GEOLOGICAL SOCIETY
OF THE OREGON
COUNTRY
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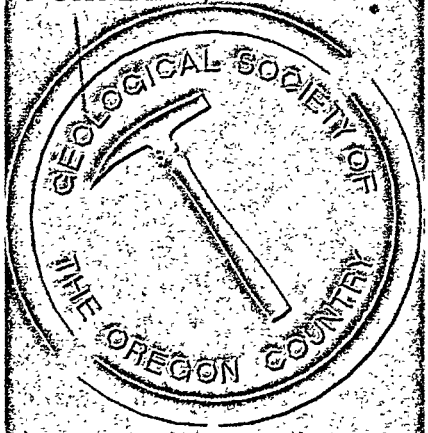
PORTLAND, OR 97207



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JANUARY 2004

THE GEOLOGICAL NEWSLETTER

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

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ACTIVITIES:

ANNUAL EVENTS: President's Field Trip—Summer or Fall; Banquet—March; Annual Business Meeting—February.
FIELD TRIPS: About 6 per year. Fees: see field trip announcements on the calendar next page.
GEOLOGY SEMINAR: Usually held on the third Wednesday of some winter months, 8:00 p.m., Rm. S17, Cramer Hall, PSU. See calendar for details
GSOC LIBRARY: Rm. S7, Open 7:30 p.m. prior to meetings.
PROGRAMS: EVENING: Second Friday evening most months, 8:00 p.m., Rm. 371, Cramer Hall, PSU, SW Broadway at SW Mill St., Portland, Oregon. NOON: Usually first Friday monthly except June, July, August, and holidays, usually at noon, Oregon State Office Building, 800 NE Oregon St., Portland, Oregon (near Lloyd Center), Crooked River Suite room 120B. Consult current calendar (next page) or verify by phone: 503/235-5158 or 503/892-6514.
MEMBERSHIP: Per year from January 1: Individual--$20.00, Family--$30.00, Junior (under 18)/Student--$10.00.
PUBLICATIONS: THE GEOLOGICAL NEWSLETTER (ISSN 0270 5451), published monthly and mailed to each member. Subscriptions available to libraries and organizations at $15.00 per year. Individual Subscriptions $13.00 per year. Single Copies: $1.00. Order from:

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P.O. Box 907, Portland, OR 97207

VISITORS WELCOME AT ALL MEETINGS
INFORMATION: www.gsoc.org
Su Ikeda, President, 503-246-1385
Calendar Editor, John Teskey, 503-641-7746, Lawlib@Teleport.com

VOL. 71, No. 1
January, 2004

JANUARY ACTIVITIES

Friday Noon Program, January 9, 2004, 12:00-1:00 p.m.: Slideshow; Madagascar, The Big Red Island, Rosemary Kenney, GSOC Member, Room 120B, Oregon State Office Building, 800 NE Oregon St. (NE 7th Ave. MAX stop).

Friday evening talk, January 9, 2004, 8:00 p.m.: Lessons Learned from Landslides. Presented by Dr. Scott Burns, Professor of Geology, Room 371, Cramer Hall, Portland State University.

Seminar, Wed. evening, January 21, 8:00 p.m, Transgression and Regression: Tracking the Migrating Shoreline Using the Rock Record, Tara Schoffstall, GSOC Member. Room S17, Cramer Hall, Portland State University.

* *

PREVIEW OF COMING TALKS IN FEBRUARY

Friday Noon Program, February 6, 2004, 12:00-1:00 p.m.: Slideshow; Oregon's Spectacular Coastline and How It Got That Way, Evelyn Pratt, GSOC Member, Room 120C, Oregon State Office Building, 800 NE Oregon St. (NE 7th Ave. MAX stop).

Friday evening talk, February 13, 2004, 8:00 p.m.: Overview of the Geology of South Carolina: New Developments. Presented by Clark Niewendorp, Oregon Department of Geology and Mineral Industries, formerly a geologist with the South Carolina Geological Survey. Room 371, Cramer Hall, Portland State University. The talk will be preceded by a short GSOC Annual Business Meeting at which officers for the upcoming year will be elected.

Calendar items must be received by 15th of preceding month. Call John Teskey, 503-641-7746
Lawlib@Teleport.com

UPCOMING GSOC ANNUAL BANQUET --
The GSOC Annual Banquet will be held on Sunday, March 14, 2004, with dinner starting at 1:00 p.m. Location is the Rheinlander restaurant, 5035 NE Sandy Blvd., Portland. Dr. Marvin Beeson, and Dr. Terry Tolan will be the featured speakers on the topic, "Geology of Portland". A registration form will be available in next month's newsletter.

HELP NEEDED FOR FUTURE FIELD TRIPS --
What's the best way to organize field trips to your favorite places? Chair the field trip committee! Two or three people with plenty of experience will help by calling participants, collecting info and field trip charges, etc. You do NOT have to lead a trip if you don't want to -we have a list of names of leader candidates. Your main focus will be Getting It All Together. Try it - it's fun! If interested, contact Clay Kelleher, phone 503-775-6263, or Beverly Vogt, phone 503-292-6939.

PRELUDE TO MARS: Preview of the Next Generation of Mars Landers

recap from Friday, December 12, 2003 GSOC meeting
Ken Cameron, DEQ, and former USGS geologist, meeting speaker

Three Mars landers will land on Mars within the next month. One of these, Beagle 2, launched by the European Space Agency, will touch down on the red planet Christmas Day 2003, as this article is being written. The other two, Spirit and Opportunity, will be sent to Mars by NASA in January. Beagle 2 is named as such because its mission is to look for chemical traces of life on Mars. The NASA rover missions will be sampling Martian rocks to determine the chemical composition of such.

So, on the eve of potentially great discoveries relating to one of our favorite extraterrestrial objects, Cameron came to speak to GSOC regarding the history and state of current knowledge about Mars. Cameron has had a great interest in space exploration throughout his life. Here is Ken's short history of Mars exploration:

- pre-1960's – optical telescopes were used to evaluate the surface of Mars. Pictures were quite blurry, and many erroneous ideas about Mars were put forth but could not be disproved. Two popular theories were that Mars had "canals" and that dark areas around the polar ice cap during Martian spring were proof of plant life on Mars.
- 1965 – Mariner IV flew by the red planet taking 33 pictures which showed a barren full of mountains and craters. Mars looked a lot like the moon, and disheartened many who hoped that life would be found on Mars.
- 1976 – Viking lander explored the surface of Mars for the first time. Many photos of the planet taken by the companion orbiter showed close-up views of the features of Mars. These photos had a resolution of about 300 feet, Nowadays the resolutions have increase to about 10 feet of accuracy; however, this amount of detail has slowed the map making progress so that only 5% of the surface has been completed.
- 1997 – Sojourn mission landed a rover on the surface in the Southern Highlands of Mars.

Current State of Knowledge of Mars

Next we learned the current state of knowledge about Mars. Cameron divided this knowledge into 5 major areas – tectonics, volcanism, polar ice caps, atmosphere, and water on Mars.

Mars is a planet composed of two major provinces: the Southern Highlands and the Northern Plains. There are about 8 kilometers of vertical difference in elevation between the two. The Southern Highlands are very old and are believed to be part of the original planet crust. The Northern Plains have been reworked from the original, so are about 1 billion years younger, but still very old.

Mars does not contain any obvious **tectonic** features which indicate motion of crustal plates, such as rifts, trenches, etc. In fact, Mars is not tectonically active like the surface of the earth. However, there are some very broad bands of differing magnetic intensity in the Southern Highlands which are reminiscent of magnetic reversals in the oceanic crust of the earth.

One way in which the crust of Mars is active is **volcanism**. An enormous bulge in the surface, called the Tharsis Bulge, contains a number of shield volcanoes, and nearby Olympus Mons, at 24,000 meters, is the largest volcano in the solar system. These mountains were able to swell to these huge proportions because the crust above the hot spot which feeds them does not displace like on the earth. Indeed, Olympus Mons is so high that it protrudes above the thin Martian atmosphere into space. An enormous scarp at the base of the mountain is believed to be of aeolian origin. The basalt flows which form the slopes of the volcano can be seen to contain leveed channels similar to basalt flows on earth.

Associated with the Tharsis Bulge is a series of huge fractures called the Vallis Marineris. These enormous canyons are believed to be caused by extension associated with the bulging crust.

Since the surface of Mars does not move much by tectonic forces, layers of sediment can exist in place which gives a nice "layer cake" effect when eroded or etched by the Martian wind. Cameron showed a few slides which illustrate this effect.

The **Polar Ice Caps** are features of Mars that have long attracted the interest of scientists. The northern ice cap is believed to be composed largely of dry ice (frozen carbon dioxide). A residual part of the cap which never evaporates in summer is to be composed at least in part of water ice. In close-up photos, layers of ice can be seen, each of which may be the result of decades or centuries of climatic cycles on the planet.

Other effects of Mars' cold climate are evident from close-up photographs of Mars. Patterned ground near the poles on earth, created by freezing water in the ground, are similar to features seen on the red planet. Also, flat-topped features near the Martian poles resemble tuyas of earth, where a volcano erupts into an entrapping barrier of thick ice.

Many interesting things have been discovered in the close-up photos of the Martian **atmosphere**. Because a great deal of the particles on the surface have the consistency of talcum powder, huge dust storms can build up and cover the entire planet at times. This pulverized dust is light in color when compared to larger sand-sized basalt grains, so interesting contrasts can be observed which emphasize many aeolian features on the surface. Many dune-type features have been seen in the surface photos. Also, mysterious streaks across the surface of the planet were shown to be caused by dust devils, in a photo which caught a dust devil in action. Clouds are also common on Mars, and may be formed by water ice. A very important question which scientists want to answer is how much water exists in the atmosphere and soil of Mars.

The surface of Mars does contain quite a few features that were formed by **water**. Dendritic patterns of erosion in places suggest that sustain flows of water may have existed on the planet. Features which resemble multiple wave-cut benches suggest lakes. Huge break-out flood features, orders of magnitude larger than our own Ice Age Floods, exist on the surface. More tantalizing questions about the role of water on Mars still exist and tease our imaginations. Hopefully some of the answers will be determined by the upcoming missions. We wait with excitement for the results of the missions.

Carol Hasenberg

You can keep abreast of the Mars missions on the internet at these websites:

NASA press release:
http://science.nasa.gov/headlines/y2003/17dec_beagle2.htm
Beagle 2 mission home page:
http://www.beagle2.com/index.htm
NASA'S Mars exploration home page:
http://mars.jpl.nasa.gov/
ESA Mars express home page:
http://www.esa.int/marsexpress
Malin Space Science Systems:
http://www.msss.com/

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compiled by Rosemary Kenney

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Nominating Committee Results

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

President	Clay Kelleher
Vice President	Charles Carter
Secretary	Beverly Vogt
Treasurer	Marvel Gillespie
Director, 3 years	Kehrnan Shaw
Director, 2 years	Richard Meyer
Director, 1 year	Evelyn Pratt

The slate of officers will be voted on and approved at the February monthly meeting. The Nominating Committee members include Rosemary Kenney, Chair; Bev Vogt; and John Newhouse. Our thanks to the selected members and members of the Nominating Committee!

Don't forget that annual **DUES PAYMENTS** are coming up! Think about all those great member benefits for a mere annual fee of $20 (individual)!!!

PS – If you joined GSOC in September or later, your 2004 dues are paid, good deal!!!

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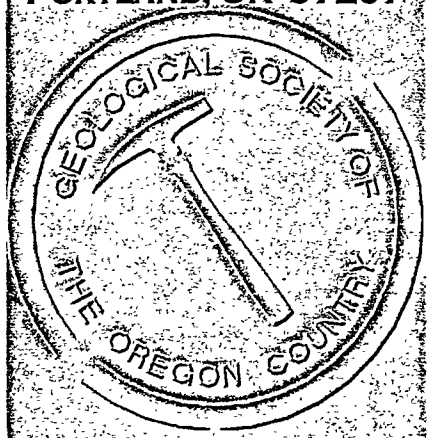

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Children under age 18_____

Address _____ **City** _____ **State** ___ **Zip**_____-_____
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Geologic Interests and Hobbies_____
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VOL. 71, No. 2
February, 2004

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Seminar, Wed. evening, February 18, 8:00 p.m, "If Minerals Could Talk, What Rock Stories They Would Tell", Tara Schoffstall, GSOC Member. Room S17, Cramer Hall, Portland State University.

PLEASE NOTE: PARKING AT PORTLAND STATE UNIVERSITY IS AVAILABLE AFTER 7 P.M. IN THE PARKING STRUCTURE ON BROADWAY DIRECTLY ACROSS FROM CRAMER HALL

* *

PREVIEW OF COMING TALKS IN MARCH

March 14 - GSOC Banquet - see flier at back of newsletter.

Friday Noon Program, March 5, 2004, 12:00-1:00 p.m., Slideshow: Altered Flood Control, Climate Change, and Rebuilding NW Salmon Stocks, Kyle Martin, Climatologist for the NW Indian Tribes, Room 140, Oregon State Office Building, 800 NE Oregon St. (NE 7th Ave. MAX stop).

Calendar items must be received by 15th of preceding month. Call John Teskey, 503-641-7746
Lawlib@Teleport.com

In Search of Ancient Oregon: A Beautiful new Book about the Geology of Oregon

GSOC members will be happy to know that **Ellen Morris Bishop**'s book, In Search of Ancient Oregon, has finally been released. She was the speaker at our GSOC March 2002 Annual Banquet and told us at that time she was working on this book. It was certainly worth the wait, because she has prepared a wonderful book about Oregon's geology.

After a brief introduction about plate tectonics, formation of island arcs, and the origins of life on our planet, Ellen tells the **story of Oregon's geology in chronological order**, starting with our oldest rocks, which crop out near Suplee in central Oregon, in the Blue Mountains near Greenhorn, and in the northernmost portion of Harney County. The outcrop near Suplee is Devonian limestone that originated 380 million years ago as a reef that was part of an ancient volcanic island arc. From that quiet beginning, she proceeds to unfold the exciting story of how our state took shape over millions of years—and how geologists were able to piece the story together. She tells of island arcs—where they formed and how they became part of Oregon, ancient beaches and forests, complex movement of exotic terranes, subduction, volcanism, fossils—all the elements that have combined to create Oregon as it is today.

The beauty of her story is that she cares passionately about geology and loves to share her excitement with her readers. She has walked over much of this state, has helped work out the geology in some of the areas, and—luckily for us—was at significant outcrops with good weather, good lighting, and a camera that she knows how to use well. Her **219 color photographs are dazzling** and will make you want to go out and see this fantastic geology for yourself. These pictures prove the old saying, "One picture is worth a thousand words."

Few of us who love geology can make non-geologists understand the wonder of the geology of Oregon the way Ellen can. She received her doctorate in geology from Oregon State University, has taught geology and environmental sciences for Eastern Oregon University, Lewis and Clark College, and Marylhurst University. She has authored and co-authored books on geology and the out-of-doors and has written columns on geology for the Oregonian and the Columbian. Through all these experiences, she has become a **great story teller**, filled with energy, enthusiasm, and knowledge of her subject. In producing this book, she has made the story of our state's geology accessible to people who would never be interested in a technical paper or book.

In Search of Oregon makes quite clear that fact that the geology of Oregon is complex. As people learn more about it, geologic interpretations of how it was formed and put together change. Trying to put **all the current geologic models** together in a readable way that even the novice can understand and enjoy is truly challenging. Purists may argue about some of the details in the book, but no one can argue that this is a good story, told in a breathtaking manner that is a pleasure to read.

I recommend this book to GSOC members. It was published by Timber Press, costs $39.95, and is available at the **Nature of the Northwest Information Center, 800 NE Oregon Street, Portland**, or at your local bookseller. In Search of Ancient Oregon is a great complement to Orr, Orr, and Baldwin's book, Geology of Oregon, which is a more technical book with maps and drawings and which most GSOC members probably already have. Both are valuable books to anyone who wants to understand the geology of the state.

Beverly Vogt

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Richland, Washington 99352
FOR MORE INFORMATION, CONTACT: Connie Estep, Curator, 509-943-9000

Artists, **Stev Ominski and Brian Swaren**, who offered the original Tip of the Iceberg Interpretive Art of the Missoula Floods, have completed three new pieces to further describe the events of the end of the last ice age, 12 ½ to 15 thousand years ago. At that time, a lobe of the ice sheet blocked the flow of the Clark's Fork River near present day Sandpoint, Idaho. Water backed up behind this blockage to form glacial Lake Missoula. Lake Missoula grew and eventually broke through its ice dam, flooding eastern Washington and Oregon's Willamette Valley as it followed the course of the Columbia River to the Pacific Ocean. This was a flood of unimaginable proportion and repeated itself nearly a hundred times by some estimates.

The additions include, "**Dry Falls Aerial**" described as an encompassing pencil painting for the Plunge Pool at Dry Falls. This pencil painting is the study used in preparing the second painting: "**Dry Falls: Final Design and Color Study for Plunge Pool.**" The Falls drop nearly 350 feet to the floor of the Grand Coulee and are more than three miles wide. To enable the viewer to see the rock formations, Ominski has depicted the floods as they subside.

The third painting takes the viewer closer to the eastern end of the Flood: "**Rocky Butte: The Ice Age Floods in East Portland.**" At Rocky Butte, elevation 612 feet, the waters seemingly "parted" with the majority of the deluge continuing down the Columbia River to the Pacific Ocean. Part of the floods however, backed up into the Willamette Valley to the South, creating temporary Lake Allison.

These paintings are on display at the CREHST Museum through **March 14, 2004**. CREHST is located at 95 Lee Blvd., Richland, Washington. Visitors are welcomed Monday through Saturday, 10 a.m. to 5 p.m. and Sunday noon to 5 p.m. For more information and driving instructions for the museum, please call 943-9000.

See also the CREHST website www.crehst.org.

Also, check out the website for the Ice Age Floods Institute, www.iceagefloodsinstitute.org, where the home page illustration is one of the exhibit's paintings. Several GSOC members have participated in the formation and continuation of this organization (IAFI).

Tualatin Valley Gem Club

Here's a list of events happening at this organization through March. For more information, phone or email Taylor Hunt at 503-662-4790 or hunt6422@hevanet.com

February Meeting
Meeting Location: Forest Grove Senior Center, 2037 Douglas St (right behind the Chamber of Commerce)
Forest Grove, Oregon
Meeting time: 7:30 pm
Entertainment 8:00pm
Refreshments 9:00pm

Earth Science Education
Talks and Video Presentations for 2004

- February 11th, Speaker: Taylor Hunt, "Bingham Canyon, Utah: The World's Largest Open Pit Copper Mine" video plus short talk about mining geology of the Quirrah Mts. Also display of copper ore, malachite, azurite, copper jewelry.
- February 25th, Professor Scott Burns of Portland State University will talk on living with landslides.
- March 10th, Speaker: Taylor Hunt, "Quarries, the Story of Hard Rock Mining" video plus short talk about metamorphic rock types and formation. Also display of calcite, marble, dolomite, rubies, sapphire, rough or jewelry.

- March 24th, Speaker: Taylor Hunt, "Dinosaur National Park" video plus short talk about On the Morrison Formation, the great east to west river that formed it during the Jurassic Period, and the source and emplacement of the Entrada and Navajo Sandstone. Also display of dino fossils, bone, teeth or anything from Utah.

Field Trips

- February 21st, Leader: Taylor Hunt, Current and Ancient Landslides and Floods, space limited, reservations required, small fee.
- March 20th, Leader: Taylor Hunt, Two Portland area Quarries, space limited, reservations required, small fee.

The Mars Report

You can keep abreast of the continuing Mars missions on the internet at these websites:

NASA'S Mars exploration home page:
http://mars.jpl.nasa.gov/
ESA Mars express home page:
http://www.esa.int/marsexpress
Malin Space Science Systems:
http://www.msss.com/
Beverly Vogt recommends this website for the latest press releases. It's also full of space news, space links, and even space shopping for you space cadets out there:
http://spaceflightnow.com/

UPCOMING AAAS MEETING

The American Association for the Advancement of Science (AAAS) is holding its annual meeting Feb. 12-16 in Seattle, Washington. The theme of the meeting is "Science at the Leading Edge." The meeting will include plenary and topical lectures as well as 140 symposia--one of which is "The Science of Earth and Sky"--along with two-day seminars on such topics as proteomics, nanotechnology, vaccines, and a forum for school science. The Exhibit Hall will include a Science Career Fair, career building workshops, family science days, and a Marine Sciences Pavilion. For more information about the meeting, go to www.aaasmeeting.org.

CLIMATE SCIENCE: High and Dry

Venice is being swallowed by the sea. The combination of land subsidence due to groundwater pumping and sea level rise due to global warming has increased the water level in the city by 23 cm in the past 100 years, and a further rise of about 50 cm is projected to occur over the next century. The frequency of the floods known as "acqua alta" has increased; these events submerge large areas of the city by as much as a meter in extreme cases. Various measures have been proposed to safeguard the islands from the high waters, such as the construction of a set of movable gates across the three entrances to the lagoon in which Venice resides, but none have convinced all of the critics.

