



THE GEOLOGICAL NEWSLETTER

"NEWS OF THE GEOLOGICAL SOCIETY OF THE OREGON COUNTRY"

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JANUARY/FEBRUARY 2012

The Geological Society of the Oregon Country

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www.gsoc.org

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VISITORS WELCOME AT ALL MEETINGS

CALENDAR

JANUARY/FEBRUARY ACTIVITIES

Friday evening talk, January 13, 2012, at 7:30 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University. Speaker Dr. Richard Waitt of the USGS Cascades Volcano Observatory will present "Dark at Noon: The 1980 Mt. St. Helens Eruption Through Eyewitnesses."

Friday evening talk, February 10, 2012, at 7:30 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University. Speaker Dr. Jim O'Connor of the USGS Water Science Center in Portland will present "The Bridge of the Gods; Folklore, Forests and Floods."

FUTURE ACTIVITIES

The Seventy-seventh Annual GSOC Banquet will be Sunday, March 11, 2011, at the Monarch Hotel in Clackamas, Oregon. Speaker William Orr, Professor Emeritus and Curator of the Condon Collections, Museum of Natural and Cultural History, University of Oregon will present "Plowing New Ground in Oregon Geology".

Dr. William Orr will highlight a few of the many changes he and his wife Elizabeth chronicle in the 6th edition of Geology of Oregon. With ordinary on-the-ground field work, several astonishing new discoveries have been made such as the ORE-IDA graben in SE Oregon and the Crooked River Caldera. He will also speak about their significance. Much of the Tertiary volcanism east of the Cascades is now regarded to be due to the passage of the Yellowstone mantle plume beneath Oregon-a

major departure from earlier models of back-arc-spreading and Basin and Range extension. Our understanding of Oregon's tectonic history of major subduction earthquakes, while not yet crystal clear, has been greatly advanced in the last decade. The new emphasis on geologic hazards as well as the features on some of the geologists who have made Oregon geology what it is will also be examined.

The registration form for the 77th GSOC Annual Banquet is attached to this newsletter. Please submit your registration by March 5 if you wish to attend.

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

BOARD MEETING NOTES

November 12, 2011

The meeting was called to order by President Rik Smoody at the Bartels-Vogt residence. Board and GSOC members present included Jane Walpole, Paul Edison-Lahm, Richard Bartels, Dawn Juliano, Julia Lanning, Larry Purchase, Carol Hasenberg, Bev Vogt, Jan Kem, Tara Schoffstall, Dave Olcott, Rosemary Kenney and John Piccininni.

The minutes of the September 10th, 2011 board meeting and the treasurer's report were approved.

Field Trips and Other Events

For her 2012 President's field trip, Jane is arranging a bus tour in the Willamette Valley. Other 2012 tentative field trip destinations were discussed. Paul requested additional guides for next summer's downtown geology tour and three members volunteered at the meeting.

Upcoming Speakers:

Jane is looking for speakers for January and February 2012. Possible topics include geological dating, I-5 stabilization, and Iceland. John, our nominated Vice President for next year, will look into finding speakers on groundwater flow and fracking.

Holiday Party and Annual Banquet

The discussion of whether or not to find an alternate venue for the Christmas Party was tabled until after the holidays when Anne O'Neill will be present. The board's consensus was that the "Christmas Party" will henceforth be referred to as the "Holiday Party."

Bart is making arrangements with the Monarch Hotel for the March Annual Banquet, with a date TBA. Rik is arranging the banquet speaker.

Old and New Business

Nominating Committee:

The committee nominations are as follows: President – Jane, Vice-president – John, Secretary – Paul, Treasurer – Dawn, 2-Year Director – Julia. Tara threw her hat into the ring for 1-year Director. Bart will search for a nominee for 3-year Director.

Inventory:

Bev distributed inventory list for review and requested that any additions to the list be emailed to her. Rosemary has old field guides she would like to get rid of. Bart moved to put the guides for free out at the annual banquet and then allow Rosemary to recycle any that are not taken. Julie will look into scanning the guides and report back.

Meeting Minutes:

The board reconsidered our decision at the last meeting to omit board meeting minutes from the newsletter and voted to allow Carol to continue her good work condensing the minutes for the newsletter.

Adverts for Geology-Related Businesses:

Paul will contact Oregon Dept. of Justice regarding our non-profit status and use of advertising in our mailings.

Finances:

Carol raised a concern about how to make GSOC break even. Fortunately, in reducing the number of newsletter mailings to 6 per year we think we will save approximately \$400 and put us back in the black for 2012.

Next Board Meeting will be Saturday, January 14th, 2012, 10:00 a.m. at Rosemary's house.

edited from the meeting minutes provided by GSOC Secretary Paul Edison-Lahm

Don't forget that annual **DUES PAYMENTS** are due! Think about all those great member benefits for a mere annual fee of \$25 for an individual and \$35 for a family!

PS – If you joined GSOC in September or later, your 2012 dues are paid, good deal!!!

holiday party wrap-up



Yes, another fascinating year was marked at the 3rd annual GSOC Holiday Party on December 9. Delicious food, good fellowship, and great entertainment was to be had at the Simon Benson house that night. The highlight of this year's party was a song composed and sung by GSOC member Al LePage concerning the President's field trip he attended in 2010:

"Here We Come A Fossiling"

Lyrics by Al LePage, Music to the tune of "Here We Come A Wassailing"

Here we come a fossiling,
among the rock so pure,
Here we find a talus slope,
with ammonites galore.

CHORUS ...

**Rocks and gems come to you,
and to you a fossil, too,
Join the fun, come on field trips all around the
year,
come on field trips all around the year.**

Here we find the fossil jaw,
that Carol had recovered,

that didn't look like anything,
but something big discovered.

CHORUS ...

Here's a hilly side slope,
yes it was quite a walk,
Here we find an open pit,
where once there was a "croc."

CHORUS ...

Here we come a lecturing,
with Larry and Van Tassell,
Here we come a learning,
it really was no hassle.

CHORUS ...

Here's a limestone monolith,
our fine state's oldest rock,
and here's somebody's car part,
yes it was all the talk.

CHORUS ...

Here's the great Blue Mountains,
a series of terranes,
Bev & Bart deciphered them,
using their great brains.

CHORUS ...

Here's a camp under the stars,
with rock hounds who are dear,
with fondness just remember,
that trip we took last year.

CHORUS ...

Next year Al has a short play he would like GSOC members to perform. It should be a hoot!

GSOC Treasurer Richard Bartels is still accepting donations from GSOC members to cover the society's expenses for the Christmas party.

NOMINATING COMMITTEE RESULTS

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

President **Jane Walpole**
Vice President.....**John Piccininni**
Secretary **Paul Edison-Lahm**
Treasurer**Dawn Juliano**
Director, 3 years**Janet Rasmussen**
Director, 2 years.....**Julia Lanning**
Director, 1 year..... **Tara Schoffstall**

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

The Nominating Committee members were Rik Smoody, Richard Bartels, and Larry Purchase. Our thanks to the selected members and members of the Nominating Committee!

Scott Burns Tells GSOC About Geology Of Pacific Northwest National Parks

by Beverly Vogt

Friday night, November 11, Scott Burns, PSU geology professor, spoke to GSOC about the National Parks of the Pacific Northwest. Dr. Burns, who each year teaches a PSU geology class about National Parks, confined his GSOC talk to the Pacific Northwest parks. He pointed out that most national parks were established because of their geology.

The first park he discussed was the one closest to us—**Mount Rainier National Park**, established in 1899. Mount Rainier is the highest mountain in the Cascade Range—the north-south trending volcanic arc that exists because of melting of part of the oceanic Juan de Fuca Plate that is being subducted beneath the continental North American Plate. Less than a million years old, Mount Rainier at its

current height of 14,411 feet is the highest Cascade volcano and is thought to have been at one time at least a thousand feet higher. About 6,000 years ago, a series of violent eruptions and explosions culminating in a violent explosion about 5,700 years ago destroyed the original summit. Blocks of rocks and ice were thrown great distances from the summit, glaciers melted, and numerous catastrophic mudflows roared down the mountain. New glaciers eventually formed, and about 2,500 years ago, eruptions of lava flows and ash began to rebuild the old, heavily damaged summit.

Unlike many of the other Cascade volcanoes, about 90 percent of Mount Rainier's volcanic products have been andesitic lava flows. Heavily laden rain clouds rising from the Pacific routinely drop large amounts of rain and snow on the mountain, and it is covered by numerous glaciers, 26 of which have been named. Glacial activity has deeply eroded the mountain. The most popular entrance is the Nisqually entrance, located on the southwest corner of the park. The park headquarters are located at Longmire, which was originally settled because of the hot springs located nearby. The main road continues past Longmire and eventually reaches the appropriately named Paradise visitors center, with numerous trails, a fantastic view of the mountain, and, in summer, fields of gorgeous wild flowers. Other specific areas discussed by Dr. Burns included Stevens Canyon; Longmire Hot Springs; Sunrise area on the east side; ice caves; summit crater; Grove of the Patriarchs; Narada Falls; and Nisqually, Carbon, and Emmons glaciers.

Thousands of years of volcanic activity have severely altered many of Mount Rainier's rocks. Rockfalls, rockslides, avalanches, debris flows, mudflows, and other mass-wasting processes occur frequently on its slopes. More than 55 lahars (enormous mudflows) originating on its steep slopes and transported by water from its streams and melting glaciers have traveled great distances down its valleys and out on the surrounding flat areas. The longest was the Osceola Mudflow, which about 5,700 years ago traveled down the White River and continued about 70 miles to the northwest, eventually reaching Puget Sound. This history of mudflows has alerted geologists to the danger to

surrounding communities and cities, and much work has been done to develop warning systems and emergency evacuation procedures.

Crater Lake National Park, established in 1902, was the second park Dr. Burns discussed. Crater Lake lies in the caldera of Mount Mazama, which collapsed after a series of explosive eruptions beginning almost 7,000 years ago and culminating in a final devastating eruption 6,845 years ago. Ash from that eruption was widely distributed north to British Columbia and Alberta, south to Nevada, and east to Montana. The resulting caldera gradually filled with rainwater, forming Crater Lake, which is famous for its clarity and deep blue color. The lake covers about 21 square miles and is over 1,900 feet deep. Mount Mazama probably started to develop about 75,000 years ago and is thought at one time to have reached a height of about 11,000 feet, with a shape that was broader and less steep than Mount Rainier. Its composition is primarily dacite and rhyodacite.

Features discussed by Dr. Burns included the Pumice Desert on the north side of Mount Mazama; parasitic Mount Scott (Scott's favorite); Phantom Ship and Devils Backbone, which are dikes; Lloa Rock, a lava-filled explosion crater viewed from the inside; and the Pinnacles, spires of pyroclastic material cemented by fumarolic cement (similar to the Valley of Ten Thousand Smokes in Katmai National Park and Preserve in Alaska).

Lassen Volcanic National Park, established in 1916, was the third park discussed. Lassen Peak, the 10,457-foot-high volcanic peak located at the southern end of the Cascade Range, is actually a dacite dome—the largest such dome in the world. The dome is a sort of parasitic offspring of the large composite volcano known as Tehama that collapsed late in the Pleistocene, leaving a caldera more than two miles wide. About 18,000 years ago, the dome of Lassen Peak, along with several much smaller domes (Eagle Peak, Vulcan's Castle, Mount Helen, and Bumpass Mountain), began to form on the flanks of Tehama. Lassen Peak is surrounded by large quantities of talus formed as the dome pushed its way to the old surface of Tehama. A summit crater on Lassen Peak was the source of several

eruptions, including those occurring from 1914 to 1921. Several of these eruptions, which were observed, described, and photographed, caused severe problems for nearby residents. The "Great Eruption" of 1915 produced a mushroom cloud over the mountain, a glowing avalanche that roared down the northeast side of the mountain, and a series of mud and ash flows that swept down the mountain, leaving a four-mile-long area called today the "Devastated Area."

Other features of interest include Chaos Crags, formed as four dacite domes north of Lassen Peak about 1,200 years ago; Chaos Jumbles, a rock avalanche extending from the base of Chaos Crags and probably triggered by the collapse of one of the domes about 300 years ago; Lake Manzanita formed when Manzanita Creek was dammed by the Chaos Jumbles rock avalanche; and numerous small lakes including small cirque lakes such as Emerald Lake and Lake Helen, plus several other lakes such as Summit Lake that were dammed by moraines. Thermal features associated with the volcanic activity include Sulfur Works with hot springs and fumaroles, Little Hot Springs Valley, Bumpass Hell with boiling springs and bubbling mud pots, and Devils Kitchen whose hot springs are so acidic that they have eaten holes and pits into the bedrock. This park is truly a wonderland of all sorts of volcanic features—many of which are quite recent.

