



# THE GEOLOGICAL NEWSLETTER

"NEWS OF THE GEOLOGICAL SOCIETY OF THE OREGON COUNTRY"

VOLUME 76, NUMBER 1  
JANUARY/FEBRUARY 2010

## The Geological Society of the Oregon Country

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VISITORS WELCOME AT ALL MEETINGS

## CALENDAR

### FEBRUARY ACTIVITIES

Friday evening talk, February 12, 2010, at 8 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University: Speaker Dr. Paul Hammond of Portland State University will present "Mapping Columbia River Basalt lava flows in central Washington: What it tells us about tectonic plate activity."

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 6<sup>th</sup> Aves. and Harrison and Hall Sts.

### FUTURE ACTIVITIES

GSOC Seventy Fifth Annual Banquet, Sunday, March 21, 2010, 1:00 p.m. at the Monarch Hotel in Clackamas, Oregon. Speaker Dr. Robert J. Carson of Whitman College will present "Where the Great River Bends: A natural and human history of the Columbia at Wallula," based upon his recent book of the same title. See page 9 of this newsletter for the registration form.

Check the GSOC website ([www.gsoc.org](http://www.gsoc.org)) for updates to the calendar.

### UPCOMING ACTIVITIES FROM OTHER ORGANIZATIONS

This year's FOSSILFEST 2010 at Hatfield Marine Science Center Visitor Center in Newport, Oregon, will be held on February 13, 2010, from 9 am until 4 pm. Bill Orr and Ellen Morris Bishop are the scheduled speakers. You may bring your fossils in to have them identified. If you are interested in joining informally arranged activities with other Society members, check in

with those staffing the informational table for GSOC. Activities may include meals at local restaurants, walks on the beach to look for fossils, or other side trips and gatherings. Attendees should make their own arrangements for overnight lodging on Saturday if they desire to stay for the entire weekend. Recommendations of lodging may be found on our website ([www.gsoc.org](http://www.gsoc.org)) in a link to this event. Call Janet Rasmussen at 541/753-0774 for more information about GSOC participation.

Concordia University Portland will host the 2010 **Oregon Academy of Sciences Annual Meeting** on Saturday, February 27, 2010 (8 AM - 3 PM). Registration deadline is February 12. For more information and registration form visit the website at <http://www.oas.pdx.edu/>.

The 2010 **Seismological Society of America Meeting** will be held in Portland, Oregon.: More than 500 seismologists from around the world will convene at the Seismological Society of America (SSA) annual conference on April 21 – 23. SSA is an international scientific society devoted to the advancement of seismology and its applications in understanding and mitigating earthquake hazards and in imaging the structure of the earth. The searchable database of meeting abstracts will be available in February. For a complete description of special sessions, visit [http://www.seismosoc.org/meetings/2010/specialsession\\_s.php](http://www.seismosoc.org/meetings/2010/specialsession_s.php). SSA will also convene a town hall meeting about earthquake preparedness for Portland residents on April 21. For more information, please visit the SSA meeting home page: <http://www.seismosoc.org/meetings/2010/index.php>.

**Portland State University Geology Department Geology Winter Colloquium 2010**, Cramer Hall S17, 3:30-4:30 p.m.. All are invited to attend! For information contact: Scott Burns, 503, 725-3389, [burnss@pdx.edu](mailto:burnss@pdx.edu), or refer to the department website: <http://geology.pdx.edu/node/3>

- Jan 27 On the Leading Edge, Early Pacific Northwest Exploration and the Roots of American Fluvialism, Jim O'Connor, USGS
- Feb 3 Stories in Stone, Travels through Urban Geology, David Williams, writer
- Feb 10 Understanding debris flows: you know it don't come easy, Dick Iverson, USGS
- Feb 17 Klamath Water, Application of groundwater models to Klamath River Basin, Marshall Gannett, USGS

- Feb 24 Old Glaciers, Late Pleistocene Chronology of Alpine Glaciation for the western US, Shaun Marcott, OSU
- Mar 3 When the Sandy River bed was 20 m higher: Extreme sediment loading during Mount Hood's last eruption, Tom Pierson, USGS.
- Mar 10 Ooze or Explode?, Geochemical control on Mount Hood's plumbing and eruptive behavior, Alison Koleszar, OSU

**Oregon State University Department of Geosciences 2010 Winter 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](http://www.geo.oregonstate.edu/events/SeminarSeries/Seminar_Current.htm)

- February 4 Jeff Shaman, Oceanic and Atmospheric Sciences, Oregon State University Absolute Humidity and the Seasonality of Influenza
- February 11 John Dilles, Dept. of Geosciences, Oregon State University So We Want Hybrid Fuel-Efficient Cars and Solar Panels. What will be our real mineral and energy footprint?
- February 18 Dan Gavin, Dept. of Geography, University of Oregon Climate-Driven Variation in Fire Occurrence and Severity Over the Past 2000 Years in the Siskiyou Mountains, Oregon: Implication for current fire regimes
- February 25 Cathy Busby, Geological Sciences, UC, Santa Barbara The Birth of the Sierra Nevada Microplate
- March 4 Pat Corcoran, Oregon Sea Grant and , Dept. of Geosciences, Oregon State University Coastal Storms and Hazards: Research and Engagement in North Coast Communities
- March 11 Jack Barth, Oceanic and Atmospheric Sciences, Oregon State University, Hypoxia off the Coast of Oregon and its Relation to Climate Change

**University of Oregon Department of Geological Sciences, Winter 2010 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>

- January 27 - Eldon M. Gath (Earth Consultants International) , Tectonic Geomorphic and Paleoseismic Investigations for the Panama Canal Expansion Project

- February 3 - John Vidale (University of Washington), Episodic Tremor and Slip, the curious third wheel of fault motion
- February 10 - Dr. William C. Hammond (University of Nevada, Reno), What GPS studies tell us about deformation in the interior Western US
- February 17 - Mark Hemphill-Haley (Humboldt State University), Neotectonic Studies, North and South Islands, New Zealand or Why Sabbaticals are Good for the Soul
- February 24 - Cathy Busby (University of California Santa Barbara), Birth of the Sierra Nevada Microplate
- March 3 - Robert Yeats (Oregon State University), Slip rate budget across orogenic belts: Northern Pakistan case history
- March 10 - John W. Valley (University of Wisconsin), Zircon from Hell

## BOARD MEETING NOTES

January 9, 2010

Board and GSOC members present included Carol Hasenberg, Larry Purchase, Beverly Vogt, Richard Bartels, Jan Kem, Dave Olcott, Anne O'Neill, Clay Kelleher, Janet Rasmussen, Doug Rasmussen, Paul Edison-Lahm, Tara Schofstell, Rosemary Kenney, Rik Smoody, and John Newhouse.

The agenda and the minutes of the November 14, 2009, Board meeting were approved. The Treasurer's report was discussed. We ended with \$2000 more than last year at the end of the year, partially because we received a bequeathal of \$1000 from Bob Richmond's estate. The Treasurer's report was approved.

To facilitate transfer of duties from outgoing officers and chairs to new officers and chairs, Carol asked all relevant people to create and bring to the next meeting a formal description of his/her duties, a list of all GSOC property in his/her possession, and a supplemental list of all contacts and other specific information that would be useful to the new officer. The formal description of duties and list of GSOC property in your possession should be posted on the GSOC bulletin board. The supplemental list should not be a public document, but hard copies of it, the position description, and list of GSOC

properties in your possession should be brought to the next meeting. In addition to officers, people who need to prepare such information are Business Manager, Internet Publicity Chair, Archivist, Field Committee Chair, Host Committee Chairs, Newsletter Editor, Property Chair, and Librarian. The incoming President, Larry Purchase, will work on filling the vacant chair positions. Bev is to send digital copies of the bylaws to all board members by email.

It was decided that because of the success of the December meeting/party, we will do the same thing next December, except the whole event, including light dinner buffet, review of field trips, and social time with music will be at the Simon Benson House. We need to encourage donations to cover the cost of reserving the house.

From now on, the Newsletter will be bimonthly, with the calendar sent out in intervening months. Carol wants anyone with suggestions for changes in format to send them to her as soon as possible.

The Banquet is March 21. Arrangements are being made to have two of Bob Carson's books for sale at the banquet. The banquet flier will be available in the next Newsletter. Banquet arrangements were discussed. The Board voted to authorize Tara to set up the online store for sales of GSOC memorabilia and to purchase example products to show at the sales table to encourage people to buy such items online. Special service awards to some of the members were discussed.

Field trips were discussed. Larry's President's Trip is scheduled for June 18-22, with camping at Delintment Lake. Larry will check on possibility of reserving a group camp site and will provide a field trip guide. Clay will work on a Bull Run trip for July 10 or 17, Dave and Larry will have their overnight field and camping trip in August. Ken Cameron will have his geology/hiking trip to Ramona Falls in September. Bev will talk with Joe Conrad to see if he will lead another building stones trip. Fossil Fest is Feb. 13. Our plans are informal, and people will stay as long as they like. Larry will organize and set up GSOC table. Bev and Bart will bring the laminated Oregon geologic map, banner,

brochures, and applications. Clearing house for plans and information will be at the GSOC table. Janet will send information about the Fossil Fest to Carol for the Newsletter as soon as possible.

Jan, Anne, and Dave reported on their research for purchasing a digital projector in time for the annual banquet. The Board gave Dave authority to purchase the Hitachi CP-X3010 LCD digital projector. Thanks were given to the committee for doing such complicated research.

Carol reminded the board that they were authorized to purchase a reduced price new GSA field trip guide for the GSOC library. A committee of Larry, Clay, Paul, and Rosemary were appointed to research what to do when we need a larger meeting room and how we can recover the cost of such a larger space. One suggestion is to ask for a donation of \$1 or \$2 dollars for such good programs. Board members are reminded of the Oregon Academy of Science meeting, Feb. 27, at Concordia University in northeast Portland. We also want to thank Rosemary again for hosting our Board meetings and supplying us with food and drinks!!

The next meeting is scheduled for 10 a.m., Saturday, March 20, 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.

## **Costa Rica's Tectonic Setting**

Synopsis of the January 8, 2010, lecture by Dr. Martin Streck, Department of Geology, Portland State University  
by Carol Hasenberg

Dr. Martin Streck, who has led field trips to Costa Rica five times, specializes in Igneous Petrology and Volcanology at Portland State University. Streck started the presentation about Costa Rica by describing the physical provinces of the Central American country. Costa Rica contains several mountain ranges that run more or less parallel to its Pacific (southern) shore, the Cordilleras Guanacaste, Tilarán, Central, and Talamanca from west to east. These mountains get ever higher from west to east, which was discussed later in the lecture. Two of the highest peaks in Costa Rica are Irazú in the Cordillera Central and Cerro Chirripó (the highest at 3820 m.) in the Cordillera Talamanca. The Central Valley, containing eighty percent of the population of the country, lies adjacent and south and west of the backbone of the country. The Nicoya peninsula is located on the Pacific shore to the west of the Central Valley. The Caribbean lowlands on the northern shore are moist and tropical.

The tectonic setting which has produced this dramatic landscape is very complex. There are two key features to the tectonic setting. One of these is the fact that two remnants of the ancient Farallon plate, which has by now been largely subducted below the North American plate, are key players in the tectonic activity. The Cocos plate, one of these remnants, lies off the coast of Mexico and Central America and is traveling northeast with a relative motion of about 80 mm per year. The other remnant, the Nazca plate, is subducting into South America with an eastern motion. The Galapagos hot spot is the other key feature of the tectonic setting. This hot plume is located at the boundary between the Cocos and Nazca plates and has sent volumes of material both towards Central America and South America on these plates.

According to the formation model described by Streck, the Galapagos hot spot was instrumental in

creating a new tectonic plate sandwiched between the North American and South American plates. This became the Caribbean plate that we see today. It began as a massive basaltic outpouring which occurred in the initial phase of eruptions from the hot spot, about 90 million years ago. Geologists infer this by the fact that the basement basaltic rock found all over the Caribbean plate is about the same age and composition. The Caribbean plate was carried north and east from the hot spot location and developed its current size and boundaries over time. Meanwhile the hot spot eruptions continued but on a lesser scale. We can see the result by studying a map of the ocean floor, which shows ridges of volcanoes that emanate both northeast and east from the Galapagos Islands.

Today the land bridge of Central America that stretches between the large American continents is at the southwestern edge of the Caribbean plate, and is a volcanic arc. The Cocos plate subducts below the Caribbean plate on the Pacific coast of Costa Rica. Along with the Cocos plate has ridden the trail of the volcanic ridge from the Galapagos. Streck believes that this ridge is in the process of plugging the current subduction trench where it intersects the Costa Rican coast near the Cordillera Talamanca. This is borne out by the fact that the Talamanca volcanoes are currently not very active, whereas the other volcanoes in Costa Rica are very active. Eventually the subduction zone will migrate to a new location in response to this impediment.

A further complexity to this tectonic geometry is the Panamanian microplate, which is located on the southwestern edge of the Caribbean plate. It contains the southeastern third of Costa Rica and Panama. With all these plate boundaries intersecting near or through the country, Costa Rica is a very geologically hazardous land.

Streck showed an elevation chart of Central American volcanoes from Guatemala to Costa Rica (west to east) which showed their base heights as well as their peak heights. At either end of the chart were taller peaks but also higher base elevations. In Costa Rica the volcanoes on the west side of the country have bases close to sea level and peak heights of about 2000 m. On the eastern side in the

Cordillera Talamanca the base heights are about 2000m. with a peak height just below 4000 m. This also demonstrates the effect of the Galapagos volcanic ridge upon the geography of the country.

In addition to easily seen effects of the hot spot, it is also possible to distinguish characteristic magma trace element proportions for different volcanic ranges in Central America. Streck showed some example charts showing Barium/Lanthanum ratios from Guatemala to Costa Rica, with the central zone in Nicaragua having a much higher ratio than that of the earth's mantle. The big picture inferred by this research is that in the central zone more recycled crust material is entering into the magmas.

With all this geologic complexity and hazard, Central American countries should provide very fertile research areas for geologists like Dr. Streck for years to come. They would also be very fascinating places to visit.

### References and Additional Reading

CentralAmerica.com site provided me with descriptions and spellings of the provinces of Costa Rica:

<http://centralamerica.com/cr/moon/moland.htm>

Wikipedia has good references on the Caribbean plate and other tectonic topics:

[http://en.wikipedia.org/wiki/Caribbean\\_Plate](http://en.wikipedia.org/wiki/Caribbean_Plate)

[http://en.wikipedia.org/wiki/List\\_of\\_tectonic\\_plates](http://en.wikipedia.org/wiki/List_of_tectonic_plates)

Rutgers University has a lot of information about Central America and field trips which they have done:

<http://www-rci.rutgers.edu/~carr/index.html>

USGS page "Poster of the Seismicity of the Caribbean Plate and Vicinity" has nice downloadable maps of the area

<http://earthquake.usgs.gov/earthquakes/eqarchives/poster/regions/caribbean.php>

At the time of this writing, the January 12, 2010, magnitude 7.0 earthquake in Port-au-Prince, Haiti, has just occurred. This is a Caribbean plate seismic

event. Please refer to the USGS website and humanitarian organizations for more information: <http://earthquake.usgs.gov/earthquakes/recenteqsw/w/Quakes/us2010rja6.php>

## Types of Volcanic Eruptions

*Editor's note: The following definitions are from the USGS web page,*

*<http://pubs.usgs.gov/gip/volc/eruptions.html>, maintained by John Watson and was last modified 2/5/97. Geologists have names which describe the manner or pattern in which volcanoes erupt. These types of eruptions have historic precedents and most, but not all, of the names refer to the precedents. You can also link to the USGS web page and view the pictures that accompany the descriptions.*

“In a **Strombolian**-type eruption observed during the 1965 activity of Irazú Volcano in Costa Rica, huge clots of molten lava burst from the summit crater to form luminous arcs through the sky. Collecting on the flanks of the cone, lava clots combined to stream down the slopes in fiery rivulets.”

“In contrast, the eruptive activity of Parícutin Volcano in 1947 demonstrated a "**Vulcanian**"-type eruption, in which a dense cloud of ash-laden gas explodes from the crater and rises high above the peak. Steaming ash forms a whitish cloud near the upper level of the cone.”

“In a "**Vesuvian**" eruption, as typified by the eruption of Mount Vesuvius in Italy in A.D. 79, great quantities of ash-laden gas are violently discharged to form cauliflower-shaped cloud high above the volcano.”

“In a "**Peléan**" or "Nuée Ardente (glowing cloud) eruption, such as occurred on the Mayon Volcano in the Philippines in 1968, a large quantity of gas, dust, ash, and incandescent lava fragments are blown out of a central crater, fall back, and form tongue-like, glowing avalanches that move downslope at velocities as great as 100 miles per

hour. Such eruptive activity can cause great destruction and loss of life if it occurs in populated areas, as demonstrated by the devastation of St. Pierre during the 1902 eruption of Mont Pelée on Martinique, Lesser Antilles.”