In a departure from the idea that the solution is to control the sea, Comerlati et al. offer a fundamentally different proposal: raise Venice by pumping CO2 or seawater into the brackish aquifer that lies 600 to 800 m beneath the city. They estimate that the city could be raised by as much as 30 cm in 10 years if seawater were used, and up to 24 cm if CO2 were used, which would have the added benefit of reducing Italy's net greenhouse gas emissions. This strategy could avoid the potentially harmful side effects that repeatedly restricting water flow into the lagoon would precipitate and could eliminate all but the severest of the acqua alta episodes, which would make raising the gates an infrequent necessity.

HJS

Eos 84, 546 (2003).

WINTER WEATHER IN OREGON(?)

Here are some websites to peruse for the climate in Oregon, so you can decide whether the recent weather this winter is within reason:

The Oregon Climate Service (OCS), located on the Oregon State University campus in Corvallis, Oregon, is the state repository for weather and climate information. They are affiliated with Oregon State University's College of Oceanic and Atmospheric Sciences (COAS).
Oregon Climate Service website
http://www.ocs.orst.edu/
Oregon Climate Summaries from the Desert Research Institute, Western Regional Climate Center:
http://www.wrcc.dri.edu/summary/climsmor.html
NOAA (National Oceanic and Atmospheric Association), National Climatic Data Center, Asheville, North Carolina, Oregon Climate Summary:
http://lwf.ncdc.noaa.gov/oa/climate/research/cag3/OR.html
Also the NOAA Snow Climatology site:
http://lwf.ncdc.noaa.gov/oa/climate/monitoring/snowclim/mainpage.html

If Minerals Could Talk, What Rock Stories They Would Tell

Did you know that minerals can tell us more than just how to name a rock? They can give us vital clues as to the history of the rock and the environment in which it was created. Come learn some simple guidelines that even the most novice geologist can use to "read" the history of a rock.

Tara Schoffstall
Wednesday GSOC Seminar leader

GSOC BOARD MEETING NOTES

January 17, 2004

Treasurer's Report
The GSOC contribution to the PSU Geology Department scholarships was not made in 2003 due to an oversight. We will be making the 2003 contribution right away and give the 2004 contribution in May. The contribution is to be given to support a PSU geology student in field camp.

Annual Banquet
This year's annual banquet plans are nearly complete. A banquet registration form is attached to this month's newsletter. GSOC will looking for a new banquet committee for next year. Our deepest thanks to Rosemary Kenney and Phyllis Thorne who have put in so many hours of service to this organization.

Rosters
GSOC members can get obtain a copy of the GSOC roster in one of two ways:

- via email – contact Su Ikeda opalsu@comcast.net.
- via mail – contact Beverly Vogt 503/292-6939.

Seminars
Tara Schoffstall has been doing an excellent job as the seminar instructor and GSOC members need to get out and support her! For those of you who would like to come but are wondering about the parking situation, you may park in the PSU parking garages after 7:00 p.m. free of charge. There is a garage directly across Broadway Blvd. from Cramer Hall which is very convenient. For a map of the PSU campus see the PSU website: http://www.pdx.edu/campus/

Friday Night Projectionist.
Clay Kelleher will continue as the Friday night projectionist for now. If you are interested in helping with this activity contact Clay at 503/775-6263 or Claygeo@cs.com.

Upcoming Events

Yumei Wang, DOGAMI Earthquake specialist and member of the Earthquake Engineering Research Institute reconnaissance team, has volunteered to give a talk to GSOC on the recent Algerian earthquake.

Job Descriptions – GSOC Officers and Committee Chairs

If you are a GSOC officer or committee chair, the board is requesting that you write descriptions of your position to facilitate communication. Job descriptions should include:

- a short version for advertising the position
- a long version for training assistants and replacements

Upcoming GSOC Board Meetings

Feb 13 – board meeting after Friday night meeting
April 3 – next board meeting at Rosemary's house

Nominating Committee Results

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

President	Clay Kelleher
Vice President	Charles Carter
Secretary	Beverly Vogt
Treasurer	Marvel Gillespie
Director, 3 years	Kehrnan Shaw
Director, 2 years	Richard Meyer
Director, 1 year	Evelyn Pratt

The slate of officers will be voted on and approved at the February monthly meeting. The Nominating Committee members include Rosemary Kenney, Chair; Bev Vogt; and John Newhouse. Our thanks to the selected members and members of the Nominating Committee!

Don't forget that annual **DUES PAYMENTS** are coming up! Think about all those great member benefits for a mere annual fee of $20 (individual)!!!

PS – If you joined GSOC in September or later, your 2004 dues are paid, good deal!!!

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY
SIXTY-NINTH ANNUAL BANQUET

Speaker

The Geological Society of the Oregon Country will be having its 69th Annual Banquet on Sunday, March 14, 2004 (starting at 12:30 pm). The program topic will be "Geology of the Portland Basin", with **Dr. Marvin Beeson**, Professor Emeritus, Portland State University Department of Geology, and **Terry Tolan**, Kennedy/Jenks Consultants, Kennewick, Washington.

Where and When

Location of the banquet will be Gustav's Rheinlander Restaurant, 5035 NE Sandy Blvd., Portland, Oregon. There is ample free parking next to the restaurant, behind the restaurant and across Sandy Blvd. Public transportation riders may get there by bus on the #12 Sandy Blvd. bus route. One may also take the MAX train to the Hollywood Transit Station, but will need to walk two blocks north to Sandy Blvd. to transfer to the Sandy Blvd. bus, which does not stop in the Hollywood Transit Station.

Menu

Chicken Schnitzel (Chicken breast with creamy mushroom sauce)
Served with braised sweet and sour red cabbage and spatzle.

Munich Sausage Trio (Bratwurst, Weiswurst, and Bier Sausage)
Served with braised sweet and sour red cabbage, sauerkraut and spatzle.

Grilled Marinated Portabella Mushrooms
Served with zucchini planks and sweet potato rounds.

All dinners include a mixed green salad, fresh baked rolls with butter, apple strudel and hot beverage.

_____ Number of tickets at $18.50 each. Please indicate entrée choice. Also, if you have a table preference, please indicate it on the reservation.

Names of persons attending:

_____ Meal choice (circle one) Chicken Sausage Vegetarian

_____ Meal choice (circle one) Chicken Sausage Vegetarian

_____ Meal choice (circle one) Chicken Sausage Vegetarian

_____ Meal choice (circle one) Chicken Sausage Vegetarian

_____ Amount enclosed. (Reservations must be received by Monday, March 1, 2004)

Send to: The Geological Society of the Oregon Country
P.O. Box 907
Portland, Oregon 97207

GEOLOGICAL SOCIETY
OF THE OREGON
COUNTRY
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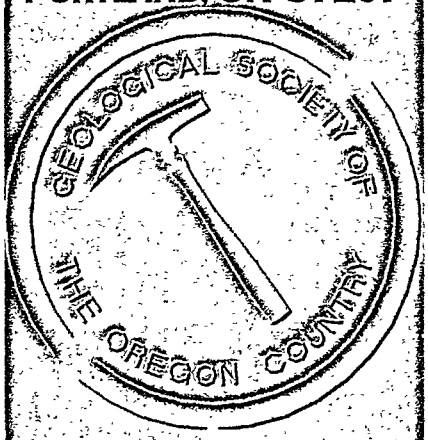
PORTLAND, OR 97207



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MARCH 2004

THE GEOLOGICAL NEWSLETTER

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Library: .....Diana Gordon – 503/835-7748
Evening Program: .....Charles Carter – 503/469-8353
Web Site: .....Carol Hasenberg – 503/282-0547
Refreshments (Evening Program): .....Tom and Diana Gordon

ACTIVITIES:

ANNUAL EVENTS: President's Field Trip—Summer or Fall; Banquet—March; Annual Business Meeting—February.
FIELD TRIPS: . See calendar next page.
GEOLOGY SEMINAR: See calendar next page for schedule, 8:00 p.m., Rm. S17, Cramer Hall, PSU.
GSOC LIBRARY: Rm. S7, Open 7:30 p.m. prior to meetings.
PROGRAMS: EVENING: Second Friday Evening each month, 8:00 p.m., Rm. 371, Cramer Hall, PSU, SW Broadway at SW Mill St., Portland, Oregon. NOON: Usually first Friday monthly except June, July, August, and holidays, usually at noon, Oregon State Office Building, 800 NE Oregon St., Portland, Oregon (near Lloyd Center), Crooked River Suite room 120B. Consult current calendar (next page) or verify by phone: 503/235-5158 or 503/892-6514.
MEMBERSHIP: Per year from January 1: Individual--$20.00, Family--$30.00, Junior (under 18)/Student--$10.00.
PUBLICATIONS: THE GEOLOGICAL NEWSLETTER (ISSN 0270 5451), published monthly and mailed to each member. Subscriptions available to libraries and organizations at $15.00 per year. Individual Subscriptions $13.00 per year. Single Copies: $1.00. Order from:

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VISITORS WELCOME AT ALL MEETINGS
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Clay Kelleher, President, 503-775-6263
Calendar Editor, John Teskey, 503-641-7746, Lawlib@Teleport.com

VOL. 71, No. 3
March, 2004

MARCH ACTIVITIES

Friday Noon Program, March 5, 2004, 12:00-1:00 p.m., Slideshow: Altered Flood Control, Climate Change, and Rebuilding NW Salmon Stocks, Kyle Martin, Hydrologist for the Columbia River Intertribal Fish Commission, Room 140, Oregon State Office Building, 800 NE Oregon St. (NE 7th Ave. MAX stop).

Sunday, March 14, 12:30 p.m., GSOC 69TH ANNUAL BANQUET, Gustav's Rhinelander Restaurant, 5035 NE Sandy Blvd., Portland, Oregon. Program topic will be **"Geology of the Portland Basin"**, with **Dr. Marvin Beeson,** Professor Emeritus, Portland State University Department of Geology, and **Terry Tolan,** Kennedy/Jenks Consultants, Kennewick, Washington. **Due date for registration is March 5**

Seminar, Wed. evening, March 17, 8:00 p.m.: Making Cross-Sections from Geologic Maps, Tara Schoffstall, GSOC Member. Room S17, Cramer Hall, Portland State University.

PLEASE NOTE: PARKING AT PORTLAND STATE UNIVERSITY IS AVAILABLE AFTER 7 P.M. IN THE PARKING STRUCTURE ON BROADWAY DIRECTLY ACROSS FROM CRAMER HALL

* *

PREVIEW OF COMING TALKS IN APRIL & MAY

Friday evening talk, April 9th, 2004, 8:00 p.m.: Lifeline Damage Investigations: The May 2003 Magnitude 6.8 Algerian Earthquake, presented by Yumei Wang, Geohazard Programs, Oregon Department of Mineral Industries, Room 371, Cramer Hall, Portland State University.

Friday evening talk, May 14th, 2004, 8:00 p.m.: Lessons Learned from Landslides. Presented by Dr. Scott Burns, Professor of Geology, Room 371, Cramer Hall, Portland State University.

Calendar items must be received by 15th of preceding month. Call John Teskey, 503-641-7746
Lawlib@Teleport.com

WELCOME

We welcome the following new member to the Geological Society of the Oregon Country

Bonnie Prange

MISCELLANEOUS WEB MUSINGS

Edinburgh Geological Society, founded in 1834, has a little article on Oregon's Table Rocks: http://www.edinburghgeolsoc.org/z_41_06e.html

Washington State Department of Natural Resources offer lectures and field trips at: http://www.dnr.wa.gov/geology/courses.htm

Upcoming PCC (Portland Community College) Spring Quarter non-credit classes with a natural science theme, listed under Special Interest:
More Than an Ice Age
Weather Tips
Stargazing 101
PCC Geology courses for credit:
G161 Geology of Malheur Region: field trip experience
G207 Geology of the Pacific Northwest
G 202 Physical Geology
G 203 Historical Geology
G 208 Volcanoes and Their Activity
http://www.pcc.edu/schedule/

Report from Tucson, Arizona

Once again, our intrepid editor is on the move, reporting from the Fossil, Gem and Mineral show in Tucson, Arizona! Our little entourage, consisting of myself, my husband John, and my son Paul, had a great adventure cruising the **Tucson Gem Show** on the February 5 to 7 for minerals, fossils and jewelry and sampling some of the geological treats of the region. Not to mention escaping from the Oregon rain for a little while.

First of all, the Gem Show is Mecca for those interested in rock collecting. You are not going to see a bigger spread of exciting rocks, minerals, gems, or fossils anywhere. Dealers come from virtually the four corners of the earth to ply their wares – fossil dealers from Morocco, amber dealers from Poland, Russia, and Mexico, turquoise brokers from the Western US and China, African bead specialists, and many, many more. The show takes over a good portion of the downtown area of Tucson, including the convention center, a dozen or so hotels/motels, and numerous large tents.

The focus of this year's show was beads and beading, which has become very popular. There were several shows dedicated to beading and we attended the Best Bead Show at the Kino Veterans Memorial Community Center. For more info on this year's shows see http://www.tucsonshowguide.com/tsg/show_info.cfm

Personally I thought that the prices had gone up a bit this year, but there are still plenty of bargains to be had. One thing you have to be careful of is that there are lots of vendors and plenty of fakery going on. You may be buying glass instead of stone, for example. A gold/platinum gem setter who was staying with us at our bed and breakfast was taking a class with the theme of exposing fakeries of expensive gemstones.

If you have deep pockets, there are quite a lot of goodies for you at the Gem Show. The convention center display is open to the public the last few days of the show and contains many prize mineral specimens, worth thousands each, plus gold nuggets, fine jewelry (lots of opals), and many other amazing things.

This year I purchased some beading stock and some miscellaneous items. A friend of my husband's, Charles McGrady from Gillespie, Illinois is an artist who specializes in life-size dinosaur models for

museums and other collectors. So our little group spent a lot of time at the Arizona Mineral and Fossil Show at the Vagabond Plaza Hotel, where he exhibits. I picked up a nice little color photo book of trilobites called Discovering the Mysterious Trilobites from the author, Thomas T. Johnson, and a trilobite t-shirt.

Also of interest was a lecture presented by the Association of Applied Paleontological Sciences at the Vagabond. The speaker was **Dr. Mark A. Norell** of the American Museum of Natural History (NYC) discussing his travels and work in Mongolia and China for the last 15 summers. Dr. Norell was an excellent speaker, and his travels to these remote regions was reminiscent of the journeys made by Roy Chapman Andrews, the charismatic early dinosaur hunter in this part of the world.

Many dinosaurs have been found in the sandy deserts of Mongolia. Over 2000 skull specimens have been found, more than any other region of the world. Nesting and brooding behaviors of dinosaurs have been suggested by several of the finds. Feathered specimens have been found, and Dr. Norell believes that most dinosaurs were feathered in at least some portion of their lives. (It is believed that feathers evolved as a protection against the cold.) Dr. Norell showed us slides of a number of amazing feathered specimens.

For those of you who are thinking of attending the Tucson Gem Show sometime, it starts usually the first weekend of February and lasts about 2 weeks. Some exhibits end sooner than others, so it is best to plan ahead. There are a number of websites with information about the show. I would also recommend securing your accommodations well in advance.

There's also plenty of great geology and other natural history – oriented activities in the Tucson area, which include Saguaro National Park, visited Kitt Peak National Observatory, and toured Kartchner Caverns.

The Tucson mountains are thick with saguaro and associated Sonoran desert species. We stayed at a bed and breakfast on the border of **Saguaro National Park** about 15 miles northwest of downtown Tucson. Abundant outcrops of Mesozoic granite in the Tucson mountains create very sandy soils in this area. The ridge directly east of the site was capped with a Tertiary welded tuff. The nearby Hugh Norris trail in the park offers some spectacular views of the surrounding terrain on your way up to Wasson Peak. This year I found a rock composed of magnetite in the wash at the bed and breakfast. I was very proud of myself for identifying this mineral!

Well, back to the rain of the Northwest! Hope you enjoyed your little tour and once again I would highly recommend checking out Tucson for a February sun break!

Carol S Hasenberg

Abstract from Bev Vogt:

GEOCHEMISTRY: Exotic Extraterrestrial Carbon
Linda Rowan

Graphite is a relatively rare mineral phase in meteorites. Some of the graphite found in some of the most primitive meteorites, the chondrites, originated from other stars.

Semenenko et al. describe seven unusual graphite-bearing xenoliths found within the Krymka chondrite. The graphite grains are different from other meteoritic graphite in their shape, size, mineral associations, metal and sulfide associations, and carbon isotopic abundances. The graphite probably formed by the compression and heating of an exotic organic compound during multiple shock events due to impacts on the Krymka parent body. The identity of the exotic organic species is still unclear, but these findings provide clues to the evolution of carbon-bearing materials that are ubiquitous components in everything from dusty disks around stars, to giant gas planet atmospheres, to terrestrial life. -- LR

Geochim. Cosmochim. Acta 68, 455 (2004).

GEOLOGICAL TIME CHART

Rusty on your geological time chart? Here's the latest version from the USGS web site:

Phanerozoic Eon (544 ma to present)
- Cenozoic Era (65 ma to present)
  - Quaternary Period (1.8 ma to present)
    - Holocene Epoch (8,000 years ago to present)
    - Pleistocene Epoch (1.8 ma to 8,000 years ago)
  - Tertiary Period (65 to 1.8 ma)
    - Pliocene Epoch (5.3 to 1.8 ma)
    - Miocene Epoch (23.8 to 5.3 ma)
    - Oligocene Epoch (33.7 to 23.8 ma)
    - Eocene Epoch (55.5 to 33.7 ma)
    - Paleocene Epoch (65 to 55.5 ma)
- Mesozoic Era (248 to 65 ma)
  - Cretaceous Period (145 to 65 ma)
  - Jurassic Period (213 to 145 ma)
  - Triassic Period (248 to 213 ma)
- Paleozoic Era (544 to 248 ma)
  - Permian Period (286 to 248 ma)
  - Carboniferous Period (360 to 286 ma)
    - Pennsylvanian Period (325 to 286 ma)
    - Mississippian Period (360 to 325 ma)
    - Devonian Period (410 to 360 ma)
    - Silurian Period (440 to 410 ma)
    - Ordovician Period (505 to 440 ma)
    - Cambrian Period (544 to 505 ma)

Precambrian Time (4500 to 544 ma)
- Proterozoic Era (2500 to 544 ma)
  - Vendian Period (544 to 650 ma)
- Archaean Era (3800 to 2500 ma)
- Hadean Time (4500 to 3800 ma)

For more info on geological time, visit the USGS web site at:
http://geology.er.usgs.gov/paleo/geotime.shtml
http://pubs.usgs.gov/gip/geotime/

or, try the University of California (Berkeley) Museum of Paleontology's excellent Web Geological Time Machine:
http://www.ucmp.berkeley.edu/help/timeform.html

or this one:
Do you keep forgetting the geo time chart? Read some hilarious pneumonic sayings on Dr. Bob's Geologic Time Page:
http://oldsci.eiu.edu/geology/jorstad/geoltime.html
One of my favorites was "Quit Telling Crazy Jack That Perry Como Died Slowly Over Coals"!!!

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APRIL 2004

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Assistant Business Manager:
Cecelia Crater – 503/235-5158

ACTIVITIES:

ANNUAL EVENTS: President's Field Trip—Summer or Fall; Banquet—March; Annual Business Meeting—February.
FIELD TRIPS: About 6 per year. Fees: see field trip announcements on the calendar next page.
GEOLOGY SEMINAR: Usually held on the third Wednesday of some winter months, 8:00 p.m., Rm. S17, Cramer Hall, PSU. See calendar for details
GSOC LIBRARY: Rm. S7, Open 7:30 p.m. prior to meetings.
PROGRAMS: EVENING: Second Friday evening most months, 8:00 p.m., Rm. 371, Cramer Hall, PSU, SW Broadway at SW Mill St., Portland, Oregon. NOON: Usually first Friday monthly except June, July, August, and holidays, usually at noon, Oregon State Office Building, 800 NE Oregon St., Portland, Oregon (near Lloyd Center), Crooked River Suite room 120B. Consult current calendar (next page) or verify by phone: 503/235-5158 or 503/892-6514.
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Name_____ **Spouse**_____

Children under age 18_____

Address _____ **City** _____ **State** ___ **Zip**_____-_____

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

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Please indicate Membership type and include check for appropriate amount:

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Clay Kelleher, President, 503-775-6263
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VOL. 70, No. 4
April, 2004

APRIL ACTIVITIES

Friday evening talk, April 9th, 2004, 8:00 p.m.: Lifeline Damage Investigations: The May 2003 Magnitude 6.8 Algerian Earthquake, presented by Yumei Wang, Geohazard Programs, Oregon Department of Mineral Industries, Room 371, Cramer Hall, Portland State University.