Moving away from volcanic terranes, Dr. Burns then discussed Olympic National Park, a classic example of an accreted terrane. Established in 1938 and located on the Olympic Peninsula, Washington, Olympic National Park has the highest annual precipitation in the conterminous United States. It is characterized by 60 glaciers at higher elevations, a rain forest on the lower western slopes, and a dry northeastern area produced by a rain shadow. The park consists mainly of two groups of rocks—belts of relatively light-weight sedimentary and low-grade metamorphic rocks combined with heavier submarine basalt called the Crescent Formation—which were scraped off the subducting Juan de Fuca Plate and pushed onto the Olympic Peninsula. The park is divided into two sections: the coastal section, which is a narrow strip extending from the mouth of the Queets River on the south to Cape

Alava and the Ozette River on the north, and the inland, much larger portion containing Mount Olympus and surrounding Olympic Mountains. The coastal section is characterized by sea stacks, mélanges, sea arches, various other erosional features, and beach terraces indicating sea-level changes. Park headquarters are at Port Angeles just outside the park, and a visitors center is at Hurricane Ridge inside the main portion of the park. Mount Olympus at approximately 7,980 feet is the highest point in the park, and it and its surrounding mountains are composed of a chaotic blend of turbidites, mélanges, and sedimentary and low-grade metamorphic rocks all folded and faulted together.

Some of the points of interest mentioned in the talk are glacially- or landslide-formed Lake Angeles, Lake Crescent caused by a landslide from Storm King Mountain, and Lillian Ridge formed from a mélange.

Dr. Burns then shifted his attention to **North Cascades National Park**, established in 1968. Located also in the state of Washington, North Cascades National Park consists mainly of four units of sedimentary, volcanic, granitic, and metamorphic rocks of varying ages that have been brought together, often as accreted terranes, by plate tectonic collisions, subduction, accretion, uplift, and volcanism. Then they were shaped by erosion and over 600 glaciers. This is truly a complicated geologic area, with rocks ranging in age from the Precambrian Yellow Aster Formation to Quaternary volcanic extrusive rocks from Mount Baker and Glacier Peak.

Specific features discussed by Dr. Burns included the metamorphic Pickett Range, Skagit Gneiss, Lake Chelan which lies in a deep U-shaped valley, volcanic Mount Baker, explosively eruptive Glacier Peak volcano, and the Chilliwack Batholith that lies between the Shuksan and Ross Lake faults. This is exciting and complex country, with incredibly beautiful and mystifying rocks.

Finally, Dr. Burns briefly discussed the **Ice Age Floods National Geologic Trail** that was recently authorized by Congress but not funded. The concept

is that there will be 16 visitor centers extending from Missoula, Montana, to Ilwaco, Washington.

Dr. Scott Burns as usual crammed a huge amount of information into a brief lecture. His class covering all the National Parks would be fascinating, and he encouraged GSOC members to try it some time.

***Earth* profiles Pat Pringle**

by Beverly Vogt

The December 2011 issue of *Earth* magazine features a two-page profile of Pat Pringle, one of our local geologists who has led several GSOC field trips, including one day of this year's President's Field Trip to Mount Rainier. The magazine is published by the American Geosciences Institute (AGI) and presents timely geologic news and discussions of issues of concern to geologists and other people interested in geology.

The two-page profile discusses details of Pat's professional experience and focuses on his studies related to tree ring dating. He has in fact established an undergraduate tree-ring research laboratory at Centralia College in Centralia, Washington, where he has been a professor since 2005. Pat's work with tree-ring studies (dendrochronology) has apparently earned him the nickname of "Stumps" to some USGS geologists. Pat is also familiar to many of us as the author of two excellent field trip guides—one to the geology of Mount Saint Helens and the other to the geology of Mount Rainier.

If you don't subscribe to this magazine (which would be a good idea for someone interested in geology) and want to see a copy, look for it in your local library or contact me (bevvoigt@comcast.net).

Review of The Ocean of Truth, by H.W. Menard (1986)

by Beverly Vogt

Bart bought a copy of this wonderful book at the book sale table at one of the GSOC Annual Banquets and put it on our bookshelf, where it languished unknown to me for several years. He was recently going to lend it to a friend interested in plate tectonics—but when I saw it on the dining room table for the first time, I kept it to read myself. It was absolutely fascinating. Its author, Henry William “Bill” Menard, pioneer of deep-sea exploration, active participant in the plate-tectonics revolution, and master of modern marine geomorphology, wrote this book because he believed that “the revolution in the earth sciences merited a history that had not been written.” He knew and worked with many of the people involved in developing this new concept, so he definitely had the credentials to tell the story of their struggles to come to terms with the questions of whether or not continental drift was a possibility, and, if so, how could it occur, and how could it be proved. His original plan was to tell the story from 1900 until 1980, but cancer interrupted his plan, and he was able to cover the story only until the end of the 60s. In fact, he was working on galleys of this book when he died in 1986.

Menard starts with the story of the German meteorologist, astronomer, and explorer Alfred Wegener, whose trips to Greenland starting in 1906 convinced him that some of the existing continents had at one time been together and had somehow mysteriously drifted apart, making him the first to formally deal with the term and concept of continental drift. People before him had noticed the fit between South America and Africa—but Wegener was the first to put it into the literature. Eventually scientists came to realize that the answers to these questions would be found not on the continents but in the oceans.

Menard describes how earth scientists—especially geophysicists and oceanographers—who were in various branches of the service during World War II, began to travel over the world’s oceans,

collecting data by various methods for various purposes. The cold war and concerns for national security, petroleum exploration, and communication by undersea cables all meant that people were seeing more and more of the ocean floor and collecting data by ever-improving equipment and techniques. Menard tells how they began to notice things that no one had ever seen before—gigantic long ridges with high sides and a deep valley in the middle, flat-topped undersea volcanoes called “guyots”, long fractures or escarpments like the Mendocino Fracture Zone, strange magnetic anomalies, unexplainable variations in amounts and character of sediments on ocean floors, gravity anomalies over deep trenches that contained surprisingly small amounts of sediments—all sorts of puzzles. More and more funding and ships loaded with equipment became available, and scientists put them to good use. Menard describes the 40s and 50s as the time of data collection and the 60s as the time of figuring it all out.

Plate tectonics was too big a problem for just one person to solve, and it took many people to bring the concept to life. J. Tuzo Wilson, Harry Hess, H. Benioff, A.M Coode, Allan Cox, R.S. Dietz, Maurice Ewing, James Gilluly, Warren Hamilton, Bruce Heezen, Gordon MacDonald, D.H. Matthews, Bill Menard, Ian McDougal, M. Talwani, Fred Vine, plus many others I had never heard of—these were the geologists, oceanographers, and geophysicists who worked, argued, traveled on long grueling data-collecting cruises, cooperated or competed, and shared ideas. Scientists struggled to develop tools that worked under terrible conditions, went on long grueling ocean trips to collect huge amounts of data that had to be reduced and interpreted, and then argued almost to the death about such topics as whether the earth was expanding or contracting, why there were strike-slip faults such as the San Andreas Fault, why the long mid-ocean ridges with valleys in the center circled the globe, why guyots were flat-topped, what were the long east-west fracture zones on the Pacific floor, why were symmetrical magnetic anomalies parallel to mid ocean ridges, etc. Once the plate tectonic concept took shape, then the mechanism that made it possible had to be determined. People argued and took sides, and some

committed themselves to ideas that were dead ends or just plain wrong.

This book gives the reader an inside view on how theories or new models in geology (and many other sciences) are developed. At first the plate tectonics concept was mostly in the hands of an “old boy” network of people who went to school or worked together, lived in the same neighborhood, partied together, and talked geology nonstop. As important as the theory of plate tectonics is to us today, early on only a few geologists knew or cared much about it. In fact, Menard shows that in 1969, 91 papers were published on conodonts and only 56 were published on continental drift. Once the concept was accepted, however, it was the work of succeeding geologists to add the details, which they have been doing since the end of the 60s.

Menard ponders over how new ideas appear, who gets credit, what kind of person is best suited to come up with new concepts, what kind of scientific organizations generate ideas and solutions to problems most effectively, how publication generates recognition and spreads new ideas—all the things he dealt with during these exciting years. This is the best description of the inner workings of the scientific competition and cooperation I have ever read. It certainly equals the excitement of the story of the discovery of DNA in The Double Helix by James D. Watson (also a great book).

Menard’s book is well indexed and footnoted and has a wonderful list of useful references. It also includes illustrations of original data and

photographs of many well-known people. I recommend it whole heartedly to anyone who is interested in the history of plate tectonics. In fact I got an extra copy of it through amazon.com and am donating it to the GSOC library so other people can enjoy it.

The moral of this story is that if you have a geology book that is interesting, accurate, and not out of date—and you think someone else would enjoy it as much as I did this one—donate it to GSOC for the book sale table at the Annual Banquet.

WELCOME NEW MEMBERS FOR 2012!

We’ve gotten a lot of new members this past year! You guys are awesome!

**Mike Bliziotos
Sue Cousineau
Jim Hieman
Marilee Hoskins
Mark Landis
George Long
Virginia Ohler
Teresa Pett
John Piccinini
Vickie Robinson
Hank Schottland
David Terrell
Theresa Triano
Kay Wyatt**

**Iris Walling
Mary Ford
John Hoskins
Wes Kempfer
Cheryl Landis
Dennis McDougall
Doug Ohler
Joshua Pett
Fenella Robinson
Garret Romaine
Elka Schottland
Robert Timmer
Robert Casiano**

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compiled by Carol Hasenberg

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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.

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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
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VISITORS WELCOME AT ALL MEETINGS

CALENDAR

MARCH/APRIL ACTIVITIES

The Seventy-seventh Annual GSOC Banquet will be Sunday, March 11, 2011, at the Monarch Hotel in Clackamas, Oregon. Speaker William Orr, Professor Emeritus and Curator of the Condon Collections, Museum of Natural and Cultural History, University of Oregon will present "Plowing New Ground in Oregon Geology".

Dr. William Orr will highlight a few of the many changes he and his wife Elizabeth chronicle in the 6th edition of *Geology of Oregon*. With ordinary on-the-ground field work, several astonishing new discoveries have been made such as the ORE-IDA graben in SE Oregon and the Crooked River Caldera. He will also speak about their significance. Much of the Tertiary volcanism east of the Cascades is now regarded to be due to the passage

of the Yellowstone mantle plume beneath Oregon—a major departure from earlier models of back-arc-spreading and Basin and Range extension. Our understanding of Oregon's tectonic history of major subduction earthquakes, while not yet crystal clear, has been greatly advanced in the last decade. The new emphasis on geologic hazards as well as the features on some of the geologists who have made Oregon geology what it is will also be examined.

The registration form for the 77th GSOC Annual Banquet was attached to the January/February newsletter and is also available on the website www.gsoc.org. Please submit your registration by March 5 if you wish to attend.

Friday evening talk, April 13, 2012, at 7:30 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University. Speaker Sheila Alfsen, MAT, GIT, Oregon Community College Instructor and Consultant will

present "Iceland: Geologic Perspectives from the Land of Fire and Ice."

Sheila Alfsen is a community college instructor and course developer who teaches both face-to-face and online courses in geology. In addition, she is working towards geologic registration in Oregon and has worked as a consultant for various construction projects in the western United States. In 2008, Sheila had the opportunity to travel to Iceland with a geologic tour sponsored by the Geologic Society of America for American educators. Sheila's long-term studies of Pacific Northwest geology enhanced her understanding of the features visited on the tour and she will share some of the geologic perspectives she gained on continental rifting, volcanism, glaciation and hydrothermal features and their innovative uses.

FUTURE ACTIVITIES

Friday evening talk, May 11, 2012, at 7:30 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University. Speaker TBA.

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

2012-2013 BOARD OF DIRECTORS

The following slate of officers has been elected by the membership at the February meeting of the Society:

President Jane Walpole
Vice President..... John Piccininni
Secretary Paul Edison-Lahm
Treasurer Dawn Juliano
Director, 3 years Janet Rasmussen
Director, 2 years Julia Lanning
Director, 1 year..... Tara Schoffstall

The board also has these automatic members:

Immediate Past President..... Rik Smoody
Previous Past President Larry Purchase

We look forward to your term of service!

BOARD MEETING NOTES

January 14, 2011

The GSOC board meeting was called to order by President Rik Smoody at Rosemary Kenney's residence. Board and GSOC members present included Jane Walpole, Rik Smoody, Beverly Vogt, Richard Bartels, Dawn Juliano, Larry Purchase, Jan Kem, Dave Olcott, Janet Rasmussen, Doug Rasmussen, Anne O'Neill, Rosemary Kenney, and John Piccininni. The minutes of the November 12th, 2011, board meeting were approved.

Treasurer's year-end report was approved.

Field Trips and Other Events

The board is planning the following field trips for this year:

- For her 2012 President's field trip, Jane is arranging a trip covering local Portland area geology, landslides, and terroir. Dates and details to be announced.
- Dave Olcott is responsible for the geology and stratigraphy of the Portland Basin field trip to be held probably September 14-16 and tentatively led by Terry Tolan. It will start with a Friday evening lecture by Terry, followed by two days in the field by van.
- Bev and Bart will lead an informal trip to see the Crooked River and Wildcat calderas possibly on Sept. 29 and 30, depending on Dave's trip timing.
- Janet is working on an informal summer tide pool tour plus a coastal canoe/kayak trip and has scheduled this for June 23, coinciding with favorable tides.
- The timing of the Downtown Building Stones tour organized by Paul Edison-Lahm will depend on the other trip schedules, and Paul needs to have training time for his guides.

Field trip leaders should keep Carol and Janet informed of confirmed dates, speakers, fees and other pertinent information for publication to members.

Upcoming Speakers

John has scheduled GSOC member Sheila Alfsen for the April program.

He is planning to have Jim Jackson from PSU and someone from USGS Water Resources speak in August on how fracking is done. Each speaker will have a half an hour for his/her presentation plus time for questions.