“"**Hawaiian**" eruptions may occur along fissures or fractures that serve as linear vents, such as during the eruption of Mauna Loa Volcano in Hawaii in 1950; or they may occur at a central vent such as during the 1959 eruption in Kilauea Iki Crater of Kilauea Volcano, Hawaii. In fissure-type eruptions, molten, incandescent lava spurts from a fissure on the volcano's rift zone and feeds lava streams that flow downslope. In central-vent eruptions, a fountain of fiery lava spurts to a height of several hundred feet or more. Such lava may collect in old pit craters to form lava lakes, or form cones, or feed radiating flows.”

“"**Phreatic**" (or steam-blast) eruptions are driven by explosive expanding steam resulting from cold ground or surface water coming into contact with hot rock or magma. The distinguishing feature of phreatic explosions is that they only blast out fragments of preexisting solid rock from the volcanic conduit; no new magma is erupted. Phreatic activity is generally weak, but can be quite violent in some cases, such as the 1965 eruption of Taal Volcano, Philippines, and the 1975-76 activity at La Soufrière, Guadeloupe (Lesser Antilles).”

“The most powerful eruptions are called "**plinian**" and involve the explosive ejection of relatively viscous lava. Large plinian eruptions--such as during 18 May 1980 at Mount St. Helens or, more recently, during 15 June 1991 at Pinatubo in the Philippines--can send ash and volcanic gas tens of miles into the air. The resulting ash fallout can affect large areas hundreds of miles downwind. Fast-moving deadly pyroclastic flows ("nuées ardentes") are also commonly associated with plinian eruptions.”

# THE GEOLOGICAL NEWSLETTER INDEX

Volume 75, 2009

compiled by Carol Hasenberg

January.....no.1 .....	pages 1-7	July .....	no.7.....	pages 43-49
February.....2 .....	7-14	August.....8.....		50-56
March.....3 .....	15-21	September.....9.....		57-63
April.....4 .....	22-28	October.....10.....		64-67
May.....5 .....	29-35	November.....11.....		68-72
June.....6 .....	36-42	December.....12.....		73-78

## ARTICLES and REPORTS..... Page

A New Perspective on Oregon Fossils, Synopsis of the May 9, 2009, lecture by Dr. Willliam Orr of OSU, by Carol Hasenberg .....	38
A Tale of Two Calderas, Synopsis of the February 13, 2009, lecture by Mark Ferns and Jason McClaughry of DOGAMI, by Carol Hasenberg .....	17
Catclysms on the Columbia, Synopsis of the November 13, 2009, lecture by Dr. Scott Burns of PSU, by Evelyn Pratt ..	75
Caving in Oregon, Synopsis of the September 17, 2009, Lecture by Patty and Roger Silver of the Oregon Grotto of the National Speleological Society, by Carol Hasenberg .....	65
Checklist for Geosearching the Web, by Tara Schoffstall .....	11
Excursions into Zeolite Country, Synopsis of the October 9, 2009, lecture by Rudy Tschernich of the Rice Museum, by Carol Hasenberg .....	69
Is It a Meteorite (or a Meteor-Wrong)?, by Carol Hasenberg .....	19
Meteorites on the Road, Synopsis of the June 12, 2009, lecture by Dick Pugh of the Cascadia Meteorite Laboratory, by Evelyn Pratt .....	46
Oregon Aggregate Mine Permitting: Working Towards Economic and Ecologic Harmony, Synopsis of the December 12, 2008, lecture by Ben Mundie of DOGAMI, by Carol Hasenberg .....	3
The Cascadian Graben, by Janet Rasmussen .....	45
The Effects of the Ice Age Floods on the Portland Region, Synopsis of the April 10, 2009, lecture by Rick Thompson and Sylvia Thompson, by Carol Hasenberg .....	31
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 at USGS CVO, by Carol Hasenberg .....	26
Wave Energy: The Wave of the Future? Synopsis of the January 9, 2009, lecture by Justin Klure of Pacific Energy Ventures, LLC, by Carol Hasenberg .....	9
What's a Nannofossil?, by Carol Hasenberg .....	40

## AUTHORS

Hasenberg, Carol:

Oregon Aggregate Mine Permitting: Working Towards Economic and Ecologic Harmony, Synopsis of the December 12, 2008, lecture by Ben Mundie of DOGAMI.....	3
Wave Energy: The Wave of the Future? Synopsis of the January 9, 2009, lecture by Justin Klure of Pacific Energy Ventures, LLC .....	9
A Tale of Two Calderas, Synopsis of the February 13, 2009, lecture by Mark Ferns and Jason McClaughry of DOGAMI .....	17
Is It a Meteorite (or a Meteor-Wrong)? .....	19
"Dream Bigger Dreams," Synopsis of GSOC President Hasenberg's inaugural address, March 8, 2009 .....	24
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 at USGS CVO.....	26
The Effects of the Ice Age Floods on the Portland Region, Synopsis of the April 10, 2009, lecture by Rick Thompson and Sylvia Thompson .....	31
A New Perspective on Oregon Fossils, Synopsis of the May 9, 2009, lecture by Dr. Willliam Orr of OSU.....	38

What's a Nannofossil?.....	40
A Trip to the Dalles, Synopsis of the June 2009 Waste, Wind, and Water Field Trip .....	51
A Trip to the Dalles, cont. ....	58
SOTA Revisited, 2009 President's Field Trip Synopsis .....	60
Caving in Oregon, Synopsis of the September 17, 2009, Lecture by Patty and Roger Silver of the Oregon Grotto of the National Speleological Society .....	65
Excursions into Zeolite Country, Synopsis of the October 9, 2009, lecture by Rudy Tschernich of the Rice Museum .....	69
Pratt, Evelyn:	
Meteorites on the Road, Synopsis of the June 12, 2009, lecture by Dick Pugh of the Cascadia Meteorite Laboratory.....	46
Catclysms on the Columbia, Synopsis of the November 13, 2009, lecture by Dr. Scott Burns of PSU.....	75
Rasmussen, Janet:	
The Cascadian Graben .....	45
Schoffstall, Tara:	
Checklist for Geosearching the Web .....	11
 <b>FIELD TRIPS</b>	
A Trip to the Dalles, cont., by Carol Hasenberg.....	58
A Trip to the Dalles, Synopsis of the June 2009 Waste, Wind, and Water Field Trip, by Carol Hasenberg.....	51
SOTA Revisited, 2009 President's Field Trip Synopsis, by Carol Hasenberg.....	60
 <b>SOCIETY BUSINESS</b>	
"Dream Bigger Dreams," Synopsis of GSOC President Hasenberg's inaugural address, March 8, 2009, by Carol Hasenberg .....	24
Board Meeting Notes: April 10, 2009, by Beverly Vogt .....	32
Board Meeting Notes: December 13, 2008, by Beverly Vogt .....	4
Board Meeting Notes: February 13, 2009, by Beverly Vogt .....	16
Board Meeting Notes: June 6, 2009, by Beverly Vogt .....	47
Board Meeting Notes: November 14, 2009, by Beverly Vogt.....	74
Generous Bequest to GSOC.....	9
GSOC Society Dues Payment Schedule Changes .....	2
 <b>MEMORIALS</b>	
Deceased GSOC Member [Marilyn Lum] Led Quiet but Interesting Life .....	48
In Memoriam - Ewart Baldwin .....	40
In Memoriam - Terry Norman Toedtemeier and Robert Ernest Richmond.....	2
Long-Time GSOC Member Don Barr Dies .....	66
 <b>MISCELLANEOUS</b>	
Volcanic News from Alaska .....	33



# . GEOLOGICAL SOCIETY OF THE OREGON COUNTRY SEVENTY FIFTH ANNUAL BANQUET

## Speaker

The Geological Society of the Oregon Country will be having its 75th Annual Banquet on Sunday March 21, 2010. Speaker Dr. Robert J. Carson of Whitman College will present *“Where the Great River Bends: A natural and human history of the Columbia at Wallula,”* based upon his recent book of the same title. Dr. Carson will discuss the geology, natural history, and human history of the Wallula area, with emphasis on the geology. There will be copies of the new book and his book Hiking Guide to Washington Geology (Keokee Books, 2009) available for purchase at the event.

## 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 Primavera** (linguine and fresh vegetables tossed in 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.

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## **GSOC 75<sup>TH</sup> 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:

_____	<b>Meal choice (circle one)</b>	<b>Pot Roast</b>	<b>Pasta</b>	<b>Chicken</b>
_____	<b>Meal choice (circle one)</b>	<b>Pot Roast</b>	<b>Pasta</b>	<b>Chicken</b>
_____	<b>Meal choice (circle one)</b>	<b>Pot Roast</b>	<b>Pasta</b>	<b>Chicken</b>
_____	<b>Meal choice (circle one)</b>	<b>Pot Roast</b>	<b>Pasta</b>	<b>Chicken</b>

\_\_\_\_\_ Amount enclosed. *Reservations must be received by Monday, March 15, 2010.*

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

# GEOLOGICAL SOCIETY OF THE OREGON COUNTRY ACTIVITIES:

**ANNUAL EVENTS:** President's Field Trip—Summer or Fall; Banquet—March; Annual Business Meeting—February.

**FIELD TRIPS:** About 4 per year. Fees: see field trip announcements on the calendar next page.

**GSOC LIBRARY:** Rm. 69, Cramer Hall, Portland State University. Open 7:30 p.m. prior to meetings.

**PROGRAMS:** Second Friday evening most months, 8:00 p.m., Rm. S17, Cramer Hall, PSU, SW Broadway at SW Mill St., Portland, Oregon.

**MEMBERSHIP:** Per year from January 1: Individual--\$25, Family--\$35, Junior (under 18)/Student--\$15. Membership applications are available on the website [www.gsoc.org](http://www.gsoc.org).

**PUBLICATIONS:** **THE GEOLOGICAL NEWSLETTER (ISSN 0270 5451)**, published monthly and mailed to each member. Subscriptions available to libraries and organizations only at \$20.00 per year. Single Copies are available at \$2.00 each. Order from:

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# THE GEOLOGICAL NEWSLETTER

"NEWS OF THE GEOLOGICAL SOCIETY OF THE OREGON COUNTRY"

VOLUME 76, NUMBER 2  
MARCH/APRIL 2010

## The Geological Society of the Oregon Country

P.O. Box 907, Portland, OR 97207-0907

[www.gsoc.org](http://www.gsoc.org)

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Larry Purchase – 360/254-5635

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VISITORS WELCOME AT ALL MEETINGS

## CALENDAR

### APRIL ACTIVITIES

Friday evening talk, April 9, 2010, at 8 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University: Speaker Thomas C. Pierson of the USGS Cascades Volcano Observatory in Vancouver, Washington will present "When the Bed of the Sandy River was 20m Higher," a look at dramatic channel aggradation of the lower Sandy River that resulted from a dome-building eruption (AD 1780-1793) during the most recent volcanic activity at Mount Hood.

Dr. Pierson has worked for the CVO since 1980 and also is an Adjunct Professor at also Adjunct Professor with the Dept. of Geology at Portland State University and a licensed geologist in the State of Washington. His work focuses on volcano hazards involving the mobilization and rapid movement of rock debris and water down the

flanks of volcanoes—lahars, debris avalanches, and floods.

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 6<sup>th</sup> Aves. and Harrison and Hall Sts.

### FUTURE ACTIVITIES

Friday evening talk, May 14, 2010, at 8 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University: Speaker William E. Scott of the USGS Cascades Volcano Observatory in Vancouver, Washington will present "Re-evaluation of the Magnitude of the Great A.D.1835 Eruption of Cosiguina Volcano, Nicaragua."

The eruption of Cosiguina Volcano, Nicaragua, in 1835 was described by witnesses in truly catastrophic terms. The research community that assesses atmospheric impacts of eruptions through study of ice cores has long searched for signs of the eruption, but found little convincing evidence. Two brief field investigations of Cosiguina during the past few decades have shown that the eruption was more modest than related by eyewitnesses, but that a repeat would nonetheless have substantial consequences for the region.

Check the GSOC website ([www.gsoc.org](http://www.gsoc.org)) for updates to the calendar.

## **?? Question to the GSOC Membership ??**

Should we hold the Friday night meetings at 7:30 p.m. rather than 8:00 p.m.? Please send your feedback to President Larry Purchase, in person at the April meeting, or phone 360/254-5635 or email [lkpurchase@q.com](mailto:lkpurchase@q.com).

## **A NOTE FROM THE EDITOR --**

“Why didn’t I get a newsletter or calendar last month?” I have heard many members ask me this past month. I should have sent out a calendar or newsletter but as there was no news, well, I just didn’t do it. I apologize. Also, this is the March/April edition of the newsletter, even though you won’t receive it until the beginning of April. Next month we will issue the May/June issue and will be back to being caught up. You can expect to receive a newsletter from now on and a calendar in the off-months from now on. We also may include field trip flyers on the off-months, so remember to check!

## **UPCOMING ACTIVITIES FROM OTHER ORGANIZATIONS**

The **2010 Seismological Society of America Meeting** will be held in Portland, Oregon.: More than 500 seismologists from around the world will convene at the Seismological Society of America (SSA) annual conference on April 21 – 23. SSA is an international scientific society devoted to the advancement of seismology and its applications in understanding and mitigating earthquake hazards and in imaging the structure of the earth. The searchable database of meeting abstracts will be available in February. For a complete description of special sessions, visit <http://www.seismosoc.org/meetings/2010/specialsessions.php>. SSA will also convene a town hall meeting about

earthquake preparedness for Portland residents on April 21. For more information, please visit the SSA meeting home page:

<http://www.seismosoc.org/meetings/2010/index.php>.

## **BOARD MEETING NOTES**

March 20, 2010

The meeting was called to order by President Larry Purchase at home of Rosemary Kenney. Board and GSOC members present included Larry Purchase, Rik Smoody, Beverly Vogt, Richard Bartels, Dave Olcott, Anne O’Neill, Janet Rasmussen, Paul Edison-Lahm, Jan Kem, Tara Schoffstall, Rosemary Kenney, Dawn Juliano, and Carol Hasenberg.

The agenda, the minutes of the January 10, 2009, Board meeting, the election, the annual GSOC business meeting and the Treasurer’s report were approved. Larry appointed Janet to be Sgt.-at-Arms to keep the meeting on track.

As part of the transfer of duties from outgoing officers and chairs to new officers and chairs, Larry dispersed keys and other GSOC equipment to the appropriate officers and committee chairs. The formal description of duties and list of GSOC property should be posted on [gsoc2.proboards.com](http://gsoc2.proboards.com). In addition to officers, people who need to prepare such information are Business Manager, Internet Publicity Chair, Historian, Archivist, Field Committee Chair, Host Committee Chairs, Newsletter Editor, Property Chair, and Librarian. Larry Purchase has filled most of the vacant chair positions.

The upcoming speaker schedule was discussed, Tom Pierson from CVO will speak on April 9, Willie Scott of CVO will speak on May 14. Carol presented the schedule for the Newsletter, with deadlines as follows: March/April deadline on March 20, May/June deadline on April 20, July/August deadline on June 20, September/October deadline on August 20, and November/December deadline on October 20. Bev asked that people announce via email when they post something important on Proboards. People who

have not yet put their position descriptions on Proboard are encouraged to do so.

The committee for website and internet issues consists of Rik, Tara, Carol, and Janet. They will contact each other via cyberspace and work at blinding speed to bring GSOC and the rest of us into the 21st Century. People doing anything related to PR are to mention that we have a twitter account at [www.twitter.com/geosocietyor](http://www.twitter.com/geosocietyor). Tara also gave me this URL: [www.printfection.com/gsoc](http://www.printfection.com/gsoc), for purchasing shirts and mugs with GSOC called out. At the next Board meeting Tara will report the recommendations of the 4-member Website and Internet Committee, regarding passwords and security issues, for discussion and decision. The above committee will also work on preparing a presence on Facebook (check your email for updates from Rik). Also, any clarifications or corrections on material in this paragraph should go to the committee listed above and then to the secretary. Carol asked for comments from Board members on her newly designed GSOC website.

The 2010 field trip schedule was presented:

- **June 26, Bull Run trip, Clay, Bev, and Bart leading**
- **July 17-18-19-20 (tentative date); Larry's President's Trip, possibly reserving a group camp site at Delintment Lake, and preparing a field trip guide, with Larry as leader and with help from Bev and Bart**
- **August 21 and 22 (tentative date), Dave and Larry will have their overnight field and camping trip in Phillipi Canyon in the Columbia River Gorge**
- **September at an as yet unknown date, Ken Cameron will have his geology/hiking trip to Ramona Falls**

Janet suggested that next year we schedule a field trip to study tidal pools between March and September at a low tide time. The summer picnic was also discussed.