Seminar, Wed. evening, April 21, 8:00 p.m.: Overview of the Geology of Oregon and the Pacific Northwest, Tara Schoffstall, GSOC Member. Room S17, Cramer Hall, Portland State University. (Please note: This seminar was originally planned for December 2003 but was rescheduled due to weather)

PLEASE NOTE: PARKING AT PORTLAND STATE UNIVERSITY IS AVAILABLE AFTER 7 P.M. IN THE PARKING STRUCTURE ON BROADWAY DIRECTLY ACROSS FROM CRAMER HALL

* *

PREVIEW OF COMING TALKS IN MAY

Friday evening talk, May 14th, 2004, 8:00 p.m.: Lessons Learned from Landslides. Presented by Dr. Scott Burns, Professor of Geology, Room 371, Cramer Hall, Portland State University.

Calendar items must be received by 15th of preceding month. Call John Teskey, 503-641-7746
Lawlib@Teleport.com

WELCOME

We welcome the following new member to the Geological Society of the Oregon Country

Alexandra Kristall

GSOC ANNUAL BANQUET

The 69th GSOC Annual Banquet was held Sunday, March 14, 2004 at the Rheinlander Restaurant in NE Portland. A few highlights of the meeting were:

- MC John Teskey showed us the latest 3-D viewing technology, see page 16 for references.
- Evelyn Pratt reviewed the history of the society's gavel and The Two Islands book.
- These items plus the infamous GSOC pickaxe were transferred to new and past President Clay Kelleher.
- Several members were honored for their contributions to the society this past year – Beverly Vogt, Carol Hasenberg, Tara Schoffstall, John Teskey, Phyllis Thorne, Charles Carter, Marvel Gillespie, and Diana Gordon.
- New President Clay Kelleher mentioned that there were important positions yet to fill for this year – in particular, the field trip committee.

The History of the GSOC Gavel

The GSOC gavel was presented to the Society by E. N. Bates, who had it made from the wood of the Glenesslin, a full rigged steel sailing ship that foundered and sank at the base of Neahkahnie Mountain in 1913. The gavel was first used by outgoing president, H. Bruce Schminky during his welcoming remarks at the banquet May 28, 1943. That was our Eighth Annual Banquet. Mr. Bates became president in 1944.

GEOLOGY OF THE PORTLAND BASIN

presented at the 69th GSOC Annual Banquet
March 14, 2004
Dr. Marvin Beeson and Terry Tolan, speakers

by Carol Hasenberg and Beverly Vogt

Because they have done so much work on Columbia River basalt in this region, Marvin Beeson and Terry Tolan were laughingly introduced by GSOC President Clay Kelleher as "co-discoverers of basalt". This team has authored and co-authored many important geological papers and maps of the Portland Basin. They gave an excellent presentation to this year's GSOC Annual Banquet.

Talk begins with Dr. Beeson –

To begin, Beeson remarked that almost every graduate student project done by his students during his tenure at Portland State University resulted in fairly significant discoveries. He explained the reasons that brought this about:

- Projects were designed to answer questions about the geology of the area rather than do an exercise, which made discoveries more possible.
- His students looked at the solutions to geological problems in terms of the context of a complete geological picture rather than as isolated problems. The solutions needed to fit within the context to be valid.
- Fairly rapid chemical analyses were available for most of these projects, which was a significant improvement over the conditions under which early-day workers in Oregon geology had to struggle.

Next Beeson displayed a geological map of the Portland area and pointed out the various geological formations found in the Portland basin. He began by discussing the oldest unit found in the basin, the Waverly Heights basalt:

- The origin of this layer is a volcanic mantle plume arising in an island arc setting, similar to that of Hawaii, but directly off the Oregon coast

of 40 million years ago. The deep, high-density outcrops indicated by gravity analysis are believed to have formed shield volcanoes that extended from the ocean floor to above the surface.

- Outcrops of Waverly Heights basalt can be found along the Willamette River south of Oregon City and on Elk Rock Island in the Willamette River. It also underlies Tryon Creek State Park but is poorly exposed there.
- Rock in this formation can be distinguished from Columbia River basalt by the presence of secondary mineral deposits. Such deposits are not common in Columbia River basalt; they need the presence of a magma source for a period of time to produce the heat necessary to heat the circulating water that deposits the minerals.
- Potassium-Argon dating indicates the age of the formation, which is similar in age to the oldest parts of the Cascade volcanic rocks.

Beeson addressed the Columbia River basalt next. During Beeson's tenure, many changes were made in the understanding of the distribution of the CRB units. Beeson, Tolan, and many other workers contributed to a much broader understanding of the distribution and characteristics of the Columbia River Basalt Group:

- About 300 major flows of Columbia River basalt were erupted over an 11-million-year period, and most were erupted in the 2-million-year period between 16 and 14 million years ago.
- The Grande Ronde, Wanapum, and Saddle Mountain formations are the most voluminous.
- Many of the flows followed large synclinal forms developing at that time.
- Roughly ten percent of the flows came into the western Oregon area.
- Beeson's group mapped several intracanyon flows which filled canyons parallel to the current Columbia River Gorge.
- Beeson determined that the outcrops of Miocene basalt on the Oregon coast that were, at the time, thought to have been locally generated were in fact chemically identical to the Columbia River basalt flows which are found to the east in the Portland basin .in the Columbia River Gorge, and and farther east in the Columbia Basin. The coastal basalt flows are now generally accepted to be Columbia River basalt that flowed from the east to the coast.

At this point, Terry Tolan took over the presentation and began with an illustration of how enormous were the flows and the eruptions that produced them. Just one Columbia River basalt flow was more than two orders of magnitude larger than the largest volcanic flow known in historic times. The lava curtains produced in the eruptions would have been 50 miles long and sprayed lava at least 5000 feet into the air.

Tolan's knowledge of Columbia River basalt has been very useful in his career as a geological consultant. For example, the Columbia River basalt is an important holder and conductor of groundwater in the region. Knowledge of layer mapping is critical to groundwater planning. One may determine inflow and outflow to water reservoirs and track ground water contamination.

The study of geological structures in the Portland basin is also enhanced by knowledge of Columbia River basalt. For example, the Portland Hills fault is a northwest-trending, strike-slip fault which began prior to the basalt flows in the Miocene. In fact, the Portland basin is a large pull-apart basin which is quite old. Basalt flows and sediments have collecting in the basin for a long time, and the distribution of various basalt flows indicates that the basin existed before the basalt flowed into the area. Also, the basalt created a level datum at the time it was emplaced, and the displacement and thickness of the basalt gives information about the structures which existed at the time and what has happed since.

Northwest-trending faults are a common structural feature in Oregon and Washington, and other major fault zones in the area are the Gales Creek/Mount Angel system and the Lacamas Lake/Sandy River system. These faults and the Portland Hills fault created and define the Portland basin.

Tolan continued with a discussion of the Troutdale Formation and Sandy River Mudstone. Previous to

Beeson's work, geologists failed to see the two formations as part of an interconnected system of deposits from the ancestral Columbia River system. It is now believed that the Troutdale Formation was formed by sands and gravel depositing in and along the riverbed, and the Sandy River Mudstone was formed from mud deposited as overbank flood deposits in the river floodplain.

The Troutdale Formation consists of two major divisions: the upper and lower Troutdale. The upper Troutdale is characterized by deposits of volcanic glassy sands from eruptions of Boring Lava , which was erupted between Troutdale and the Hood River area between 2 million and 4 million years ago. This volcanic sand is very good at holding and discharging water, which makes it an important source for wells in the area.

Concluding his part of the talk, Tolan commented on the success that he and the other graduate students had working with Beeson, which he attributed to the fact that Beeson insisted that converging lines of evidence be used to create a consistent theory for the geological context of the problem.

Dr. Beeson concluded the talk with a couple of remarks about the Ice Age Floods in the Columbia River gorge. The first remark was about a puzzle geologists had about the composition of many large, flood-deposited boulders found between I-205 and the Columbia River Gorge. These boulders proved to be composed of Boring Lava, yet for the most part, Boring outcrops occur beyond the reach of the flood waters. How could these boulders get in the path of the floods, and why aren't they composed of Columbia River basalt, which was stripped bare throughout the gorge?

The answer to the first part of the puzzle was that the boulders came from landslides in the Columbia River Gorge. The Boring Lava is located high on the slopes of the Gorge. The second part is answered farther down the river, where many broken pieces of Columbia River basalt are found in the flood deposits. Although much Columbia River basalt was swept away by the floods, its severely jointed nature caused it to break into much smaller pieces which were swept farther down the river.

The last remark concerned the nature of the Ice Age Flood deposits in the Portland basin. The earliest of the floods deposited mostly Palouse loess. Later floods had a composition which contained greater and greater amounts of Columbia River basalt, by chemical analysis.

Having thus described the major formations found in the Portland basin, the talk was concluded. It was a privilege to have two such authorities on the Portland basin discuss their work at the GSOC Annual Banquet. Thank you, Dr. Beeson and Mr. Tolan!

3-D GEOLOGY

The USGS web page with the National Parks geology in 3-D is at this site:
http://3dparks.wr.usgs.gov/index.html

Free 3-D glasses are at:
http://www.rainbowsymphony.com/freestuff.html

by John Teskey

SPRING BOOKWORMS

Book Review by Dr. Paul Hammond

Origins, The Evolution of Continents, Oceans and Life,
by Ron Redfern, 2002, University of Oklahoma Press, Norman, OK, 360 p.; 323 p. of text; Glossary, p. 324-338; Acknowledgements and Dedication, p. 339-341; Bibliography, p. 342-349; Index, p. 350-360.

A coffee table book, often shown in the isle stands at Powell's City of Books. Sells for as little as $36 at Powell's. Publisher's price $50. One of five best

books I've read since 1994. It fairly details the geologic history, since the Precambrian, of the European, northwest African, North American continents and the Caribbean region. This book contains more scientific geological information than 90% of other similar books, plus GORGEOUS, strikingly detailed, full-page illustrations, many simple colored maps, and wonderfully informative margin-of-page illustrations and diagrams. The text is very well written in an enticing, inquisitive style that piques your curiosity. Best parts are those detailing and illustrating the history of the continents bordering the North Atlantic Ocean, the history of the Tethys Sea, and the evolution of life forms, especially the hominids. The book nicely combines human history with geologic history. It is highly recommended for one interested in beautifully illustrated Earth history.

Radiometric Dating

Adapted from the USGS publication, "Geologic Time"

A chemical element consists of atoms with a specific number of protons in their nuclei but different atomic weights owing to variations in the number of neutrons. Atoms of the same element with differing atomic weights are called isotopes. Radioactive decay is a spontaneous process in which an isotope (the parent) loses particles from its nucleus to form an isotope of a new element (the daughter). The rate of decay is conveniently expressed in terms of an isotope's half-life, or the time it takes for one-half of a particular radioactive isotope in a sample to decay. Most radioactive isotopes have rapid rates of decay (that is, short half-lives) and lose their radioactivity within a few days or years. Some isotopes, however, decay slowly, and several of these are used as geologic clocks. The parent isotopes and corresponding daughter products most commonly used in radiometric dating are listed below:

Parent Isotope	Stable Daughter Product	Currently Accepted Half-Life Values
Uranium-238	Lead-206	4.5 billion years
Uranium-235	Lead-207	704 million years
Thorium-232	Lead-208	14.0 billion years
Rubidium-87	Strontium-87	48.8 billion years
Potassium-40	Argon-40	1.25 billion years
Samarium-147	Neodymium-143	106 billion years
Carbon-14	Nitrogen-14	5730 years

The mathematical expression that relates radioactive decay to geologic time is called the age equation and is:

$$t = \frac{1}{\lambda}\ln\left(1+\frac{D}{P}\right)$$

Where t is the age of the rock or mineral specimen
D is the number of atoms of a daughter product today,
P is the number of atoms of the parent isotope today,
Ln is the natural logarithm of the expression in parentheses,
And □ is the appropriate decay constant.
The decay constant for each parent isotope is related to its half-life, $t^{1/2}$, by the following expression: $t^{1/2} = \frac{\ln 2}{\lambda}$.

Dating rocks by these radioactive timekeepers is simple in theory, but the laboratory procedures are complex. The numbers of parent and daughter isotopes in each specimen are determined by various kinds of analytical methods. The principal difficulty lies in measuring precisely very small amounts of isotopes.

The potassium-argon method can be used on rocks as young as a few thousand years as well as on the oldest rocks known. Potassium is found in most rock-forming minerals, the half-life of its radioactive isotope potassium-40 is such that measurable quantities of argon (daughter) have accumulated in potassium-bearing minerals of nearly all ages, and the amounts of potassium and argon isotopes can be measured accurately, even in very small quantities. Where feasible, two or more methods of analysis are used on the same specimen of rock to confirm the results.

Another important atomic clock used for dating purposes is based on the radioactive decay of the isotope carbon-14, which has a half-life of 5,730 years. Carbon-14 is produced continuously in the

Earth's upper atmosphere as a result of the bombardment of nitrogen by neutrons from cosmic rays. This newly formed radiocarbon becomes uniformly mixed with the nonradioactive carbon in the carbon dioxide of the air, and it eventually finds its way into all living plants and animals. In effect, all carbon in living organisms contains a constant proportion of radiocarbon to nonradioactive carbon. After the death of the organism, the amount of radiocarbon gradually decreases as it reverts to nitrogen-14 by radioactive decay. By measuring the amount of radioactivity remaining in organic materials, the amount of carbon-14 in the materials can be calculated and the time of death can be determined. For example, if carbon from a sample of wood is found to contain only half as much carbon-14 as that from a living plant, the estimated age of the old wood would be 5,730 years.

The radiocarbon clock has become an extremely useful and efficient tool in dating the important episodes in the recent prehistory and history of man, but because of the relatively short half-life of carbon-14, the clock can be used for dating events that have taken place only within the past 50,000 years.

Tualatin Valley Gem Club

Here's a list of events happening at this organization through May. For more information, phone or email Taylor Hunt at 503-662-4790 or hunt6422@hevanet.com

Earth Science Education
Talks and Video Presentations for 2004

- April 14th, Speaker: Taylor Hunt, "Eocene Lake Geology and Fossil Formation", video plus short talk on Fossil Lake National Monument Wyoming. Display table of fossil lake fish in matrix and other fossils, gemstone, or rock from Wyoming, or anything starting with "W".
- April 28th, Speaker: Taylor Hunt, "Amber, Formation and Uses" video plus short talk on differences between copal and amber, what make the colors. Also display of amber rough, polished, with insects, jewelry or anything starting with "A".
- May 12th, Speaker: Taylor Hunt, "Opal from Australia", video plus short talk on opal formation and its various colors. Also display of opal rough, polished, as jewelry, opal fossils. Anything from Australia.
- May 26th, Speaker: Taylor Hunt, "Arches National Park, Utah", video plus short talk on the last billion years of Utah's geologic history. Also display of mineral, crystals and rocks of Utah.

Field Trips

- April 3rd, Museum Guide: Taylor Hunt, Rice N. W. Museum of Rocks and Minerals, short video of finding the "Alma King" 6# Rhodochrosite crystal, museum admission, reservation required.
- April 10th, Field Trip Leader: Taylor Hunt, Vernonia area fossil snails, clams and Turritell, reservations required, small fee.
- May 22nd, Field Trip Leader: Taylor Hunt, Explore Underwater Volcanoes and Pillow Basalt, reservations required, small fee.
- July 10th, Field Trip Leader: Taylor Hunt, Eocene Fossils in Ancient Lake Sediments in the Columbia George, this trip requires dry weather and low water and some hiking, space limited, reservations required, small fee.

April GSOC Seminar

by Tara Schoffstall

Did you know that Oregon has nine distinct geologic areas? Have you ever wondered how Oregon got to be the way it is? Come and learn through a hands-on lab format how geologic processes created these unique areas. Everyone is welcome, and no geology background is needed. Seminar is on Wednesday, April 19th at 8:30pm.

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MAY 2004

THE GEOLOGICAL NEWSLETTER

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ACTIVITIES:

ANNUAL EVENTS: President's Field Trip—Summer or Fall; Banquet—March; Annual Business Meeting—February.
FIELD TRIPS: About 6 per year. Fees: see field trip announcements on the calendar next page.
GEOLOGY SEMINAR: Usually held on the third Wednesday of some winter months, 8:00 p.m., Rm. S17, Cramer Hall, PSU. See calendar for details
GSOC LIBRARY: Rm. S7, Open 7:30 p.m. prior to meetings.
PROGRAMS: EVENING: Second Friday evening most months, 8:00 p.m., Rm. 371, Cramer Hall, PSU, SW Broadway at SW Mill St., Portland, Oregon. NOON: Usually first Friday monthly except June, July, August, and holidays, usually at noon, Oregon State Office Building, 800 NE Oregon St., Portland, Oregon (near Lloyd Center), Crooked River Suite room 120B. Consult current calendar (next page) or verify by phone: 503/235-5158 or 503/892-6514.
MEMBERSHIP: Per year from January 1: Individual--$20.00, Family--$30.00, Junior (under 18)/Student--$10.00.
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Please indicate Membership type and include check for appropriate amount:

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GEOLOGICAL NEWSLETTER

The Geological Society of the Oregon Country
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VISITORS WELCOME AT ALL MEETINGS
INFORMATION: www.gsoc.org
Clay Kelleher, President, 503-775-6263
Calendar Editor, John Teskey, 503-641-7746, Lawlib@Teleport.com

VOL. 70, No. 5
May, 2004

MAY ACTIVITIES

Friday evening talk, May 14th, 2004, 8:00 p.m.: Lessons Learned from Landslides. Presented by Dr. Scott Burns, Professor of Geology, Room 371, Cramer Hall, Portland State University.

Seminar, Wed. evening, May 19, 8:00 p.m.: Name That Rock: A Rock Open House, Do you have any mysterious rocks you would like identified? The next seminar will be an open house inviting the public to bring enigmatic rocks for identification. Tara Schoffstall, GSOC Member. Room S17, Cramer Hall, Portland State University.

May Field Trip, Saturday, May 22, 9 a.m.: Geology of the Columbia River Gorge: Led by Beverly Vogt, Oregon Department of Geology and Mineral Industries, retired, the trip will start at Lewis and Clark State Park and spend the day in the Gorge. Take I-84 16 miles of east of Portland. Take exit 18 (marked "Lewis and Clark State Park/Oxbow Regional Park), at bottom of exit turn left and go a quarter of mile to Lewis and Clark State Park. Trip will last from 9 a.m. to approximately 3 p.m. Bring lunch and drinking water, wear walking shoes or boots, and dress appropriately for the weather. Cost of participating in the field trip is $4 for GSOC members and $5 for nonmembers. People are encouraged to carpool, and passengers should share gas expenses. Any further questions, call Beverly Vogt, 503-292-6939.

PLEASE NOTE: PARKING AT PORTLAND STATE UNIVERSITY IS AVAILABLE AFTER 7 P.M. IN THE PARKING STRUCTURE ON BROADWAY DIRECTLY ACROSS FROM CRAMER HALL

PREVIEW OF JUNE ACTIVITIES

Friday evening talk, June 11, 2004, 8:00 p.m.: Speaking on a Topic of Vulcanism. Presented by Dr. Martin Streck, Professor of Geology, Portland State University. Presentation location: Room 371, Cramer Hall, Portland State University.

June Field Trip, Sunday afternoon, June 13, 1-5 p.m.: Causes, Repairs, and Prevention of Landslides in the Portland West Hills: Led by landslide expert Dr. Scott Burns, Professor of Geology at Portland State University. Participants are to meet outside Portland State University at 1 p.m. by the volcanic bomb at the northeast corner of Cramer Hall (intersection of SW Mill and SW Broadway). Wear good walking shoes or boots, and dress appropriately for the weather. People are encouraged to carpool, and passengers should share gas expenses. Trip will last from 1 to 5 p.m. Cost for participating in the trip is $4 for GSOC members and $5 for nonmembers. Any further questions, call John Teskey, 503-641-7746.

Calendar items must be received by 15th of preceding month. Call John Teskey, 503-641-7746
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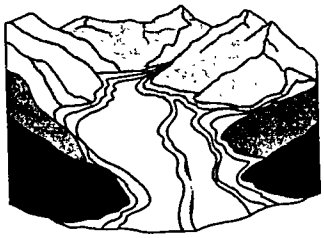


International Glaciological Society Symposium

July 26-30, 2004, Portland, Oregon

PSU Geology Department Assistant Professor Christina Hulbe has requested some help from GSOC leading field trips for the upcoming symposium. The duties of the field trip leaders will be to guide a symposium group using field trip logs provided by the PSU Geology Department. If you are interested, please contact Clay Kelleher. For additional information on the symposium, refer to the following websites:

- PSU Geology Department: http://www.geol.pdx.edu
- Dr. Hulbe's website: http://web.pdx.edu/~chulbe
- Symposium website: http://glaciers.pdx.edu/iwi04

GSOC BOARD MEETING NOTES

April 4, 2004

The GSOC Board of Directors met April 4, 2004, at Rosemary Kenney's home.

A total of 72 people attended the Annual Banquet. Paul Hammond donated $149 to GSOC, which was the money he made by the sale of his books at the banquet. The Society thanks him for his generosity and his continuing interest in GSOC and its activities. Thanks also go to Rosemary Kenney, Phyllis Thorne, and John Newhouse, members of the Banquet Committee, for their hard work that produced this very successful event.

