are Larry Purchase, chair, Jan Kem and Anne O'Neill. Our thanks to the selected members and members of the Nominating Committee!



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GSOC MINI-CALENDAR

DECEMBER ACTIVITIES

Friday evening talk, December 11, 2009, at 8 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University: Topic of the meeting to be “What GSOCers did on their Summer Field Trips,” and will feature various GSOC members with slides, rocks, and any other appropriate materials. After the meeting GSOC members and their guests are invited to a small holiday get-together. Details will be announced at the meeting.

FUTURE ACTIVITIES

Friday evening talk, January 8, 2010, at 8 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University: Topic of the meeting to be announced.

Check the GSOC website (www.gsoc.org) for updates to the calendar.

FOR DETAILS, SEE INSIDE