At the next Board meeting, the committee of Larry, Clay, Paul, and Rosemary will discuss the need for a larger meeting room and how we can recover the cost of such a larger space. Rosemary asked if we

could discuss changing the regular Friday night meeting time to 7:30 p.m. at the next Board meeting.

Newly appointed GSOC jobs are Property Custodian, Bart, with Jan as list maintenance person; Librarian, Diana Gordon; Archivist, Carol; Historian, Rosemary; Assistant Business Manager, Anne. Anyone having GSOC equipment should give Jan a list of what he/she has so Jan can make a comprehensive list of GSOC equipment and its location. Bev and Bart are given authority to donate old equipment we will never use again to Goodwill and report any such donations to the GSOC Board.

Tara has been working getting samples of products that can be ordered online to generate funding for the society, and the samples will be displayed at the banquet and future meeting to generate online purchases. Thanks to Tara for her hard work on this project. Anyone with other ideas for products should contact Tara.

Bev and Bart have purchased at a reduced price the recent GSA field trip guide and will see that it is placed in the GSOC library. Two rare and possibly valuable books were discovered in the GSOC library discard pile (1896 Glacial Lake Agassiz report and a Bretz book on the Missoula floods), and Jan and Bev will look at getting appraisals for these. The book on romance of mining will be sold at a silent auction at the banquet.

Special thanks to Don Haines of DOGAMI's Nature of the Northwest for material donated to GSOC for sale at the banquet.

The next meeting is scheduled for 10 a.m., Saturday, May 15, 2010, at Rosemary's house.

Beverly Vogt, Secretary

# IN MEMORIAM

## Irv Ewen, 1964 GSOC president, dies

Irv Ewen passed away on Thursday, March 4, 2010 after a long illness. Born October 12, 1932, Irv received a Bachelor's Degree in Geology from Oregon State University, and for his first job worked as a field assistant for Andy Corcoran, a former State Geologist and GSOC President, at the Oregon Department of Geology and Mineral Industries.

Irv then worked as a planner for Multnomah County for 35 years, was a volunteer with the Portland Opera, and was also active in many other organizations, including GSOC, Portland Historical Rail Society, Delta Sigma Phi fraternity, Northwest Senior Theater, and Portland Gay Men's Chorus. He was a well known free-lance photographer, leaving a collection of over 50,000 photographs of architecture, weddings, social and community events, concerts, theater, opera, as well as views of the Columbia River Gorge, which he loved.

Irv is survived by Marlo James Dean, his life partner of 14 years.

## GSOC in the 21<sup>ST</sup> Century

by Tara Schoffstall

### GSOC now Twitters!

Follow us @GeoSocietyOR for all the latest info. Sign up and add the above address as a friend to your twitter feed or preview the feed at <http://twitter.com/GeoSocietyOR>.

Members might also be interested in following these sites as well as our own: Geology.com (@GeologyDotCom); Geology News (@GeologyNews); GSA (@geosociety); Earthquake and Tsunami (@EQTW); Scientific American (@sciam); OMSI (@OMSI); Get Geology Jobs (@GetGeologyJobs); NASA (@NASA); AAPG (@AAPG); National Geographic (@NatGeoSociety); Meteorite Men (@MeteoriteMen); Smithsonian's Museum of

Natural History (@NMNH); Discovery News (@Discovery); and many more! See our Twitter page for everyone we're following for a more complete list.

### GSOC Products are 4 sale!

GSOC has a page on the printfection.com site for products such as t-shirts, cups, mouse pads, etc. with designs including the GSOC logo, humorous designs, and MORE! Help raise funds for the club and have great GSOC products for yourself or for gifts!

<http://www.printfection.com/gsoc>

### GSOC is now on Facebook!

Dear Tara and members,

"I hauled off and created a Facebook account for GeoSociety Oregon (as if a person, born in 1935) whose email address is:

[GeoSocietyOR@gmail.com](mailto:GeoSocietyOR@gmail.com).

"If you want to sign on, invite GSOC to be your friend on Facebook. For assistance, contact me [Rik Smoody] for more info."

-Rik Smoody

## WELCOME NEW MEMBERS FOR 2010!

Dave Aeder

James Argentina

Sally Visher

Christopher Hunter

Michael Klaas

Elizabeth Smith

Kristine Quintana

Sheila Alfsen

Joseph Cohen

Patrick Farrell

Karl Karlgaard

William N.Orr

Jean Spangler

## GEOLOGICAL MAPPING AND STRUCTURE IN SOUTHEASTERN WASHINGTON

Synopsis of the February 12, 2010, lecture by Dr. Paul Hammond, Department of Geology, Portland State University  
by Carol Hasenberg

Paul Hammond's talk discussed how his Portland State University team's recent stratigraphic mapping work for the US Forest Service

demonstrates regional deformation caused by motion of the North American and Pacific tectonic plates. The area in question lies between Chinook Pass and Yakima in the White Pass area southeast of Mt. Rainier in Washington.

Stratigraphic mapping is a forensic science in which geologists use different sorts of evidence to determine the extent of geological layers – formations, units, and individual flows - which have a common origin and age. The eastern section of the study area is overlain by the westernmost layers of Columbia River Basalt. Hammond described some of the complexity in sorting out the various individual flows of the Columbia River Basalt units in the area. Features of individual flows include lobate margins, vesicular boundaries, and thin out into scoria. Individual flows can also be distinguished on the basis of chemical trace element analysis. This analysis work is done by the Washington State University GeoAnalytical Laboratory which has a world-renown reputation for consistent results.

Hammond's team mapped the Columbia River Basalt strata in the region, as well as older formations below. Three volcanic units were of particular interest: the Tieton, Edgar Rock, and Fifes Peak volcanoes volcanics occurred in the early Miocene, approximately 22-26 million years ago. These volcanoes were early arc volcanoes in the region. By mapping these and the Columbia River basalts they were able to determine the amount of folding and faulting in the area.

A series of folds with an east to west axis are evident between the Columbia River Gorge to the south and continue north through the Yakima Valley and are known as the Yakima Folds to geologists. Since these folds occur in strata that was flat 16 million years ago, their existence tells structural geologists what sort of forces have been acting on the continent since then. In addition to the east-west oriented Yakima Folds, the area also contains folds and faults running nearly right angles to these, and a notable example of these is the Cleman Mountain anticline ridge. All these fold structures are expressions of the reaction of the earth's crust to the forces created by the movement

of tectonic plates and underlying mantle. The Yakima Fold belt is one of the few places in the world where anticlines (fold humps) are non-eroded ridges.

The tectonic environment for the region is the boundary between the North American Plate and the oceanic plates to the west, including the Pacific Plate and Juan de Fuca Plate. GPS technology has been able to confirm the movement of the tectonic plates, as well as evidence collected on the earth's surface. The movement of the oceanic plates is such that they push the North American plate boundary north. Also, the thickness of the North American plate varies from about 60 km in the northeast corner of Washington to 30 km further west and south. The result is that the thinner, weaker crust in this area is folded northward and also tends to rotate and shear around the obstruction to the north and east. This explains the presence of both the Yakima Folds and northwest/southeast trending faulting.

#### References And Additional Reading:

The Evergreen State College, "Field Trip Guide: Geology and Art Cascade Mountains & Columbia Plateau," Fall 2004:

<http://academic.evergreen.edu/curricular/geologyandart/Central%20WA%20Field%20Trip%20Guide.pdf>

Newell P. Campbell and Daryl Gusey, "Geology of the Naches Ranger District, Wenatchee National Forest, Kittitas and Yakima Counties, Washington," Washington DNR Open File Report 92-3, March 1992:

[http://www.dnr.wa.gov/Publications/ger\\_ofr92-3\\_naches\\_text.pdf](http://www.dnr.wa.gov/Publications/ger_ofr92-3_naches_text.pdf) (key)

[http://www.dnr.wa.gov/Publications/ger\\_ofr92-3\\_naches\\_pl1\\_63k.pdf](http://www.dnr.wa.gov/Publications/ger_ofr92-3_naches_pl1_63k.pdf) (map, 85MB) This map is well out-of-date and incomplete.

Thomas R. Watters, "Periodically spaced anticlines of the Columbia Plateau," Geological Society of America Special Paper 239, 1989:

<http://si-pddr.si.edu/dspace/bitstream/10088/2656/1/198910.pdf> Reference should be made to Special Paper

239, which contains a wealth of information on the basalts and Columbia Plateau.

## **The Wallula Gap 17Ma to Now**

Synopsis of the March 21, 2010, annual banquet address by Dr. Robert J. Carson, professor of Geology and Environmental Studies, Whitman College, Walla Walla, Washington  
by Carol Hasenberg

The speaker for the 75<sup>th</sup> Annual Banquet of the Geological Society of the Oregon Country was Dr. Robert J. Carson, a geologist well known to all of his Portland colleagues. In his address, Carson discussed material used in his recently co-authored book, Where the Great River Bends: A natural and human history of the Columbia at Wallula (Keokee Books, 2008). As he took the podium, Carson recognized several of his colleagues in the audience: Bill Orr from the University of Oregon, Paul Hammond, whose son was the first graduate of Whitman's geological degree program, and Scott Burns of Portland State University.

Carson then dedicated his talk to Ewart and Margie Baldwin. Ewart Baldwin helped to establish the geology program at Whitman College during the 1980-81 academic year. Carson remembered Baldwin fondly by quoting his three favorite sayings that Baldwin used during the field trips he led: He would bellow to the bus driver to put the "pedal to the metal" to get to the next stop and then shout "Stop the machine!" when they arrived. He would never let the bus driver backtrack by hollering "Never Deadhead!," a trucking term used to admonish drivers to never take the truck back empty.

Carson began his discussion of the geological history of the Wallula Gap by showing the GSOC audience the first image recorded (by hand drawing) of the area from Paul Kane on the 1843 Fremont Expedition. The picture highlighted the Twin Sisters, a basalt chimney that served as a rock climbing mecca from the 1920's until 2001 when rock climbing was banned.

The Wallula Gap is in the easternmost section of the Columbia Gorge. To the north of the Gap, the Columbia River is joined by the Snake River and the Yakima River, and so all three of these river basins are emptied through the gap. The McNary Dam, completed in 1953, is located south of the Gap and impounds the present reservoir Lake Wallula in the Gap.

Carson speculated on what geological formation might underlie the Columbia River Basalt (CRB) in the Wallula Gap area: it could be Tertiary sediment, terrane rocks or granite, similar to that found in the nearby Wallowa Mountains. The outpourings of the Columbia River Basalt greatly affected the history of the Wallula Gap, because the courses of the rivers in the area were greatly affected by the floods of the molten rock. During the greatest flood basalt events, the course of the Columbia River was pushed to the extreme north and west sector of the basin, and the Columbia River left the basin far to the west of the Gap. With the subsequent warping and folding of the terrain, the Columbia and Yakima Rivers passed through the Gap at about some time before 5 million years ago. Meanwhile, the ancestral Clearwater and Salmon Rivers changed their courses from a more northern outlet into the Columbia basin to Wallula Gap earlier than the Columbia River itself.

After the basalt floods, the river systems continued to evolve and erode the basalts into the Columbia River basin we see today. The most dramatic changes to the look of the basin occurred during the Pleistocene, when the Cordilleran glacier covered the northwestern part of the continent and ice and water were more abundant and destructive than they are today. Most of us know that Glacial Lake Missoula flooded the Columbia River basin many times between 18,000 and 15,000 years ago.. It is less well known that Glacial Lake Bonneville was also drained through this outlet about 16,000 years ago.

Carson illustrated the concept of the Glacial Lake Missoula ice dam created by the Pend Orielle lobe of the Cordilleran Ice Sheet using a smaller modern day analogy which he recently photographed on a field trip. The photos were of the Perito Moreno



Glacier in Patagonia, which also bisects L-shaped Lago Argentina and creates up to 30 meters of elevation difference in the levels of the two arms of the lake.

During the Ice Age Floods the Wallula Gap played a significant role in the draining of the Columbia basin. A “hydraulic dam” was formed at the Gap due to the fact that there was about twice as much flow as could fit through the gap.

Next Carson discussed the after-effects of the Ice Age Floods that can be seen in the Gap today. These include erosional features, such as scablands, and depositional features, including eddy bars in side canyons at elevations up to 900 feet. The talus piles we see at the bases of features like Twin Sisters and the sand dunes in Juniper Canyon have been accumulating since the floodwaters receded.

Dr. Carson saved about ten minutes at the end of his lecture to discuss the biological diversity and modern history of the Wallula Gap. Co-author Mike Denny wrote the chapter of the book which deals with biology. Denny discusses some of the nuts and bolts of how the ecosystem works in addition to describing the biological diversity. His work is illustrated with outstanding wildlife photography.

Next Carson showed pictures of the Gap during the Oregon Country era. Fort Walla Walla and the town of Wallula were shown in their heydays from sketches, paintings, and photographs. Some more recent photos of a frozen Columbia River in 1916 and 1929 suggest the magnitude of climate change which we are experiencing. Next came photos of the 1948 flood on the Columbia River, which flooded agricultural fields along the river. Those same fields were flooded for good in 1953 after the construction of the McNary Dam. The old town of Wallula was covered by the floodwaters and the town cemetery was moved above the flood line.

After his very interesting lecture, Carson signed copies of the two titles he brought for purchase at

the event, printed by Keokee Books of Sand Point, Idaho. Where the Great River Bends is a particularly lavish printing with full color illustrations throughout. Thanks again to Dr. Carson for making GSOC's 75<sup>th</sup> Anniversary so special!

### References and Additional Reading:

Carson, R.J., ed., 2008, Where the Great River Bends: The Columbia at Wallula, Sandpoint, Idaho, Keokee Co. Publishing, Inc. Keokee Books' description of the book can be found at: <http://www.keokeebooks.com/greatriverbends.html>

Carson, Bob, and Scott Babcock, 2009, Hiking Guide to Washington Geology, Sandpoint, Idaho, Keokee Books, 272 p.

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Lake Bonneville and the Bonneville Flood  
Lake Missoula and the Missoula Floods:  
<http://vulcan.wr.usgs.gov/Glossary/Glaciers/IceSheets/framework.html>  
Glacial Lake Missoula and the Missoula Floods  
[http://vulcan.wr.usgs.gov/Glossary/Glaciers/IceSheets/description\\_lake\\_missoula.html](http://vulcan.wr.usgs.gov/Glossary/Glaciers/IceSheets/description_lake_missoula.html)  
Lake Bonneville and the Bonneville Flood:  
[http://vulcan.wr.usgs.gov/Glossary/Glaciers/IceSheets/description\\_lake\\_bonneville.html](http://vulcan.wr.usgs.gov/Glossary/Glaciers/IceSheets/description_lake_bonneville.html)

US Army Corps of Engineers, Walla Walla District, “McNary Master Plan: A Plan for Development and Management of the Natural and Manmade Resources of Lake Wallula.”:  
<http://www.nww.usace.army.mil/planning/ER/mcnary/default.htm>

Wikipedia: The Perito Moreno Glacier page:  
[http://en.wikipedia.org/wiki/Perito\\_Moreno\\_Glacier](http://en.wikipedia.org/wiki/Perito_Moreno_Glacier)

Twin Sisters Final Report (report on prohibition of rock climbing), December 1, 2001:  
[http://www.whitman.edu/environmental\\_studies/internships/reports/Stinson.htm](http://www.whitman.edu/environmental_studies/internships/reports/Stinson.htm)

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Phone (\_\_\_\_) \_\_\_\_\_ - \_\_\_\_\_ Email address \_\_\_\_\_

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VISITORS WELCOME AT ALL MEETINGS

## CALENDAR

### MAY/JUNE ACTIVITIES

Friday evening talk, May 14, 2010, at 7:30 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University: Speaker William E. Scott of the USGS Cascades Volcano Observatory in Vancouver, Washington will present "Re-evaluation of the Magnitude of the Great A.D.1835 Eruption of Cosigüina Volcano, Nicaragua."

The eruption of Cosigüina Volcano, Nicaragua, in 1835 was described by witnesses in truly catastrophic terms. The research community that assesses atmospheric impacts of eruptions through study of ice cores has long searched for signs of the eruption, but found little convincing evidence. Two brief field investigations of Cosigüina during the past few decades have shown that the eruption was more modest than related by

eyewitnesses, but that a repeat would nonetheless have substantial consequences for the region.

Join GSOC members at **Pizzicato Pizza, 1708 SW 6th Ave.**, at **6:00 p.m.** before the lecture for an informal dinner and conversation.