The Board appointed John Teskey to fill Kehrnan Shaw's vacant three-year position on the Board. They also appointed Rosemary Kenney to fill the vacant position of Past President left when Past President Su Ikeda moved out of town.

Unfilled positions were discussed, including the Field Trip Committee Chair. It was agreed that at least three and possibly more summer field trips as well as another trip some other time during the year would be a reasonable goal for field trips each year. The President's Trip will round out the field trip schedule for the year.

Although Beverly Vogt indicated she does not want to be Field Trip Chair again this year, she will work with Charles Carter and Evelyn Pratt to find field trip leaders. John Teskey and Evelyn Pratt agreed to be members of the Field Trip Committee, and Beverly Vogt and Rosemary Kenney will contact other GSOC members to find someone else to be on the committee. Two field trips have already been scheduled for this year.

On May 22, Beverly Vogt will lead a trip to see the geology of the Gorge. On June 13, Dr. Scott Burns, Geology Professor at Portland State University, will lead an afternoon field trip to see the landslides of Portland's West Hills. The details of these trips can be found elsewhere in this Newsletter.

Other yet unfilled positions include the Banquet Committee Chair and the Speakers Bureau Chair. It was decided to transfer the responsibility for being the Friday night projectionist to the Vice President, who arranges for the speakers and has to be at the lectures to introduce the speaker anyway.

Vice President Charles Carter asked for ideas about locations for the annual picnic, which will probably be held on August 22.

The next Board meeting will be10:00 a.m., Saturday morning, June 5, 2004, at Rosemary's house.

Beverly Vogt

Upcoming GSOC Field Trips

The first GSOC field trip of 2004 is scheduled for May 22 and will focus on the geology of the Columbia River Gorge. The trip will be led by

Beverly Vogt, retired from the Oregon Department of Geology and Mineral Industries and past president and current secretary of GSOC. If you have any questions, call Beverly Vogt, 503-292-6939.

The second field trip will be on Sunday afternoon, June 13, and will be about landslides in Portland. Led by landslide expert Dr. Scott Burns, Professor of Geology, Portland State University, the trip will focus on the causes, repairs, and prevention of landslides. It will cover landslides in the Portland West Hills, including the Zoo landslide, the infamous Pittock Mansion slide (shown repeatedly on TV with a truck being pursued downhill by the tree- and mud-laden slide), and the Mt. Calvary Cemetery slide. There will also be a stop at the Willamette Stone, the point established on June 4, 1851, by John B. Preston, first surveyor general of Oregon, at the intersection of the Willamette base line and the Willamette meridian in the Portland Hills (source: Oregon Geographic Names, by Lewis McArthur). If you have any questions, call John Teskey, 503-641-7746.

People are encouraged to carpool, and passengers should share gas expenses.

Beverly Vogt

PEGGY ALLEN DIES

Peggy Allen, widow of John Eliot Allen and a long-time GSOC member, died on February 12, 2004. She and John had lived for many years at the Ione Plaza on the PSU campus, but in recent years after John's death, she had moved to California to be near her daughter. Our sympathies go to her family.

Beverly Vogt

GOOD FRIDAY GSOC SEMINAR – the M 6.8 Boumerdes, Algeria Earthquake of May 21, 2003

Yumei Wang, Oregon Department of Geology and Mineral Industries (DOGAMI), speaker for the April 9, 2004 GSOC Friday night meeting
Charles Carter, GSOC Vice President, introduced the speaker by reminding the audience that 40 years earlier the Good Friday Earthquake rocked Anchorage, Alaska

Ms. Wang was part of a team sent to investigate the effects of the Boumerdes earthquake by the American Society of Civil Engineers. Wang was the geotechnical earthquake damage expert for the team.

Wang introduced her topic by describing the seismicity of the Algerian coast and the tectonic setting of the earthquake. The northeast African coast is located along a converging boundary between the African and Eurasian tectonic plates. The boundary here is somewhat complex, and seismologists are not sure whether a subduction fault exists or the action is more characteristic of continental collision. Seismology maps of the earthquake and its many aftershocks indicate that thrust fault motion was responsible for the earthquake. (See the related article on "Beach Ball Seismological Symbols" in this newsletter, and find the symbol for a thrust fault.)

International seismology organizations located the epicenter of the quake with difficulty. The United States Geological Survey (USGS) placed the epicenter off the coast, six miles underground and about 45 miles east of Algiers, the capitol of Algeria. Epicenter locations varied from other seismological organizations. This ambiguity made it difficult for seismologists to estimate the levels of shaking generated by the quake.

Wang then showed the GSOC audience some maps of Algeria to provide the setting for the damage found. First was a geological map of the Algerian coast. Although the Atlas mountains in the interior

of the country are older material, the north coast is largely comprised of young alluvial sediment. Next were USGS seismic hazard maps of the Algerian coast. These maps had been produced based on mapped faults, historic earthquakes, background earthquakes, and tectonic strain rates. The new earthquake had exceeded the range of shaking amplitude found on the map.

The Boumerdes quake generated tsunamis in the Mediterranean which propagated northwest. On the Algerian coast the quake produced a large draw down of the sea, on the order of 500 meters.

Wang then showed the GSOC audience a number of slides of the earthquake damage, and reviewed the damage statistics. Twenty three hundred people were killed in the quake, plus another 800 missing. Eleven thousand people were injured and about 200,000 were rendered homeless. Housing units, many of which were constructed of concrete frame and masonry, were heavily damaged (182, 000 units). Although European building codes were adopted after an earthquake in 1980, enforcement of the code is not widespread.

There was also widespread damage to the lifelines in the country. Wang showed slides of the water distribution system and bridges. The loose, granular, saturated soil near rivers is often susceptible to liquefaction, which was responsible for much of the lifeline damage. A vertical component to the motion was responsible for other damage to structures including a grain elevator photographed by Wang.

Carol Hasenberg

UPCOMING GEOLOGY LECTURES AT PSU

Spring Seminar Series, PSU Department of Geology –
May 12, 2004, "What's With Those Columbia River Basalts? Vicki S. McConnell, New State Geologist and Director, Oregon Dept. of Geology and Mineral Industries

May 26, 2004, "Assessing the Consequences of a Volcanic Eruption Through the Yucca Mountain Nuclear Waste Repository, Nevada", Larry Mastin, Cascade Volcano Observatory U.S. Geological Survey

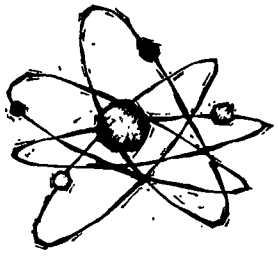
Seminars held in Cramer Hall room 69; 3:30 - 4:30 p.m. For more information visit the PSU Department of Geology website.

May GSOC Seminar

by Tara Schoffstall

Name That Rock: A Rock Open House

Do you have any mysterious rocks that you would like to put a name to? How about a rock you'd just like to learn a little more about? Bring it in! The next Seminar will be an Open House where the public is invited to bring in any rock they would like more information about. There will resources available that we can use to try and figure out those enigmatic rocks!



SPACE, TIME, AND YOUR SUMMER READING RECOMMENDATIONS

I've decided to add to my recommended reading list for cosmology/astronomy/quantum mechanics which I began in the September 2002 issue of The Geological Newsletter. All are written for the layman (i.e., minimum amount of mathematics required, but still require some thought):

Brian Greene, The Fabric of the Cosmos : Space, Time, and the Texture of Reality, Knopf; 1st edition February 10, 2004, 576 pages . I have just finished listening to the audible.com version of this book. I

would highly recommend this book as the starting place for reading the recent history of cosmology. Brian is an excellent writer, and illustrates the principles of relativity and quantum phenomena with witty analogies using characters from favorite TV shows such as the Simpsons and the X-files. He also has reviewed the last 100 years of progress in these fields, showing how each new theory has fit into the understanding of physical reality and the history of the cosmos. A must read for further exploration of these fields.

Amir D. Aczel, God's Equation: Einstein, Relativity, and the Expanding Universe, Four Walls Eight Windows; October 1999, 273 pages. This book is a pleasure to read. The star of the book is the equation of general relativity formulated by Albert Einstein in 1915, and in particular the cosmological constant which was later added to this equation by Einstein, but later refuted by him as his "greatest blunder". Yet the cosmological constant did not go away, and interpretations of it have surfaced in several major theories quite recently. Also woven into the fabric of the tale is the history of Einstein himself and his quest for the equation of general relativity. It is a fascinating glimpse of arguably the greatest physicist of all time and the work which defined his greatness.

Stephen Hawking, A Brief History of Time, Bantam Books, 1998, original version published 1988. This is a classic, well written history of cosmology from Aristotle to Hawking himself. The updated version contains lavish illustrations, updates to the original text and a new chapter on wormholes and time travel.

Brian Greene, The Elegant Universe, Vintage Books, 1999. This Pulitzer Prize finalist is an excellent follow-up to Hawking's book and expands the reader into the latest developments in Unified Field Theory. The early chapters contain excellent and humorous illustrations of general relativity. The chapters on superstring theory are a little more difficult to picture. After all, what do 11 dimensions really look like?

John Gribbin, The Birth of Time: How We Measured the Age of the Universe, Weidenfeld and Nicolson, 1999. I have read this and other books by this well-known science writer. His books cover a remarkable variety of subjects and are fairly easy to read. This is a must read for those interested how astronomical research fits into theories of the origin of the universe.

Carol Hasenberg

FIELD GUIDES

If you feel like studying geology at home, or making your own field trip excursions, you can purchase the following GSOC field trip guides from years gone by:

Geologic Trip Log through Eastern Foothills of Oregon Coast Range between Vernonia and Banks, 1964 .....$0.75
Columbia River Gorge and Grand Canyon of the Deschutes River, 1964 .....0.75
Geological Guide Book for Central Oregon, Prineville, Paulina, Suplee, Delintment Lake, 1965 .....0.75
Condon's First Island, Geological Trips in the Siskiyous and along the Rogue River, 1970 .....1.25
Field Trips along the Oregon Coast in Lincoln County, 1974 .....2.25
Field Guide to Geologic Sites in the Newberry Crater Area, 1976 .....2.00
Investigating the Geology of the North Cascades, Washington state, 1977 .....2.25
Sawtooth Mountains and the Stanley Basin, Idaho, 1978 .....1.75
Lewiston, Idaho, 1984 .....3.50
Northern Idaho and Montana, 1988 .....6.50
Cascadia Subduction Zone, 1992 .....7.00
The Missoula Floods, 2000 .....15.00
Roadside Geology of the Eastern Sierrra Region, Bodie, Mono Lake, 2002 .....2.25
Field Trip to Southwest Oregon Coast, 2003 .....8.00

Contact Rosemary Kenney 503/892-6514.

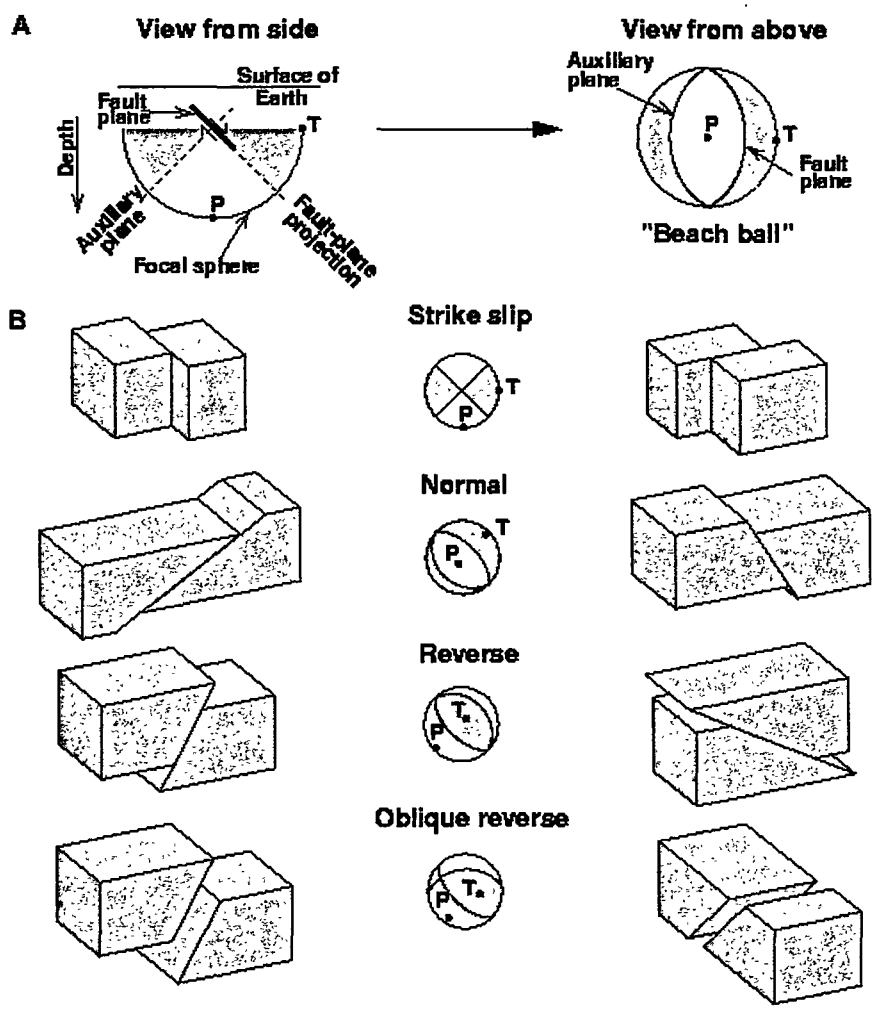
Beach Ball Seismological Symbols

Seismologists use symbols which resemble beach balls to depict the ground motion of the fault surfaces in an earthquake. You may have an opportunity to look at a fault map that describes an earthquake, and if you know how to read the beach ball symbols (which seismologists refer to as the "focal mechanism") you can tell what kind of rupture occurred near the beach ball location. Since the rupture can vary in different locations along the fault, you may see a number of beach balls which fully describe the motion.

Below is an illustration from the United States Geological Survey (USGS) website which describes the motion from a number of different beach ball orientations.

For more exciting earthquake info see the USGS Earthquake Hazards Program site:
http://earthquake.usgs.gov

Schematic diagram of a focal mechanism



USGS, 1996

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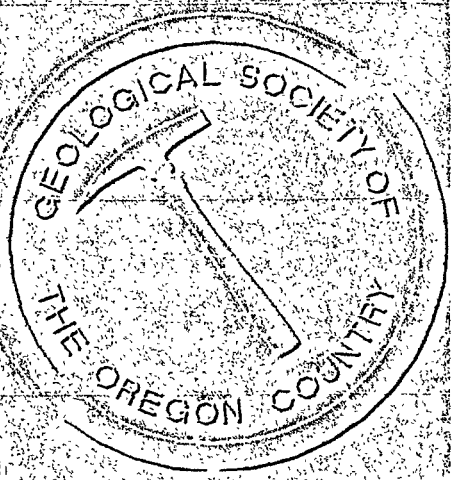

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ACTIVITIES:

ANNUAL EVENTS: President's Field Trip—Summer or Fall; Banquet—March; Annual Business Meeting—February.
FIELD TRIPS: About 6 per year. Fees: see field trip announcements on the calendar next page.
GEOLOGY SEMINAR: Usually held on the third Wednesday of some winter months, 8:00 p.m., Rm. S17, Cramer Hall, PSU. See calendar for details
GSOC LIBRARY: Rm. S7, Open 7:30 p.m. prior to meetings.
PROGRAMS: EVENING: Second Friday evening most months, 8:00 p.m., Rm. 371, Cramer Hall, PSU, SW Broadway at SW Mill St., Portland, Oregon. NOON: Usually first Friday monthly except June, July, August, and holidays, usually at noon, Oregon State Office Building, 800 NE Oregon St., Portland, Oregon (near Lloyd Center), Crooked River Suite room 120B. Consult current calendar (next page) or verify by phone: 503/235-5158 or 503/892-6514.
MEMBERSHIP: Per year from January 1: Individual--$20.00, Family--$30.00, Junior (under 18)/Student--$10.00.
PUBLICATIONS: THE GEOLOGICAL NEWSLETTER (ISSN 0270 5451), published monthly and mailed to each member. Subscriptions available to libraries and organizations at $15.00 per year. Individual Subscriptions $13.00 per year. Single Copies: $1.00. Order from:

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TRIP LOGS: Write to the same address for names and price list.
WEBSITE: www.gsoc.org. Email address: gsoc@spiritone.com.

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INFORMATION: www.gsoc.org
Clay Kelleher, President, 503-775-6263
Calendar Editor, John Teskey, 503-641-7746, Lawlib@Teleport.com

VOL. 70, No. 6
June, 2004

JUNE ACTIVITIES

Friday evening talk, June 11, 2004, 8:00 p.m.: Reconstructing an exceptional magma system active 7 Ma ago: The Rattlesnake Tuff, Harney Basin, Oregon. Presented by Dr. Martin Streck, Portland State University, Professor of Geology, Room 371, Cramer Hall, Portland State University.

June Field Trip, Sunday afternoon, June 13, 1-5 p.m.: Causes, Repairs, and Prevention of Landslides in the Portland West Hills: Led by landslide expert Dr. Scott Burns, Professor of Geology at Portland State University. Participants are to meet outside Portland State University at 1 p.m. by the volcanic bomb at the northeast corner of Cramer Hall (intersection of SW Mill and SW Broadway). Wear good walking shoes or boots, and dress appropriately for the weather. People are encouraged to carpool, and passengers should share gas expenses. Trip will last from 1 to 5 p.m. Cost for participating in the trip is $4 for GSOC members and $5 for nonmembers. Any further questions, call John Teskey, 503-641-7746.

No Wednesday evening seminar scheduled for June, see July schedule below for next Wednesday evening seminar details.

PLEASE NOTE: PARKING AT PORTLAND STATE UNIVERSITY IS AVAILABLE AFTER 7 P.M. IN THE PARKING STRUCTURE ON BROADWAY DIRECTLY ACROSS FROM CRAMER HALL

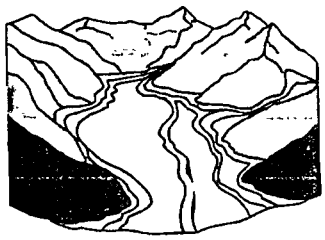
PREVIEW OF JULY ACTIVITIES

Friday evening talk, July 9, 2004, 8:00 p.m., Trying to Predict Earthquakes in the Western United States. Presented by Dr. Evelyn Roeloffs, U.S. Geological Survey, Room 371, Cramer Hall, Portland State University

Seminar, Wednesday Evening, July 21, 8:00 p.m.: Cataclysms in the Geologic Timeline, Tara Schoffstall, GSOC Member. Room S17, Cramer Hall, Portland State University.

July Field Trip, Saturday, July 24, 9:00 a.m.: Products of Recent (Holocene) Eruptions of Mount Hood. Led by Ken Cameron, geologist, Oregon Department of Environmental Quality and formerly the USGS, the trip will examine materials produced by Mount Hood eruptions, with such stops as Timberline Lodge, White River, ZigZag River, and along Highway 26. Meet in the shopping center at the Welches traffic light intersection on Highway 26 on the way to Mount Hood. Bring food and water, dress appropriately, and wear good walking shoes and boots. If you have any questions, call Beverly Vogt or Richard Bartels, 503-292-6939.

Calendar items must be received by 15th of preceding month.
Call John Teskey, 503-641-7746 Lawlib@Teleport.com



International Glaciological Society Symposium

Note updated information to last month's announcement.

July 26-30, 2004, Portland, Oregon

PSU Geology Department Assistant Professor Christina Hulbe has requested some help from GSOC for the upcoming symposium. The duties will include field trip leaders and volunteers for the symposium. The field trip leaders will guide a symposium group (typically non-technical spouses and guests of the attendees) using field trip logs provided by the PSU Geology Department. The trips are casual in nature and GSOC leaders will not have to drive. If you are interested, please contact Clay Kelleher. For additional information on the symposium, refer to the following websites:

- PSU Geology Department: http://www.geol.pdx.edu
- Dr. Hulbe's website: http://web.pdx.edu/~chulbe
- Symposium website: http://glaciers.pdx.edu/iwi04

Upcoming GSOC Field Trips

by Beverly Vogt

Summer GSOC field trip schedule announced

The Geological Society of the Oregon Country (GSOC) has already had one field trip this season—a trip to see the geology of the Columbia Gorge on May 22. GSOC will conduct the following other field trips this summer.

June Field Trip, Sunday afternoon, June 13, 1-5 p.m.: "Causes, Repairs, and Prevention of Landslides in the Portland West Hills": Led by landslide expert Dr. Scott Burns, Professor of Geology at Portland State University. Participants are to meet outside Portland State University at 1 p.m. by the volcanic bomb at the northeast corner of Cramer Hall (intersection of SW Mill and SW Broadway). Wear good walking shoes or boots, and dress appropriately for the weather. People are encouraged to carpool, and passengers should share gas expenses. Trip will last from 1 to 5 p.m. Cost for participating in the trip is $4 for GSOC members and $5 for nonmembers. Any further questions, call John Teskey, 503-641-7746.