Annual Banquet, Annual Picnic, and Holiday Party

The Annual Banquet will be March 11 at the Monarch Hotel, with Dr. William Orr as speaker.

Assignments were discussed:

Janet - programs

Rik and Rosemary - place cards

Jan and Rosemary - book sales table and will accept books either before or at the banquet

Larry and Carol Hasenberg – posters

Bart - list of attendees

Clay - master of ceremonies

Jane – presidential inaugural address and discussion of upcoming field trips

The date for the Annual Picnic will be determined after the field trip schedule is worked out.

An alternate venue for the Holiday Party was discussed. The board voted to return to the same venue. A different arrangement of food and drink layout and field trip summary presentations should be considered. Donation amount per members attending should be recommended to cover the costs. After this party, consideration should be given to whether it should be done again—or if we should do something else to liven up the December meeting.

Old and New Business

The proposed slate of officers was discussed. The election is scheduled for the February meeting.

Jan discussed the need for 200 addressees to keep our low mailing rate. Possible recipients were discussed. Bart warned that if recipients are not at their address, the mail is returned to GSOC for the cost of \$.46 per return.

Upcoming Events of Interest to Members

- The Oregon Academy of Science meets February 25 (<http://www.oas.pdx.edu>).
- Fossil Fest will be February 11 at Newport.

The next GSOC Board Meeting will be Saturday, March 10, 2012, 10:00 a.m., at Rosemary's house.

Notes compiled from board meeting minutes submitted by Beverly F. Vogt, Acting Secretary.

THE BRIDGE OF THE GODS AND THE BONNEVILLE LANDSLIDE

Synopsis of the January 14, 2011 GSOC Friday night lecture by Dr. Jim O'Connor of the USGS Water Science Center in Portland, Oregon by Carol Hasenberg

It got a little wild at the beginning of the February GSOC meeting when President Rik Smoody asked the crowd what he had in his bag - round, smooth, and found in eastern Washington. When onions were finally guessed, he pelted the crowd with them. Actually, he threw the onions only to willing recipients.

Having settled the crowd after this rollicking start, Jim O'Connor came up to speak to the crowd about a favorite Northwest object of lore, The Bridge of the Gods over the Columbia River. No, not the flimsy-looking cantilever through truss that spans the Columbia today at Cascade Locks, but a natural bridge said to have spanned the Columbia River long ago in the same location.

Science has been putting some truth to the legends of the Bridge of the Gods. It has been known for some time that a massive landslide which came from nearby Table Mountain was the geologic cause for the Bridge legend. The landslide completely blocked the Columbia River, which then backed up all the way to Wallula Gap (where it turns west out of Washington State). The massive flood that followed this obstruction was the most severe flood event on the Columbia since the Ice Age Floods produced by Lake Missoula.

The primary topics of O'Connor's lecture were the history of piecing together the origin and the dating of the landslide. An expert on geomorphology, O'Connor has also researched the effects of the landslide on the location and elevation of the Columbia riverbed along its path through the Columbia Gorge. O'Connor has worked for the USGS on and off since 1991, so he has had a long history of interaction with this topic.

O'Connor began by talking about the legend of the Bridge of the Gods and how it has been romanticized in the Northwest in fiction and artwork for the past century and a half. Along the same period of time, geologists had speculated about how the river could have been blocked in the not-so-distant past, as the evidence for this was numerous snags sticking out of the water between Cascade Locks and the Dalles, remnants of trees which had been drowned in a flood. Also, the terrain north of the river in the area of Cascade Locks seemed to be a massive landslide. In the time of Lewis and Clark, natives of the area described the river in their forefathers' day as being unobstructed to the ocean.

In 1915 Joseph Duller pieced together the current theory that the Bonneville Landslide had come off Table Mountain to the north and completely covered the river. Now the question was when did this landslide happen? The drowned trees were a key piece of evidence since various tests could be conducted on these. Donald Lawrence, a 1930's doctoral student of botany at Johns Hopkins University, catalogued the location of more than 1800 snags and conducted the first attempt at dating the trees using dendrochronology, the study of tree growth rings. His tests on the snags themselves were inconclusive, as he could not correlate any of the ring patterns found on the drowned trees with those of growing trees, but by looking at the oldest live trees growing on the slide itself, found that these trees had sprouted about 1562. Lawrence also saved cross-sectional samples of the snags with the Oregon Forestry Center. In the 1950's Lawrence tried dating the snags through the newly devised technique of radiocarbon dating. His sample date was 1250, although there was a large margin of error using this technique.

Since Lawrence's time, there had not been further attempts to date the landslide, since the Lawrence samples were thought to have perished in the 1964 fire that consumed the Forestry Building and the remaining tree snags had been drowned by the Bonneville Dam. However, this was not the case, and several years ago Pat Pringle of the Washington Department of Natural Resources, a fellow researcher of the slide, was contacted by the staff of the World Forestry Center telling him that a box of tree cross sections had been found with notes from Lawrence. Photographic evidence showed that these indeed were taken from the snags in the river. So they were radiocarbon dated using modern techniques which initially showed the trees died between 1411 and 1455. That date has now been bracketed to be between 1423 to 1444. This correlated well with the dendrochronology dating done by Lawrence. There has been a few detours in the path to the goal of dating the slide, but the early 1400's is the currently accepted date.

O'Connor also showed some Columbia River elevation charts he has constructed showing the river elevations prior to the slide, after the slide and subsequent outburst flood, and today with the Bonneville and Dalles Dams in place. In prehistoric time, prior to the Bonneville Landslide, the Columbia River was tidal all the way to Celilo Falls, which bumped the river elevation to 159 feet above sea level. Indeed, this area was a native fishing ground for the 10,000 years prior to the building of the Dalles Dam in the 1950's. After the landslide, which blocked the river 200 feet above its base, the water rose to the elevation of Wallula Gap. The outburst flood which destroyed the natural dam created the Cascades of the Columbia, which limited the tidal part of the Columbia to the area downstream from its rapids. This is the river that Lewis and Clark traveled upon in their voyage of discovery. The dam building of the mid-twentieth century has now created two great lakes in this region of the river, drowning the Cascades, the Dalles of the Columbia, and Celilo Falls.

Further Reading

“The Evolving Landscape of the Columbia River Gorge: Lewis and Clark and Cataclysms on the Columbia”, by Jim E. O'Connor. This article first appeared in Oregon Historical Quarterly 105:3 [2004]: 390–421, and now can be found on the Journals of the Lewis and Clark Expedition Website by the University of Nebraska Lincoln at http://libxml1a.unl.edu/lewisandclark/read/?_xmlsrc=lc.oconnor.01&_xslsrc=LCstyles.xsl.

The Columbia River “A Photographic Journey” website http://columbiariverimages.com/Regions/Places/bonneville_landslide.html has some nice pictures of the Bonneville Slide, although the description of the dating of the slide on the site has been superseded by subsequent research.

IN MEMORIAM

This past year three GSOC members have died. Rosina Higdon, a very long-time GSOC member,

died in November. John Newhouse, who had worked for the USGS and DOGAMI and had been an active member of GSOC for several years, died in December. The latest death was a home fire tragedy occurring February 16 which took the life of member Tom Owen. GSOC members are currently putting together a memorial fund for some sort of tribute to our passing members.

Don't forget that annual **DUES PAYMENTS** were due January 1! Think about all those great member benefits for a mere annual fee of \$25 for an individual and \$35 for a family!

PS – If you joined GSOC in September or later, your 2012 dues are paid, good deal!!!

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.

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 78, NUMBER 3
MAY/JUNE 2012

The Geological Society of the Oregon Country

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VISITORS WELCOME AT ALL MEETINGS

CALENDAR

MAY/JUNE ACTIVITIES

Friday evening talk, May 11, 2012, at 7:30 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University. Speaker Dick Pugh of the Cascadia Meteorite Laboratory at Portland State University, will present "Chicken Little Was Right – The Sky IS Falling!"

The goals of the Cascadia Meteorite Laboratory (CML, <http://meteorites.pdx.edu/>) are to promote meteorite research, provide formal education about meteorites, increase public awareness about meteorites, and manage the Portland State University meteorite collection. CML member Dick Pugh is a long-time meteorite enthusiast, educator, and field scientist who graduated from Portland State University and went on to teach science

for 30 years at Cleveland High School in Portland. He has spent decades giving lectures on meteorites and currently is the face of CML's outreach program. He has donated many specimens to CML from his private collection, including many "non-ordinary" ordinary chondrites. The CML is funded by public donations.

Dick would also like to invite anyone who thinks they found a meteorite to bring it to the meeting for inspection.

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 6th Aves. and Harrison and Hall Streets.

Friday evening talk, June 8, 2012, at 7:30 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University. Speaker Bill Burns of DOGAMI will present “_____”, the results of his last 2 years’ work studying landslide and other geologic hazards on Mt. Hood. See more info at

<http://www.oregongeology.org/sub/FIELDOFFICES/profile-burns.htm>

GSOC Field Trip, “Tidal Pools and Beaver Creek Paddle Trip”, Saturday, June 23, 2012. Led by GSOC director and Past President Janet Rasmussen, this trip features a tide pool exploration with guest speaker Karen Driscoll and non-motorized boat trip at Beaver Creek State Natural Area near Newport, Oregon. Fee is \$15 and participants must provide their own lodging and transportation to the sites, and must either provide their own non-motorized boat or share with other participants with boats. Registration form is included in this newsletter.

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.

FUTURE ACTIVITIES

There is no Friday evening talk planned for July 2012.

Friday evening talk, August 10, 2012, at 7:30 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University. Speaker Jim Jackson, Petroleum Geology and Mineral Resources adjunct at Portland State University, will present “_____”.

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

IN MEMORIAM

GSOC’s second-longest member died March 28 at the age of 90 years. Clara Bartholomay was born in Ohio and moved to Oregon in the 1950’s. She loved the outdoors and was a member of the Oregon Agate and Mineral Society as well as GSOC. Her membership started in 1959 according to GSOC historian Rosemary Kenney.

BOARD MEETING NOTES

March 10, 2012

The meeting was called to order by out-going President Rik Smoody at Rosemary Kenney’s residence. Board and GSOC members present also included President-elect Jane Walpole, Richard ‘Bart’ Bartels, Bev Vogt, Julia Lanning, Dawn Juliano, Janet Rasmussen, Doug Rasmussen, Tara Schoffstall, Paul Edison-Lahm, Larry Purchase, Dave Olcott, Jan Kem, and Rosemary Kenney. The minutes of the January 14th, 2012 board meeting were approved.

Treasurer's Report:

The treasurer’s report was approved. After an illustrious tenure as treasurer, Bart is handing over the reins to Dawn Juliano. Many thanks to Bart for his many contributions to our society!

Field Trips and Other Events

President’s Field Trip:

Jane reports that the President’s Field Trip will be broken up into two days. Dr. Burns has agreed to do a half-day field trip on July 20th (2012) on wineries, terroir, and the floods and one full-day field trip on July 30th on landslides.

Other Field Trips and Annual Picnic:

Janet’s coast field trip is scheduled for June 23rd. It will include tidepools and a paddle trip. Dave’s geology of the Portland Basin field trip with Terry Tolan is still on for September 14th – 16th. Bev & Bart’s trip to the Crooked River and Wildcat Caldera is still on for September 29th -30th. Paul’s Downtown Geology field trip will be scheduled in August after a picnic date has been decided.

Dave will see if he can get a speaker for a presentation on glaciers, which could be scheduled for the day of the annual picnic on a Saturday or Sunday in August.

Upcoming Speakers:

Shelia Alfsen will speak on Iceland in April. The August lecture on shale gas industry practices will be informational and is not planned as a debate. Dick Pugh should also be considered a potential speaker on meteorites.

Annual Banquet:

Jan & Bev will price the books on yellow stickies. Bart will bring the mugs. The secretary received an itemized mug inventory from Bart, indicating that there remain 32 mugs stored at PSU and seven boxes of mugs (@ 36 mugs each) stored at Bev and Bart's.

Old and New Business

Business Manager Update:

Jan was pleased that there weren't enough envelopes for the last newsletter, since this was a consequence of having 206 newsletters to send out. Jan will need a decision on when to stop mailing the newsletter to non-paying members, as there are thirty-six members who have not yet paid their dues.

Rik spoke on GSOC's behalf at Tom Owens' recent memorial. He will circulate Tom's obituary via email.

Doris Cruckshank, daughter of Fred Miller (GSOC President '65), has a box of pictures and memorabilia that she might want to donate. We will follow up with her.

Bob Timmer in Eastern Oregon has a really good scanner that can scan up to 30 pages a minute and would be able to digitize our archives.

Bev has completed her GSOC property inventory, completing her inventory project. Bev will transfer the inventory list to Jan, who will maintain and add this duty to the business manager's list of duties. Jan suggests going through the inventory and updating the list each February.

Larry mentioned that NARG is opening a museum in Fort Vancouver. Larry will ask the Vancouver library if they could take the GSA bulletins currently at Bev and Bart's.

Paul distributed to board members the *Guide to Nonprofit Board Service in Oregon* courtesy of Oregon Department of Justice.

Next Board Meeting will be Saturday, May 12th, 2012, 10:00 a.m. at Rosemary Kenney's house.

Notes compiled from board meeting minutes submitted by Paul Edison-Lahm, Secretary.