GSOC Seminar, Wednesday, May 19th @ 8pm, Room 69, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University "Get Online or Left Behind: Keeping up with Geology News in the 21st Century"

With all the geologic events going on, it's not the TV you should be watching - it's the internet. Want to get the news before the news does? Or just want to find out more details on the events already out there? Tara Schoffstall will offer an overview of using Google and Twitter for geology research, events, and on the spot updates. Learn how to use the internet to find information, such as online seismograms, volcanocams, tsunami models, first hand accounts from the scene of the events in real time - plus much, much more! All ages welcome.

Friday evening talk, June 11, 2010, at 7:30 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University: Speaker Don J. Pettit, Senior Emergency Response Planner, Emergency Response Program, Oregon Department of Environmental Quality. Stay tuned to the website or the June calendar for more info.

#### Field Trip to Bull Run Watershed

Saturday, June 26, 2010 - GSOC member Clay Kelleher is arranging a one day trip to **Bull Run Watershed**. This restricted area provides the water supply for Portland, Oregon. See the Field Trip Reviews on our website ([www.gsoc.org](http://www.gsoc.org)) for photos and text about the last GSOC trip to Bull Run, which was very popular and well-attended. For more information or to register for the trip, refer to the registration form on page 25 of this newsletter or available from the GSOC website.

*NOTE: You must be a GSOC member or guest of a member to attend GSOC field trips. You may join GSOC at any time, for \$25.*

**Free parking** is available at Portland State University Friday nights after 5 p.m. in Parking Structure 2 on Broadway Ave. directly across from Cramer Hall and on level one of Parking Structure 1, bounded by Broadway and 6<sup>th</sup> Aves. and Harrison and Hall Sts.

## **FUTURE ACTIVITIES**

#### President's Field Trip

July 17-20, 2010 Fri-Tues - GSOC President Larry Purchase is arranging the President's Field Trip for mid-July in Eastern Oregon. This will be a camping trip, as motels are over an hour's drive away. We hope to camp at **Delintment Lake in the Ochoco Mountains**. We will visit the oldest rocks in Oregon near the town of Suplee, and also have an opportunity to dig for ammonite fossils at a private ranch. Watch this space for more details on schedule and cost as they become available. The trip registration form will be included with the June issue of *The Geological Calendar*.

*NOTE: You must be a GSOC member or guest of a member to attend GSOC field trips. You may join GSOC at any time, for \$25.*

Field Trip, August 21st, 2010: "In the Path of Catastrophic Floods; Bars, Scablands, and

**Cataracts."** Led by GSOC Director Dave Olcott, this full day trip leaving from Lewis and Clark State Park will focus on catastrophic flood features, both 'recent' and "ancient". Specifically, the trip will examine sites from The Dalles, through 15 Mile Creek Valley and eastward to Phillipi Canyon. Several sites that J Harlan Bretz documented in his 1928 publication, "Bars of Channeled Scabland" will be visited. Transportation will be by car caravan/car pool with participants making their own arrangements. In an attempt to reduce the number of cars, car pooling is encouraged (Dave will assist in coordinating this endeavor). The trip registration form will be in the July/August issue of *The Geological Newsletter* and participation will be limited to the first 25 members and their guests who have paid for the trip. For more information contact Dave Olcott ([daveolcott46@yahoo.com](mailto:daveolcott46@yahoo.com)) or (503) 695-5219.

*NOTE: You must be a GSOC member or guest of a member to attend GSOC field trips. You may join GSOC at any time, for \$25.*

Check the GSOC website ([www.gsoc.org](http://www.gsoc.org)) for updates to the calendar.

## **GSOC Meetings Start at 7:30 Now!**

At the April Friday night meeting, GSOC members decided to hold the Friday night meetings at 7:30 p.m. rather than 8:00 p.m. We will start this policy in May 2010, so remember to come earlier!

## **UPCOMING ACTIVITIES FROM OTHER ORGANIZATIONS**

**Portland State University Geology Department Geology Spring Colloquium 2010**, Cramer Hall S17, 3:30-4:30 p.m.. All are invited to attend! For information contact: Martin Streck, 503-725-3379, [streckm@pdx.edu](mailto:streckm@pdx.edu), or refer to the department website: [http://geology.pdx.edu/files/u5/Seminar\\_Spring\\_10\\_100\\_330v2\\_0.pdf](http://geology.pdx.edu/files/u5/Seminar_Spring_10_100_330v2_0.pdf)

- April 28, 2010 "The Dynamics of the Mount Etna plumbing system.", Wendy Bohrsen, Central Washington University
- May 5, 2010 "The Not-So-Great 1835 eruption of Volcán Cosigüina,, Nicaragua – Reconciling eyewitness accounts and the geologic record.", Willie Scott, Cascades Volcano Observatory
- May 12, 2010 "The petrology of ongoing eruptions at Kilauea Volcano, Hawaii: Summit and rift zone

perspectives on the dynamic balance between magma recharge, storage and eruption during shield building.”, Carl Thornber, Cascades Volcano Observatory

- May 26, 2010 “Mount St. Helens: The legacy of the 1980 unrest and eruption.”, Cynthia Gardner, Cascades Volcano Observatory

**Oregon State University Department of Geosciences 2010 Spring Seminar Series**, Thursdays, 4:00 pm, Gilfillan Auditorium, unless otherwise noted. Refer to department website for more information:

<http://www.geo.oregonstate.edu/Seminars>

- May 06, 2010 Nadine Barlow, Department of Physics, Northern Arizona University, “Planetary Potholes--Impact Cratering on Earth and throughout the Solar Systems,” Gilfillan Auditorium
- May 13, 2010 Kelly Falkner, Oceanic and Atmospheric Sciences, Oregon State University, “Ocean-ice Sheet Interactions in Petermann Fjord, Northern Greenland”, Gilfillan Auditorium
- May 20, 2010 Cynthia Gardner, Cascade Volcano Observatory, Vancouver, WA Mt. St. Helens, “30 Years On: The Legacy of the 1980 Unrest and Eruption”, Gilfillan Auditorium
- May 27, 2010 Patricia Gregg, Department of Geosciences, Oregon State University, topic TBD, Gilfillan Auditorium
- Jun 03, 2010 Sherry Cady, Department of Geology, Portland State University, “Biogeochemical Interactions between Microorganisms and the Environment”, Gilfillan Auditorium

**University of Oregon Department of Geological Sciences, Spring 2010 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>

- April 28 - Gordon Grant (USFS), topic TBA
- May 5 - Kurt Cuffey (UC Berkeley), topic TBA
- May 12 - Jim O'Connor (USGS), topic TBA
- May 19 - Darryl Granger (Purdue University), topic TBA
- May 26 - Noah Finnegan (UC Santa Cruz), “Do bedrock rivers record climate change?”
- June 2 - Oliver Chadwick (UC Santa Barbara), topic TBA

**Mt. St. Helens Institute Field Seminars**

Since 2000, their field seminars have helped educate hundreds of people about the wild wonders of Mount St. Helens. They’ve taken people exploring on the Pumice Plain, led them to the volcano’s summit, showed them the stars, and shared with them the history of the eruption and how it changed the land. Their seminars, taught by highly experienced, passionate instructors, are open to all ages. Youths under 14 must be accompanied by an adult. For the current schedule see the website:

[mshinstitute.org/index.php/programs/field\\_seminars](http://mshinstitute.org/index.php/programs/field_seminars)

### **OMSI Science Pub Portland**

There are now TWO Science Pubs in Portland -- one at the Bagdad Theater in Southeast, and one at Mission Theater in Northwest. Learn about cutting-edge topics in science and technology from leading researchers and scientists, all while enjoying food and drinks. Experience an informal atmosphere where you can interact with experts and where there are no silly questions. No scientific background is required; just bring your curiosity, sense of humor, and appetite for food, drinks, and knowledge!

<http://www.omsi.edu/sciencepubportland>

- “Searching for Other Earths,” Monday, May 10, Ruslan Belikov, PhD, an astrophysicist at the NASA Ames Research Center, Bagdad Theater (note: one week later than usual!)
- “What’s Eating You: People and Parasites,” Tuesday, May 25, Eugene H. Kaplan, PhD, Axinn Distinguished Professor of Conservation and Ecology, at Hofstra University, Mission Theater
- “The Cheese Stands Alone: The Science Behind Oregon’s Acclaimed Artisan Cheeses,” Monday, June 7, Lisbeth Goddik, PhD, associate professor of Food Science and Technology at Oregon State University and an extension dairy processing specialist, at the Bagdad Theater

## **GSOC in the 21<sup>ST</sup> Century**

by Tara Schoffstall

### GSOC now Twitters!

Follow us **@GeoSocietyOR** for all the latest info. Sign up and add the above address as a friend to your twitter feed or preview the feed at

<http://twitter.com/GeoSocietyOR>.

### GSOC Products are 4 sale!

GSOC has a page on the printfection.com site for products such as t-shirts, cups, mouse pads, etc.

with designs including the GSOC logo, humorous designs, and MORE! Help raise funds for the club and have great GSOC products for yourself or for gifts!

<http://www.printfection.com/gsoc>

### GSOC is now on Facebook!

Dear Tara and members,

“I hauled off and created a Facebook account for GeoSociety Oregon (as if a person, born in 1935) whose email address is:

[GeoSocietyOR@gmail.com](mailto:GeoSocietyOR@gmail.com).

“If you want to sign on, invite **GeoSocietyOR** to be your friend on Facebook. For assistance, contact me [Rik Smoody] for more info.”

-Rik Smoody

*Editor's Note: Note correction in bold to the facebook friend search word from the last newsletter. I was not able to find our facebook page by searching with "GSOC".*

## **NEW LOOK TO THE GSOC WEBSITE**

Check out the new look to our website! Our new site features a home page with upcoming events listed, a calendar page which combines meeting and field trip calendars, a GSOC history section, newsletter archives, membership info, contacts, AND MORE! Our site URL is [www.gsoc.org](http://www.gsoc.org).

Future website projects will include slideshow effects, updating old field trip reviews to fit the new format, expanding the archives sections and adding new events! Keep abreast of all the action by visiting our site regularly!

## **IN MEMORIAM**

### **Longtime member and Past President Esther Kennedy dies**

Esther was born in French Gulch, California, on July 17, 1912, and died in Portland, Oregon, on March 29, 2010.

She was an avid amateur botanist, birder and geologist, and enjoyed sharing her knowledge with

others on hikes, walks, and field trips. She was president of the Native Plant Society, Oregon Agate and Mineral Society and Geological Society of the Oregon Country. She and husband Bill joined GSOC in 1975, and she served as president in 1998. In addition to her presidency, she served as librarian, on various committees, and was Chairman of the Banquet Committee for several years. She not only organized the banquets but supervised the making of the place cards. Because of her artistic talent, one year she hand-painted all of the banquet place cards! Each place card was a different scene from the President's Field Trip. Her President's Field trip was "Puget Lowlands to Cascade Highlands," with the assistance of John Whitmer. We learned about Puget Sound and the North Cascades, including Anacortes, Concrete and Washington Pass.

She was always gracious, cooperative and available when anyone help with any thing.

She is survived by her daughters, Helen Sinclair of Portland, Barbara Kennedy of Crooked River Ranch and Kathryn Persing of Redmond, son Bernie Abrahams of Wetmore, Colorado, and several grandchildren and great-grandchildren.

Rosemary Kenney, GSOC Historian

## **Aggradation from Mt. Hood Volcanic Eruptions in the Sandy River**

Synopsis of the April 9, 2010, lecture by Dr. Thomas Pierson, Supervisory Hydrologist, USGS CVO Laboratory, Vancouver, Washington

by Carol Hasenberg

Last month, Dr. Pierson lectured the GSOC crowd on the process of river **aggradation** as a result of a volcanic eruption. According to Wikipedia, aggradation is “the increase in land elevation due to the deposition of sediment” where the sediment “can be caused by changes in climate, land use, and geologic activity, such as volcanic eruption, earthquakes, and faulting.” Specifically, Dr. Pierson

discussed aggradation of the Sandy River due to the deposition of sediment in its upper reach from volcanic eruptions of Mt. Hood. Aggradation is a volcanic hazard which occurs in rivers downstream from volcanic eruptions.

Aggradation from a volcanic eruption is a process that occurs on a timescale of months, years, and decades after the eruption of a volcano and so is a less obvious volcanic hazard than explosive blasts, pyroclastic flows, and lahars (debris flows and hyperconcentrated flows). Nevertheless, aggradation occurs in river plains tens of kilometers from the volcanic source and so can affect the usability of the land in the affected river valley.

The study of the aggradation in the Sandy River Valley by the USGS Cascades Volcano Observatory began in the early 1980's with studies by Ken Cameron and Pat Pringle, when funding became available shortly after the eruption of Mt St. Helens. Pierson has continued this work, which involves studying sediment produced by at least two eruptive periods of Mt. Hood , the Timberline eruptive period (approximately AD 300-AD 600) and the Old Maid eruptive period, which started in 1780 with a dome building eruption that ended in 1793. The studies have involved determining the volume of sediment produced by the eruptions, and determining when the sediments were washed downstream, and their maximum downstream impacts - i.e., height and width of the sediment-laden stream bed and the extent of the sediments in the delta at the mouth of the river.

The Old Maid and Timberline dome-building eruptions occurred high on the southwest flank of Mt. Hood and so produced a debris fan on that side of the mountain. Erosion of that fan (plus direct transformation of pyroclastic flows mixing with snow) produced lahars that traveled down the river. Lahars flowed down the Sandy , Zigzag, and White rivers during the eruptions; a few reached the Columbia River. The classic example of a lahar which Pierson mentioned was the mudflow that occurred on the North Fork of the Toutle River after the eruption of Mt. St. Helens. A large lahar from the Old Maid eruption traveled far down the Sandy River, leaving a deposit in its upper reach, including

the Old Maid Flat area. This and other volcanic sediment deposits became the source material for the aggradation that occurred downstream in subsequent years.

When the Old Maid eruption took place, the Sandy River riverbed was 3-4 meters lower than it is today. It was lined by terraces that had formed as a result of the Timberline eruption more than a millennium earlier. The terraces were covered with trees and forest duff. The large Old Maid lahar, which occurred in late 1781 or early 1782 covered some of the terraces and killed many of the trees in its path. Today the lahar layer is characteristically denser than the sediment in the terraces above and covered by a layer of clay. Tree wells and snags can be seen in this layer in Old Maid Flat today. As time went on the sediment in the upper reach of the river was washed downstream and covered the stream banks and previous terraces in the lower "depositional reach" of the river.

The Lewis and Clark expedition passed through the area in 1805-1806 when the aggradation process was in full swing. They recorded that the Sandy River was choked with sediment and was nowhere more than 4 inches deep and much wider than it is today. They referred to it as the " Quicksand River." A large tongue of debris stuck out into the Columbia River at the Sandy River Delta. This account and observations of recent volcanic eruptions such as Mt. St. Helens and Mt. Pinatubo have illustrated the aggradation process to researchers. At its peak in months and years subsequent to a volcanic event (depending on rainfall amount and intensity), streambeds can rise tens of meters above their previous levels, burying forests, dwellings, or even towns located near their banks. They overflow their old banks and take on the characteristics of a braided stream channel. The stream path loops back and forth across the channel depositing and re-depositing the sediment.

By the late 19th century the Sandy River had cut back down through the sediment, leaving terraces on its banks as the remnant of the eruption and aggradation process. The researchers have found the timelines for this process largely by tree ring dating techniques, or dendrochronology. They were

able to pinpoint the eruptive years through a combination of dendrochronology and chemical analysis of the tree rings by Paul Sheppard of the University of Arizona. They were able to date the terrace formation by dating the oldest trees growing on them. The highest terraces had the oldest tree dates of 1793. Lower terraces were dated 1835 and 1858. The riverbed reached its present elevation before 1911.

Many of the samples analyzed by Pierson in the terrace study were taken at Oxbow Park and Dabney Park along the Sandy River. Pierson recommended that those interested in seeing uncovered snags and cross sections of the terrace should visit the shores of the Sandy River very soon after flood events. The lecture's publicity poster photo was taken after the big flood in 2006 in Oxbow Park. Pierson also showed the GSOC audience photos he had taken of the lahar layers with the sediment above. The clayey layer above the lahar was clearly visible. The sediment cross sections also show the characteristic signs of a braided stream channel, including horizontal layering, lenses of gravel, and cross bedding where dune features occur in the terraces. Pierson also recommended looking in the middle of the Sandy River during periods of low flow (i.e., late summer) for snags from the Timberline eruption just out from Group Camp #2 in Oxbow Park.

When showing the audience a slide of the Mt. Hood Volcanic Hazard Map, Pierson noted that aggradation hazards have not been shown for the Sandy River. Although aggradation is not a hazard that occurs so quickly that you have to "run for it," Pierson noted that it would impact the usability of the land along the river. A member of the audience asked Pierson whether the Bull Run water pipes crossing the Sandy could be damaged by aggradation and Pierson replied that they could. The long term solution contemplated to minimize the hazard would be to bury the pipes under the river.