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August Field Trip, Saturday, August 24: "Geology of the Northern Oregon Coast". Led by Evelyn Pratt, former GSOC president. Details will be announced in next month's Newsletter.

People are encouraged to carpool, and passengers should share gas expenses.

LESSONS LEARNED FROM LANDSLIDES – the precursor to the June GSOC field trip

Dr. Scott Burns, Portland State University (PSU), speaker for the May 14, 2004 GSOC Friday night meeting

Dr. Burns started his lecture by briefly reviewing his life's work. He grew up in Beaverton, Oregon, and showed us a memorable "Zoo Crossing" slide of PSU during the 1950's with the newly activated

slide near the Oregon Zoo. His first degree was in chemistry at Stanford, and then he "saw the light" and switched to geology. He completed his dissertation in Quaternary geology at the University of Colorado in 1980. He has worked and studied in Switzerland and Louisiana. He showed GSOC members slides of these remote places which also involved landslides in the talk.

He began talking about his current work at PSU, where he has been since 1990. He has been involved in the studies of the Bonneville slide in the Columbia Gorge. He told GSOC that although he had been rooting for an age date of 300 years for the slide, which would make its occurrence coincident with that of the last Cascadia Subduction Zone earthquake, it now looked as though the evidence showed a date of 550 years. The slide would have occurred at about 1450 A.D.

Scott has been involved with landslide of all shapes and sizes, and next he gave GSOC a list of signs which indicate the presence of landslides:

- signs that say "Falling Rocks"
- trees with knees or "pistol butt" trunks
- buildings out of plumb
- roadcuts containing "colluvium" – angular jumble
- vegetation changes which show disturbance
- classic landslide topography –
    - slide scarps
    - hummocky topography
    - stair-step, or back-rotational scarps

Next Burns showed the audience some maps of the Portland metropolitan area, with landscapes marked on them. Landslides occur primarily:

- in the Portland Hills loess
- on steep slopes along the rivers – Oaks Bottom, University of Portland
- Clackamas River basin

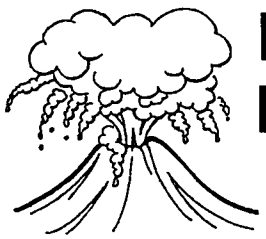
Burns then showed the GSOC audience some slides of major local landslides – Holly Lane in Oregon City, the huge 1991 slide on the Wilson River Highway, the slide in Kelso, Washington which destroyed 60 homes, the slide at the Capes development on the Oregon coast, the slide at the Estacada airport. Amongst the many acts of man and nature which triggered these slides were:

- cutting away the toe of the slide
- adding weight to the top of the slide
- adding water to the slide
- erosion of the slide base

Burns then took the GSOC audience on a little trip down south to Louisiana to some slides which he investigated while teaching at Louisiana Tech. Louisianans are laid back and fatalistic about dealing with landslides – one county road superintendent explained to him how he had "job security" by fixing the landslide on his highway every year. The clay-rich Louisiana soils contain large amounts of smectites, or shrink-swell clays, which is a material prone to failure. Scott was involved in a landslide study which correlated the amount of smectites in the soil to the probability of a slide forming.

Burns concluded the talk with a discussion of how landslides must be considered in the location of dwellings in the northwest. He presented slides from volcanic activity in the Cascades and debris flows in the Columbia Gorge and the Umpqua River. These are slides which have been a part of the northwest geology for thousands of years, and we had better become aware of these patterns to avoid disaster.

Carol Hasenberg



IGNEOUS ROCKS, PHASE DIAGRAMS, AND BOWEN'S REACTION SERIES

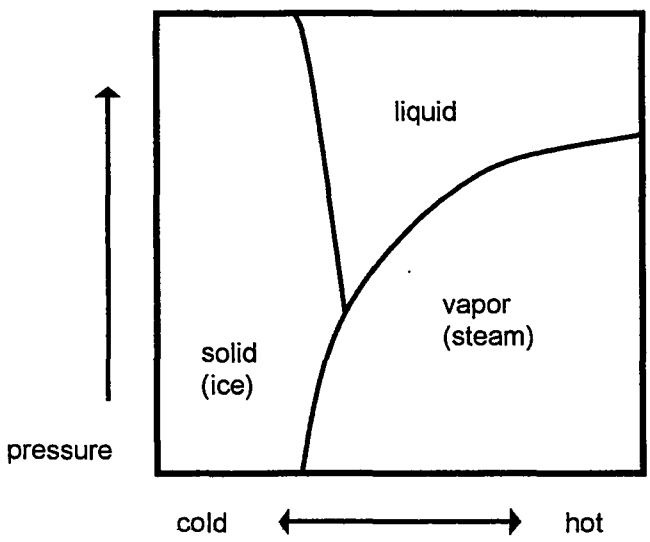
There was an excellent site on the internet about igneous rocks, mineral solutions, and phase diagrams, which I found a couple of years ago. The author, Dr. Lynn S Fichter (email fichtels@jmu.edu), from the Dept. of Geology & Environmental Science, James Madison University,

has permitted us to publish some extracts from the site, (http://geollab.jmu.edu/Fichter/Fichter/Fichterls.html)

Why study mineral solutions and phase diagrams? This branch of geology, in which the minerals themselves are studied, explains the processes which produce rocks of various mineral compositions. Knowing the processes which produce minerals can give clues as to the tectonic settings which created the rocks. The famous pioneer in this work was Norman L. Bowen, who performed experiments on the crystallization of silicate liquids in the early 20th century.

What is a mineral phase? According to Dr. Fichter's site, "A phase is anything that can be mechanically separated. For example, minerals in a rock are each different phases, and liquid and vapor are different phases. More importantly here, in a partially, or fractionally, melted rock the melt portion is one phase and the unmelted residue is a second phase."

A very simplified phase diagram for water is shown below. This diagram shows the phases of water dependent on the environmental temperature and pressure.



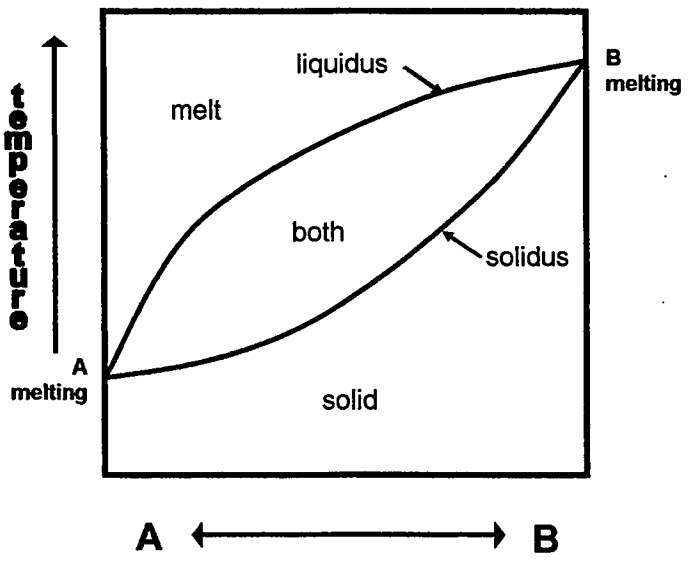
Mineral phase diagrams can be like the above diagram for water, with a single composition at different temperature and pressure; however minerals are generally mixed in the real world and diagrams showing the behavior of mixtures are common. Dr. Fichter's site discusses solid solution and binary eutectic phase diagrams:

"The **solid solution phase diagram**...shows two phases: crystal and melt...one variable - temperature plotted along the vertical axis...Pressure is held constant...complete miscibility (mixability) in both liquid (magma) and crystal phases...demonstrates how the metallic cations in a mineral can be partitioned into fractions. For example, all the ferro-magnesium minerals (olivine, pyroxene, amphibole, biotite) are solid solutions of Mg and Fe. High temperature crystallization species are Mg rich, intermediate temperature species mixed Mg and Fe, and low temperature species Fe rich."

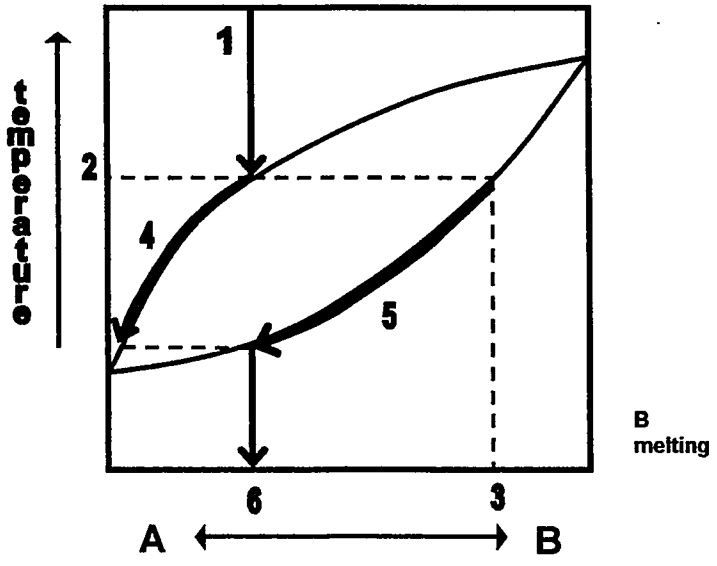
" The **binary eutectic phase diagram** explains the chemical behavior of two immiscible (unmixable) crystals from a completely miscible (mixable) melt, such as olivine and pyroxene, or pyroxene and Ca plagioclase. The binary eutectic phase diagram demonstrates how two mixed and unrelated minerals can be fractionated. For example, amphibole and plagioclase are both found in diorite, but can be at least partially separated by fractionation."

Fractionation occurs when early forming minerals have a different composition than the magma. If these are removed from the magma before crystallization is complete, then the magma is changed in composition from the original.

Here we have a very simple example of a solid solution phase diagram. On the website, Dr. Fichter shows the interaction between sodic and calcic plagioclase, rather than mineral A and B.

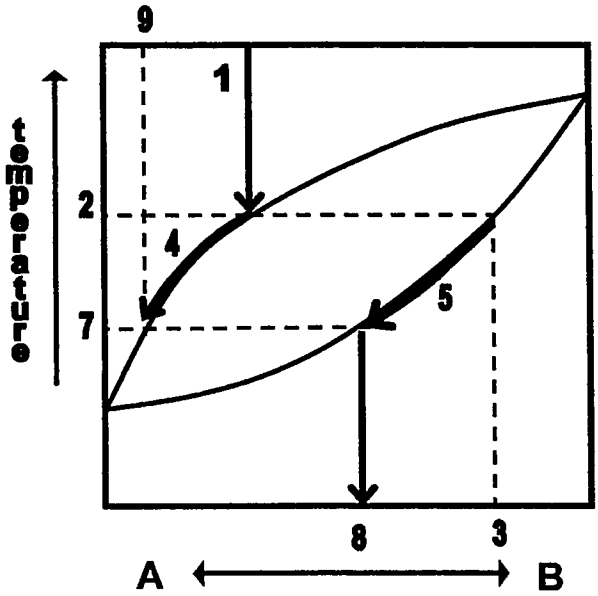


The solid solution diagram shown here describes the interaction between generic minerals A and B. The liquidus line shows the temperature of the first solid crystal of melts of various compositions. The solidus line shows the temperature of the first drop of melt for a solid crystal solution of various compositions.



Now we can find out what happens to the melt as it cools and solidifies. If the melt starts at 30% composition of B and 70% of A at **1**, the temperature of the first crystal is **2**, and the composition of the first crystal is **3**. As the melt continues to solidify, its composition is given by the liquidus **4**. The crystal composition of the solid solution follows the solidus **5**. If the mixture cools slowly without separation, the final composition of the solid solution will be the same as the original melt **6**.

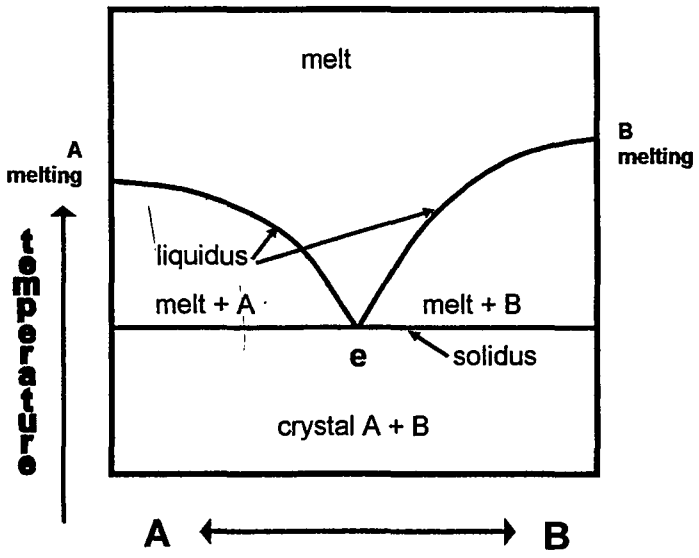
If the process gets interrupted, say for example that



the early forming crystals get separated from the melt, then the melt composition will be richer in mineral A and the crystal composition will be richer in mineral B than the original mix.
The final solid solution phase diagram shows a cooling process interrupted at the temperature at **7**; the crystal composition at point **8** and the melt composition at point **9**.

Melting processes can separate minerals in a similar manner when interrupted, as shown on the website.

Now we will introduce the binary eutectic phase diagram for two hypothetical substances A and B:



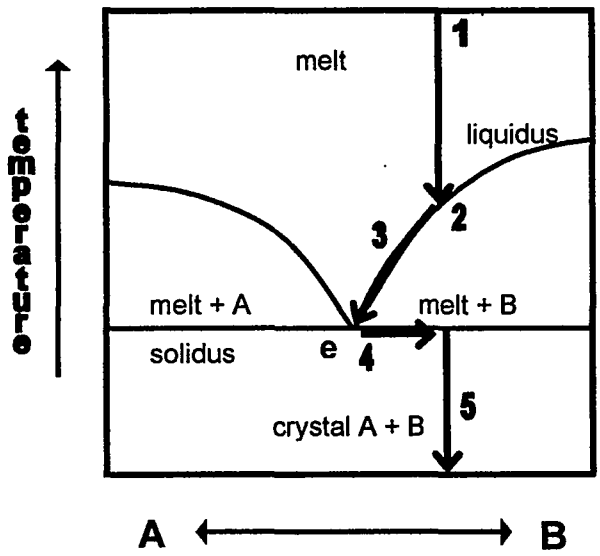
Dr. Fichter's notes on the binary eutectic diagram:

- The liquidus line separates the all melt phase from the melt+crystal phase.
- The solidus line separates the melt+crystal phase from the all crystal phase. NOTE that the solidus and liquidus lines are experimental, they have been determined by melting and cooling many melts at different percent compositions.
- The eutectic (e) is the point at which all three phases can exist simultaneously, A, B, and melt. The eutectic here is 50% B, but can be any percent depending on the minerals involved.
- If we add some B to a melt of A (say 20% B; red arrow) the temperature of melting (crystallization) is lowered. The more B we add the lower the melting temperature becomes; that is, it moves down the liquidus line toward the eutectic. Any mixture of A and B lowers the melting (crystallizing) temperature down the liquidus.

An Example of Equilibrium Crystallization From a Melt With a 50/50 Eutectic:

The First Crystal (numbers on phase diagram correspond with numbers below)

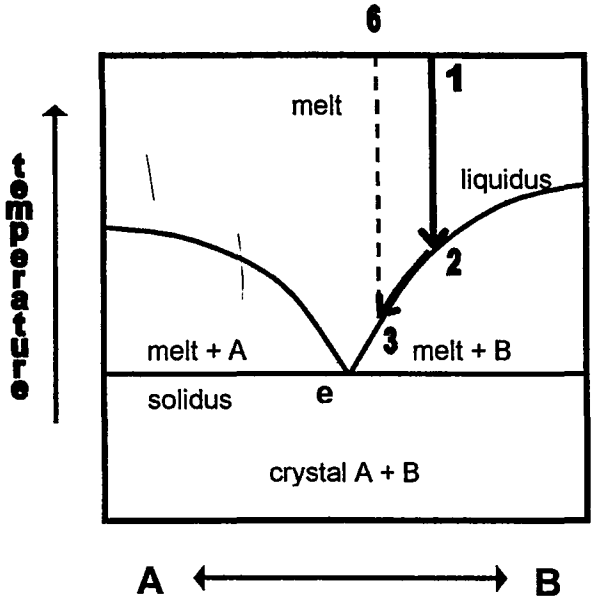
1. Assume a melt composition of 70% B and 30% A.
2. Cool melt to liquidus line along red arrow. Only B crystals form...because we are on the Melt+B liquidus line; no A can crystallize until the



eutectic is reached.

3. Removing (crystallizing) B changes the melt composition making in richer in A. Therefore the melt composition begins to migrate to the left, but down the liquidus line toward the eutectic point. The system must stay on the liquidus line since going above it would raise the temperature high enough to melt everything.
4. At the eutectic point, and only at the eutectic point, can A finally begin to crystallize out of the melt, and A and B now crystallize out together at a ratio of 50/50 until all the melt is gone.
5. Finally after all the melt is gone the two crystals A+B can leave the eutectic. Since the original composition of 70% B has not changed we therefore shift the path right to the 70% point, and continue to drop the temperature straight down. This path is the same any time the composition of B is greater than the eutectic value. If the composition is less than the eutectic, the path is similar, but a mirror image.

If this process is interrupted while the melt is solidifying, the melt composition can be read by projecting straight up from the liquidus (6), and the crystal composition will be pure B.



We will conclude next month with a discussion of Bowen's reaction series.

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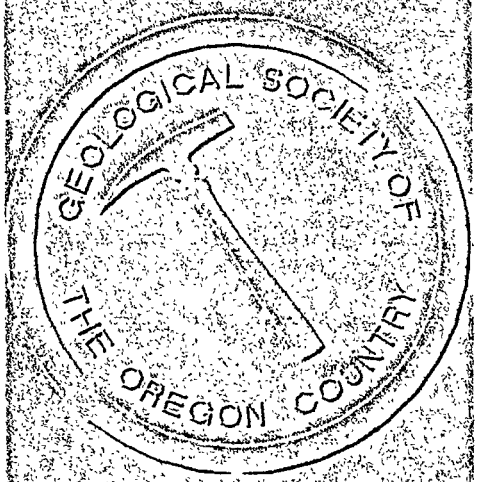

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THE GEOLOGICAL NEWSLETTER

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ACTIVITIES:

ANNUAL EVENTS: President's Field Trip—Summer or Fall; Banquet—March; Annual Business Meeting—February.
FIELD TRIPS: About 6 per year. Fees: see field trip announcements on the calendar next page.
GEOLOGY SEMINAR: Usually held on the third Wednesday of some winter months, 8:00 p.m., Rm. S17, Cramer Hall, PSU. See calendar for details
GSOC LIBRARY: Rm. S7, Open 7:30 p.m. prior to meetings.
PROGRAMS: EVENING: Second Friday evening most months, 8:00 p.m., Rm. 371, Cramer Hall, PSU, SW Broadway at SW Mill St., Portland, Oregon. NOON: Usually first Friday monthly except June, July, August, and holidays, usually at noon, Oregon State Office Building, 800 NE Oregon St., Portland, Oregon (near Lloyd Center), Crooked River Suite room 120B. Consult current calendar (next page) or verify by phone: 503/235-5158 or 503/892-6514.
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VOL. 70, No. 7
JULY, 2004

JULY ACTIVITIES

Friday evening talk, July 9, 2004, 8:00 p.m., Trying to Predict Earthquakes in the Western United States. Presented by Dr. Evelyn Roeloffs, U.S. Geological Survey, Room 371, Cramer Hall, Portland State University.

Seminar, Wednesday Evening, July 21, 8:00 p.m.: Cataclysms in the Geologic Timeline. Science is the process of discovering and explaining patterns. It's also the process of discovering disruptions of patterns. Find out what disruptions caused scientists to sit up and take note that the end of an era was at hand. How did they determine when one age ended and another began? Why is the Geologic Timeline divided the way it is? What clues in the record can be found to possibly explain these disruptions? Find out Wednesday, July 21st at 8pm. All are welcome! Tara Schoffstall, GSOC Member. Room S17, Cramer Hall, Portland State University.

July Field Trip, Saturday, July 24, 9:00 a.m.: Products of Recent (Holocene) Eruptions of Mount Hood. Led by Ken Cameron, geologist, Oregon Department of Environmental Quality and formerly the USGS, the trip will examine materials produced by Mount Hood eruptions, with such stops as Timberline Lodge, White River, ZigZag River, and along Highway 26. Meet in the shopping center at the Welches traffic light intersection on Highway 26 on the way to Mount Hood. Bring food and water, dress appropriately, and wear good walking shoes and boots. If you have any questions, call Beverly Vogt or Richard Bartels, 503-292-6939.