PLANNING NEW GROUND IN OREGON GEOLOGY

Synopsis of the March 11, 2012 Seventy-seventh Annual GSOC Banquet lecture by Dr. William Orr, Professor Emeritus and Curator of the Condon Collections, Museum of Natural and Cultural History, University of Oregon
by Evelyn Pratt

To tell the Oregon story, we need to reach way out of state. The Colorado Plateau, the Snake River Plain, a little bit of the Basin and Range, the Klamath Mts. (oldest part is in California, but economically these mountains are very important in Oregon), the Cascades, and the Blue Mts., which unlike the rest, are mostly in Oregon.

A geologic map of western Oregon shows neat north-south stripes. A geologic map of eastern Oregon, on the other hand, is a mess.

Let's put Oregon into a global perspective. The continental volcanic arc is the engine that drives the state. In the rain shadow of the Cascades is the high desert/backarc basin. The Willamette Valley is a low forearc. It is sinking, and receives sediments from the volcanic arc to the east and the Coast Range to the west. The Coast Range is being elevated by the accretionary wedge of the Juan de Fuca plate that is moving down and east under the North American plate. The Juan de Fuca plate is western Oregon's "pavement". The Pacific plate, on the other hand, is northwestward bound at about 3 1/2 inches per year. Due to the extreme telescoping that the sediments have suffered with subduction, the continental slope is rumpled. The continental shelf can be compared to a deep sea fan; a seamount with huge transform faults.

One of the most important ideas in sedimentology is that of turbidites. These sediments, traveling from the continental shelf to deep water, are very fast,

strong, and move far. Upturned turbidites are an index of earthquake events, showing light sand, dark shale, light sand, dark shale, and so forth.

Offshore banks and plateaus on the Oregon continental shelf show that the Juan de Fuca plate moves a couple inches a year. Chris Goldfinger (OSU) has produced a detailed map of the continental slope.

Offshore from Yaquina Bay are the Wecoma, Daisy Bank, and Alvin faults. Along the base of the Alvin slope the clathrates (gas hydrates) are a new discovery. Another recently-learned fact is that the Siletz block (Siletzia Terrane) is really big, and is rotating clockwise. It was the last terrane to be accreted onto Oregon.

How many North American cities can lay claim to being in the middle of an ancient volcanic field? Portland's Boring Volcanics are young – generally 2 million to 56 thousand years old. Up the Columbia River a few miles, Beacon Rock is the youngest at 56,000 years. Like Los Angeles, Portland is cut by a mix of northwest-trending lateral strike-slip faults. Dr. Orr's latest book has a chapter for each of nine physiographic strips between the faults. He also includes summaries of the hydrology and hydrogeology of the strips.

Geologic hazards of Oregon include earthquakes, tsunamis and storm surges, floods, blasts and ash clouds spewing out of volcanoes, and mass movements such as landslides. There is a 1996 map of local landslides. The best place to see mass movement is the Columbia Gorge, especially the Washington side. The Bonneville landslide is a small part of the Cascade landslide complex. The town of Stevenson has slump blocks as well as landslides, which are affecting home sites. The biggest landslide, 25 miles by 100 miles, or about 2000 square miles, is off the continental slope off the coast of southern Oregon, just north of the Gorda Plate.

The Sandy River is building a delta into the Columbia River. The Sandy has flooded during each of the last three eruptions of Mt. Hood, and it

floods every time we have a heavy rainfall with melting snow.

A hazard map of lahars shows that they have come down Hood River, White River, and Sandy River, in actions similar to the recent Pinatubo lahar in the Philippines.

Three kinds of Oregon faults produce earthquakes. Subsidence by earthquakes produce ghost forests, such as the cedar stumps that Brian Atwater (USGS) recognized in southern Washington.

The latest technology for seeing through vegetation is LIDAR, or Light Detection And Ranging. LIDAR is used almost exclusively for land surveys, especially of forested areas and where geologists are looking for evidences of landslides and faults breaking the surface.

Crooked River and Wildcat Mountain each form huge calderas. The tuff of Smith Rock erupted from the Crooked River caldera. The John Day tuffs were once thought to have been derived from Cascade volcanoes, but are now known to be largely derived from these two calderas. The Danforth Formation was thought to be composed of four ignimbrites or tuffs. Now the Miocene/Pliocene tuffs are considered as separate formations with separate eruptive centers. From the youngest to oldest they are Hampton, Rattlesnake, Prater Creek, and Devine Canyon.

A diagram of Sheep Rock shows a cap of CRB on top, then a thick layer of ash on a layer of ignimbrite (a pyroclastic flow deposit, which occurs suddenly and makes a good time marker). In 1995, an ignimbrite on Mt. Unzen, Japan, traveled over 100 miles an hour. Blue Mountains stratigraphy includes ignimbrites that moved more than 100 miles from their vents.

The Blue Mountains used to show 5 accreted terranes. Now they show 3, with Baker and Grindstone combined and Izee overlapping. From the late Triassic to the early Cretaceous, terranes merged offshore and were stitched together with plutons.

The Yellowstone hot spot initially erupted, so it was thought, at McDermitt Caldera on the Oregon-Nevada border. Fault zones from there funneled Columbia River Basalts northward, ending with the Wanapum Basalt and lastly, the Saddle Mountain Basalt in southeastern Washington. As the North American crust moved southwest, the Yellowstone hot spot left a series of volcanic centers extending northeast and forming the Snake River Plains. The hot spot now underlies the Yellowstone Plateau.

The sixth edition of William and Elizabeth Orrs' Geology of Oregon is due to be published soon.

Major revisions in the sixth edition include:

- Annexes Steens basalt to CRB
- Explains Yellowstone mantle plume
- Demotes Grindstone and Izee from terrane status
- Explains Oregon-Idaho graben on Owyhee
- Shows Crooked River Caldera in the east Blue Mountains
- Relates gas hydrate volume on continental slope
- Shows huge submarine landslide offshore (~2000 square miles)

GEOLOGY OF THE LAND OF FIRE AND ICE

Synopsis of the April 13, 2012 Friday night GSOC lecture by GSOC member Sheila Alfsen, MAT, GIT, Chemeketa and Linn-Benton Community College Instructor and Consultant
by Carol Hasenberg

Why do people go to Iceland? If you're like most people, you might say the Nordic experience or the wonderful hot springs and spas. But not us rock nuts! We know that Iceland is the only place on planet Earth that you can stand on a section of a mid-oceanic ridge (sans diving suit) and has wonderful geology to observe as a result. Last month's GSOC speaker Sheila Alfsen was a part of a 2008 geological tour of Iceland organized by the GSA for American educators. Alfsen had a leg up on a lot of her colleagues on the tour because she hails from Oregon, where there are many features similar to that of the land of fire and ice.

So why is there land on the mid-oceanic ridge in Iceland? In addition to sitting on a spreading center, the island is also atop a "hot-spot" or plume of especially hot material coming from the earth's mantle. There are other examples of islands atop hot spots, notably the island of Hawaii. This hot spot produces a large amount of lava, creating enough mass that it allows the ridge to poke out of the water. The mid-oceanic ridge cuts right through the middle of the island from the SSW to the NNE (approximately) with an additional spur from the middle of the island towards the south. At the end of this spur lies a couple of active volcanoes in the ocean to the south of the island. One of these, Surtsey, formed a small island which will probably be very short-lived.

Iceland was an important player in the development of the theory of continental drift. In 1912, Alfred Wegener, a professional meteorologist, advanced the theory which was proven to be correct nearly 50 years later. Wegener spent a lot of time in Greenland and Iceland in collecting evidence to verify his theory. In 1930 he installed a series of survey markers in Iceland which demonstrated this theory. Alfsen's group visited and photographed one of these important markers.

The first stop on Alfsen's tour was to Thingvellir National Park, which straddles the mid-oceanic ridge near the capital of Reykjavik. Large cracks are present along the ridge and one of these is the feature of the park. At its deepest it is filled with clear fresh water of Lake Thingvallavatn. Alfsen's pictures of the crack reminded the author of Crack in the Ground in Eastern Oregon. You can allegedly have one foot on the North American plate and one foot on the Eurasian plate in the park, although the rift zone contains a series of parallel cracks.

Icelandic people have learned to live in this land -- avoiding its catastrophic natural hazards, engineering its volcanic features, learning from its unique geology, and profiting from the heat produced by its seething lava. Hydrothermal power plants supply most of the energy to the country, and Alfsen's group toured the largest one, Hellisheidarvirkjun, on the tour. A byproduct of

power generation is geothermal home heating. The geothermal aquifers near the continental margin supply water that is 300 degrees Celsius and the power generation process leaves it still pretty hot.

One interesting feat of its inhabitants occurred when the port town of Heimaey was overrun by a lava flow in 1973. Although the buildings in the town were mostly destroyed, the Icelanders were able to divert the flow by spraying its edges with cold seawater and save the harbor and port area which provided their livelihood. This example was cited in John McPhee's book The Control of Nature.

Probably the best known natural phenomenon that occurs often in Iceland is the eruption of volcanoes below the surface of its ice cap Vatnajokull, the third largest continental glacier after the Antarctica and Greenland ice caps. These eruptions convert great amounts of ice into water from underneath the ice cap, and the resulting flood gushes out from beneath the ice cap, sweeping all in its path, building an outwash plain, and finally rushing into the sea. The Icelandic term for these is Jokulhlaups, and they occur every few years on the island. The Icelanders have learned not to build anything permanent in the areas where these occur.

Geologists, having observed this phenomenon in action, also can study the mountains produced in

such a manner on the island. These "table mountains" are flat-topped and contain a material for which the Icelandic term is moberg, a glassy breccia that forms when the lava cools very quickly from exposure to the ice or water. After Alfson's talk, PSU Professor Emeritus Paul Hammond mentioned that we have a local table mountain, Lone Butte, near Indian Heaven in Washington, that erupted during the Pleistocene beneath an ice cap on the Cascades.

Alfson wrapped up the talk on Iceland's geology by showing the beauty of this volcanic wonderland. The basaltic lava flows with their massive entablatures and scored colonnades were reminiscent of those from the Columbia River Basalt, but much younger. The oldest rocks on Iceland are Miocene in age. Huge waterfalls abound in Iceland, as water is very abundant there. Icebergs dot the ocean in areas. Humans seem very small indeed when projected onto this incredible geologic canvas.

References and Additional Reading

Thingvellir National Park website:
<http://www.thingvellir.is/english>

"Tidal Pools and Beaver Creek Paddle Trip", Saturday, June 23, 2012 **GSOC Past President Janet Rasmussen, trip leader**

GSOC member and Past President Janet Rasmussen is leading a one day trip (Friday evening activities are optional) to explore tidal pools at the Yaquina Head Outstanding Natural Area, and the Beaver Creek State Natural Area near Newport, Oregon. Participants are encouraged to bring their own non-motorized boats (canoes, inflatables, kayaks, rowboats, or drift boats). If you don't have a boat, there will be some to share. Kayaks may be rented with delivery and pick-up service from Newport, but these are expensive.

Fee and camping/lodging: Fee of \$15 includes field guide, insurance and speaker honoraria. All other costs and arrangements are the responsibility of the participants, including transportation, lodging, and meals. Janet will assist facilitating the car pool and boating arrangements, so participants should indicate needs or offers to accept passenger(s). Camping can be arranged at Beverly Beach State Park (for reservations go to <http://www.oregon.gov/OPRD/PARKS/reserve.shtml>). Participants wishing to camp are urged to reserve sites as soon as possible. Participants wishing to lodge indoors will need to make motel arrangements in the Newport area. Motel options can be reviewed on the Trip Advisor website for the Newport area (http://www.tripadvisor.com/Hotels-g51992-Newport_Oregon-Hotels.html#). Some members will be staying at

Moolack Shores Motel (<http://www.moolackshores.com>), a small, unique, oceanfront establishment just north of the Yaquina Head lighthouse.

Itinerary: For those who arrive in Newport Friday, June 22, we will plan a group dinner at a local restaurant. At 7 pm, our tidal pool expert, Karen Driscoll will host dessert and give an overview at her Newport home, 515 SW 4th St.

On Saturday, June 23, at 7:30 am, participants will gather for breakfast at the Chalet Restaurant and Bakery, 2026 N. Coast Hwy, just north of the Fred Meyer on the east side of Hwy 101. We will drive from the Chalet to Yaquina Head at 8:30. Low tide is at 9:30 am (-1.0). Admission to Yaquina Head is \$7 per car, but free for those who hold Golden Age passes. We will carpool as needed so that no fee is assessed. We will explore the tidal pools, go to the Visitor Center, watch for birds and seals, and examine the local geology.

After lunch at a local restaurant (to be determined), or on your own, we'll carpool to Beaver Creek State Natural Area with our boats, about 9 miles south of Newport. There is minimal current and no tidal influence on the portion of Beaver Creek that we will explore by water. If there aren't enough boats for the entire group to paddle together, we'll split the group into paddlers and hikers, and then switch after an hour or two. There are many hiking trails through the marsh and hills from the Visitor Center at Beaver Creek.