### References and Additional Reading

USGS CVO Website – "Mount Hood, Oregon, Eruptive History":

[http://vulcan.wr.usgs.gov/Volcanoes/Hood/Eruptive\\_History/framework.html](http://vulcan.wr.usgs.gov/Volcanoes/Hood/Eruptive_History/framework.html)

USGS CVO Website – "Volcano Hazards in the Mount Hood Region, Oregon," includes volcanic hazard map of Mt. Hood in \*.pdf format:

<http://vulcan.wr.usgs.gov/Volcanoes/Hood/Hazards/OFR97-89/framework.html>

Geological Society of the Oregon Country website, "The Buried Forests of Mt. Hood" field trip review, July 11, 1998, with leader Ken Cameron shows pictures of tree snags and tree wells in Old Maid Flat:

[http://www.gsoc.org/fieldtrip\\_old/july98.html](http://www.gsoc.org/fieldtrip_old/july98.html)

Ken Cameron's upcoming GSOC field trip scheduled for September 2010 will also visit some of the sediment deposits from the Old Maid Eruption.

Cameron, Kenneth A., and Pringle, Patrick T., "Prehistoric Buried Forests of Mount Hood", *Oregon Geology*, Volume 53, Number 2, March 1991, pp. 34-43, available from the DOGAMI website at [www.oregongeology.com/pubs/og/OGv53n02.pdf](http://www.oregongeology.com/pubs/og/OGv53n02.pdf).

Carol Hasenberg, "Buried and Submerged Forests of the Pacific Northwest, synopsis of the GSOC May 13, 2005, Friday night meeting with guest speaker Pat Pringle, geologist, Washington Dept of Natural Resources," *The Geological Newsletter*, Volume 71, Number 6, June 2005. This article discusses dendrochronology as explained by Pat Pringle.

Wikipedia Website – "Aggradation", part of WikiProject Geology:

<http://en.wikipedia.org/wiki/Aggradation>

The Laboratory of Tree Ring Research, University of Arizona, Tucson

<http://www.ltrr.arizona.edu/dendrochronology.html>

"The Columbia River: A Photographic Journey" – Sandy River, Oregon website :

[http://www.columbiariverimages.com/Regions/Places/sandy\\_river.html](http://www.columbiariverimages.com/Regions/Places/sandy_river.html)



# GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

## Bull Run Watershed – Geology, Hydrology, and Engineering – June 26, 2010

**Departure/return point:** parking lot section A-8 of Fred Meyer “Hollywood West” store, 3030 NE Weidler St. Fred Meyer allows all-day parking for people taking this trip. Tri-Met has Saturday service on lines #73 and #77 along Broadway, #9 six blocks away on 24<sup>th</sup> Ave, and many others at Hollywood Transit Center, about ½ mile away.

**Times:** Check-in Saturday 7:45-8:30 am, leave 8:30 am, return about 4:00 pm.

**Fee:** \$15, paid in advance (see below) includes trip handouts and bus transportation.

**GSOC Membership:** may be purchased simultaneously, see [www.GSOC.org](http://www.GSOC.org) for rates.

**Transportation:** Mini-coach supplied by Water Bureau, limited to 26 passengers, no standees, no private autos.

**Leaders:** Briggy Thomas Portland Water Bureau Natural Resources Educator/Field Biologist, Beverly Vogt GSOC secretary (geology MS thesis in watershed), Clay Kelleher GSOC administrative leader.

**Itinerary:** Introductions, field trip guide, and lecture en route. The bus will enter the watershed from the east gate (Lolo Pass) and proceed westward, stops to be determined at points of interest for geology, hydrology, and watershed management. All stops at or near roadside.

**Breaks:** periodic rest stops, and bus has a rest room.

**Lunch break:** In watershed, bring your own sack lunches and beverages. Ice chests provided.

**Weather:** Watch forecasts and dress appropriately. Even fair afternoons may begin in the Cascades with a morning chill. If rain is predicted in Portland, expect even heavier in the watershed. That’s why it’s there!

**Registration:** Mail completed form below with payment to GSOC, Bull Run Field Trip, PO Box 907, Portland OR 97207. Include name and address, and telephone(s) and/or e-mail addresses in case we need to contact you. Make checks payable to GSOC. Space limited, first come first served! Full payment required to hold reservation. A waiting list will be built in the order received, fully refunded if we can’t fit you in.

**Information:** Clay Kelleher, e-mail [clayr2236kher@comcast.net](mailto:clayr2236kher@comcast.net), or home evenings and weekends phone 503-775-6263.

**Cancellations:** Trip will occur regardless of weather. You may contact Clay to cancel your reservation as late as Friday June 25 at 6:00 pm and get full refund. People on waiting list will be notified in order.

**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.

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### REGISTRATION FORM FOR BULL RUN FIELD TRIP 2010

June 26, 2010

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: \$15.** Send this form and payment to:

GSOC, Bull Run Field Trip, PO Box 907, Portland, OR 97207-0907, must arrive by Thursday **June 24, 2010.**





# THE GEOLOGICAL NEWSLETTER

"NEWS OF THE GEOLOGICAL SOCIETY OF THE OREGON COUNTRY"

VOLUME 76, NUMBER 4  
JULY/AUGUST 2010

## The Geological Society of the Oregon Country

P.O. Box 907, Portland, OR 97207-0907

[www.gsoc.org](http://www.gsoc.org)

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#### Assistant Business Manager:

Anne O'Neill - 503/477-7827

VISITORS WELCOME AT ALL MEETINGS

## CALENDAR

### JULY/AUGUST ACTIVITIES

Friday evening talk, July 9, 2010, at 7:30 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University: Speaker Joe Levy, Polar Regions postdoctoral researcher at Portland State University Department of Geology, will present "Walking to Mars: What Antarctic Permafrost Suggests About Martian Geology, Climate, and Habitability".

The talk is focused on how climate conditions on Earth and Mars produce characteristic "equilibrium landforms"--features of the permafrost landscape that can be used to infer temperature and moisture conditions over time. The talk deals with a number of permafrost landforms from the coldest desert on Earth (and just a typically cold desert on Mars!).

Join GSOC members at **Pizzicato Pizza, 1708 SW 6th Ave.**, at **6:00 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 6<sup>th</sup> Aves. and Harrison and Hall Sts.

#### **President's Field Trip**

July 16-20, 2010 Fri-Tues - GSOC President Larry Purchase will lead the President's Field Trip in Eastern Oregon. This will be primarily a camping trip, as motels are over an hour's drive away. We plan to camp at **Delintment Lake U.S. Forest Service Campground in Ochoco National Forest.**

<http://www.fs.fed.us/r6/malheur/recreation/camp/delintment.shtml>

We will visit the oldest rocks in Oregon near the town of Suplee, and also have an opportunity to dig for ammonite fossils at a private ranch. The trip registration

form was included with the June issue of *The Geological Calendar*, and is also available on the GSOC website <http://www.gsoc.org/Preztrip%202010.pdf>.

Detailed information about the President's Field Trip:

**Trip participation policies:** People wanting to participate in this trip need to send in their registrations by July 4. **All participants must preregister and must be GSOC members or their guests. People who are not preregistered will not be allowed to take part in this trip.** Participants must also fill out and sign a liability waiver upon arrival at Delintment Lake Campground. Minors must be accompanied by a responsible adult GSOC member parent, designated person, or legal guardian. Minor participants who are with someone other than their parents need the written permission of the parent or legal guardian.

**Fee and camping/lodging:** Fee of \$40 includes trip reading packet and guest speakers. Fee for a minor accompanied by GSOC parent or guardian is \$10. All other costs are responsibility of participants. The U.S. Forest Service camping fee of \$10/night/campsite (\$5/night for Golden Age Passports) at Delintment Lake Campground will be the responsibility of the participants. Fee for additional cars at a campsite is \$3/car. Water from a pump is available at the campground. No showers are available. Meal arrangements and costs will be the responsibility of the participants. Transportation will be by car or carpool, with participants making their own arrangements (call Larry, Bev, or Bart [see phone numbers below] if you need help arranging carpooling). Participants wishing to lodge indoors will need to make their own motel arrangements in Burns or the John Day area.

**Route to Delintment Lake Campground:** Take State Highway 380 from Prineville through Post to Paulina. From Paulina, take Paulina-Suplee Road (Highway 112) to the site of Suplee. From there, take Highway 318 (south), which becomes Highway 69 at the Crook/Grant county line. Continue on Highway 69 to the Forest Service boundary, where it becomes F.S. Road 41. Stay on F.S. Road 41 at any junction and follow signs to Delintment Lake. At the campground sign, turn left into the campground.

**Itinerary:** Join GSOC President Larry Purchase, with field trip leaders Dr. Ellen Bishop, well known Oregon geologist and author of many books on geology including *In Search of Ancient Oregon* and *Hiking Oregon's Geology*, and GSOC members Beverly Vogt and Richard Bartels, retired geologists who have led

several other GSOC fieldtrips. We will see the oldest rock in Oregon (Devonian monolith, age of 400 mya), collect ammonites from near our campground and other collecting sites, and learn about some of Oregon's most complicated and interesting geology.

- Day 1, Friday, July 16, travel from Portland and set up camp at Delintment Lake, where around 2 p.m., we can start collecting Bajocian-age (between 169 to 176 mya) ammonite fossils. If you arrive after 2 p.m., look on campground bulletin board for information on where you can find us.
- Day 2, Saturday, July 17, Dr. Ellen Bishop will present the geology and geologic history of the area. Days 1, 2, and 3 will be in Ochoco National Forest and surroundings.
- Day 3, Sunday, July 18, we will collect fossils with Larry Purchase and North American Research Group (NARG) fossil collectors. We will see the site where the Jurassic crocodile-like reptile fossil called *Thalattosuchia* (150 to 200 mya) and listed by the National Geographic as the second "Top" fossil find of the Year 2007 was found.
- Day 4, Monday, July 19, Richard Bartels and Beverly Vogt will lead a trip on F.S. Road 6370 in Malheur National Forest illustrating a geologic cross section through the Izee terrane.
- Day 5, Tuesday, July 20, travel home, with optional stops at Thomas Condon Paleontological Center, John Day Fossil Beds, and other local points of interest.

**Note:** This trip is the 75th anniversary of GSOC's first President's Field Trip, which was to Delintment Lake and Robertson's and Weberg's ranches to look at Bajocian (169 to 176 mya) ammonites and the geology of the Suplee and Izee areas.

**For this trip you need better, more detailed maps than just highway maps. We suggest you get the two relevant Forest Service maps:** (1) Ochoco National Forest and Crooked River National Grassland map; and (2) Malheur National Forest map.

**Gasoline:** At Delintment Lake, the closest gasoline is at Burns (45 miles away) or John Day (60 miles away). **Be sure you fill up at Prineville** and maybe top it off at Paulina if gas is available there.

**Bring the following equipment for camping and for fossil collecting:**

- Appropriate clothing and footwear—weather may be hot, cold, wet, muddy and/or windy.
- Camping gear.

- Water, sunscreen, sunglasses, hat, and mosquito repellent.
- Fossil collecting equipment: Safety glasses, gloves, rock hammer, chisels, thin chisels for splitting layers, putty knife (5 inches), painter's tool, edger blade, (worst case a screw driver), picks, sledge hammer, pry bars, small soft brush, large potato brush (or large soft-bristled paint brush), small shovel, hand lens, marking or duct tape, marking pen, aluminum foil (to wrap delicate fossils), storage trays, news paper, crazy glue and Vinac glue (NARG will have the glue you need). You probably don't need all of this but mainly the essentials to extract fossils from rock and carry them safely home. Contact Larry Purchase (see above) with any questions about fossil collecting equipment.

**Questions?** Contact leader GSOC President Larry Purchase (360-254-5635, [lkpurchase@q.com](mailto:lkpurchase@q.com)) or Beverly Vogt/Richard Bartels (503-292-6939, [bevvogt@comcast.net](mailto:bevvogt@comcast.net), [bartbartels@comcast.net](mailto:bartbartels@comcast.net)).

*NOTE: You must be a GSOC member or guest of a member to attend GSOC field trips. You may join GSOC at any time, for \$25/individual, \$35/family.*

## **GSOC Annual Picnic**

Saturday, August 14, 2010

This year's GSOC Annual Picnic will be held in conjunction with the Fifth Annual Northwest Fossil Fest, sponsored jointly by the North America Research Group (NARG) and the Rice Northwest Museum of Rocks and Minerals, located at 26385 Groveland Drive, Hillsboro, OR 97124, just north of US Highway 26. Take exit 61, turn right off the exit, and take the first road to the left (west), which is Groveland Drive. Admission to the Rice Museum will be free, compliments of NARG, from 10 a.m. to 4 p.m.

The Fossil Fest starts at 10 a.m., but the GSOC picnic lunch, which will be on the grounds of the Rice Museum, will be served at noon. The GSOC picnic is open to GSOC members and their guests only.

As no picnic tables are available at the museum, members are urged to bring portable tables and chairs. GSOC will supply paper plates, napkins, paper cups, utensils, and serving tables. There will be no personal grilling this year, but NARG is selling hamburgers, hot dogs, soda, and water for a nominal price. You may bring your own beverages but no alcoholic drinks because they are not permitted on Museum property. Although the hot dogs or hamburgers may be purchased

from NARG, we ask that you bring side dishes, salads, or desserts, based on the first letter of your last name as follows:

- A through L bring a side dish or salad.
- M through Z bring a dessert.

This year's Fossil Fest theme is "Paleobotany, Fossil Plants of the Ancient Northwest." Bring your children and grandchildren, as there will be free games and a fossil hunt. Paleobotanist Dr. Bill Rember, U of Idaho, has been invited to speak on Clarkia flora. There will also be fossil displays, and the Rice Museum and its gift shop will be open. If you bring fossils, experts will be available to identify and explain them for you. If you have any questions, contact GSOC President Larry Purchase (360-254-5635, [lkpurchase@q.com](mailto:lkpurchase@q.com)) or Beverly Vogt (503-292-6939, [bevvogt@comcast.net](mailto:bevvogt@comcast.net)).

## **Philippi Canyon Field Trip**

Field Trip, August 21st, 2010: "In the Path of Catastrophic Floods; Bars, Scablands, and Cataracts." Led by GSOC Director Dave Olcott, this full day trip leaving from Lewis and Clark State Park will focus on catastrophic flood features, both 'recent' and "ancient". Specifically, the trip will examine sites from The Dalles, through 15 Mile Creek Valley and eastward to Phillipi Canyon. Several sites that J Harlan Bretz documented in his 1928 publication "Bars of Channeled Scabland" will be visited. See the trip registration form on page 33 of this newsletter for details.

*NOTE: You must be a GSOC member or guest of a member to attend GSOC field trips. You may join GSOC at any time, for \$25/individual, \$35/family.*

## **FUTURE ACTIVITIES**

Field Trip, September 18, 2010

GSOC member and popular field trip leader Ken Cameron will lead a one day hike to **Ramona Falls** on Mt. Hood, with geological interpretation along the way. The field trip involves hiking the 7-mile-long loop trail that goes up Old Maid's flat along the Sandy River near the town of Zigzag. Along the way Ken will point out lahar and pyroclastic flow deposits, tree wells, and andesite flows.

Participants will meet and register at the Hoodland Plaza at Welches on Highway 26 on the way to Mt Hood. The meeting place (on your right, heading east) has a

Thriftway grocery store and a 76 gas station. Car pooling will be arranged there for the short drive to the trailhead.

Trailhead parking permits are required. The trail is rocky and gently uphill for the first half. Wear shoes suitable for hiking and carry food and water for the day.

*NOTE: You must be a GSOC member or guest of a member to attend GSOC field trips. You may join GSOC at any time, for \$25/individual, \$35/family.*

Check the GSOC website ([www.gsoc.org](http://www.gsoc.org)) for updates to the calendar, including information on the August and September GSOC field trips.

## **UPCOMING ACTIVITIES FROM OTHER ORGANIZATIONS**

### **Mt. St. Helens Institute Field Seminars**

Since 2000, their field seminars have helped educate hundreds of people about the wild wonders of Mount St. Helens. They've taken people exploring on the Pumice Plain, led them to the volcano's summit, showed them the stars, and shared with them the history of the eruption and how it changed the land. Their seminars, taught by highly experienced, passionate instructors, are open to all ages. Youths under 14 must be accompanied by an adult. For the current schedule see the website: [mshinstitute.org/index.php/programs/field\\_seminars](http://mshinstitute.org/index.php/programs/field_seminars)

### **OMSI Science Pub Portland**

There are now TWO Science Pubs in Portland -- one at the Bagdad Theater in Southeast, and one at Mission Theater in Northwest. Learn about cutting-edge topics in science and technology from leading researchers and scientists, all while enjoying food and drinks. Experience an informal atmosphere where you can interact with experts and where there are no silly questions. No scientific background is required; just bring your curiosity, sense of humor, and appetite for food, drinks, and knowledge!