PLEASE NOTE: PARKING AT PORTLAND STATE UNIVERSITY IS AVAILABLE AFTER 7 P.M. IN THE PARKING STRUCTURE ON BROADWAY DIRECTLY ACROSS FROM CRAMER HALL

PREVIEW OF AUGUST ACTIVITIES

August Field Trip, Saturday, August 21 (note date correction from last month's announcement): Geology of the Northern Oregon Coast. This trip will be led by Evelyn Pratt, GSOC Past President. For more information on meeting place or trip itinerary, contact Evelyn Pratt, 503-299-4306.

GSOC Annual Picnic, Sunday, August 22, 2004. Location and details to be announced in next month's newsletter.

Calendar items must be received by 15th of preceding month.
Call John Teskey, 503-641-7746 Lawlib@Teleport.com

IN MEMORIAM – DR. MARVIN BEESON

Many GSOC members were shocked to hear of the untimely death of Portland State University Emeritus Professor of Geology Marvin Howard Beeson on June 3, 2004. He was but 66 years of age, and recently spoke at the 2004 GSOC Annual Banquet.

Born in 1937 and raised in La Grande, Oregon, Dr. Beeson spent the bulk of his career teaching and conducting research at Portland State University. His research and the research of his graduate students were instrumental in determining the nature of the Columbia River Basalt in Oregon and Washington states, and he was considered one of the foremost experts of the geology of this region. He will be greatly missed by the Oregon geology community.

Remembrances for Dr. Beeson are to the Mt. Hood Kiwanis Camp. For further information visit the Portland State University Department of Geology website http://www.geol.pdx.edu/. A lecture that Dr. Beeson gave in 2001 on Columbia River Basalt can also be found at the website.

Summer GSOC field trip schedule continues...

The Geological Society of the Oregon Country (GSOC) has already had two field trips this season—one trip to see the geology of the Columbia Gorge on May 22 and the other on June 13 to examine landslides in Portland. GSOC will conduct the following other field trips this summer. For all trips, bring food and water, dress appropriately, and wear good walking shoes and boots.

July Field Trip, Saturday, July 24, 9:00 a.m.: Products of Recent (Holocene) Eruptions of Mount Hood. Led by Ken Cameron, geologist, Oregon Department of Environmental Quality and formerly the USGS, the trip will examine materials produced by Mount Hood eruptions, with such stops as Timberline Lodge, White River, ZigZag River, and along Highway 26. If you have any questions, call Beverly Vogt or Richard Bartels, 503-292-6939.

August Field Trip, Saturday, August 21 (note date correction from last month's announcement): Geology of the Northern Oregon Coast. Led by Evelyn Pratt, former GSOC president. For more information on meeting place or trip itinerary, contact Evelyn Pratt, 503-299-4306.

The SECRETS of the RATTLESNAKE TUFF

synopsis of GSOC Friday night meeting, June 11, 2004, speaker Dr. Marvin Streck, Portland State University Department of Geology

Dr. Streck presented to GSOC the results of his 1994 doctoral dissertation for Oregon State University, the subject of which was the Rattlesnake Tuff formation of southeastern Oregon.

The Rattlesnake Tuff is a widespread, thin formation of mostly rhyolitic ash of glassy composition found in the High Lava Plains in southeastern Oregon. This interesting area was visited by GSOC in the September 1999 President's field trip organized by the editor, Past GSOC President Carol Hasenberg. This area of Oregon is interesting from a geological standpoint for a number of reasons, being crossed by the Brothers Fault Zone, the northern terminus of the Basin and Range Province, and containing both basaltic and silicic late-Miocene volcanics.

The boundaries of the Rattlesnake Tuff form a large hand-print shaped zone covering roughly one

quarter of the state of Oregon. The center of the zone lies a few miles south of Riley, Oregon, off of U. S. route 395. Rattlesnake Tuff outcrops appear as far north as John Day and as far south as the southern end of the Catlow Valley. (For those readers with the Walker/McLeod Geologic Map of Oregon, R.T. is included in the map unit Tat in the Malheur/Burns area and Ts in the John Day area.)

Rattlesnake Tuff was created by rapidly moving pyroclastic flows which erupted in a period of at most a few weeks about 7 million years ago. Approximately 300 km^3 of magma was spewed (about the volume of Mt. Shasta) over a wide area, so that typical outcrops are 10-20 meters thick.

The outcrops of Rattlesnake Tuff consist of vitrified ash with various degrees of welding, uniform and banded pumice of mostly rhyolitic composition, mafic (basaltic) inclusions, and xenoliths of metamorphic host rock material. Dr. Streck concentrated mainly upon the pumices in his analyses for his dissertation, but also looked at the composition in general of the material in order to develop a model of the system which produced the ash.

Dr. Streck analyzed the uniformly colored pumices for their mineral content. What he found was that although the rhyolitic pumices all had a similar composition of major elements, the trace elements varied, and could be classified into 5 uniform groups, indicating 5 different types of magmas. Two prominent trace elements which were characteristic were barium in feldspar crystals and titanium in magnetite within the pumice. His conclusion from this analysis was that these rocks showed various stages of crystallization within the magma chamber and the differences in composition were caused by fractionation. (For a little run-through of fractionation, consult the phase diagram article from last month's newsletter, plus the Bowen's Reaction Series article in this month's newsletter.)

Dr. Streck then went on to analyze the vitrified outcrops, plus small amounts of dacite bands in the banded pumices, and the mafic inclusions in the outcrops. The composition of the vitrified outcrops were proved to be rhyolites of similar composition, with roughly the same classifications as that of the pumices. The mafic inclusions were shown to have a silicic composition similar to that of the local basaltic volcanoes of the same age, but with quite different concentrations of trace elements. The composition of the dacites were directly between the mafic and the rhyolitic, and showed a range of composition stretching between the two types. His conclusions from these analyses were that the mafic inclusions were from the connection of a basaltic magma chamber to the rhyolitic chamber, and the dacites are a mixture of the two magmas.

In constructing the model of the system which produced the ash, Dr. Streck envisioned a rhyolitic magma chamber with a basaltic chamber ponded below the rhyolite. The basalt rises in pipes up to the rhyolite. From this contact, the basalt magma serves as a warmer for the rhyolitic mixture above, and crystals forming in the rhyolite chamber fall down into the pipes, causing fractionation to occur. An eruption occurs, spewing the various components of the system, which includes the rhyolite magma in various stages of fractionation, basaltic inclusions and dacite mixtures, plus some bits of the metamorphic parent rock, which is what we find on the surface today.

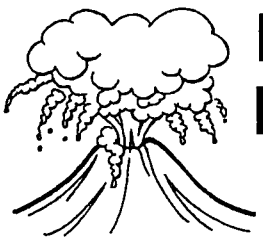
Carol Hasenberg

Further reading:

Streck, Martin J., "Field Guide to the Rattlesnake Tuff and High Lava Plains near Burns, Oregon", Oregon Geology, Volume 61, Number 3, May/June 1999.

Streck, Martin J., 1994, Volcanology and petrology of the Rattlesnake Ashflow Tuff, eastern Oregon: Corvallis, Oregon, Oregon State University doctoral dissertation, 185 p.

Further references are cited in the Oregon Geology article.



IGNEOUS ROCKS, PHASE DIAGRAMS, AND BOWEN'S REACTION SERIES

There is an excellent site on the internet about igneous rocks, mineral solutions, and phase diagrams. The author, Dr. Lynn S Fichter (email fichtels@jmu.edu), from the Dept. of Geology & Environmental Science, James Madison University, is permitting us to publish some extracts from the site, (http://geollab.jmu.edu/Fichter/Fichter/Fichterls.html). This is the conclusion of the article we began last month.

Discussion of the evolution of magma from Dr. Fichter's site:

"As a logical extension of his work, Bowen proposed a hypothesis for the origin and evolution of igneous rocks. ...The core idea is that a silica-rich mafic or ultramafic rock (the parent rock) gives rise to all other igneous rocks (and not just igneous rocks, but all rocks). The process occurs when the parent rock is fractionated, that is split into two fractions each with a composition different from the parent. Fractionation may occur during crystallization of a magma, or melting of a preexisting rock.

During fractionation the mafic parent rock selectively melts producing two fractions. The first fraction is a melt whose composition is closer to the bottom of BRS (editor's note: Bowen's Reaction Series – see diagram at the end of the article) than the original rock. This melt is intermediate in composition. The second fraction is the unmelted crystal residue with a composition more mafic (i.e. ultramafic) than the original rock. That is, its composition is higher in BRS than the original rock.

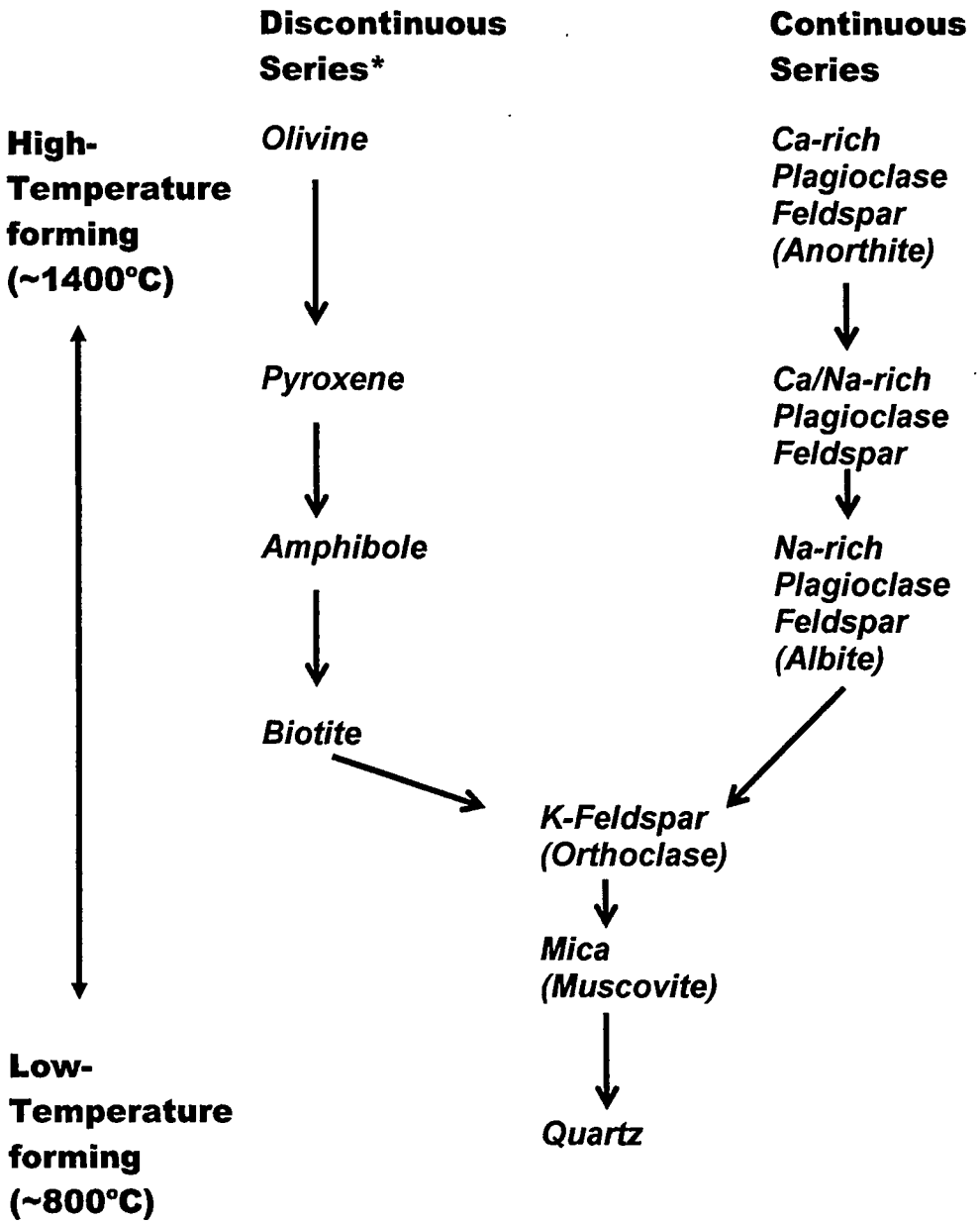
"If time and conditions allow, the fractionation process can continue and the intermediate rock produced during the first fractionation can fractionate into a felsic magma, leaving behind a crystal residue more mafic than the intermediate rock." Dr. Fichter's page on Igneous Rock Evolution shows these fractionation relationships in terms of BRS.

Bowen's original idea was that fractionation occurred during the crystallization process. The process begins with a magma (melt) slowly cooling. Crystallization begins with minerals highest in the reaction series. Because these minerals have the highest specific gravity they settle to the bottom of the magma chamber by gravity settling. Also, because these first formed minerals are high in Ca, Mg, and Fe, they take these elements to the bottom with them in greater quantities than their average composition in the original melt. The remaining melt is thus depleted in Ca, Mg, and Fe, and has a composition lower in the reaction series.

Thus, the original magma of one composition is divided into two fractions. The first fraction is a cumulate (early formed crystals which "accumulate" at the bottom of the magma chamber) collected at the bottom of the magma chamber composed of high density Ca, Mg, and Fe rich minerals from the top of BRS. The second fraction is the lower density, more Na, K, and Si rich remaining melt with a composition lower down in BRS.

There are practical problems with fractional crystallization. For one, gravity settling is a slow process, and requires more time than is normally available. And two, for gravity settling to occur the cooling magma must remain still, a difficult state for a hot, turbulent melt. Nonetheless, field evidence indicates that gravity settling does occur, at least under some conditions, but it not as significant a mechanism for igneous rock evolution as fractional melting."

Bowen's Reaction Series



*Bowen found that minerals stable at progressively lower temperature would crystallize replacing the higher temperature minerals as the magma continued to cool.

Igneous Rock Properties Table

Magma Type	Felsic	Intermediate		Mafic	Ultramafic
Intrusive	*Granite**	*GranoDiorite*	*Diorite*	*Gabbro*	*Peridotite-Dunite*
Extrusive	*Rhyolite*	*Dacite*	*Andesite*	***Basalt****	**
Principal Mineral Contents	*Quartz Mica Biotite K-Felspar Na-Feldspar*	*Amphibole Biotite Quartz Na-Feldspar*	*Amphibole Pyroxene Biotite Ca/Na-Feldspar*	*Pyroxene Ca-Feldspar*	*Olivine Pyroxene*
Magma Temperature	*800-1000°C*	*1000-1100°C*		*1100-1200°C*	
Magma fluidity*	*Highly viscous* _____ *Very fluid*				
Silica Content from USGS by weight	*>68%*	*63-68%*	*52-63%*	*48-52%*	

*Magma fluidity is a direct result of silica content. Since felsic magma is so sticky, the intrusive form granite is far more common than rhyolite (Oregon being an exception to this rule). Also, fluid mafic magma produces more basalt than the intrusive gabbro.

**Since this magma is produced as a result of fractionation of mafic magma and with the high crystallization temperature of the mineral content, this type of magma is almost always intrusive.

GSOC BOARD MEETING NOTES

Summary of June 5, 2005, GSOC Board meeting

Because of a lack of a quorum, no formal actions were taken. The following topics were discussed, however.

The annual picnic will be held on August 22, with the location to be announced next month. It was decided that we need to pursue getting a better speaker system or bull horn for field trips, so Beverly Vogt will get estimates of costs for the next Board meeting. She will also get some ideas for costs of mineral kits for Tara Schoffstall to use in her Wednesday night seminars. We also need to get a laser pointer and also some way for showing maps on field trips. John Teskey will work on evaluating the value of the GSOC library. The next Board meeting will be held at 10 a.m., August 22, wherever the annual picnic is being held.

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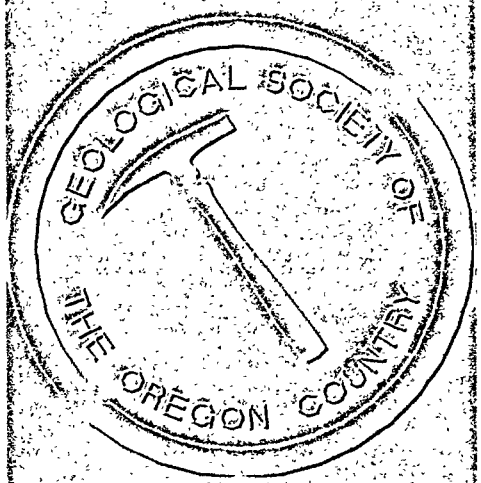

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VOL. 70, No. 8
AUGUST, 2004

AUGUST ACTIVITIES.

Seminar, Wednesday Evening, August 18, 8:00 p.m.: Where Did That Earthquake Come From? How can scientists tell if an earthquake felt in the Northwest originated in the Northwest? Did it occur near the Cascade Volcanoes or near the offshore Juan de Fuca subduction zone? Perhaps it was a part of a larger quake that was centered in California or Alaska. Think it's hard finding the origin of an earthquake? It's not! You don't have to be a seismologist to figure out the location of an earthquake's epicenter. Find out Wednesday, August 18th at 8 pm. All are welcome! Tara Schoffstall, GSOC Member. Room S17, Cramer Hall, Portland State University.

August Field Trip, Saturday, August 21 (note date correction from last month's announcement): Geology of the Northern Oregon Coast. This trip will be led by Evelyn Pratt, GSOC past president. For more information on meeting place or trip itinerary, contact Evelyn Pratt, 503-299-4306

PLEASE NOTE: PARKING AT PORTLAND STATE UNIVERSITY IS AVAILABLE AFTER 7 P.M. IN THE PARKING STRUCTURE ON BROADWAY DIRECTLY ACROSS FROM CRAMER HALL

GSOC ANNUAL PICNIC, Sunday, August 22, 10 a.m. – 2 p.m. Laurelhurst Park Please see detailed information appearing elsewhere in this newsletter.

PREVIEW OF SEPTEMBER ACTIVITIES

NO INFORMATION AVAILABLE AT THIS TIME

Calendar items must be received by 15th of preceding month.
Call John Teskey, 503-641-7746 Lawlib@Teleport.com

TRYING TO PREDICT EARTHQUAKES IN THE WESTERN UNITED STATES

A hit and miss summary of the GSOC Friday night talk, July 9th, 2004, written by Charles Carter. The talk was presented by Dr. Evelyn Roeloffs of the Cascade Volcano Observatory, U.S.G. S. Dr. Roeloffs earned her Ph.D. in Geophysics at the University of Wisconsin-Madison, did Postdoctoral work at Northwestern University, and began her research with the U.S.G.S. at Menlo Park before going to Vancouver.

The first successful prediction of a major earthquake was done by researchers in China in 1975; this prediction saved thousands of lives and spurred efforts to predict earthquakes. However, since then, there has been little success, and the highly publicized attempt to predict an earthquake at Parkfield, California in 1988 did not work out because the earth did not cooperate (prior to 1988 at Parkfield there were fairly regular earthquakes with recurrence intervals of about 22 years). Earthquake prediction research was then put on the back burner in the U.S. until the last few years when there has been renewed interest (i.e., funding). 1

In Oregon and Washington, there have been about 25 damaging earthquakes since 1872. Most of these quakes have had magnitudes of 5 or greater, and therefore a method to predict earthquakes in this region could have valuable consequences. Moreover, there are three types of earthquakes that can occur here: the deep earthquakes with focuses in the subducting plate such as the 2001, M 6.8 Nisqually quake; the shallow (less than 25 km deep) quakes that could have magnitudes as much as 7.5; and the megathrust-subduction quakes with magnitudes as high as 9.

Dr. Roeloffs reviewed 3 major research emphases to predict earthquakes:

- looking for patterns in space and time of historic quakes, e.g. with foreshocks, or with more complex patterns
- the study of aseismic crustal deformation, i.e. areal and temporal changes in strain
- electromagnetic methods, i.e. the study of geophysical methods such as resistivity or changes in the distribution and frequency of electromagnetic waves.

Foreshocks have received particular attention. The Loma Prieta earthquake of M7.1 in the California coast range south of San Francisco was preceded by a number of foreshocks, but the foreshocks occurred too long before the actual quake to be useful in predicting the quake. And globally, 12 to 17 percent of larger earthquakes are characterized by foreshocks, but in the Pacific Northwest --- where we have a much shorter historic record than China or Japan for example--- the largest quakes such as the Nisqually and the Scotts Mills M5.6 did not produce foreshocks. With respect to the Cascadia Subduction Zone quakes greater than 7, the northern and southern ends of the quakes generally exhibit foreshocks, whereas the central segments of the ruptures lack foreshocks. However, researchers now think that they can predict 18 % of these quakes closer than 75 km to the primary rupture within 10 days. Looking at more complex patterns of seismicity, the Russian Dr. Keilis-Borok worked up an algorithm to predict the increased probability of a quake in the Kuril Islands. In addition, this algorithm has been used to predict a quake of M6.5 or greater in southern California between 5 January and 5 September of this year (2004).

Aseismic crustal deformation is difficult to measure. In Japan, where the historical record goes back about 1000 years, significant deformation is thought to have occurred prior to a M8 quake. And in 1944, leveling crews found a closure difference of about 3 mm before, and then 4mm just a few hours before the main Tomakomai shock.