Trip Participation Policies: If you plan on participating in this trip, please send in your registration form and fee by **June 15, 2012**. Participation will be limited to the first **20** persons who have paid for the trip. **All participants must be GSOC members or their guests. Minors must be accompanied by a responsible adult GSOC member parent, designated person, or legal guardian.** A letter from his or her own parent or legal guardian giving permission for a minor to participate in the field trip with a designated person must be attached to this registration form if the child is not attending with his or her own parent or legal guardian. Participants must also fill out and sign a liability waiver at the meeting place in Newport to participate. Minor participants will need the signature of a parent or legal guardian on the liability waiver. All persons must wear life jackets while boating. *All* boats are required to carry Invasive Species permits for 2012 (http://www.dfw.state.or.us/conservationstrategy/invasive_species/quagga_zebra_mussel.asp).

If weather forecast indicates a *strong* possibility of rain, this trip may be cancelled. Registered participants will be advised at the earliest opportunity and full refunds will be made.

Things to Do if you plan on participating:

- Contact Janet and get on the participant list jkayerocks@yahoo.com or 541/753-0774.
- Send in registration form and payment by **June 15, 2012**.
- Make car pool and lodging arrangements for Friday and possibly Saturday night. (The Rasmussens are staying for both nights.)
- Join GSOC if you are not a member (form is included on the registration form)
- Wear/bring appropriate clothing with a change just in case— might be warm, cold, wet, dry, muddy, or very windy. Bring water bottle, hat, sunscreen, sunglasses, bug spray, hand lens. Binoculars, camera, and field guide to birds and/or tidal pools would be very useful.
- Meet to sign waiver either at dinner Friday (to be arranged via email/phone with registered participants), at 7 pm meeting at Karen Driscoll's house Friday, or at the Chalet during breakfast on Saturday morning.

QUESTIONS? Contact Janet Rasmussen jkayerocks@yahoo.com or 541/753-0774. Directions to Karen Driscoll's house, arrangements for Friday dinner, availability of boats will be communicated via email or by phone after June 15 registration deadline.

STAY TUNED: Additional details will be available on the GSOC website, www.gsoc.org.

REGISTRATION/MEDICAL INFORMATION FORM
Tidepools and Coastal Paddle Trip – June 23, 2012

NOTE: Fill out one registration and medical information form for each participant. Apply for membership if you are not a member or guest of a participating member. The membership form is located on the last page of this newsletter. Additional registration forms may be downloaded from the GSOC website www.gsoc.org.

REGISTRATION

Participant name _____ Minor (circle one): Yes or No

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

If participant is a minor, name of designated GSOC accompanier _____

Address of participant _____

City _____ State _____ Zip _____ - _____

Phone (____) _____ - _____ Cell Phone (____) _____ - _____ Email address _____

Car-pooling (circle one): I need a ride I can accept ___ passenger(s) I neither need nor can offer a ride

Boats (fill in blanks with yes/no/details): I will bring a boat _____. I am willing to loan my boat to other participant(s) _____. I will need to use someone else's boat _____.

Fee: \$15, includes field guide, insurance and speaker honoraria. All other costs are responsibility of the participants. Send this form and payment to:
GSOC, PO Box 907, Portland, OR 97207-0907, by **June 15, 2012**.

MEDICAL INFORMATION

Name of physician: _____ telephone number: _____

Allergies: _____

Medications (attach list if necessary): _____

Special medical conditions: _____

In case of an emergency call: _____

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.

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 78, NUMBER 4
JULY/AUGUST 2012

The Geological Society of the Oregon Country

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

www.gsoc.org

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antjane@aol.com

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Tara Schoffstall (1 year) – 503/513-6925

tschoffstall@gmail.com

Julia Lanning (2 years) – 503/201-8022

julia@julialanning.com

Janet Rasmussen (3 years) – 541/753-0774

jkayerocks@yahoo.com

CALENDAR

JULY/AUGUST ACTIVITIES

There is no Friday evening talk planned for July and August 2012. The talk previously scheduled for August 10 will happen this fall. We will resume Friday night meetings in September.

GSOC Field Trip, President's Field Trip: President Jane Walpole has arranged for Dr. Scott Burns of Portland State University to lead two trips on separate days in the Portland vicinity. On Friday, June 29, he will lead an afternoon tour of local landslides. The second day of the field trip will be held on Friday, July 20. On that day he will lead a short tour of wineries and discuss the importance of terroir. Stay tuned to the GSOC website www.gsoc.org for further details. Van transportation is being considered.

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Anne O'Neill - 503/477-7827

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Field Trip Committee Chair

Dave Olcott – 503/695-5219

daveolcott46@yahoo.com

VISITORS WELCOME AT ALL MEETINGS

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.

FUTURE ACTIVITIES

Friday evening talk, September 14, 2012, at 7:30 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University. Speaker Terry Tolan, Senior Geologist/Hydrogeologist at GSI Water Solutions Kennewick, Washington, will present "Tectonic, Volcanic & Stratigraphic History of the Portland Basin." This talk will be a prelude to the GSOC field trip organized by Dave Olcott and featuring guest field trip leaders Tolan and Dr. Steve Reidel the following two days.

GSOC Field Trip, "Ancient Walls" Tour of Downtown Portland Geology, Saturday, August 25, 2012. Come See Hidden Fossils & Billion Year Old Building Stones! Join us Saturday, August 25th at 9:00 a.m. for a 2½ hour

outdoor walking tour of downtown Portland's geological mysteries and oddities. Our 1½ mile tour will begin at the Fossil Cartel in Pioneer Place Mall (700 SW 5th Avenue — parking at 4th and Yamhill — accessible by bus and MAX). Bring good walking shoes, sunscreen and clothing for a cool, but potentially warming summer morning. Water and snacks are advisable. Open to public. Wheelchair accessible. Children under 12 must be supervised. Cost is \$10.00. Space is limited so please RSVP by August 20th to ancientwalls@comcast.net with name and email and number of expected guests.

GSOC Annual Picnic

The GSOC Annual Picnic will be held on Sunday, August 26, 2012. This year's picnic will be a total potluck event at the picnic area atop Larch Mountain in the Columbia River Gorge. Bring your own food and beverages and we will provide the plates and plastic utensils. It also wouldn't hurt to bring your own chairs and perhaps a card table if you have one, as the available picnic tables are scattered. The picnic will begin at 12:00 noon and there will be a brief GSOC board meeting before the picnic at 11:00 a.m. Plan an hour's driving time from Portland. **Dr. Andrew Fountain from PSU** is scheduled to talk about glaciers at 1:00 p.m.

For information about the picnic site see the [Larch Mountain picnic area](#) page on the Forest Service website. You will need a \$5 day-use permit or a FS recreation pass to park there. Day-use permits may not be available on site according to our information. For more information on Forest Service recreation passes (and alternatives) see the FS Region 6 [Recreation Passes & Permits page](#). To purchase a day-use permit or FS recreation pass online or through a Forest Service outlet see [Discover Your Northwest Store](#) and [Store Locations](#). They are also available from some commercial establishments such as REI and Big Five. They are not available at the Nature of the Northwest store anymore. In the event that Larch Mountain remains closed or other such last minute emergencies, stay tuned to the [GSOC website](#).

The directions to Larch Mountain on the website are really lousy, so here are some better directions courtesy Dave Olcott:

Traveling east on I-84 from the Portland area, take Exit 22 (Corbett). Travel 1.6 miles up Corbett Hill Road to the intersection with the Historic Columbia River Highway - turn left onto the old highway. Travel approximately 2 miles to Larch Mt. Road (go straight). If you go left at this point you will end up at the Vista

House. Proceed 14 miles up Larch Mt. Road to the upper parking lot.

For more geology info on Larch Mountain refer to the [USGS](#) and [Wikipedia](#) sites. This should be an outstanding site for a picnic.

GSOC Field Trip, "Tectonic, Volcanic & Stratigraphic History of the Portland Basin." September 15 and 16, 2012.

GSOC field trip chair Dave Olcott will coordinate a Friday night lecture (Sept. 14th), followed by two days in the field. **Terry Tolan**, a highly recognized professional in the geologic community will present the lecture and guide the comprehensive field trip. He will be assisted by **Dr. Steve Reidel**, another outstanding geologist. Transportation will be by two twelve-passenger vans. Cost of the trip will be \$70.00/person and participation will be limited to the first 22 GSOC members and their guests who have paid for the trip. The assessment fee will cover the cost of van rental, gas, insurance, printing, and honoraria for leaders. Participants will be responsible for lunches, snacks, and beverages. The registration form for the trip is at the end of this newsletter. The assessment fee and registration form must be in by September 3rd. If you have questions or wish to reserve a participant spot at this time, email Dave at daveolcott46@yahoo.com or call (503) 695-5219.

GSOC Field Trip, "A Trail of Two Calderas," September 29-30, 2012.

Bart Bartels and Bev Vogt are planning a field trip to the **Crooked River and Wildcat Mountain Calderas** in central Oregon on September 29 and 30. We plan to camp the nights of Sept. 28 and 29 at [Haystack Reservoir Campground](#), located on the eastern shore of Haystack Reservoir about 8 miles south of Madras between US 97 and US 26, and motels are also available in Madras and Redmond. The field trip will start at 9 a.m. on Saturday morning at Haystack Reservoir and finish Sunday afternoon. Cost of the field trip including field trip guide is \$20. Lodging, transportation, and food are the responsibility of the participants. For questions, details, and registration, contact Bart and Bev at 503-292-6939 (bartbartels@comcast.net or bevvogt@comcast.net). Deadline for registration is September 17. There will be a registration form available in the next issue of *The Geological Newsletter*.

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

BOARD MEETING NOTES

May 12, 2012

The meeting was called to order by President Jane Walpole at Rosemary Kenney's residence. Board and GSOC members present also included John Piccininni, Dawn Juliano, Paul Edison-Lahm, Julia Lanning, Tara Schoffstall, Janet Rasmussen, Rik Smoody, Larry Purchase, Carol Hasenberg, Richard Bartels, Beverly Vogt, Jan Kem, Dave Olcott, and Rosemary Kenney. The minutes of the March 10th, 2012 board meeting were approved.

Treasurer's Report: The board reviewed the club's finances.

Field Trips and Other Events

President's Field Trip (Jane): Dr. Burns will still do the half-day winery field trip on July 20th 2012, but will need to reschedule his landslide presentation which will now be only a half-day.

Coast Field Trip (Janet) June 23rd: The cost of the trip is now \$15 and it is limited to 20 people. Karen Driscoll has invited people to her house the evening before the tidepool event. Larry brought copies of the DOGAMI Oregon Geology issue relevant to Janet's field trip. Additional copies may be available for other field trips if there is a DOGAMI publication on point.

Geology of the Portland Basin (Dave) September 14th – 16th: There will be a geologist in each of the two vans, now that Terry Tolan will be assisted by Steve Reidel. A driver for the second van may be needed.

Crooked River & Wildcat Caldera (Bev & Bart) September 29th-30th: Bart suggests that people go to the campsite at Haystack Reservoir Friday night to set up their tent; or people could stay at Madras/Bend area hotels. The trip will break early afternoon Sunday so people can drive back to Portland.

Carol requests that if people hear of a good lecture that they send an email to the group or let Rik know for posting on the Facebook page, rather than put such announcements in the newsletter.

Downtown Geology (Paul): It was decided that this field trip will occur on Saturday 8/25. Guides will include Rik, Tara, Jane, Clay, Paul, and Larry. Prior

to the trip, Sheila Alfsen will give a class for the field trip guides. Pending confirmation with Sheila, the class is penciled in for Saturday 8/18. Paul will organize online registration and have this information and a flyer to Carol by the June 20th newsletter deadline; he will also coordinate with Fossil Cartel and Pioneer Place. Carol, Jan, Julia, Bart, Bev will help with registration on the day of the trip. Cost will be \$10, with children under 12 free.

Carol will need the descriptions of field trips limited to one page for newsletter.

Annual Picnic: It was decided that the Annual Picnic will be held on August 26th, 2012 at 12:00 pm. at the Larch Mountain picnic sight. Dave will coordinate with Dr. Andrew Fountain from PSU to talk about glaciers at 1:00 p.m.

Upcoming Speakers (John): June's speaker will be Bill Burns from DOGAMI discussing Mt. Hood geo-hazards. No speaker is planned for July. John will reschedule Jim Jackson from Portland State for either October or November; Jim will discuss Shale Gas Exploration. In January 2013, Yumei Wang from DOGAMI will discuss her post- earthquake trip to Japan.

Old and New Business

Poster Printing and Distribution: (Jan & John)

John did the poster for last night's presentation. Tara suggests using a format in addition to pdf so that it will show up on mobile devices. Paul will look into this. An exhaustive discussion of formatting was tabled.

Jan reports that procedure for the newsletter is working well. Jan has 225 copies of the newsletter printed and includes warnings to members who have not paid dues. The Board approved Jan dropping non-paying members from his list, with Bev first reviewing the drop list. John raised the issue of the price of posters for off-newsletter-month speakers. Larry suggested that printed posters be abandoned in favor of sending pdf by email. Jan will still mail four posters to DOGAMI.

Additional Business:

Rosemary would like members to be reminded of the lending library. Janet will put it on the website in Friday night meeting announcements and Jane will mention it at the meetings.

Rosemary is working on a book about the GSOC presidents and needs information on every president

from the year 2000. Tara and Janet will follow up on research for Rosemary.

Tara will send links of archived field trip guides to Rik for eventual storage on Google docs.

Bart reminded us that we still have a large supply of mugs; it was suggested that they be offered for sale at the Downtown Geology walk.

Happy Birthday was sung for Rosemary.

Next Board Meeting will be Saturday, July 14th, 2012, 10:00 a.m. at Rosemary's house.