<http://www.omsiedu/sciencepubportland>

- "Seeing Things in a New Light: Infrared Imaging," Tuesday, July 20, at the Mission Theater. Join us to see the world in a "new light." John Lester Miller (a.k.a. Dr. Strangephoton) will give an energetic presentation on the history, phenomenology, and applications of infrared imaging.
- "Packing for Mars: The Curious Science of Life in the Void," Thursday, August 12 at the Bagdad Theater (note the different day of the week!). Space

is a world devoid of the things we need to live and thrive: air, gravity, hot showers, fresh produce, privacy, beer. Space exploration is in some ways an exploration of what it means to be human.

- "Great Balls of Fire: Meteorites," Tuesday, August 17 at the Mission Theater. Dick Pugh, field scientist at the Cascadia Meteorite Laboratory at Portland State University will present.
- "Dangerous Liaisons: Sexual Selection and Sexual Conflict," Tuesday, September 21 at the Mission Theater. Reproduction is an essential part of all life, yet the existence of males and females leads to a real-life battle of the sexes that shapes the biology of most organisms. Speaker Patrick Phillips, PhD, is a professor of biology and director of the Center for Ecology and Evolutionary Biology at the University of Oregon. He is an expert on the genetics of complex traits, such as aging, behavior, development, and reproduction.
- "Cataclysms on the Columbia: The Great Missoula Floods," Monday, October 11 at the Bagdad Theater (one week later than usual). One of the greatest sets of geological events to ever have occurred in North America was the Missoula Floods. Occurring as many as 40 times during the last ice age, the floods were caused by waters released from ancient Lake Missoula that scoured the Columbia River basin, carved out the Columbia River Gorge, and swept across at least 16,000 square miles of the Pacific Northwest. This Science Pub will focus on the incredible story of discovery and development of the idea of the floods by J Harlen Bretz and will discuss the effect of the floods on the landscape of the Willamette Valley and the area around us. Speaker Scott Burns, PhD, is a professor of geology and past Chair of the Department of Geology at Portland State University where he has been for nearly 20 years. Scott specializes in environmental and engineering geology, geomorphology, soils, and Quaternary geology.

## **Chile's Recent Earthquake has Lessons that We Can Learn**

Synopsis of the June 11, 2010, lecture by Yumei Wang, P.E., Geohazards Team Leader, Oregon Department of Geology and Mineral Industries (DOGAMI), ASCE TCLEE Investigation Team, Oregon Earthquake Commission (OSSPAC), and Allison Pynch, G.E., P.E., Senior Engineer, Shannon and Wilson, Inc., Geotechnical and Environmental Consultants

by Carol Hasenberg

Last month's Friday night lecture featured two speakers that are on the TCLEE (call it TEEK-lee) earthquake damage reconnaissance team sponsored by the American Society of Civil Engineers (ASCE). The team travelled to Chile this year to view and report on the damage to ports, transportation systems, electrical power systems, and other lifelines as a result of the February 27, 2010 magnitude 8.8 earthquake there.

Chile, a country with a healthy economy and geography somewhat similar to that of western Oregon, was hit by a magnitude 8.8 earthquake which occurred in the subduction zone adjacent to its coastline on February 27. After the main shock of the earthquake, approximately 130 magnitude 6.0 or greater aftershocks occurred. A magnitude 6.9 crustal earthquake followed the main shock by two weeks and was believed to be a reaction to the main shock. A devastating tsunami followed the main shock, with heights from 4 to 12 meters in Chile.

Despite the destructive power of this earthquake, the country fared relatively well. There was extensive damage, but several factors contributed to the moderation of the destruction and the ability of the country to recover quickly. First, Chile has experienced 76 magnitude 7.0 and larger earthquakes since 1900, including the magnitude 9.5 Valdivia earthquake in 1960, the most powerful quake ever recorded. As a consequence, they have had earthquake provisions in their building codes for a long time.

Secondly, the time of day was fortuitous. The earthquake occurred at night, so there were no children in the 4,000 damaged schools. Families were together during the quake. Also, the tide was low during the tsunami, which reduced its height somewhat. Thirdly, the earthquake occurred in summer, so the weather had been dry and relatively few landslides were triggered.

Despite these strokes of luck, damages did occur. Over 300,000 homes were damaged. Nearly five hundred people lost their lives, although these mostly occurred as a result of the tsunami. In some areas there was as little as 10 minutes of warning, even though people knew what to do.

Because many vital lifelines must either cross water or lie adjacent to it in regions of poor soil, there were damages to the systems that the TCLEE team investigated. Because a subduction zone earthquake creates subsidence or uplift in different land masses, ports can be left high and dry or flooded. The presentation included a slide of a port whose water had drained away. Other ports had damaged seawalls and soil cracking and mass movement due to liquefaction, a common failure of wet, grainy, loosely-packed alluvial or coastal soils. The TCLEE team visited a coastal town, Dichato, which was virtually destroyed by a 12 meter tsunami.

Bridges were collapsed all over the country, but there again Chile was lucky because the main transportation arteries could remain open. The country's main freeway was built in two stages so all river crossings had two distinct bridges. Usually one or the other of these were able to be used soon after the quake.

Electrical power systems did well in general. Most power was running within 24 hours after the quake. Fuel was more of a problem. Two major refineries had to be shut down, and fuel is now being imported by ship. In spite of all the difficulties they've had due to the earthquake, the Chilean economy is still functioning and the country is rebounding from its seismic event.

The point of the talk was to contrast the damage in Chile to what is expected during a Cascadia

Subduction Zone earthquake in Oregon. We expect a magnitude 8.5 to 9.0 quake with a tsunami. We have rivers and coastlines with poor soils. Our infrastructure is weaker than that in Chile. We haven't had dozens of major earthquakes to eradicate weak structures from the Oregon building inventory. We expect thousands of people to die in our big earthquake, not hundreds.

One vulnerable area discussed by the speakers was bridges. Our bridge systems are deteriorating under the gravity loads we are subjecting them to, and most haven't been designed to current seismic standards. We have done some piecemeal upgrades to some of the bridges (the Marquam superstructure for example) but our transportation networks have not been upgraded to the point where they will be operational after such a quake. We have 900 deficient bridges and at the current rate of rehabilitation it will take more than 200 years to fix them. The I-5 corridor and the coast highway will not be up and running after our earthquake.

Another problem area is fuel. Our fuel depot is located across from Swan Island in northwest Portland. The tanks are on poor soils which can liquefy during an earthquake. There will be tanks destroyed and hazardous, flammable fuel spilled.

The examples presented by the TCLEE team painted a bleak picture for the aftermath of our earthquake in Oregon. We will either have to deal

with a massive loss of life and a devastated economy, or take steps now to improve our lot.

### References and Additional Reading

(En Español) Servicio sismológico Universidad de Chile. [Listado de Terremotos Históricos \(Chile\)](http://ssn.dgf.uchile.cl/home/terrem.html)  
<http://ssn.dgf.uchile.cl/home/terrem.html>

List of earthquakes in Chile from Wikipedia has links to the earthquake pages and many references  
[http://en.wikipedia.org/wiki/List\\_of\\_earthquakes\\_in\\_Chile](http://en.wikipedia.org/wiki/List_of_earthquakes_in_Chile)

In pursuing a more earthquake-prepared society here in Oregon, you may want to ask your governmental agencies and political candidates the following questions:

- How can we prepare our emergency facilities, such as emergency control centers, fire stations, and hospitals, to be operational after the Cascadia Subduction Zone earthquake?
- How can we improve our school buildings to protect our children during the Cascadia Subduction Zone earthquake?
- How can we prepare our transportation, electrical, and other vital lifeline systems to protect our public health and facilitate economic recovery after the Cascadia Subduction Zone earthquake?



# GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

## Philippi Canyon – Bars, Scablands, And Cataracts – August 21, 2010

**Itinerary:** GSOC Director Dave Olcott will focus on catastrophic flood features, both ‘recent’ and “ancient”. Specifically, the trip will examine sites from The Dalles, through 15 Mile Creek Valley and eastward to Phillipi Canyon. Several sites that J Harlan Bretz documented in his 1928 publication “Bars of Channeled Scabland” will be visited.

Access on private land will provide special viewing at several sites. The trip will be culminated by a 3 mile (round trip) hike (easy but rocky in places) that will provide superb views of flood features in the Philippi Canyon Divide Crossing and the John Day River Canyon. Since we will be traveling through some significant historical sites, we will be joined by a local historian who will provide some connections with the local geology.

**Check-In:** Check-in Saturday at Lewis and Clark State Park (Exit 18, east side of Sandy River off of I – 84) at 7:30 am; leaving by 8:00 am.

**Fee:** \$20, plus GSOC membership fee if you are not already a member or guest of a member.

**GSOC Membership:** may be purchased simultaneously, see form at end of newsletter or [www.gsoc.org](http://www.gsoc.org) for rates.

**Transportation:** Transportation will be by car caravan/car pool with participants making their own arrangements. Participants are encouraged to arrange carpools in advance of the trip, as pullout space will be limited. (Dave will assist in coordinating this endeavor).

**Food:** Participants are to bring plenty of water, snacks and a bag lunch.

**Weather:** Dress appropriately for wet, windy and/or hot weather, and hiking. Bring a walking stick if you use one, a hat, sunscreen and sunglasses. Hiking boots are recommended.

**Registration:** Mail completed form below with payment to GSOC, Philippi Canyon Field Trip, PO Box 907, Portland OR 97207. Include name and address, and telephone number(s) and/or e-mail addresses in case we need to contact you. Make checks payable to GSOC. Participation will be limited to the first 25 GSOC members and their guests who have paid for the trip! Full payment is required to hold reservation.

**Additional Information:** Dave Olcott [daveolcott46@yahoo.com](mailto:daveolcott46@yahoo.com) or (503) 695 – 5219.

**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.

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### REGISTRATION FORM FOR PHILIPPI CANYON FIELD TRIP 2010

August 21, 2010

NOTE: Fill out one registration form for each participant.

Participant name \_\_\_\_\_ minor? Yes or No

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 (\_\_\_\_) \_\_\_\_\_ - \_\_\_\_\_ Cell Phone (\_\_\_\_) \_\_\_\_\_ - \_\_\_\_\_ Email address \_\_\_\_\_

**Fee: \$20.** Send this form and payment to:

GSOC, Philippi Canyon Field Trip, PO Box 907, Portland, OR 97207-0907, must arrive by **August 14, 2010.**

# **GEOLOGICAL SOCIETY OF THE OREGON COUNTRY ACTIVITIES:**

**ANNUAL EVENTS:** President's Field Trip—Summer or Fall; Banquet—March; Annual Business Meeting—February.

**FIELD TRIPS:** About 4 per year. Fees: see field trip announcements on the calendar next page.

**GSOC LIBRARY:** Rm. 69, Cramer Hall, Portland State University. Open 7:30 p.m. prior to meetings.

**PROGRAMS:** Second Friday evening most months, 8:00 p.m., Rm. S17, Cramer Hall, PSU, SW Broadway at SW Mill St., Portland, Oregon.

**MEMBERSHIP:** Per year from January 1: Individual--\$25, Family--\$35, Junior (under 18)/Student--\$15. Membership applications are available on the website [www.gsoc.org](http://www.gsoc.org).

**PUBLICATIONS:** **THE GEOLOGICAL NEWSLETTER (ISSN 0270 5451)**, published monthly and mailed to each member. Subscriptions available to libraries and organizations only at \$20.00 per year. Single Copies are available at \$2.00 each. Order from:

**Geological Society of the Oregon Country, P.O. Box 907, Portland, Oregon 97207**

**TRIP LOGS:** Write to the same address for names and price list.

## **APPLICATION FOR MEMBERSHIP THE GEOLOGICAL SOCIETY OF THE OREGON COUNTRY**

Name \_\_\_\_\_ Spouse \_\_\_\_\_

Children under age 18 \_\_\_\_\_

Address \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_ Zip \_\_\_\_\_ - \_\_\_\_\_

Phone (\_\_\_\_) \_\_\_\_\_ - \_\_\_\_\_ Email address \_\_\_\_\_

Geologic Interests and Hobbies \_\_\_\_\_

**Please indicate Membership type and include check for appropriate amount:**

**Individual \$25.00** \_\_\_\_\_ **Family \$35.00** \_\_\_\_\_ **Student \$15.00** \_\_\_\_\_

**Make Check Payable to:**      **The Geological Society of the Oregon Country**  
   **PO Box 907**  
   **Portland, OR 97207-0907**



# THE GEOLOGICAL NEWSLETTER

"NEWS OF THE GEOLOGICAL SOCIETY OF THE OREGON COUNTRY"

VOLUME 76, NUMBER 5  
SEPTEMBER/OCTOBER 2010

## The Geological Society of the Oregon Country

P.O. Box 907, Portland, OR 97207-0907

[www.gsoc.org](http://www.gsoc.org)

### 2010 - 2011 Administration:

#### President:

Larry Purchase – 360/254-5635

[lkpurchase@q.com](mailto:lkpurchase@q.com)

#### Vice-President:

Rik Smoody - 360/546-2019

[science@smoo.com](mailto:science@smoo.com)

#### Secretary

Beverly Vogt – 503/292-6939

[bevvoigt@comcast.net](mailto:bevvoigt@comcast.net)

#### Treasurer

Richard Bartels – 503/292-6939

[bartbartels@comcast.net](mailto:bartbartels@comcast.net)

#### Directors:

Dave Olcott (1 year) – 503/695-5219

Anne O'Neill (2 years) - 503/477-7827

Paul Edison-Lahm (3 years) – 971/404-6064

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#### Assistant Business Manager:

Anne O'Neill - 503/477-7827

VISITORS WELCOME AT ALL MEETINGS

## CALENDAR

### SEPTEMBER/OCTOBER ACTIVITIES

**Wednesday evening talk, September 29, 2010, at 7:30 p.m.**, in **Room 69**, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University: Speaker Dr. Ken Severin, Director of the Advanced Instrumentation Laboratory at the University of Alaska in Fairbanks ([www.uaf.edu/ail](http://www.uaf.edu/ail)), will present "A Tiny View Of The Biggest State." Dr. Severin will present some amazing photos taken in the lab with electron microscopes plus other cool findings from his research laboratory. *Please refer to the website for possible updates on the location of this lecture.*

What do you do when someone brings you a sample and says "Analyze this"?

Dr. Severin comments, "We want to get more information from materials, but frequently don't know exactly what information we want, or the techniques that

are available to get the information. In this lecture, I will try to unravel some of the alphabet soup (LA-ICP-MS\*, XRD\*, XRF\*, XRM\*, FTIR\*, EPMA\*, ESEM\*) of analytical techniques often used in the geological sciences with a description of what goes on in the instrument, examples of the kind of data the instrument gives, and some of the inherent limitations of the techniques."

- \* LA-ICP-MS = laser ablation inductively coupled plasma mass spectrometry, XRD = X-ray diffraction, XRF = X-ray fluorescence, XRM = X-ray microscopy, FTIR = Fourier transform infrared spectrometry, EPMA = Electron probe micro analysis, ESEM = Environmental scanning electron microscopy

Ken Severin started out studying modern foraminifera and became interested in growth of these intricate microorganisms. That led to a career involving the micro-elemental analysis of fish otoliths, and oversight of a multi-instrument lab at the University of Alaska Fairbanks where everything from gold nuggets to

Egyptian teeth to volcanic materials to snow are examined with a variety of techniques.

Join GSOC members at **Pizzicato Pizza, 1708 SW 6th Ave.**, at **6:00 p.m.** before the lecture for an informal dinner and conversation.

Friday evening talk, October 8, 2010, at 7:30 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University: Speaker Don J. Pettit, Senior Emergency Response Planner, Emergency Response Program, Oregon Department of Environmental Quality, will present "the Oregon Incident Response Information System."

**Do you know what hazardous materials are used, stored, or transported through Oregon?** --The Oregon Department of Environmental Quality (DEQ) has created a tool aimed at providing key geographic information needed to guide response efforts to emergency personnel – the Oregon Incident Response Information System (OR-IRIS). Affectionately nicknamed the Oregon Map of Everything, OR-IRIS uses GIS data useful to understanding the natural, physical and jurisdictional setting of a hazardous release so that a safe, appropriate and efficient response can be conducted. OR-IRIS consists of self-contained pre-packaged GIS data in a format that allows for exploration and analysis by those without advanced GIS (computer mapping) skills.

**Free parking** is available at Portland State University **Friday** nights after 5 p.m. and **Wednesday nights after 7 p.m.** in Parking Structure 2 on Broadway Ave. directly across from Cramer Hall and on level one of Parking Structure 1, bounded by Broadway and 6<sup>th</sup> Aves. and Harrison and Hall Sts.