Groundwater fluctuations in water wells have also been noted prior to quakes such as before the M8.1, 1946 earthquake at Nankai, Japan, and before the M6.1 Kettleman Hills, California quake. Borehole strain meters have been set up in California and Hawaii that can detect small movements of the

crust, but these meters have not been used for long-term deformation rates.

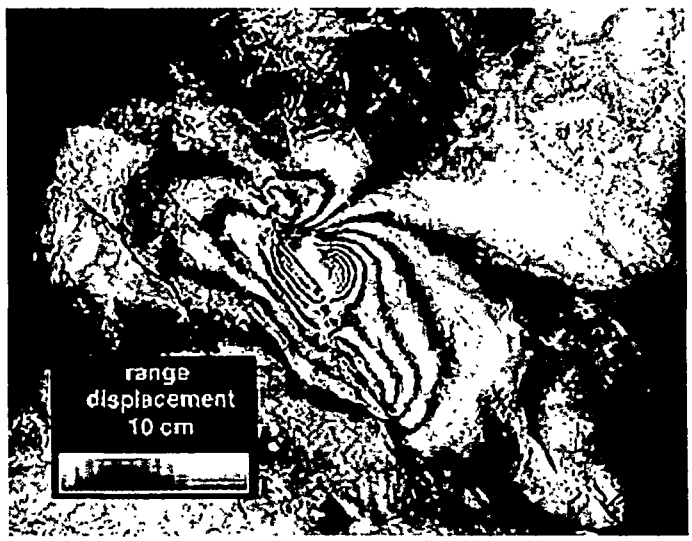
In a more remote sensing way, GPS Geodesy has been used to detect "slow" earthquakes in the Cascadia Subduction Zone. Changes in motion measured over intervals of 14 to 16 months indicate compression; this strain may then transfer stress to the shallower, locked part of the megathrust fault zone. These slow earthquakes are accompanied by tremors that have higher amplitudes during slip/compression. Also crustal deformation in the Pacific Northwest is being measured by Earthscope's Plate Boundary Observatory; they plan to set up another GPS station that can be used to monitor borehole strain meters above the slow earthquake zone. And, Project Neptune at the University of Washington intends (if funded) to place fiber optic cables across the Cascadia zone to use with ocean bottom deformation sensors and seismometers. Lastly, Synthetic Aperture Radar Interferometers (InSAR) are being used to measure millimeter scale differences in crustal movement that may precede earthquakes.

Electromagnetic Methods such as resistivity and low frequency electromagnetic waves are also being tried to help predict earthquakes. For example, 10 days before the Loma Prieta quake there were marked differences in the low frequency spectrum of electromagnetic waves. Electromagnetic methods are being investigated because electromagnetic fields can be altered as the crustal rocks are stressed and strained. Low frequency magnetometers have been installed at many California schools (The Quaketracker Project) in the hopes that readings from these instruments will lead to earthquake predictions.

Dr. Roeloffs closed on a reserved, yet upbeat note. She doesn't think that earthquake prediction is a reality at present, but she is optimistic that we will one day be able to predict earthquakes, saving countless lives.

Websites that Dr. Roeloffs recommended include:

www.iris.edu/seismon/
www.geophys.washington.edu/seismosurfing.html
www.pgc.nrcan.gc.ca/geodyn/geodyn.htm
www.nasa.gov/vision/earth/environment/earthquakes.html



InSAR photo from NASA website

Summer GSOC field trip schedule continues...

The Geological Society of the Oregon Country (GSOC) has already had three field trips this season—on May 22, June 13, and July 24. GSOC will conduct the following other field trips this summer. For all trips, bring food and water, dress appropriately, and wear good walking shoes and boots.

August Field Trip, Saturday, August 21: Geology of the Northern Oregon Coast. Led by Evelyn Pratt, former GSOC president. For more information on meeting place or trip itinerary, contact Evelyn Pratt, 503-299-4306.

Gotta Hava Loupe!!!

As a geology enthusiast, you might be wondering you can get a loupe or hand lens for GSOC field trips or other exploration. Here's the info!!!

A loupe, (otherwise known as pocket magnifier or hand lens), is used by geologists to closely inspect

small but visible objects. Loupes are handy for GSOC'ers to observe rock crystals and other small details when on a GSOC field trip. But before you rush out to get one for this month's exciting field trip on the Clackamas river, do a little research so that you get the right lens for you.

First, you should know that there are three basic lens configurations for the lenses in a loupe. They are:

- A coddington, or single lens, which is more rugged (especially in watery environments), needs to be larger in diameter due to the fact that the edges are visually distorted.
- A doublet, with two lenses separated by an air space, provides less visual distortion (slight distortion at the edges) than the single lens and is usually very reasonable in price.
- The triplet is the highest quality of lens, and thus is the highest in price. A Hastings triplet has three lenses cemented together in an achromatic configuration (all lenses focus on the same point). Triplets also have the least distortion of the image, and are the standard lens used to grade diamonds.

In addition to the lens configuration, each loupe will have a power specification (10X, meaning 10 times larger than "real life", etc.) and a lens size in diameter. In general, the higher the power, the smaller in diameter the lens will be. Also, the higher the power the lens, the less depth of field you will have. For rock crystal viewing, power in the range of 10X to 15X is generally sufficient. Make sure you bring along a sample to inspect if buying your loupe locally.

Last but not least, make sure you purchase or make a lanyard for your lens. My old hand lens is now rusting at the top of Steens Mountain!!! It is so easy to put the lens down and walk away from it – you won't if it's hanging around your neck.

So, where are you going to get that loupe? Some local places that carry a selection are:

- Ed's House of Gems on NE Sandy Blvd.
- Handley Rock and Jewelry Supply on Hwy 99 in Vancouver, WA

Also check out the following web sites for more info about loupes:

http://www.kooters.com/handlens.html
http://www.indigo.com/magnify/geology-lenses.html
http://www.allensinc.com/coins/supplies/magloupe.htm
http://www.kassoy.com/loupes01.htm
http://www.frostproof.com/catalog/m37.html
http://www.frostproof.com/catalog/meas02.html

ANNUAL GSOC PICNIC:

Sunday, 22 August, 10 to 2 PM

Location: Laurelhurst Park (Picnic Site F). The park is in SE Portland between Oak Street (south side) and Ankeny Street (north side) just east of 39th Avenue. Site F is just south of Ankeny; park on the south side of Ankeny close to Laurelhurst Place.

Food: GSOC provides a choice of hamburgers, turkey burgers, veggie burgers, or hot dogs, and the buns and condiments. If your last name begins with an A through L, please bring a salad or side dish, and M through Z, a dessert. Lunch time is at NOON. Please bring your own drinks; beer and wine are permitted at the park.

RSVP: Please call or email Charles Carter (503-469-8353; chcarter39@hevanet.com) to indicate number coming, type of food you are bringing, and type of "entrée" that you would like. Cost: members $2 and guests $3, payable in advance or at park. Please make checks payable to GSOC and mail to Charles Carter, 13875 SW Hart Road, Beaverton, Oregon, 97008.

Facilities: We have Picnic Site F reserved from 8 to 2 PM. The 100-year-old park is in a sylvan urban setting and there are some great trees and even some relief. There are 8 picnic tables (5 in one row and 3 in another) and restrooms.

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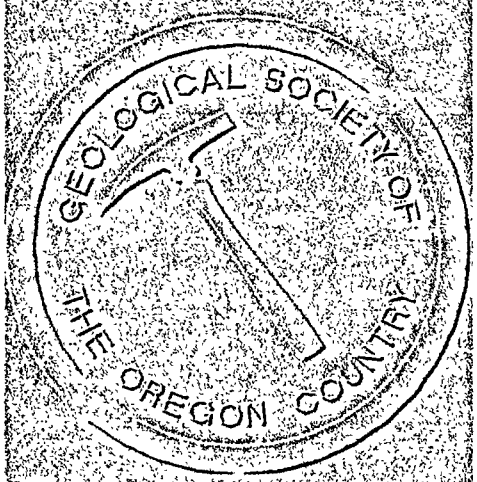

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SEPTEMBER 2004

THE GEOLOGICAL NEWSLETTER

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ANNUAL EVENTS: President's Field Trip—Summer or Fall; Banquet—March; Annual Business Meeting—February.
FIELD TRIPS: About 6 per year. Fees: see field trip announcements on the calendar next page.
GEOLOGY SEMINAR: Usually held on the third Wednesday of some winter months, 8:00 p.m., Rm. S17, Cramer Hall, PSU. See calendar for details
GSOC LIBRARY: Rm. S7, Open 7:30 p.m. prior to meetings.
PROGRAMS: EVENING: Second Friday evening most months, 8:00 p.m., Rm. 371, Cramer Hall, PSU, SW Broadway at SW Mill St., Portland, Oregon. NOON: Usually first Friday monthly except June, July, August, and holidays, usually at noon, Oregon State Office Building, 800 NE Oregon St., Portland, Oregon (near Lloyd Center), Crooked River Suite room 120B. Consult current calendar (next page) or verify by phone: 503/235-5158 or 503/892-6514.
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Calendar Editor, John Teskey, 503-641-7746, Lawlib@Teleport.com

VOL. 70, No. 9
SEPTEMBER, 2004

SEPTEMBER ACTIVITIES.

Friday evening talk, September 10th, 2004, 8:00 p.m. Oregon Fossils and Volcanoes, an Unlikely Association. Presented by Prof. William Orr, University of Oregon, at Room 371, Cramer Hall, Portland State University.

Seminar, Wednesday Evening, September 15, 8:00 p.m.: Glaciers: The Evidence They Leave Behind. Learn the geologic structures geologists look for when trying to determine where glaciers existed during past ice ages. All are welcome! Tara Schoffstall, GSOC Member. Room S17, Cramer Hall, Portland State University.

September Field Trip, Saturday, September 25, 9:00 a.m.: Products of Recent (Holocene) Eruptions of Mount Hood. Led by Ken Cameron, geologist, Oregon Department of Environmental Quality and formerly the USGS, the trip will examine materials produced by Mount Hood eruptions, with such stops as Timberline Lodge, White River, ZigZag River, and along Highway 26. Meet at 9:00 a.m. in the parking lot of the shopping center at the Welches traffic light intersection on Highway 26 on the way to Mount Hood. Cost of the trip is $4 for GSOC members and $5 for nonmembers. If you have any questions, call Beverly Vogt or Richard Bartels, 503-292-6939. Note: This trip was originally scheduled for July 24 but had to be rescheduled.

PLEASE NOTE: PARKING AT PORTLAND STATE UNIVERSITY IS AVAILABLE AFTER 7 P.M. IN THE PARKING STRUCTURE ON BROADWAY DIRECTLY ACROSS FROM CRAMER HALL

PREVIEW OF OCTOBER ACTIVITIES

NO INFORMATION AVAILABLE AT THIS TIME

Calendar items must be received by 15th of preceding month.
Call John Teskey, 503-641-7746 Lawlib@Teleport.com

EDIACARAN PERIOD APPENDED TO TIME SCALE

A new period for the geologic time scale

In March of this year, the International Union of Geological Sciences (IUGS) approved the addition of the Ediacaran Period to the geologic time scale. This newly ratified period directly precedes the Cambrian and is the first addition to the time scale since 1891, when the Carboniferous Period was divided into the Mississippian and Pennsylvanian. The Ediacaran Period is bounded by global ice ages below and the diversification of animal life above. The base of the new period is defined by the texturally and chemically distinctive carbonate layer overlying glaciogenic rocks along Enorama Creek in the Flinders Ranges of South Australia. It is characterized by the unusual, mostly soft-bodied fossils that give it its name. The age of the beginning has yet to be determined precisely, but current ages range from 635.5 ± 1.2 Ma to 599 ± 4 Ma.

The above information was taken from Science, July 30, 2004, v. 305, no. 5684, pp.621-622.

Beverly Vogt

Some Ediacaran websites:
(Editor's note: the Ediacaran is sometimes called the Vendian in some geologic references)

eGeowords georeference site:
http://geowords.com/histbooknetscape/k14.htm

Miller Museum Online Exhibit, Miller Museum of Geology, Queen's University, Kingston, Ontario, Canada
Ediacaran Biota of Canada:
http://geol.queensu.ca/museum/exhibits/ediac/ediac.html

A TRIP TO YELLOWSTONE COUNTRY

a geological travelogue by Carol Hasenberg

While my fellow GSOC'ers were enjoying the hot weather and the GSOC picnic this August, I was traveling with my husband John to Yellowstone National Park. Armed with a bag load of Roadside Geology books and assorted maps, we set off – unfortunately, my rock hammers and loupe were forgotten in the rush pack job. On the way to the park, we followed the northern route, which included a fascinating drive through the Columbia Gorge, just out the back door for GSOC members. We left Interstate 84 near Umatilla, drove through the Wallula Gap (always a thrill for Ice Age Floods buffs!) and across the Palouse country of Washington state through Walla Walla, Dayton, and Pomeroy to Clarkston and Lewiston, Idaho.

From Lewiston, we drove up U.S. 12 along the Clearwater River Canyon. John and I had been through here in 1995 at the end of a trip to Drumheller, Canada, and Glacier National Park. Although I remembered the route as scenic, I didn't remember the details very well – possibly a consequence of "get home-itis". And, the canyon is very beautiful, and also very interesting for the geology buff. The ancestral Clearwater Canyon had been filled by Columbia River basalt during the Miocene and then re-carved by the modern Clearwater River. There are large expanses of canyon walls covered with Columbia River Basalt layers. But the farther one travels up the canyon, the more one sees of diorite outcrops that are about 85 million years in age, according to the Roadside Geology of Idaho. In some areas the diorite has metamorphosed into intensely sheared mylonite at the boundary of the ancient North American Continent.

At the end of this beautiful drive we had dinner in Orofino, and were lucky to find a camping spot (free!) near dark at the Knife Edge campground in the Lochsa Wild and Scenic River area along U.S.

12 in Idaho. We camped right along the babbling river and headed east early the next morning. The road now had turned up the Lochsa river towards Lolo Pass, which is also the route taken by Lewis and Clark. This area is also close to the route taken by the Nez Perce Indians in their 1877 flight from the U.S. Army. So, not only can you see beautiful granite formations of the Bitterroot batholith and breathtaking scenery, but there are also a lot of history exhibits on the way. Across the pass there are very fine outcrops of Lolo batholith granites, which, at 50 million years, are younger than the Idaho batholith.

By the next morning we had arrived in Missoula, Montana. On the hills above Missoula one can still see the lake terrace marks of Lake Missoula, the source of the Ice Age Floods. In Missoula we picked up Interstate 90 heading for Butte, Montana. About half of the way there, we took a little side trip on Montana Highway 1 through Phillipsburg, Flint Creek Hill, and past Georgetown Lake. We had planned to stop in Phillipsburg for lunch, and this turned out to be serendipitous, as this little historic town was having a jazz festival that day. What a great setting for lunch!

After enjoying the festivities for a bit, we headed through the pass on Flint Creek Hill and were awed by spectacular road cuts of Precambrian mudstones as one climbs ever higher. These outcrops looked very similar to the ones you see in Glacier National Park, where you can still see the mud cracks that were formed over a billion years ago in the bedding planes. This had been an important mining region, and you could still see some evidence of a flume or track along the hills above the road through the canyon. The way into Butte passes through the town of Anaconda, where the stack from the old smelter still rises above hills of slag and tailings, a testament to the copper smelting which was done for so many years.

From Butte, we traveled on Interstate 90 to Bozeman, Montana. Soon after leaving Butte we traveled through the Homestake Pass, where granitic rocks are exposed in the most spectacular formations. This was the most impressive geology we observed before arriving in Bozeman, although the wide valleys and beautiful mountains on their borders made for some great vistas along the way. Bozeman is a cute college town, and we enjoyed a bike ride up a ridge trail on the east side of town, where one can get awesome views of the surrounding mountains.

From Bozeman we drove east a bit on Interstate 90, then headed south on U.S. 89 down the Paradise Valley to the north entrance of the park. This valley parallels the enormous Absaroka Range to the east, with several peaks greater than 10,000 feet. The valley contains both rhyolitic and basaltic tertiary volcanic rocks. To the south of the Paradise Valley, the Yellowstone River has cut through Precambrian basement rocks, creating Yankee Jim Canyon, another eye-popping rock spectacular. Soon we arrived at Gardiner, the town on the northern boundary of the park, and also the northern boundary of the hot spring-created travertine deposits spilling out of the Mammoth Hot Springs area of Yellowstone.

We had finally arrived at the park! So we celebrated with a good soak in the Gardner River at the Boiling River Hot Springs, just a little ways inside the park. This relatively unknown feature of Yellowstone Park is one of the few hot springs there that humans can get into and enjoy. I also christened my stay in the park by buying a copy of the Roadside Geology of the Yellowstone Country by William J. Fritz, so I wouldn't miss out on any cool rock features in our Yellowstone travels. Our plan was to stay the first night at Mammoth Hot Springs lodge, then two nights each at Canyon Lodge and Lake Lodge.

We really enjoyed the night at Mammoth, which at the north end of the park is a little off the beaten track. It also contains the fine stone buildings of historic Fort Yellowstone, in a very dramatic setting below the geothermal springs and above the little canyon created by the Gardner River. After the sightseers leave, it is very pleasant to go for an evening walk on the boardwalks surrounding the geothermal features. The pools and vents of Mammoth Hot Springs mostly produce travertine limestone; siliceous sinter is not very abundant here because the water is not hot enough – there is a lot

more sinter at the hotter springs such as in the Norris Geyser Basin. The groundwater at depth near Mammoth is only about 167 degrees Fahrenheit in contrast to Norris, which has groundwater temperatures which far exceed that of boiling water. Be that as it may, the travertine makes for some dramatic formations, similar to those seen in limestone caverns. (see http://www.abdn.ac.uk/rhynie/sinter.htm)

The next day we were hot to see some more geothermal features so we set out for Norris Geyser Basin. A number of outstanding geological features can be seen on the 21-mile drive between Mammoth Hot Springs and Norris. The first was the Hoodoos or Silver Gate, a jumbled mass of gigantic blocks of ancient travertine mixed with welded tuff, which tumbled from the cliffs above. Then one must pass through the rhyolitic welded-ash flows of Golden Gate, a canyon one must climb to leave the Mammoth area.

Once above the canyon, a wide plateau spreads out around the traveler, and one gets the feeling that this plateau is the heart of the Yellowstone Country. Wide meadows, streams, and lakes dot the area, along with rounded hills covered with graying tree snags and new growth beneath, a product of the 1988 fires which affected about half of the forests in the park. The rolling meadows and hummocky terrain at just under 8000 feet in elevation are a product of glaciation. According to the Roadside Geology, about 2200 feet of ice covered this area. The plateau also has abundant wildlife. We saw a grizzly bear and a wolf in the meadows while driving towards Norris.

Several more geological features precede the arrival at Norris. Sheepeater Cliffs contain basalt columns which we did not visit. (Been there, done that!) The meadows overlay a Quaternary basalt flow, possibly explaining the flatness of the terrain. Next comes Obsidian Cliff, right alongside the road. And finally the Roaring Mountain, an immense geothermal slope, is also alongside the road.

Norris Geyser Basin was quite impressive, except for the paucity of restrooms. We walked around this feature snapping zillions of photos of sulphur-lined pools, spewing geysers, ominously moaning steam vents, and burbling pots of goo. We even caught a view of a bull bison across one of the barren, blasted fields. I was reminded of J.R.R. Tolkien's descriptions of the Plains of Gorgoroth in Mordor; except that instead of goblins, hundreds of camera-happy tourists were lurking about.

We drove to the Grand Canyon of the Yellowstone next through a pounding rainstorm only to discover that our room wasn't ready yet, so we joined the line of about 5000 Winnebagoes and other assorted vehicles to motor-tour the canyon sights in the rain. After visiting Inspiration Point I skittered back to the Exploder where I was inspired into taking a short nap. A few minutes later the letup of the rain inspired us to drive around the other side of the canyon and visit some of the lookouts over there. This was an afternoon of rain-soaked tourist mayhem. As soon as we got our cabin we hunkered down to rest and revive our spirits.

The next morning we decided to wipe the slate clean and do a loop hike which included the south rim of the canyon. Parking at the Wapiti trailhead at the bridge crossing the Yellowstone River above the falls, we proceeded along the river's edge. Wow! Each minute the scenery grew more spectacular, and the hoards of tourists mostly stayed near the parking lots. The rhyolite walls of the Grand Canyon of the Yellowstone are mostly buff or yellow, and stained with a multitude of white and red shades from the geothermal activity. Steam vents can be observed in the canyon walls. Knobs of harder mafic minerals form blackish hoodoos along the canyon's walls. Two enormous falls, the Upper Falls and the Lower Falls, lend majesty to the scene.