Notes compiled from board meeting minutes submitted by Paul Edison-Lahm, Secretary.

LEARNING ABOUT PALEOSEISMICITY THROUGH THE STUDY OF TURBIDITES

by Carol S. Hasenberg

Author's note: I attended a recent lecture sponsored by the Portland State University Geology Department where Dr. Chris Goldfinger of Oregon State University described his work in analyzing turbidite flows along the Oregon coast over the past several years. This lecture included some background information on the nature of turbidites and the prehistoric earthquakes along the Cascadia Subduction Zone and then described the techniques used to analyze the extent, synchronicity, and other characteristics of the flows.

Turbidites or turbidity currents are landslide-like phenomena which occur on the continental margins of the oceans. Fine sediments are shaken loose from the continental shelf and are transported down oceanic canyons for many miles on a cushion of water. They can occur for many reasons, including sediment load, storms, methane release from the ocean floor, tectonic over-steepening, meteor hits, and earthquake shaking.

At the time Goldfinger began his study of turbidites, evidence for large subduction zone quakes had been found along the Washington and Oregon coastlines, in a tectonic region known as the Cascadia Subduction Zone. This gave an opportunity for study of the turbidites to see if any correlations

could be made between the turbidites and earthquakes in the Pacific Northwest. Turbidite sediments could be useful in determining the number and extent of earthquake events in the past several thousand years if the two could be correlated. But this might not be as easy as it seems. The first problem is to determine which, if any, of the turbidites could be construed to have been produced by an earthquake.

This problem was solved by studying the cross section of the turbidite deposits themselves for characteristic signatures, as well as studying the structure of the turbidite deposition system all up and down the coast. It was found that some of the turbidite cross sections had fine grains on the tops and bottoms, grading to coarser grains in the middle. Others had coarse grains at the bottom grading to fine grains at the top. Goldfinger believed that the earthquake-generated turbidites would be the ones with the coarse to fine sequence, since earthquakes occur over a period of less than 5 minutes, shaking all the material up at once and then settling out, whereas the storms build in intensity over a longer period of time, then fade away. This was verified by later studies of the recently produced turbidites from the Chilean and Sumatran earthquakes, and also those produced in 1906 by the San Francisco Earthquake.

Other clues to the correlation of turbidite layers include marker sediments in the hemipelagic material deposited between the turbidite flows, such as the ash produced by Mt. Mazama and transported to the ocean as sediments. In Goldfinger's research, sediment cores were taken from the Oregon coastal oceanic canyons at various points. Sequences of sediments were correlated to match the occurrence of specific turbidite events. This was aided by the fact that one or two of the largest earthquake-induced turbidites had a very distinct cross sectional signature. Turbidite events were then analyzed to determine the extent of the area they cover, shelf width, synchronicity and sediment source.

The results of the research so far have shown that there are a number of major earthquake events that have affected the entire Oregon coast, and in addition there have been several events that have

affected the coast at Florence and south to the southern end of the Cascadia Subduction Zone. There have been a few more events affecting Coos Bay and south. These findings have shown Goldfinger and other researchers that segment boundaries are present in the Cascadia Subduction Zone at Coos Bay, Florence, and Astoria. They estimate based upon the past frequency of earthquakes in these areas during the last 10,000 years that the northern segment of the CSZ in Oregon has a probability of having a subduction quake of 12% in the next 50 years, and the southern zone has a probability of 37% in the next 50 years.

Recently Goldfinger has turned his attention to turbidite flows in the lakes of Oregon. He hopes to determine the effect of the large subduction zone earthquakes in areas like the Willamette Valley and eastward, and also amass additional data to confirm the oceanic findings from an unrelated source.

RECOMMENDED READING

Arthur D. Frankel, "Summary of November 2010 Meeting to Evaluate Turbidite Data for Constraining the Recurrence Parameters of Great Cascadia Earthquakes for the Update of the National Seismic Hazard Maps," U.S. Geological Survey Open-File Report 2011-1310, <http://pubs.usgs.gov/of/2011/1310/of2011-1310.pdf>

"Analyzing Major Indonesian Earthquakes," ScienceDaily (Apr. 30, 2007) <http://www.sciencedaily.com/releases/2007/04/070430134306.htm>

Chris Goldfinger and C. Hans Nelson, "Holocene Seismicity of the Northern San Andreas Fault Based on the Turbidite Event Record," http://ecosystems.wcp.muohio.edu/studentresearch/climatechange03/el_nino/Holocene%20Seismicity.pdf

Rachel Berkowitz, "A seismic story told by turbidites: Sediment deposits off the coast of Washington and Oregon reveal periodic tsunamis and earthquakes of similar magnitude to the ones that struck Japan's Tohoku region in March 2011," physicstoday.org, February 3, 2012,

http://www.physicstoday.org/daily_edition/down_to_earth/a_seismic_story_told_by_turbidites

MULTI-HAZARD RISKS OF MT. HOOD AREA

Synopsis of the June 8, 2012 Friday night GSOC lecture by Bill Burns, landslide expert at DOGAMI by Carol Hasenberg

Bill Burns, an engineering geology graduate from Portland State University, is the technical lead on landslide hazards at the Oregon Department of Geology and Mineral Industries (DOGAMI). He came to talk to the GSOC group about a study done at DOGAMI with a grant jointly funded by the State of Oregon and the USGS to study the risk of geologic hazards in the Mt. Hood area. Due to the size of the grant and the interests of benefitting most of the inhabitants of the region, the study was limited to corridors that included Hood River, State Highway 35 and US Highway 26. The study area included portions of Hood River, Multnomah, and Clackamas Counties.

The study of risk includes examining the probabilities of types of hazards and their effects upon the human-built assets of the region. The Mt. Hood study described by Burns included the geologic hazards of earthquakes, volcanic eruptions from Mt. Hood, floods, stream channel migrations and landslides. Assets included buildings, emergency services and schools, roads and bridges, electric towers, and dams. The data was analyzed geospatially to see what hazardous regions impacted which assets.

Prior to conducting the analyses, the residents of the study area were polled online by the research team to see what risks were perceived by the population. The hazards that scored high in the polls for risk included earthquakes, volcanoes, floods and winter storms. Very few residents felt that landslides were potential risks.

Asset data was collected and prepared for input into the analysis platforms, which included spatial overlays in a GIS (Geographic Information

Systems) software program, and also a FEMA-produced risk assessment program called HAZUS-MH. For example, the research team used population data from 2010 census blocks combined with maps of building locations to build a higher resolution population density map for the study area.

Hazard information was also processed for each type of hazard considered. Volcanic hazards included near-volcano (proximal) effects and lahars, which are ash and debris flows traveling down stream channels. Earthquake hazards included shaking from the Cascadia Subduction Zone as well as 133 faults in the local area, many of which were discovered using the high-resolution LiDAR elevation mapping system being used by DOGAMI in producing landslide hazard maps.

Landslide hazard areas included large deep seated landslides, debris flows and steep slopes. LiDAR bare earth data was really helpful in identifying these zones. There were 394 deep seated landslides and 1112 fans created from debris flows (over time) in the study area. The research team also looked at airphotos taken over the last 50 years to identify recent activity. Steep slopes and mass wasting hazard zones were also obtained from LiDAR imagery.

Floods and channel migration data were processed again by using LiDAR data. The research team found very little difference between the 25-year and 500-year flood plains. Channels migration zones were much more extensive than the normal stream floodplains, but are also fairly common occurrences in this area of glacially-fed streams.

Hazardous areas included 45% of the study area for volcanoes, 26% of the study area for landslides, 3%

of the study area for floods and 37% of the study area for earthquakes.

In analyzing the risks the researchers consider not only the severity of individual hazard events but also the return period of the events, in order to compare the potential of risk over a period of time for a particular hazard. Economically, the volcanic risks are the most severe with an average annualized risk exposure of \$5.5 M per year; earthquake, landslides and channel migration average annualized risk exposures are similar, \$2.8 M to \$4.0 M per year; and flooding less severe with an average annualized risk exposure of \$0.8 M per year. Flood and landslide hazards have shorter return periods and smaller economic loss ratios, and volcano and earthquakes occur less often but are more catastrophic.

The results of the study are available online at the DOGAMI website:

<http://www.oregongeology.org/pubs/fs/mthood-factsheet.pdf>. There is also an open file report available which contains a poster and can be previewed at:

<http://www.oregongeology.org/pubs/ofr/p-O-11-16.htm>.

ADDITIONAL READING

Open-File Report O-11-16, "Multi-Hazard and Risk Study for the Mount Hood Region, Multnomah, Clackamas, and Hood River Counties, Oregon," by William J. Burns, Kaleena L. B. Hughes, Keith V. Olson, Jason D. McClaughry, Katherine A. Mickelson, Daniel E. Coe, John T. English, Jed T. Roberts, Rachel R. Lyles Smith, and Ian P. Madin. DVD, \$30

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.

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



GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

EXPLORE THE GEOLOGY OF THE PORTLAND BASIN ITS TECTONIC, VOLCANIC & STRATIGRAPHIC HISTORY GSOC FIELD TRIP

SEPTEMBER 15th AND 16th, 2012

GSOC field trip chair Dave Olcott will coordinate a Friday night lecture (Sept. 14th), followed by two days in the field. **Terry Tolan**, a highly recognized professional in the geologic community will present the lecture and guide the comprehensive field trip. He will be assisted by **Dr. Steve Reidel**, another outstanding geologist. The evolution of the Portland Basin, an 18 by 48-mile topographic trough confined by the Coast Range to the west and the Cascade volcanic arc to the east, will be thoroughly explored over the two days. The tectonic, volcanic, and stratigraphic history of this dynamic piece of real estate will be brought to life by these highly regarded and enthusiastic geologists. All major Neogene and Holocene events and deposits preserved in the basin will be visited. Minimal walking/hiking will allow any and all interested individuals an opportunity to enjoy this trip.

Transportation will be by two twelve-passenger vans. Having a professional in each van will permit discussion and answers to questions in transit, not just at field trip stops. Participants will need to arrange their own transportation to the Gateway Light Rail Terminal, our point of departure both days. Cost of the trip will be \$70.00/person and participation will be limited to the first 22 GSOC members and their guests who have paid for the trip. The assessment fee will cover the cost of van rental, gas, insurance, printing, and honoraria for leaders. Participants will be responsible for lodging (if required), lunches, snacks, and beverages. The assessment fee and registration form must be received by September 3, 2012. If you have questions or wish to reserve a participant spot at this time, email Dave at daveolcott46@yahoo.com or call (503) 695-5219.

Trip Participation Policies: If you plan on participating in this trip, please send in your registration form and fee by September 3, 2012. Participation will be limited to the first 22 GSOC members and their guests who have paid for the trip. **All participants must be GSOC members or their guests.** Non-members may send in a membership registration form (located in *The Geological Newsletter* or at www.gsoc.org/membership.html) with an additional, separate, payment for membership to participate in the trip.

Minors must be accompanied by a responsible adult GSOC member parent, designated person, or legal guardian. A letter from his or her own parent or legal guardian giving permission for a minor to participate in the field trip with a designated person must be attached to this registration form if the child is not attending with his or her own parent or legal guardian. Participants must also fill out and sign a liability waiver at the meeting place in order to participate. Minor participants will need the signature of a parent or legal guardian on the liability waiver.

REGISTRATION/MEDICAL INFORMATION FORM

Tectonic, Volcanic & Stratigraphic History of the Portland Basin Trip – September 15 and 16, 2012

NOTE: Fill out one registration and medical information form for each participant. This application must be accompanied by a membership application and payment if you are not a member or guest of a participating member. The membership application form is located in *The Geological Newsletter* or at www.gsoc.org/membership.html.

REGISTRATION

Participant name _____ Minor (circle one): Yes or No

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

If participant is a minor, name of designated GSOC accompanier _____

Address of participant _____

City _____ State _____ Zip _____ - _____

Phone (____) _____ - _____ Cell Phone (____) _____ - _____ Email address _____

Fee: \$70, includes van rental, gas, insurance, printing, and speaker honoraria. All other costs are responsibility of the participants. Send this form and payment to:

GSOC, PO Box 907, Portland, OR 97207-0907, by **September 3, 2012**.

MEDICAL INFORMATION

Name of physician: _____ telephone number: _____

Allergies: _____

Medications (attach list if necessary): _____

Special medical conditions: _____

In case of an emergency call: _____



THE GEOLOGICAL NEWSLETTER

"NEWS OF THE GEOLOGICAL SOCIETY OF THE OREGON COUNTRY"

VOLUME 78, NUMBER 5
SEPTEMBER/OCTOBER 2012

The Geological Society of the Oregon Country

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

www.gsoc.org

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antjane@aol.com

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a.oneill@yahoo.com

Field Trip Committee Chair

Dave Olcott – 503/695-5219

daveolcott46@yahoo.com

VISITORS WELCOME AT ALL MEETINGS

CALENDAR

SEPTEMBER/OCTOBER ACTIVITIES

Friday evening talk, September 14, 2012, at 7:30 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University. Speaker Terry Tolan, Senior Geologist/Hydrogeologist at GSI Water Solutions Kennewick, Washington, will present "Tectonic, Volcanic & Stratigraphic History of the Portland Basin." This talk will be a prelude to the GSOC field trip organized by Dave Olcott and featuring guest field trip leaders Tolan and Dr. Steve Reidel the following two days.