### **Ramona Falls Field Trip**

September 18, 2010

GSOC member and popular field trip leader Ken Cameron will lead a one day hike to Ramona Falls on Mt. Hood, with geological interpretation along the way. The field trip involves hiking the 7-mile-long loop trail that goes up Old Maid's flat along the Sandy River near the town of Zigzag. Along the way Ken will point out lahar and pyroclastic flow deposits, tree wells, and andesite flows.

Participants will meet at 8:30 a.m. and register at the Hoodland Plaza at Welches on Highway 26 on the way to Mt Hood. The meeting place (on your right, heading

east) has a Thriftway grocery store and a 76 gas station. Car pooling will be arranged there for the short drive to the trailhead. The car caravan will leave the Hoodland parking lot for the trailhead at 9:00 sharp.

There will be a \$5 fee per head for this trip. Trailhead parking permits are required for the cars in the caravan. The trail is rocky and gently uphill for the first half. Wear shoes suitable for hiking and carry food and water for the day.

*NOTE: You must be a GSOC member or guest of a member to attend GSOC field trips. You may join GSOC at any time, for \$25/individual, \$35/family.*

## **FUTURE ACTIVITIES**

Check the GSOC website ([www.gsoc.org](http://www.gsoc.org)) for updates to the calendar, including information on the upcoming meetings and September GSOC field trip.

## **UPCOMING ACTIVITIES FROM OTHER ORGANIZATIONS**

**Portland State University Geology Department Geology Fall Colloquium 2010**, Cramer Hall S17, 3:30-4:30 p.m.. All are invited to attend! For information contact: Martin Streck, 503/725-3379, [streckm@pdx.edu](mailto:streckm@pdx.edu), or refer to the department website: <http://geology.pdx.edu/>

As of this publication, the lecture schedules have not been announced but do check the department website near the end of September for the upcoming lectures. Do check the times and locations also as they may have changed.

**Oregon State University Department of Geosciences 2010 Fall Seminar Series**, Thursdays, 4:00 pm, Gilfillan Auditorium, unless otherwise noted. Refer to department website for more information: <http://www.geo.oregonstate.edu/Seminars>

As of this publication, the lecture schedules have not been announced but do check the department website near the end of September for the upcoming lectures. Do check the times and locations also as they may have changed.

**University of Oregon Department of Geological Sciences, Fall 2010 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>

As of this publication, the lecture schedules have not been announced but do check the department website near the end of September for the upcoming lectures. Do check the times and locations also as they may have changed.

### **OMSI Science Pub Portland**

There are now TWO Science Pubs in Portland -- one at the Bagdad Theater in Southeast, and one at Mission Theater in Northwest. Learn about cutting-edge topics in science and technology from leading researchers and scientists, all while enjoying food and drinks. Experience an informal atmosphere where you can interact with experts and where there are no silly questions. No scientific background is required; just bring your curiosity, sense of humor, and appetite for food, drinks, and knowledge!

<http://www.omsi.edu/sciencepubportland>

- “Dangerous Liaisons: Sexual Selection and Sexual Conflict,” Tuesday, September 21 at the Mission Theater. Reproduction is an essential part of all life, yet the existence of males and females leads to a real-life battle of the sexes that shapes the biology of most organisms. Speaker Patrick Phillips, PhD, is a professor of biology and director of the Center for Ecology and Evolutionary Biology at the University of Oregon. He is an expert on the genetics of complex traits, such as aging, behavior, development, and reproduction.
- “Cataclysms on the Columbia: The Great Missoula Floods,” Monday, October 11 at the Bagdad Theater (one week later than usual). One of the greatest sets of geological events to ever have occurred in North America was the Missoula Floods. Occurring as many as 40 times during the last ice age, the floods were caused by waters released from ancient Lake Missoula that scoured the Columbia River basin, carved out the Columbia River Gorge, and swept across at least 16,000 square miles of the Pacific Northwest. This Science Pub will focus on the incredible story of discovery and development of the idea of the floods by J Harlen Bretz and will discuss the effect of the floods on the landscape of the Willamette Valley and the area around us. Speaker Scott Burns, PhD, is a professor of geology and past Chair of the Department of Geology at Portland State University where he has been for nearly 20

years. Scott specializes in environmental and engineering geology, geomorphology, soils, and Quaternary geology.

## **2010 PRESIDENT'S FIELD TRIP RECAP**

by Carol Hasenberg, Larry Purchase, and Beverly Vogt

This year's GSOC President's Field Trip took place in the rolling hills and Ponderosa Pine forests of the southeastern section of the Ochoco National forest. The group camped in the beautiful forest surrounding Delintment Lake, where the stars were beautiful and the lake water cool. The days were a bit hot but GSOC'ers didn't mind because their eyes were shining with the prospect of finding a beautiful fossil to link them with the past history of the area. As President Larry Purchase put it, “this trip is about the fossils as well as the underlying geology from which they came. We, however, mainly came to find fossils”.

This area of ancient island arc terranes crashed into the westernmost edge of the continent since the Jurassic age. What makes it even more confusing is that two island arcs collided before striking the continent. The rocks at the trip stops were from the Grindstone and Izee terranes. The oldest rocks exposed in Oregon, visited by GSOC on Saturday, July 17, are from a Middle Devonian (400 mya) section of coral reef which became included in a subduction zone that became the Songbird Formation of the Grindstone Terrane. This limestone monolith has fossils that include corals, sea jellies, and algae (Grypophyllum, Helioliter, Cnidaria, and Stromatoporoids).

In addition to this truly ancient rock, stops were also made at two locations within the Izee Terrane, in rocks of Jurassic age. On Saturday GSOC also visited the Four-Corners Site at the junction of US Forest Service roads #41 & 43, which has Bajochian fossil ammonites that are 169 to 176 million years old. This was the site that is “guaranteed” to yield fossil ammonites, although the fossils are fragile and must be handled carefully.

On Sunday, July 18, the group visited another Jurassic site from the Snowshoe Formation of the Izee Terrane. This site, located on the same private ranch as the Devonian monolith, yielded the Thalattosuchian crocodile that was recently excavated by the North American Research Group (NARG). The site also has numerous fossils of ammonites and other denizens of shallow Asian coastal waters, which took a 100 million year ride and ended up on the shores of Oregon.

In terms of finding fossils the group did well. The Devonian monolith had at its base numerous small rocks which had weathered off the parent rock and contained the ancient fossils. The Four-Corners site yielded many small ammonites. The crocodile site unveiled many ammonites, including sections of some big ones, and also bivalves (clams). The group was disappointed that slated speaker Dr. Ellen Bishop was not able to make the trip due to a serious illness in her family. However, Eastern Oregon University geologist, Dr. Jay Van Tassell, gave an excellent lecture and helped the group ID fossils.

One of our newest group members had an amazing camera that could take really close up pictures of the fossils. Keep a lookout on our website ([www.gsoc.org](http://www.gsoc.org)) for some of these photos.

On Monday, July 19, Richard Bartels and Beverly Vogt led a one-day excursion along Malheur National Forest Service Road 6370 highlighting the

Izee terrane, a continuous sequence of Lower Triassic through Upper Jurassic sedimentary rocks, including a major early Jurassic unconformity. The importance of these Izee rocks is that they record the history of the movements of various “exotic” terranes of the Blue Mountains Province (Wallowa, Olds Ferry, and Baker terranes) as they were assembled into their present configuration.

LeMaskin and Dorsey’s model (2007) for the assembly of the Blue Mountain Province was presented. Their supporting field evidence visible along Road 6370 included sediment source area and environment of deposition for each unit, east-directed thrust faulting from the basement (the Baker Terrane), and the resultant effect of this thrust faulting (submarine landsliding). The day ended with GSOCer’s collecting marine fossils of the Suplee Formation located directly above the angular unconformity.

## **GSOC PICNIC RECAP**

by Richard Bartels

Bev Vogt and I left at 2 pm and from my count we had 41 members attend the GSOC picnic held this year at the Rice Museum. Janet Rasmussen took a photo of the GSOC ex-presidents that attended. They included Rosemary Kenney (1989), Evelyn Pratt (1992), Clay Kelleher (1995), Richard Bartels (1996), Beverly Vogt (1998), and Carol Hasenberg (1999). The others were from another century.

## GEOLOGICAL SOCIETY OF THE OREGON COUNTRY ACTIVITIES:

**ANNUAL EVENTS:** President's Field Trip—Summer or Fall; Banquet—March; Annual Business Meeting—February.

**FIELD TRIPS:** About 4 per year. Fees: see field trip announcements on the calendar next page.

**GSOC LIBRARY:** Rm. 69, Cramer Hall, Portland State University. Open 7:00 p.m. prior to meetings.

**PROGRAMS:** Second Friday evening most months, 7:30 p.m., Rm. S17, Cramer Hall, PSU, SW Broadway at SW Mill St., Portland, Oregon.

**MEMBERSHIP:** Per year from January 1: Individual--\$25, Family--\$35, Junior (under 18)/Student--\$15. Membership applications are available on the website [www.gsoc.org](http://www.gsoc.org).

**PUBLICATIONS: THE GEOLOGICAL NEWSLETTER (ISSN 0270 5451)**, published monthly and mailed to each member. Subscriptions available to libraries and organizations only at \$20.00 per year. Single Copies are available at \$2.00 each. Order from:

**Geological Society of the Oregon Country, P.O. Box 907, Portland, Oregon 97207**

**TRIP LOGS:** Write to the same address for names and price list.

### APPLICATION FOR MEMBERSHIP THE GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

Name \_\_\_\_\_ Spouse \_\_\_\_\_

Children under age 18 \_\_\_\_\_

Address \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_\_ Zip \_\_\_\_\_ - \_\_\_\_\_

Phone (\_\_\_\_) \_\_\_\_\_ - \_\_\_\_\_ Email address \_\_\_\_\_

Geologic Interests and Hobbies \_\_\_\_\_

Please indicate Membership type and include check for appropriate amount:

Individual \$25.00 \_\_\_\_\_ Family \$35.00 \_\_\_\_\_ Student \$15.00 \_\_\_\_\_

Make Check Payable to: The Geological Society of the Oregon Country  
PO Box 907  
Portland, OR 97207-0907



# THE GEOLOGICAL NEWSLETTER

"NEWS OF THE GEOLOGICAL SOCIETY OF THE OREGON COUNTRY"

VOLUME 76, NUMBER 6  
NOVEMBER/DECEMBER 2010

## The Geological Society of the Oregon Country

P.O. Box 907, Portland, OR 97207-0907

[www.gsoc.org](http://www.gsoc.org)

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#### President:

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Rik Smoody - 360/546-2019

[science@smoo.com](mailto:science@smoo.com)

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Beverly Vogt – 503/292-6939

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Anne O'Neill - 503/477-7827

VISITORS WELCOME AT ALL MEETINGS

## CALENDAR

### NOVEMBER/DECEMBER ACTIVITIES

Friday evening talk, November 12, 2010, at 7:30 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University: Speaker Rachel Pirot, Geologist, Shannon & Wilson, Inc., and recent M.S. recipient at Portland State University Department of Geology, will present "Source Area Characteristics of Debris Flows on Mt. Hood."

In November 2006, a massive storm triggered debris flows on all sides of Mount Hood, Oregon. In her master's thesis survey of these drainages, Ms. Pirot characterized the source areas physically and morphologically to assess factors controlling debris flow initiation. Of the eleven drainages surveyed, seven experienced debris flows. Although findings indicate that all major drainages on Mount Hood are capable of

producing debris flows, drainages with certain characteristics were the most susceptible.

Join GSOC members at **Pizzicato Pizza, 1708 SW 6th Ave.**, at **6:00 p.m.** before the lecture for an informal dinner and conversation.

GSOC Seminar, Wednesday, November 17, 2010 at 8 p.m., Room 69, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University "PowerPoint Basics" - A short introduction to PowerPoint and/or OpenOffice.org to help in create slide shows or presentations of their geology information and resources. Included will be how to insert pictures, text, and presentation styles. All ages welcome.

**Free parking** is available at Portland State University **Friday** nights after 5 p.m. and **Wednesday** nights after 7 p.m. in Parking Structure 2 on Broadway Ave. directly across from Cramer Hall and on level one of Parking Structure 1, bounded by Broadway and 6<sup>th</sup> Aves. and Harrison and Hall Sts.



## **GSOC Annual Christmas Party**

Friday evening talk, December 10, 2010, at 6:30 p.m., will once again be the GSOC Annual Christmas Party and field trip slideshow. Attendance will be limited to GSOC members and their guests. Speakers for this year's gala event will include:

- President Larry Purchase – “The 2010 President's Field Trip to Delintment Lake, July 16-20”
- Director Dave Olcott – “In the Path of Catastrophic Floods; Bars, Scablands, and Cataracts, August 21st, 2010”
- Secretary Beverly Vogt – “Bull Run Watershed, June 26, 2010”
- Member and outstanding GSOC field trip leader Ken Cameron – “Ramona Falls Field Trip, September 18, 2010”

The party will be held at the Simon Benson House on the Portland State University campus. Donations to help cover the venue rental are being accepted by GSOC Treasurer Richard Bartels. Food and other contributions to the event are being coordinated by GSOC Director Anne O'Neill. If you are planning to attend, the basic scheme for food and volunteer contributions is the following:

- Last name A-J: Savory, tangy, or salty snacks/hors d'oeuvres
- Last name K-O: Beverages or setup items – call Anne O'Neill for itemized list
- Last name P-Z: Sweets

If you're bringing food, bring enough for 10 servings as a rule of thumb. If you're helping to set up, come at 6:00 p.m. The party will officially start at 6:30, and the slide shows will begin at 7:30 p.m. There will be food, beverages, and live music at the party.

*If you would like to come but are not yet a member of GSOC, you may join now and receive membership benefits throughout 2011.*

## **FUTURE ACTIVITIES**

Check the GSOC website ([www.gsoc.org](http://www.gsoc.org)) for updates to the calendar, including information on the upcoming meetings and the GSOC 76<sup>th</sup> Annual Banquet in March.

## **UPCOMING ACTIVITIES FROM OTHER ORGANIZATIONS**

**Portland State University Dept. of Geology & School of the Environment, Fall Colloquium 2010**, Cramer Hall 271, 3:30-4:30 p.m.. All are invited to attend! For information contact: Scott Burns, 503/725-3389, [burnss@pdx.edu](mailto:burnss@pdx.edu), or refer to the department website: <http://geology.pdx.edu/>

For Fall 2010 the theme for the seminars is: “Applied Environmental Geology”

- Oct. 27, 2010, “Wine Soils of the Willamette Valley,” Andy Gallagher, Red Hills Soil Mappings, LLC, Corvallis
- Nov. 3, 2010, “Over the River and Through the Woods: Balancing New Infrastructure & Environmental Protection,” Kent Snyder, Normandeau Associates, Vancouver
- Nov. 10, 2010 “Water Planning in Phoenix: Managing Risk in the Face of Uncertainty,” Patricia Gober, Dept. of Geography, Arizona State University, (Past President of AAG)
- Nov. 17, 2010 “A Highway no Longer Runs Through it: Restoring Streams for ODOT,” Anne MacDonald, Geengineers, Tigard
- Nov. 24, 2010 “Basic Geology is Still Important in Cleaning Environmental Sites – Two Case Histories in the Portland Area,” Mavis Kent, Plateau Geoscience LLC, Vancouver (Recently retired from Oregon DEQ)
- Dec. 1, 2010 “Environmental Cleanup of a Major Truck Stop, Portland, Oregon,” Robert Miller, Robert Miller Consulting, West Linn, Oregon

**Oregon State University Department of Geosciences 2010 Fall Seminar Series**, Thursdays from 4:00-5:00 pm in 108 Wilkinson Hall, unless otherwise noted. Refer to department website for more information: <http://www.geo.oregonstate.edu/>

- 10/28/2010 - David John, USGS, Menlo Park, California, “Prolonged Eocene Magmatism and Assembly of the Caetano Caldera, Cortez Area, Nevada: Inferences from SHRIMP U-Pb Dating”
- 11/4/2010 - Liz Johnson, James Madison University, Virginia, “The Effect of Cation Substitution of Hydrogen Solubility in Rutile”

- 11/11/2010 - The George Moore Lecture - Gilfillan Auditorium, Steve Squyres, Cornell University, "Science Results from the Mars Exploration Rover Project"
- 11/18/2010 - Adam Kent, Department of Geosciences, Oregon State University, "Deconvoluting the Mess that Picrites May Appear to Be"
- Monday, 11/22/2010, Noon-1:00 in 1003 Kelley Engineering Center - Kirk Nordstrom, USGS, Menlo Park, CA, "Yellowstone's Contaminated Waters-Transport of As, F, H2S, and Hg from Thermal Waters to Rivers and the Air"
- 12/2/2010 - Jim Peters, United Western Exploration LLC, Denver, Colorado, "Modern Petroleum Exploration: Targeting, Data Needs and Application of 3-D Seismic Software"

In addition to the Fall Seminar Series, OSU will also have the 2010 Thomas Condon Lecture:

November 10, 2010 7:00-9:30 p.m. at LaSells Stewart Center. Speaker Dr. Steve Squyres, Goldwin Smith Professor of Astronomy at Cornell University and principal investigator of the Mars Exploration Rover Project, will present "Roving Mars: Spirit, Opportunity and the Exploration of the Red Planet." There will be refreshments at 7:00 p.m., with the lecture starting at 7:30.