GSOC Field Trip, "Tectonic, Volcanic & Stratigraphic History of the Portland Basin," September 15 and 16, 2012.

GSOC field trip chair Dave Olcott will coordinate a Friday night lecture (Sept. 14th), followed by two days in the field. **Terry Tolan**, a highly recognized professional in the geologic community will present the lecture and guide the comprehensive field trip. He will be assisted by **Dr. Steve Reidel**, another outstanding geologist. Transportation will be by two twelve-passenger vans. Cost of the trip will be \$70.00/person and participation will be limited to the first 22 GSOC members and their guests who have paid for the trip. The assessment fee will cover the cost of van rental, gas, insurance, printing, and honoraria for leaders. Participants will be responsible for lunches, snacks, and beverages. The registration form for the trip is at the end of this newsletter. The assessment fee and registration form must be in by September 3rd. The registration form was published in the July/August edition of *The Geological Newsletter* and is also available on the GSOC website www.gsoc.org. If you have questions or wish to reserve

a participant spot at this time, email Dave at daveolcott46@yahoo.com or call (503) 695-5219.

GSOC Field Trip, "A Trail of Two Calderas,"
September 29-30, 2012.

Bart Bartels and Bev Vogt are planning a field trip to the **Crooked River and Wildcat Mountain Calderas** in central Oregon on September 29 and 30. For questions, details, and registration, contact Bart and Bev at 503-292-6939 (bartbartels@comcast.net or bevvogt@comcast.net). Deadline for registration is September 17. The registration form is available at the end of this issue of *The Geological Newsletter*, and on the GSOC website www.gsoc.org.

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.

Friday evening talk, October 12, 2012, at 7:30 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University. Speaker Jim Jackson, Petroleum Geology and Mineral Resources adjunct at Portland State University, will present "Shale Gas: Exploration, Production, and Problems with an Unconventional Reservoir."

FUTURE ACTIVITIES

GSOC 4th Annual Holiday Party - Friday, December 14, 2012. The party will be held in lieu of the December Friday night meeting and attendance will be limited to GSOC members and their guests. The location will be at the Simon Benson House on the Portland State University campus. The program will include slide shows of this year's field trips, food dishes-to-share as provided by the attending members, and music. Donations to help cover the venue rental are being accepted by GSOC Treasurer Dawn Juliano. Food and other contributions to the event will be coordinated by GSOC member Anne O'Neill.

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

BOARD MEETING NOTES

August 26, 2012

The meeting was convened by President Jane Walpole at the GSOC annual picnic on Larch

Mountain. Board members present included Paul Edison-Lahm and Rik Smoody, and GSOC member Dave Olcott was also present.

Since the board didn't have quorum for the meeting, no business was conducted, but the board did agree to reset the meeting for Saturday, October 13th, 2012. Location for the meeting will be announced on the website.



HISTORY OF LARCH MOUNTAIN AREA

Synopsis of the August 26, 2010, talk by Charles A. Rollins, historian
by Carol Hasenberg

Chuck Rollins, President of the Crown Point Historical Society and Past President of the Multnomah County Pioneer Association, attended the GSOC picnic as guest speaker. As a young man growing up in Oregon, he loved to hear stories told by the old folks about the history of this area, and now as an older man he loves recounting these stories to the next generation. He has written a history book of the Pacific Northwest called The Loggers: How They Saw it, Kizzar Publishing, 2010 (ISBN numbers 0615335330 and 9780615335339, 153 pages), which recounts history of the logging camps using photos taken by the loggers. He told GSOC that beginning in 1906, photos sent in for processing by Kodak were returned as post cards, and he collected a number of these to illustrate the book. He also generously donated a copy of the book to the GSOC library.

His talk recounted a history of Larch Mountain. Native Americans had a thick population in this region prior to the arrival of Europeans. It is estimated that 2 million people lived along the Columbia River and its tributaries – it was the most populated native site in North America. However, the introduction of European diseases decimated the population prior to the settlement of the area in the 1800's. Native peoples had trails leading to Larch Mountain because it was a popular area for picking huckleberries.

The first settlers mistook the native Grand Firs and Noble Firs for Larch trees, thence the name Larch Mountain. The trees in the area were magnificent. One large Grand Fir was recounted as being 7 feet in diameter with a height of 185 feet to its first limb. An early homesteader named Moore recognized the potential from this resource and developed logging in the area. The Palmer Mill was built on the mountain to rough saw the logs, and the rough-sawn wood was flumed down the mountain to Bridal Veil on the Columbia River.

The Palmer Mill area was quite the development in the early part of the twentieth century. Three hundred families lived near the mill, and facilities were built for them. The Palmer Mill school was the first school in Oregon with electrical service. A rail system was introduced on Larch Mt. to help move logs to the mills. Steep railroad grades were common and braking systems for heavy and heavily laden trains were primitive. Logging and railroading jobs were very dangerous. The logging camp averaged losses of one man per day. The railroads had frequent accidents, and brakemen were often lost on the perilous journey down the mountain.

Technology evolved at the logging camp. In the beginning, oxen were used to transport newly felled logs to the railroad cars. One can still find prone logs that were “sniped”, or beveled, so that the oxen could drag timber over these. The oxen were later replaced by steam donkeys, which were used as winches to haul logs horizontally or vertically. High lead logging raised one end of the log so that they could be loaded as well as dragged to the railroad. As technology improved, lumberman also became more conscious of conserving their resource. The Palmer Mill began using “waste logs”, ones with knots and tops of trees, to burn for heating fuel.

Inevitably, the area experienced a major fire, which occurred in 1902. Although smaller than the Tillamook Burn, this fire was one of the biggest fires in Oregon history. It destroyed much of the best timber on the mountain. The Palmer Number Two Mill was built after the fire, because there still

was timber in the area. Although the Douglas Fir was in high demand for building framing and ships’ masts, the timber men began to find uses for the other species such as the Grand Fir and Noble Fir for finish material such as molding. The wood from Larch Mountain was straight grained and knot free. During World War I Noble Fir was used to build frames for airplanes.

Looking around at the trees growing on Larch Mountain today, Rollins noted that the trunks were not as big as 100+ years of growth should have produced. He told GSOC that this was because the early foresters did not realize that trees acclimate to their particular elevation and the modern trees had been planted from seedlings produced at lower elevations. Nowadays certain large conifers are selected as “seed trees” and painted with an orange stripe around the trunk, and these are prohibited to be cut.

Rollins recounted a few more snippets of history regarding the community of Bridal Veil along the Columbia River. The mill at Bridal Veil was the biggest lumber mill on the West Coast, processing about 50 million board feet of lumber per year. It also produced boxes, and in 1913 suspended its lumber production to make 23 million boxes for a bumper crop of apples. The biggest monument for the cemetery in Bridal Veil was for a 16 year old boy who was killed tending a steam donkey that exploded.

Rollins knew first-hand the life of a logger as he worked as a logger in his youth. He relies on eyewitness accounts for his historical tales, from numerous sources over the years. Recently he made the acquaintance of a centenarian who grew up in the Palmer camp and was able to fill in a number of gaps in the history. Rollins ended the talk by recounting a little bit of rock lore for us GSOCers. He told us that in days gone by a lot of agates could be found along the Columbia River and its tributaries, and had a bucket full for us to choose from at the end of the talk.

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY ACTIVITIES:

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

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

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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



GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

TWO CENTRAL OREGON CALDERAS FIELD TRIP
SEPTEMBER 29 AND 30, 2012

Past Presidents Richard Bartels and Beverly Vogt will lead a field trip to Crooked River and Wildcat Mountain calderas in central Oregon on September 29 and 30. The Crooked River caldera, called Oregon's Super Volcano by its discoverers Mark Ferns and Jason McClaughry of DOGAMI, is enormous, covering an area approximately 25 by 17 miles and containing Smith Rock State Park on the northwest side, Prineville in the middle, and Prineville Reservoir State Park on the southeast side. Tuff ejected during the eruption that caused the collapse of the caldera has an age or approximately 29.5 Ma. Wildcat Mountain caldera to the northeast of Crooked River caldera is smaller and older, covering 10 by 7 miles. Tuff produced by its catastrophic caldera-producing eruption has an age between 41.5 and 39.35 Ma. Steins Pillar, a famous pioneer landmark located in the caldera, is an erosional remnant of this tuff. This trip will explore features of Crooked River caldera on Saturday, the 29th, and Wildcat Mountain caldera on Sunday, the 30th. The trip will be over no later than 2 p.m. on Sunday.

The trip will start Saturday morning at 9 a.m. at Haystack Reservoir Campground on the east side of Haystack Reservoir, a few miles south of Madras. Participants can camp starting on Friday night at Haystack Reservoir Campground or stay in one of the motels in nearby Madras. Participants are responsible their own lodging, transportation, and food arrangements. Carpooling is recommended. Much of the trip will be on gravel roads, so vehicles with good clearance are preferable. Cost of the trip is \$25, and participation will be limited to the first 25 GSOC members and their guests who have paid for the trip. If you have questions or want to reserve a place on the trip, contact Richard Bartels (bartbartels@comcast.net) or Beverly Vogt (bevvoigt@comcast.net), both at 503-292-6939. If the weather is bad or there are fires in the area, the trip will be canceled and your money refunded. More information about specifics will be emailed or sent to participants after the deadline.

Trip Participation Policies: If you plan on participating in this trip, send in your registration form (printed in this newsletter) and \$25 fee by Monday, September 17th. **Each participant must be a GSOC member or guest and should have a separate registration form.** A nonmember may register if he/she includes a membership application form and payment with the registration form and fee.

Minors must be accompanied by a responsible adult GSOC member parent or guardian. A letter from his or her parent or guardian giving permission for a minor to participate in the field trip with a designated person must be attached to this form. Each participant must also fill out and sign a liability waiver at the meeting place in order to participate. Minor participants must also have the signature of a parent or legal guardian on the liability waiver.

REGISTRATION/MEDICAL INFORMATION FORM
Two Central Oregon Calderas Field Trip – September 29 and 30, 2012

NOTE: Fill out one registration and medical information form for each participant. This application must be accompanied by a membership application and payment if you are not a member or guest of a participating member. The membership application form is located in *The Geological Newsletter* or at www.gsoc.org/membership.html.

REGISTRATION

Participant name _____ Minor (circle one): Yes or No

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

If participant is a minor, name of designated GSOC accompanier _____

Address of participant _____

City _____ State _____ Zip _____ - _____

Phone (____) _____ - _____ Cell Phone (____) _____ - _____ Email address _____

Fee: \$ 25, includes printed materials. All other costs are responsibility of the participants. Send this form and payment to:
GSOC, PO Box 907, Portland, OR 97207-0907, by **September 17, 2012**.

MEDICAL INFORMATION

Name of physician: _____ telephone number: _____

Allergies: _____

Medications (attach list if necessary): _____

Special medical conditions: _____

In case of an emergency call: _____



THE GEOLOGICAL NEWSLETTER

"NEWS OF THE GEOLOGICAL SOCIETY OF THE OREGON COUNTRY"

VOLUME 78, NUMBER 6
NOVEMBER/DECEMBER 2012

The Geological Society of the Oregon Country

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

www.gsoc.org

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j.piccininni@comcast.net

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Paul Edison-Lahm – 971/404-6064

edisonlahm@comcast.net

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dawnmj_2000@yahoo.com

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Julia Lanning (2 years) – 503/201-8022

julia@julialanning.com

Janet Rasmussen (3 years) – 541/753-0774

jkayerocks@yahoo.com

CALENDAR

NOVEMBER/DECEMBER ACTIVITIES

Friday evening talk, November 9, 2012, at 7:30 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University. Speaker Dr. Lara O'Dwyer Brown, Curator, Rice Northwest Museum of Rocks and Minerals, Hillsboro, Oregon, will present "The Geology of Ireland."

O'Dwyer Brown focused on minerology and petrology while pursuing her PhD from the University of California at Davis. She traces her love of geology back to Sunday drives with her family through the mountains and valleys of the beautiful Irish countryside. She has always enjoyed sharing her knowledge of the Earth with anyone willing to learn. Working at the Rice Museum is her dream job!

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Dave Olcott – 503/695-5219

daveolcott46@yahoo.com

VISITORS WELCOME AT ALL MEETINGS

For more information on the Rice Museum and the geology of Ireland see these websites: [Rice NW Museum](#) and [Bedrock Geology of Ireland](#).

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 6th Aves. and Harrison and Hall Streets.

GSOC Annual Holiday Party

GSOC Members and their guests are invited to the 4th GSOC Annual Holiday Party and field trip slideshow, Friday December 14th, 2012 at the Simon Benson House on the Portland State University Campus, 1803 SW Park Avenue at Montgomery Street corner. GSOC Board Members will provide main dishes with protein of various sorts. Other members please bring vegetable,

side dishes or desserts for 6 to share. Those interested in bringing drinks or table ware please contact Janet Rasmussen (541) 753-0774.

Schedule of Christmas Party activities:

- 6:30 pm: Dinner buffet
- 7:15 pm: Welcome presentation
- 7:30 pm: Nominations for GSOC Board members for the 2012-2013 year will be open, followed by "Year in Review" program.
- This year's GSOC field trip leaders with present brief slide show summaries of their trips.
 - Jane Walpole: "Landslides and Wineries" June 29 and July 20
 - Paul Edison-Lahm and Clay Kelleher: "A Geological Walking Tour of Downtown Portland" August 25
 - Dave Olcott: "Tectonic, Volcanic, and Stratigraphic History of the Portland Basin" September 15-16
- 8:30 pm: Dessert and musical entertainment

Donations will be accepted for the room rental. Suggested donation is \$5 per participant, except for children of members. Send donations to Dawn Juliano at the GSOC mailing address or give them to her in person at the event.

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

If you would like to come but are not yet a member of GSOC, you may join now and receive membership benefits throughout 2013.

FUTURE ACTIVITIES

Friday evening talk, January 11, 2013, at 7:30 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University. Speaker Yumei Wang, Geotechnical Engineer and Earthquake Expert at Oregon Department of Geology and Mineral Industries (DOGAMI), will speak on a topic to be announced.

Friday evening talk, February 8, 2013, at 7:30 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University. Speaker Peter McGrail, environmental engineer at PNNL, will present his current research on the feasibility of wind energy storage in rock formations.

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

BOARD MEETING NOTES

October 13, 2012

The meeting was called to order at Rosemary Kenney's residence by Vice-President John Piccininni (substituting for President Jane Walpole who was out with a cold). Board and GSOC members present also included Dawn Juliano, Larry Purchase, Rosemary Kenney, Jan Kem, Paul Edison-Lahm, Julia Lanning, Janet and Doug Rasmussen, and Dave Olcott. The minutes of the May 12th, 2012 board meeting were approved. The Treasurer's Report was approved.

The board approved \$50 to be earmarked for addition to the annual PSU scholarship in honor of Paul Hammond per the suggestion of last night's speaker who declined the \$50 speaker's honorarium.

Field Trips and Other Events

Dave provided a financial statement for his Portland Basin field trip showing a balance after expenses of \$422.18!

Bev and Bart's Crooked River & Wildcat Mountain Caldera trip will be rescheduled to May 2013 with dates to be determined.

The board approved repeating the Downtown Geology tour on an annual basis and suggested that the next tour be held early in the summer of 2013.

Old and New Business

Use of email or listserv? The idea of using email or a listserv for meeting and field trip notifications was raised and set on the agenda for the November board meeting. Dave wondered whether it would be appropriate to notify potential field trip participants by email to secure early registration and the consensus of the board was that this was a great idea.

Nominating Committee: The bylaws require that the president appoint a nominating committee in October subject to board approval. The board approved the use of an email vote once Jane has been able to appoint the nominating committee.

Holiday Party: Per Anne O'Neill's email suggestions, Janet assigned the following roles for the Holiday Party:

- Clean-up leader: Jan will make the reservation and be the main contract contact (assisted by Bart and Bev).
- Layout leader: Julia and Mark will rearrange the tables and furniture and put them back at the end of the evening.
- Beverage and Food leader: Janet will delegate beverage and food assignments — and appoint an official alcohol server. Note: board members should bring main dishes with protein.
- Program leader: Dave will organize the PowerPoint presentations.
- Recreational/Entertainment director: Dawn.
- Donations: Since last year's donations only amounted to \$40, the suggested donation will be emphasized more this year (e.g., Larry will make a sign to call attention to the donation bucket).

Inventory: Discussion to update the inventory was set over to the November board meeting.

Old and New Business

In order to get back on a regular board meeting schedule, the board decided that the next board meeting would be in November and alternate months thereafter. The next board meeting will be Saturday, November 10th, 2012, 10:00 a.m. at location to be announced.

Meeting adjourned.

Notes compiled from board meeting minutes submitted by Paul Edison-Lahm, Secretary.

IN MEMORIAM

GSOC member **Beth Hiller** died on September 6, 2012, after a short battle with liver cancer. Although she was a relatively new GSOC member, she had quickly become actively involved in our meetings, field trips, and other activities. Her enthusiasm, friendliness, energy, and warm smile will be sorely missed by her new GSOC friends. She is survived by her sons, Chris and Pete Ho, and her partner,

GSOC Business Manager Jan Kem. We extend our deepest sympathy to them all.

GSOC would also like to extend our sympathy to the family of **Gale Rankin**, a long-time member who for many years hosted the post-meeting hospitality with Archie Strong. Gale died on July 22, 2012.

A Brief History of the Portland Basin

Synopsis of the September 14, 2012, talk by Terry Tolan, Senior Geologist/Hydrogeologist at GSI Water Solutions Inc., Kennewick, Washington.
by Carol Hasenberg and Dave Olcott

As a precursor to the September GSOC field trip, guest speaker Terry Tolan took on the task of painting in large brushstrokes a brief geologic history of the Portland basin. He discussed the basic bedrock units in the basin and also the key geological maps and their authors that have been used in the past to reference that history.

The Portland basin did not exist 30 to 40 million years ago, when the subduction zone for what we call the Farallon plate was located beneath the present Cascade Range. A piece of oceanic crust then docked onto the North American continent, choking the subduction zone which subsequently reformed west of this accreted terrane. This basement bedrock for the Portland Basin can be seen today in the Waverly Heights Formation, outcropping along the Willamette River from the Sellwood Bridge to the Pete's Mountain area. This basalt rock layer can be distinguished from Columbia River Basalt due to the secondary mineralization of its vesicles, making it non-porous. Underlying this volcanic unit are marine sediments of Eocene to Miocene in age.

As time has progressed to the present, the interaction between the tectonic plates has caused this accreted terrane to rotate clockwise, and form crustal faults in a NW- to SE-trending pattern, as well as a NE- to SW-trending pattern perpendicular to the first. It has taken many years to confirm the existence of most of these faults, which were

suspected decades ago. The standard geological map of the area, compiled by Trimble in 1963 and used for several decades, shows few faults in the area.

Since the Trimble geological map, two geological mapping project series have dramatically improved our understanding of the geology of the Portland basin. One of these was the mapping of the Columbia River Basalt Group by Portland State University Professor Marvin Beeson and his students, and the other is the push instituted by the USGS and DOGAMI to more fully understand earthquake hazards in Oregon as a result of the discovery of the Cascadia Subduction Zone and its recurrent great earthquakes.

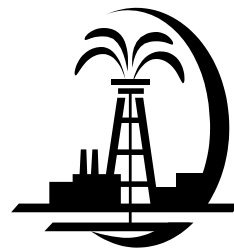
Many outcrops of Columbia River Basalt Group can be seen in the Portland Basin. These voluminous flows erupted from feeder dikes in the eastern parts of Washington and Oregon, and each flow covered huge parts of the states in a few weeks' time. The CRBG flows occurred during the Miocene era and covered much of the marine sediments in the basin. Intertwining and overlying these are several other volcanic and sedimentary units.

The Troutdale Formation and the Sandy River Mudstone were both deposited by the ancestral Columbia River. The routes taken by the Columbia River long ago were many and varied. The Coast Range and Cascade Range were not the barriers they are today. The Columbia River also carried much more water, two or more times the volume it has today. The Sandy River Mudstone was deposited as a result of very large flood events in the Columbia River Basin.

In more recent times the High Cascades have formed, and some of the magma has erupted in the Portland Basin from Boring-age volcanoes (2.6 Ma-100 Ka). These irregular bumps dot the landscape especially in the southeastern part of the basin, but also form larger peaks such as Larch Mountain and Mount Sylvania. The oldest of these are slightly over 2 million years old and are located south of Oregon City, but ages are scattered around to the north.

The faults of the Portland Basin have been confirmed with exposure, well log analysis, and seismic monitoring techniques. It was long suspected that a fault underlay the Portland Hills at the edge of the downtown area.

Within 11 hours of Tolan concluding his orientation to the Portland Basin, Friday evening, an energized group of geology enthusiasts joined him and Steve Reidel in the field. The two day trip was a patented Terry Tolan field trip; extremely informative, interactive, highly spirited and totally comprehensive. Through the choreographed selection of field stops, participants were able to reinforce and validate what they had heard in the Friday night talk as well as what they viewed in Tolan's outstanding field guide. The wealth of knowledge that Tolan and Reidel offer, and more importantly, their success in articulating it to the novice or professional, really makes a field trip with them very special. Our GSOC organization is very fortunate to have had the opportunity to interact with these two highly regarded and enthusiastic geologists.



SHALE GAS AND FRACKING: A BRIEF INTRODUCTION

Synopsis of the October 12, 2012, talk by Jim Jackson, Petroleum Geology and Mineral Resources adjunct faculty, Portland State University Department of Geology.
by Carol Hasenberg

This densely packed presentation was the first GSOC has had about oil and gas production, which might come as a surprise to many people, as the oil and gas industry is a major employer of geologists. However, working petroleum geologists are not thick on the ground here in Portland, so we were pleased to welcome PSU adjunct faculty Jim Jackson to introduce our group to the topic. Jackson has extensive experience in the industry,

and primarily worked for the Atlantic Richfield Company.

Jackson introduced the topic by describing the geological environment which produces oil and gas. It all begins with algae in a lake, swamp or marsh, or marine environment. As the algae cells die, they sink to the bottom of the body of water and collect on the bed. If the water column is anoxic, such as that found in the Black Sea today, then the carbon in the dead cells is preserved as the shales form. Kerogen is a substance produced by the breakdown of the organic matter as it is compressed into shale and buried, and is the substance that produces the oil and gas.

The geologic process necessary to produce oil and gas requires a source rock, a shale which contains the kerogen. As the source rock gets buried deeper and deeper, the rock temperature rises and the kerogen begins to cook. Kerogen produces optimal amounts of oil at a temperature range from 60°C to 150°C. Natural gas is optimally produced at a temperature range from about 80°C to over 200°C. Eventually the source rock will overmature, that is, all the volatile oil and gas will have been cooked out of it and only graphite will remain.

Jackson then discussed what is involved in conventional petroleum systems. When we talk about drilling a conventional oil and gas well, we are talking about tapping into a geological system that includes a source rock as discussed above, above which lies a porous and permeable reservoir rock, and above that a sealer rock that forms a trap structure for the reservoir. The reservoir has to be buried in the “oil window”, i.e., at just the right depth to produce the oil and gas. As the source rock heats, gas and oil migrate into the reservoir rock and continue to rise until they collect underneath the trap. The sealer rock must form some sort of a dome or wedge to hold in the gas and oil. Then the oil company can come along and tap into the reservoir with its wells, and recover oil and natural gas. Of course, finding this oil is the tricky part so conventional drilling requires a good deal of geologic expertise.

Well drilling is a tricky business, and problems can occur, as all the world knows now because of the failure of the BP drilling in the Gulf of Mexico. When a well is drilled, a metal casing is inserted into the hole and a mud slurry is used to fill the hole and maintain the pressure in the hole. After the desired depth is reached, a foamy cement slurry is pumped into the bottom of the hole and the pressure forces the cement up into the gap between the hole and the casing. After the cement cures, the soundness of the completed casing is tested by changing the density of the fluid in the well to see if a corresponding pressure increase or decrease occurs in the fluid. These positive and negative pressure tests fail if the fluid pressure shows significant change, because this means that the casing is not resisting the pressure.

As a contrast to conventional petroleum exploration, we have shale gas drilling and fracking. A shale gas system does not need to have a complicated reservoir and trap geology. Only a source rock that is buried in the “natural gas window” depth is needed. The product is natural gas only. The idea is to drill into the source rock and pump into that a mixture of mainly sand and water under enough pressure to crack the source rock. The sand then helps the cracks stay open once the fracturing fluid pressure is removed. The development of these fracking operations requires more expertise in the engineering end than the geology end. Well drilling involves drilling slanted or horizontal sections, the chemistry of the fracking mud, etc. Fracking operations require the use of many heavy trucks and trailers to haul around the fracking mud. However, it is a desirable process economically because there is so much shale gas out there to be tapped. Shale fields in the U.S. include the Barnett Shale in Texas, the Michigan Basin, and the Marcellus Shale in Pennsylvania and West Virginia.

Fracking can have significant environmental hazards though. The fractures produced in the process of extracting the gas might send natural gas and hydraulic fracturing fluid into drinking water supplies. The quantities of water used in fracking operations can be very great and residential waste water treatment operations may not be able to

handle the volumes or contaminants they hold. Fracking operations can also produce small earthquakes. Fracking operations can suck up needed water reserves in drought stricken areas. Trucks and equipment for fracking operations can degrade fragile country roads. Some improvements have been made in fracking operations as gas men have instituted water recycling and other economizing measures. Regulation of the industry is also “in the pipeline” to safeguard public infrastructure and drinking supplies.

REFERENCES AND ADDITIONAL READING

You can learn a lot about the oil and gas industry by visiting these websites:

The definitive primer on Shale Gas from the Department of Energy:

http://www.netl.doe.gov/technologies/oil-gas/publications/EPreports/Shale_Gas_Primer_2009.pdf

The Open University Learning Space Petroleum pages take you through the oil and gas basics and beyond with quick links from an outline:

<http://openlearn.open.ac.uk/mod/oucontent/view.php?id=399434>

Geology.com has a very nice section on gas and oil development:

<http://geology.com/oil-and-gas/>

News article about shale gas regulation:

<http://indianapublicmedia.org/news/indiana-dnr-mandates-companies-report-fracking-chemicals-36023/>

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.

PUBLICATIONS: **THE GEOLOGICAL NEWSLETTER (ISSN 0270 5451)**, published bimonthly 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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TRIP LOGS: Write to the same address for names and price list.

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