**University of Oregon Department of Geological Sciences, Fall 2010 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 27 - Ray Wells (USGS), "Origin and emplacement of Siletzia, a Paleogene accreted oceanic plateau in Oregon, Washington, British Columbia, and Alaska"
- November 3 - Liz Johnson (James Madison Univ), "What can OH in rutile tell us about oxidation conditions in the crust and mantle?"
- November 10 - Jesse Lawrence (Stanford Univ), "Seismic tomography beneath the Western US: Interpreting red and blue as geophysical processes"
- November 17 - Pascal Audet (UC Berkeley), "The seismic signature of water in the forearc of Cascadia"

- November 24 - No Seminar- Thanksgiving Week
- December 1 - Eric Dunham (Stanford Univ), "Earthquake Rupture Dynamics: Weakening Mechanisms, Nonplanarity, and Stress Levels on Faults"

### **USGS Fall 2010 Seminar Series Schedule - Oregon Water Science Center**

Brown Bag Seminars

(<http://or.water.usgs.gov/brownbag/>) are held on Tuesdays from noon to 1 pm. unless noted otherwise. The seminars are informal and are open to the public. Bring your lunch. The USGS Oregon Water Science Center office is located in Portland at 2130 SW 5th Ave. Directions to the USGS office are posted at <http://or.water.usgs.gov/location.html>.

- Tuesday, October 26, "Groundwater Resources of the Yakima River Basin," Matt Ely, Hydrologist, USGS Washington Water Science Center Tacoma, WA
- Tuesday, November 2, "Measuring Stream Metabolism with a Tracer: Resazurin as a "Smart" Tracer for Metabolic Activity," Roy Haggerty, Professor, Department of Geosciences, Oregon State University, Corvallis, OR
- Tuesday, November 9, "Occurrence, Fate, and Effects of Current-Use Pesticides in the Aquatic Environment," Kathy Kuivila, Research Hydrologist, USGS California Water Science Center, Sacramento, CA
- Tuesday, November 16, "Basin-Wide Distributed Modeling of Hydrologic Responses to Irrigation, Management in the Wood River Basin, Klamath County, OR," Joshua Owens, Master of Science student, Water Resources Engineering, Oregon State University, Corvallis, OR
- Week of November 22 - no seminar scheduled
- Tuesday, November 30, "Use of Continuous Monitors and Autosamplers to Predict Unmeasured Water-Quality Constituents in Tributaries of the Tualatin River," Chauncey Anderson, Hydrologist, USGS Oregon Water Science Center, Portland, OR
- Tuesday, December 7, "The Wallula CRBG Carbon Sequestration Pilot," Charlotte Sullivan, Senior Research Scientist, Pacific Northwest National Laboratory, Richland, WA
- Tuesday, December 14, "The Role of Zooplankton Grazing on Noxious Cyanobacteria Blooms in,

Vancouver Lake, WA,” Gretchen Rollwagen-Bollens, Clinical Associate Professor, School of Earth & Environmental Science, Washington State University, Vancouver, WA

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<http://www.oms.edu/sciencepubportland>

- “What Technology Wants,” Monday, November 1 at the Bagdad Theater, with speaker Kevin Kelly, a founding editor of Wired who provides a refreshing view of technology as a living force in the world
- “I Dig Bones: Adventures in Forensic Anthropology,” Tuesday, November 16 at the Mission Theater, with speaker Dr. Veronica “Nici” Vance, state forensic anthropologist at the Oregon State Police Portland Metro Forensic Lab
- There will be no Science Pub meetings scheduled for December

### **GSOC Membership List**

GSOC members wishing to obtain a membership list call or email Secretary Beverly Vogt, and she will mail you one.

### **BOARD MEETING NOTES**

October 9, 2010

The meeting was called to order by President Larry Purchase at the home of Rosemary Kenney. Board and GSOC members present included Larry Purchase, Rik Smoody, Beverly Vogt, Richard ‘Bart’ Bartels, Dave Olcott, Janet Rasmussen, Paul Edison-Lahm, Jan Kem, Carol Hasenberg, Tara Schoffstall, Anne O’Neill, Rosemary Kenney, Doug Rasmussen, and Dawn Juliano. The meeting agenda and minutes of the August 14, 2010 meeting were approved.

Treasurer's report was given by Bart and approved. Bart also gave the financial report of the 2010 field trips.

Rik told the board that the Friday night speaker for November will be Rachel Piro. The December Christmas party will again feature brief presentations by this year’s field trip leaders: Larry, Bev and Bart, Dave, and Ken Cameron. Annual Banquet speakers are still being investigated. Jim Jackson will be speaking at the PSU Weekend Geology Seminar on Thursday, 10/21/10 at 5:30 in S17.

Larry’s motion to donate Dr. Orr’s book on Oregon Fossils to last month’s speaker Ken Severn was approved. Larry has already purchased the book for \$24.95.

Carol suggested that a Powerpoint training might be helpful to future presenters. Tara volunteered to teach this as a Wednesday night seminar. Bev and Bart proposed that they give a rock identification class. This was enthusiastically approved.

Christmas Party report was given by Anne. The Benson House has again been reserved and the party will be open to membership only. Anne circulated a sign up sheet for food, drink, and other items (A-J tangy/salty, K-O beverage set-up, P-Z sweets). Members will be needed to assist with set up at 5:30 p.m.

Nominating committee report was given by Larry and Rik. Positions for vice president and 3-year director will need to be filled. Rik is compiling a list of potential nominees and will contact them before bringing the nominations back before the nominating committee.

Report of Website and Internet committee was presented by Tara, Carol, Rik, and Janet. The committee has been exploring whether an electronic discussion board is needed to provide a platform for a more open discussion than can be afforded by the website; however the committee has not reached a consensus on what the platform should be. After discussion was opened to the floor, the issue was referred back to committee. The committee’s Revised Website Policy Table was amended to require that any political information on the website come before the board rather than just the webmaster. With this amendment, the website policy was approved.

March Annual Banquet planning was discussed. Bart will make arrangements to book the Monarch hotel again. Janet will do the programs and place cards. Larry

took down a list of volunteers. Carol suggested having an ammonite glue party for the place cards.

Larry and Carol gave an update on Carol's finding of a reptile fossil on the President's Field Trip. A party may return to survey and secure the site in mid-October.

Larry announced the upcoming annual Newport Fossil Fest with a tentative date of Feb. 12-13.

Old and New Business:

- Paul is interested in organizing a downtown Portland geology tour.
- Bev will distribute the membership list via email.
- Jan and Tara brought the spiffy new GSOC mugs which are now for sale for \$10.
- Rosemary reminded field trip leaders that two copies of field trip guides are needed for the archives.

The next meeting is scheduled for 10 a.m., December 11th, 2010, at Rosemary's house.

Paul Edison-Lahm, Director (3 year)

## ***WHAT IT IS!***

Synopsis of the September 29, 2010, lecture by Dr. Ken Severin, Director of the Advanced Instrumentation Laboratory (AIL) at the University of Alaska Fairbanks (UAF)

by Carol S. Hasenberg

Dr. Ken Severin kicked off the fall series of GSOC lectures with his presentation about the Advanced Instrumentation Laboratory this past September 29<sup>th</sup>. He explained what the laboratory equipment is, how it works, and what applications are made of it to the benefit of the state of Alaska. Dr. Severin's original specialty was studying foraminifera, but his interests shifted towards a broader spectrum of study and eventually led to the position he holds today.

The Advanced Instrumentation Laboratory holds several instruments that examine the shape or structure of tiny samples, or perform analyses to discover their constituent elements. They're all known by acronyms, so Severin's lecture commenced with a discussion of the "alphabet soup" of names. He began with his favorite

instrument, the electron microprobe (EPMA or EMPA), which is used to determine the chemical composition of small solid samples in situ. This instrument works somewhat like the light microscope most high school biology students are familiar with. The beam of light passing through the sample in the light microscope is replaced by a concentrated beam of electrons focused down onto a small site on the sample. The instrument primarily records electrons and x-rays that are reflected or emitted upwards around the sample site. See Figure 1 (page 46) for a diagram of the beam and its products.

This instrument is the primary tool used in the analysis of fish otoliths, which is one of the most important uses of the AIL. Studying otoliths, which are the fish inner ear bones that do not resorb like most bones, is of enormous importance to Alaska's fishing industry, because many conclusions can be drawn about the age of the fish, their growth, and their environment during different life stages. Severin illustrated this by showing the GSOC audience an enlarged cross section of an otolith with growth bands analogous to tree rings. In one study of the habits of Alaskan whitefish, Severin analyzed samples of the cross sections of whitefish otoliths for strontium composition. Strontium levels have been shown to be high in otolithic bone grown in a salty oceanic environment and are low in bone grown in fresh water habitats such as river estuaries. From his strontium mapping Severin was able to demonstrate that the Alaskan whitefish have the unusual lifestyle of going from fresh to saline environments several times during their lifetimes.

Another fish that has been studied using EPMA analysis is the Orange roughy. In this case the electron microprobe was used to determine the ages of the large specimens of this fish which were being caught and marketed. This is important as the recovery rate of fish stocks is highly dependent upon their rate of growth. Otolithic age analysis showed that the age of marketable roughy was 100-150 years! Unsurprisingly, stocks of this fish have crashed due to overfishing by deep-sea trawlers.

The electron microprobe studies have been put to use in developing an inexpensive marking scheme

for fish from hatcheries in Alaska. Marking is an important part of determining proportions of wild and hatchery fish. The marking techniques which have been used are attaching little wires in the noses of the juvenile fish (for millions of fish!) and thermally marking the juvenile fish by growing them in heated tanks of water. Since thousands of gallons of potentially environmentally destructive fuel must be used to heat the tanks, the famous Copper River hatchery has opted to mark their fish by manipulating the tank's salinity. They know that hatchery fish can be identified by the pattern of strontium bands on their otoliths.

The electron microprobe is not the only instrument used in the study of fish otoliths. The x-ray diffractometer (XRD) has been used to analyze polymorphic forms of calcium carbonate of which the otoliths are composed. It was noticed that certain otoliths had relatively smoothly banded "normal" areas, and other areas that were wavy and bumpy in character. Something had caused the bone to grow in this fashion. Both portions had a similar chemistry so the XRD was used to determine the crystal forms of each portion. This analysis showed that the normal bone areas were composed of aragonite, a form of calcium carbonate, and the unusual areas were composed of vaterite, a form of calcium carbonate which is not commonly found in rocks. Subsequent studies have shown that the vaterite otolithic areas are common in hatchery fish and fish living in disturbed environments.

The other big user of the AIL is the USGS Alaska Volcano Observatory. The electron microprobe is useful to these scientists in determining the mineral composition of samples from the eruption of Mt. Redoubt and other Alaskan volcanoes. The information obtained from the raw data is what elements exist in what amounts at any given sample site. This data is mapped for a number of constituent elements of the sample, and the proportions of the various elements infer the mineral composition of each of the crystal grains. Up to 10 elements can be analyzed at once on this instrument.

The inductively coupled mass spectrometer (ICP-MS) analyzes samples for their elemental signatures like the electron microprobe, but there are significant differences in the way they work, the sample types and the results they achieve. The ICP-MS is primarily designed to analyze liquids, but can also analyze vapors produced from solids with a laser attachment. This laser vaporizes a trench in the object to be analyzed that is much bigger than that made by the electron microprobe. The sample is heated to a very high temperature which dries and then atomizes and ionizes its matter. Individual ions can be counted as they pass through the analyzer. Therefore it is highly sensitive and can detect material in parts per billion or even parts per trillion.

Another of the instruments in the lab is the Scanning Electron Microscope (SEM), which scans the secondary electron emissions from the electron beam to produce an image of the physical shape of a specimen. The softer specimens that would deform in a vacuum must be dried and coated with gold prior to scanning. Severin showed the GSOC audience a number of SEM images, which included grains of food, insect parts, fossil teeth. He also showed the audience several images taken of atmospheric ice crystals in a study that demonstrates how "sun dog" effects occur in Alaskan skies in the winter, and a picture of the sun with 2 rings and other wispy reflections which had quite an elaborate geometry. Such effects commonly occur in the cold Alaskan skies. The ice samples had to be prepared for viewing by immersion in liquid nitrogen.

Dr. Severin also named several other pieces of equipment used less frequently in his laboratory and discussed some of them briefly. In addition to the paid research work done by the laboratory, he teaches classes on using the equipment to UAF students. He prefers that researchers wanting AIL data design and conduct their own experiments, since they have a deeper understanding of their particular topic of study. All in all this window to the tiny world can have a big benefit on the biggest state.

REFERENCES AND ADDITIONAL READING

Advanced Instrumentation Laboratory at the University of Alaska Fairbanks discusses the instruments and has some really cool images from projects: [www.uaf.edu/ail](http://www.uaf.edu/ail)

Integrating Research and Education Project - This project is being developed as part of the Digital Library for Earth System Education (DLESE) Community Services Center, with funding from the National Science Foundation. Participating institutions include Montana State University and Carleton College:

Geochemical Instrumentation and Analysis page has a good discussion of the several pieces of equipment discussed in this article: [http://serc.carleton.edu/research\\_education/geochemsheets/index.html](http://serc.carleton.edu/research_education/geochemsheets/index.html)

Wikipedia pages that were helpful in writing this article:

Orange roughy -

[http://en.wikipedia.org/wiki/Orange\\_roughy](http://en.wikipedia.org/wiki/Orange_roughy)

Calcium carbonate -

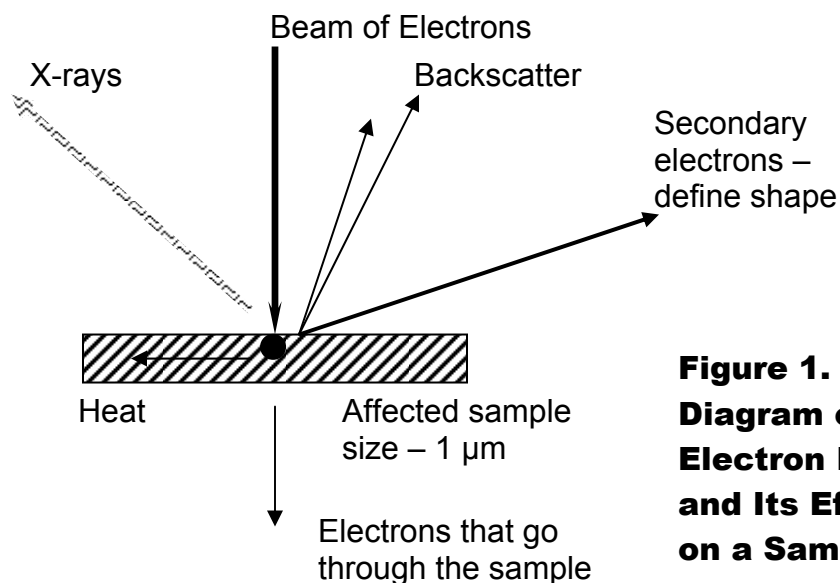
[http://en.wikipedia.org/wiki/Calcium\\_carbonate](http://en.wikipedia.org/wiki/Calcium_carbonate)

USGS Alaska Volcano Observatory:

<http://www.avo.alaska.edu/>

Several scientific papers available online also were about topics discussed in this article:

- W. Jansen and M. Slaughter, "Elemental mapping of minerals by electron microprobe," *American Mineralogist*, Volume 67, pages 521-533, 1982.
- Giuseppe Falini, Simona Fermani, Silvia Vanzo, Marin Miletic, and Giulia Zaffino, "Influence on the Formation of Aragonite or Vaterite by Otolith Macromolecules," *European Journal of Inorganic Chemistry*, 2005, 162-167.
- B. M. Jessop<sup>1</sup>, J. C. Shiao, Y. Iizuka, W. N. Tzeng, "Prevalence and intensity of occurrence of vaterite inclusions in aragonite otoliths of American eels *Anguilla rostrata*," *Aquatic Biology*, Vol. 2: 171-178, 2008.



**Figure 1.**  
**Diagram of an**  
**Electron Beam**  
**and Its Effects**  
**on a Sample**

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