It might be advantageous at this point to explain to the best of my ability the volcanism one sees in Yellowstone. Although older rocks, even as old as Precambrian in age, exist within the park, the rock exposures in the central part of the park are within the Yellowstone caldera and are quite recent in age. Three large Quaternary rhyolite eruptions have produced the rocks within this area – these occurred at 2 million, 1.3 million, and 600 thousand years ago. The caldera area is also uplifting at a rate of

about 1 inch per year, so it is certain that this is not the end of the Yellowstone volcanism. Eruptions within the caldera have all been rhyolitic in character, although there are some basaltic flows between Mammoth and Norris and in the southwestern corner of the park.

The return trip to the parking area left the edge of the canyon and we assumed we would be hiking back through the woods. However, this walk proved to be unexpectedly delightful. After passing a small lake we walked through several fields of geothermal features, which included the most classic mud pot we had seen so far. Plus, there weren't any rules and few other hikers. This was more like it! Next came another small lake, then we completed the walk by passing through a vast meadow. Down the meadow from us grazed a herd of bison and a bear cavorted. We completed the outing by picnicking at the trailhead where we had to shoo off a couple of bold and scruffy ravens.

During our stay at Canyon, the weather took on a characteristic of raining during the night, sunny to partly cloudy in the morning and intermittent showers in the afternoon and evening. High temperatures did not exceed 65 degrees. One of the canyon employees told me that this year had been very wet in Yellowstone. This weather pattern continued until the end of our stay.

The next day we were to stay at the Lake Lodge cottages on Yellowstone Lake, so we packed up the Exploder and headed to check in to the lodge and then sightsee for a while. The wide meadows just south of Canyon are an excellent place to see wildlife, and we saw several herds of buffalo grazing in the morning sun. About halfway to the lake we stopped at the Mud Volcano and walked around the boardwalk looking at the various mud pots, vents and fumaroles there. Then we were at the lake – it is huge! Also, there weren't big crowds at the Lake Lodge, which was great. We made dinner reservations at the nearby Lake Hotel and headed towards Old Faithful Inn for a day of sightseeing in the geyser basins between Old Faithful and Madison.

Geyser marathon! The next several hours we maxed out on geysers. By the end of the day we didn't care whether we ever saw another geyser. There was Old Faithful and the large geysers in the Upper Geyser Basin. We biked over to Biscuit Basin for some more geysers. There were also some very beautiful pools in this area. Then up to Midway Geyser Basin, which contains the biggest hot spring in North America, the Grand Prismatic Spring/Excelsior Geyser system. It spewed a torrent of hot water into the nearby river. John and I thought it was a shame that there were no soaking areas developed in the park with all these hot springs. Next stop was in the Lower Geyser Basin, where we saw the Great Fountain Geyser on Firehole Lake Drive, my favorite geyser in the whole park. Also the Fountain Paint Pots were here, which we hurriedly toured while ominous looking clouds converged overhead.

A couple of funny things happened on the geyser tour. At Biscuit Basin, we kept seeing geysers going off in the distance, but every time we came up to them they had stopped. Then, at the Great Fountain Geyser, we noticed quite a crowd gathered around looking at the geyser, and someone told us that the geyser would be going off sometime in the next 2 hours. So we waited a little while, until a park official came by to tell everyone that the geyser had gone off earlier that day. Luckily we hadn't waited too long!

The last sightseeing we did that day was to take a side trip on the Firehole Cascades loop just south of Madison Junction, where you could see the caldera walls above the Firehole River. The massive rhyolite in the cliffs has a very twisted grain, with obsidian swirls mixed with the crystalline lava.

The next morning we woke late, and decided to curtail the sightseeing. After a leisurely breakfast at Lake Lodge, we biked over to the Bridge Bay area for information about the lake boat tours. After deciding the tours were probably not worth the effort, and the boat rental prices were stiff, we took the bike path to the park's Natural Bridge (doesn't every park have something like this?). Duly impressed by this natural wonder, we headed back

for lunch at the lodge, just when rain started to shower the lodge. Whew – good timing!

After lolling in the lodge for awhile, we hopped back on the bikes and this time headed over to the Fishing Bridge, about a couple of miles away. It was too funny – one sign said "Fishing Bridge" and one right next to it said "Closed for Fishing". Apparently this is a spawning ground for some of the trout in the Yellowstone River, so fishing here is now out of bounds. We ended the evening by dining at the Yellowstone Lake Hotel, and got ready to head home the next day.

We left Yellowstone early the next morning, so we could make tracks for Craters of the Moon and traverse the Snake River Plain. I chose to route us on Idaho 33 to U.S. 20 across the plain, and we arrived at Craters of the Moon National Monument at about 1:30 MDT. The basaltic lava flows range from 15,000 to 2,100 years old in the park – the basalt lava flows are the last stages of the hot spot eruptions of the Snake River Plain. While at Craters, we hiked to the tree molds area and saw several excellent tree casts in the pahoehoe flows. I would have like to see the Great Rift, but there was quite a hike to this feature. I guess they don't want anyone falling in by accident – it's 800 feet deep in places, I've heard.

Our route across the plain turned out to be a winner – the scenery was great! We skirted the mountains to the north of the plain. For over half of the plain the mountains had steeply dipping layers of Precambrian sediments, as they were part of the overthrust belt of mountains formed when the Idaho batholith pushed them to the east. Along the western edge of the plain, there were some mountains in the Idaho batholith granite – they looked a lot more rounded and symmetrical. Before reaching Mountain Home and Interstate 84, U.S. 20 winds down through canyons of rhyolite ash. All in all, it was a great way to end our geological sightseeing – we headed home through the rain through the Boise area and Oregon on Interstate 84.

For maps of the parks we visited, visit these sites:
http://www.nps.gov/yell/pphtml/maps.html
http://www.nps.gov/crmo/pphtml/maps.html

Summer GSOC field trip schedule continues...

The Geological Society of the Oregon Country (GSOC) has already had three field trips this season—on May 22, June 13, and August 21. GSOC will conduct the following other field trips this summer. For all trips, bring food and water, dress appropriately, and wear good walking shoes and boots.

On September 25, Ken Cameron, geologist with the Oregon Department of Environmental Quality and formerly the USGS, will lead a field trip to examine materials produced by Mount Hood eruptions, with such stops at Timberline Lodge, White River, ZigZag River, and along Highway 26. People interested in attending should meet in the Thriftway shopping center at the Welches, Oregon traffic light intersection on Highway 26 on the way to Mount Hood. Cost of the trip is $4 for GSOC members, and $5 for nonmembers. If you have any questions, call Beverly Vogt or Richard Bartels, 503-292-6939. This trip was originally scheduled for July 24 but had to be rescheduled for this later date.

ROCK SHOW COMING

Clackamette's 40th Annual Gem and Rock show to be held in October

The members of the Clackamette Gem Club announce their 40th Annual Gem and Rock show to be held October 30-31 at the Clackamas County Fairgrounds. The hours of event, which has free admission, are 9 a.m. to 6 p.m. on Saturday, October 30, and 10 a.m. to 5 p.m. on Sunday, October 31. For additional information, contact Earle Stocker, 503-632-6680, or Bea Settle, 503-631-3128. Information is also available these websites: www.clackamettegem.com or show@clackamettegem.com.

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VOL. 70, No. 10
OCTOBER 2004

OCTOBER ACTIVITIES.

Friday evening talk, October 8, 2004, 8:00 p.m., Snapshot Tour of Buried and Submerged Forests of the Pacific Northwest: Time Capsules that Record Paleo-earthquakes, Volcanic Eruptions, and Landslides. Patrick Pringle, Geologist, WA Dept. of Natural Resources, Division of Geology, in Room 371, Cramer Hall, Portland State University.

Seminar, Wednesday Evening, October 20, 8:00 p.m.: Mass Wasting: What Causes Rocks and Soils To Fall? Come learn the many different ways rocks and soils can move, including some that are so subtle you might not even notice it's happening! All are welcome! Tara Schoffstall, GSOC Member. Room S17, Cramer Hall, Portland State University.

PLEASE NOTE: PARKING AT PORTLAND STATE UNIVERSITY IS AVAILABLE AFTER 7 P.M. IN THE PARKING STRUCTURE ON BROADWAY DIRECTLY ACROSS FROM CRAMER HALL

PREVIEW OF NOVEMBER ACTIVITIES

NO INFORMATION AVAILABLE AT THIS TIME

Calendar items must be received by 15th of preceding month.
Call John Teskey, 503-641-7746 Lawlib@Teleport.com

MORE ON THE YELLOWSTONE COUNTRY

Last month's Yellowstone article was assembled in a hurry – my husband John and I arrived home 2 days after the newsletter deadline – so I decided to follow up this month with some definitions, references, and other information you may use in planning for your trip there.

Carol Hasenberg

To begin, here are the definitions of some geological terms which I used in last month's travelogue article about Yellowstone:

geyser – A column of steam or water that periodically shoots out of the ground under pressure from the heating of the water at depth. (Fritz, 1985)

mylonite – A metamorphic rock that was strongly sheared while hot enough to flow, instead of breaking. Faults turn into mylonites as thy penetrate into the deeper levels of the crust. (Alt & Hyndman, 1989)

overthrust belt – A broad zone in which numerous overthrust faults have stacked slabs of rock on each other in an overlapping pattern like that of shingles on a roof. (Alt & Hyndman, 1989)

pahoehoe – Lava that in solidified form is characterized by a smooth, billowy, or ropy surface. (Tilling, Heliker, and Wright, 1987)

sinter – A siliceous mineral deposited around the throat of a geyser or hot spring. The silica was dissolved from silica-rich rocks by the hot water and precipitated out of solution as the water cooled. (Fritz, 1985)

Reference List for definitions:

Alt, David D., and Hyndman, Donald W., 1989, Roadside Geology of Idaho, Mountain Press Publishing Company, Missoula, Montana. (Alt & Hyndman, 1989)

Fritz, William J., 1985, Roadside Geology of the Yellowstone Country, Mountain Press Publishing Company, Missoula, Montana. (Fritz, 1985)

Tilling, Heliker, and Wright, 1987, Eruptions of Hawaiian Volcanoes: Past, Present, and Future: USGS General Interest Publication

More references of interest and information for Yellowstone and Craters of the Moon National Parks:

Alt, David D., and Hyndman, Donald W., 1994, Roadside Geology of Montana, Mountain Press Publishing Company, Missoula, Montana. This was the reference we used to plan our side trips through Montana.

Yellowstone Maps: All visitors entering the park get a road map of the park produced by the National Park Service which includes descriptions of some of the park features. It is also helpful to have a topographic map of the park, and this is a bit more difficult. In the park gift stores, the only available topo maps are some up-to-date, large scale maps of the park quadrants by the National Geographic Society. The down side of using these are that a complete set of maps of the park will run you about $36! We found an excellent topo map of the entire park (1:62,500 scale) on waterproof paper done by the USGS in 1961 in an outfitter store in Gardiner (near Mammoth Hot Springs) for $9. Some of the roads have been changed, but we already had a roadmap, so this worked for us. Anyway, you may want to research ahead if you are planning any major hiking expeditions in the park. We also found a copy of the *Geological Map of Yellowstone National Park* (see reference below), in the

Yellowstone Association store near the Fishing Bridge for $4.95. See reference below for the Association. Trail guides for hiking around the main park features are available at these areas for a 50¢ donation.

Taylor, Robert L., Ashley, Joseph M., and Locke, William W. III, of Montana State University; Hamilton, Wayne L., of Yellowstone National Park, and Erickson, Jay B., of the University of Wyoming, 1989, *Geological Map of Yellowstone National Park*, Department of Earth Sciences, Montana State University, Bozeman, Montana.

Bond, John G., 1978, *Geologic Map of Idaho*, Idaho Bureau of Mines and Geology, Moscow, Idaho, scale 1:500,000 Alt and Hyndman refer to this as "the most essential reference on the geology of Idaho." (Alt & Hyndman, 1989)

Taylor, Robert L., Ashley, Joseph M., Chadwick, Robert A., Custer, Stephen G., Lageson, David R., Locke, William W. III, Mogk, David W., Schmitt, James G., and Erickson, Jay B., *Geological Map of Montana and Yellowstone National Park*, Department of Earth Sciences, Montana State University, Bozeman, Montana. There is no date on my copy of the map.

For on-line maps of the parks, visit these websites:
http://www.nps.gov/yell/pphtml/maps.html
http://www.nps.gov/crmo/pphtml/maps.html

Lodging within Yellowstone National Park can be reserved on-line from the Xanterra website (the NPS lodging vendor). Visit the site at http://www.xanterra.com/. Other park info can be found on the NPS website at http://www.nps.gov/yell/home.htm and the USGS website at many sites in the usgs.gov domain.

If you are interested in combining fun and education at Yellowstone National Park, you may want to contact the non-profit **Yellowstone Association** at www.YellowstoneAssociation.org. They run many adults-only and family programs from April-November that focus on a variety of topics, including geology, wildlife, ecology, orienteering, art, and Native Americans of the area. You can also join the institute for $30 per year and receive information and discounts on the programs, off-season lodging within the park, and educational products.

For Craters of the Moon National Park refer to the NPS and the USGS websites. A first come, first serve type campground is available as the only lodging option within the park. Other lodging is available in Arco, Idaho, 18 miles from the monument. Contact Lost River Visitor Center for more information (208) 527-8977.

For recreational planning information about the Clearwater and Nez Perce National Forests in Idaho, the US Forest Service has an excellent publication, Clearwater Nez Perce Country Travel Planner. You may get more information about this and other items from the Clearwater National Forest headquarters by calling (208) 476-4541.

HOLOCENE COASTAL PROCESSES IN THE COLUMBIA RIVER CELL

Recap of the September 2003, 2-½ day Friends of the Pleistocene. (FOP) field trip, co-led by Frank Reckendorf and Curt Peterson and the August 21, 2004, shortened version of above, led by Evelyn Pratt for GSOC.
by Evelyn Pratt

The Oregon-SW Washington coastline is part of an active continental margin where two tectonic plates, the North American and the Juan de Fuca, are colliding. The shoreline has receded inland or advanced seaward as plate movements buckled up the Pacific Northwest continental margin or lowered it, often by catastrophic earthquakes, and as Pleistocene temperatures dropped and locked up large portions of the planet's water supply in ice or as they rose and melted that ice into the oceans.

Zones where sand transport along the shore is restricted at each end are called littoral cells.

Reckendorf and Peterson use several criteria to divide the Northwest coastline into such cells. These include 1) apparent beach widths, 2) continuous beach segments, 3) distribution of dune fields, 4) estimated heights of marine terraces, and 5) beach-sediment grain size.

Cell lengths can depend on the amount of time being discussed. A small cell might span the distance between two neighboring rip currents operating at the present time and measuring hundreds of meters. Or it could include the distance between major structural features on the continental shelf, tens of kilometers in width and in existence for thousands of years. For moderate time scales such as tens to hundreds of years, transportation of sediment along the shore is restricted mostly by prominent headlands at each end of a particular continuous beach segment. The latter type of cell is what we studied during last September's FOP trip.

The longest littoral cell between British Columbia and northern California is the Columbia River cell. It extends from Tillamook Head on the south to Point Grenville, Washington, on the north, a distance of about 160 km (~100 mi.). Tillamook Head is one of the larger headlands that bound littoral cells. It projects 2.5 km (~1.5 mi.) out to sea. Point Grenville, at 0.6 km (<0.4 mi.), is fairly small, but even a little shoreline projection makes sand accumulate. In the Columbia River littoral cell, the width of an active beach - the distance from the mean low water to vegetation - can vary from zero meters along rocky shorelines to 400 or 500 meters. Average is a bit less than 300 m (990 ft.). (This explains why it often takes a while to walk down to the surf at low tide.)

Most of the sand in the Columbia River cell comes from the Columbia River and its tributaries, which draw from an area about the size of Texas. Sedimentary and coarse-grained metamorphic and plutonic rocks supply sediment to the upper reaches, while basalt, other volcanic, and sedimentary rocks, plus glacial drift, add to the lower river's burden of solids. Other sources are retreating sea cliffs, local streams, and the continental shelf. As sea level rises and falls, material that comes from older deposits and bedrock at one time can be cut off from these sources at another.

Although the 2003 FOP trip looked at both the Washington and Oregon sides of the Columbia River littoral cell, this trip concentrated on headlands, beaches, dunes, the estuary, and the effects of human activity along the Clatsop Plains in Oregon.

COLUMBIA CELL WATERSHED, ESTUARIES, SEDIMENTATION BACKGROUND

Reckendorf & Peterson, 2003 FOP Guidebook
Adapted by Evelyn Pratt

Based on mineralogy, the Columbia River is the dominant supplier of sediment in the Columbia River Cell, bringing down 1 to 3 million cubic meters annually. Although exact figures are hard to pin down, preliminary calculations show total accumulation of sediment on the continental shelf of 27 billion cu. yards (21 billion cu. m.) from Tillamook Head to the Columbia, and 47 billion cu. yds. (36 billion cu. m.) from the Columbia to Willapa Bay, with lesser amounts from there north to Point Grenville. Willapa Bay, Grays Harbor, and the Columbia River Estuary have also been sediment sinks (accumulated sediment).

GEOLOGIC TIME SCALE: 15,000 to 16,000 years ago the Wisconsin ice age held a large portion of the Earth's fresh water in its grip. The Columbia River valley was cut down to 112 meters (~370 ft.) below present sea level some time before that. As post-Wisconsin climate warmed and sea levels rose, until around 11 ka (11,000 years ago), sediment from the Columbia River was carried to the mid-continental shelf and down Astoria Canyon. This huge underwater cleft opens about 10 miles west of the river's mouth and extends to the abyssal plain, over 9000 feet deep. Sediment that is carried through it helps form "the immense sheet-like ...Astoria submarine fan...[which] stretches more than 100 miles across the abyssal plain and covers over 7000 sq. mi." (Orr & Orr in "Geology of the Pacific NW" 1996)).

From 12-11 ka to 5 ka sea level rose sharply. From 11-9.5 ka river sediments were deposited more and more in the Columbia River tidal basin. In all, during the last 16 ka the Columbia River valley has accumulated at least 70 cu km of mostly bed load (sand and gravel). After 9.5 ka the filling of the tidal basin slowed, and the river increasingly served as a source of sand to the coastline. As sea level rose more slowly around 5-4 ka, barrier islands, spits and bars started to accumulate sediment and began accreting seaward at about 0.55 yds (half a meter) per year.
North and South Jetties were built around the turn of the century. Since then the rate at which some Columbia River cell beaches are accreting has increased at least ten times the long-term prehistoric rates. Much of the sediment may be coming from the inner shelf.

SEASONAL TIME SCALES: In summer, gentle southerly currents carry little sediment. Winter conditions result in stronger northerly shelf current and large northerly directed littoral drift. Monthly mean southerly sand transport = about 5-6 million cu m/yr, while monthly mean northerly longshore transport varies from 0.5-45 million cu m/yr., most between Nov. and Feb.

HUMAN MODIFICATIONS: Jetties were built for the benefit of Columbia River shipping. South Jetty was completed in 1889, then extended seaward 4 km (2.5 mi) around 1913. North Jetty was built between 1913 and 1927 to 3.7 km (2.3 mi). This reduced the river mouth width by half a km (0.3 mi).

The Army Corps of Engineers is responsible for keeping ingoing channel depth to 55 ft. and outgoing to 48 ft. Dredgings are currently being spread on Benson Beach at the river mouth below Ft. Canby. There is another depository 6 miles offshore, not used at present, which Dr. Peterson believes is better.

LONG BEACH PENINSULA (WILLAPA BARRIER SPIT): The main trend along the Long Beach Peninsula has been erosional at the south end and accretional at the north end. Benson Beach is receiving the most erosion in Pacific County, along with Leadbetter Point and Bay Center. Long term maximum erosion at Cape Shoalwater and Ft. Canby has varied from 13 m (43 ft.) per year to 45 m (148 ft.) per year. On the other hand, since the jetties were built Long Beach has accreted sand at a rate between 3.2 m/yr (10.5 ft/yr) and 5.5 m/yr (18.0 ft/yr.) In the early 1900's the town of Long Beach built a concrete arch at the edge of the beach. It is now over 1000 ft. east of it.

CLATSOP COUNTY: As sea level rose more slowly around 4-5 ka, the 34 km (21.1 mi.) stretch of beach between Seaside and the Columbia River mouth grew seaward at about ½ meter (1.7 ft.) a year. About 1885, around midpoint in South Jetty construction, sand began to accrete seaward more rapidly. When the 4 km (2.5 mi) jetty extension was finished in 1913, sediment accumulation and seaward beach growth had increased dramatically. Fastest growth occurred between 1885 and 1936, particularly north of the Peter Iredale. From 1885 to 1995, seaward beach growth at the Peter Iredale was 5.8 m (19 feet) per year. Rates decreased southward to 8.5 ft/year at Sunset Beach and 6.6 ft./year at Gearhart. Earlier, enough sand moved south to Seaside to cover cobbles there. Although the Army Corps of Engineers might disagree, it seems obvious that less sand has fed into the Columbia River since dam construction began in the '30's. Deposition at Seaside has been reduced and cobbles are being uncovered.

The most significant erosion in the last 30 years on the Oregon side of the Columbia has been along the river. In the 1970's a parking lot was built at the end of Fisherman's Road. It was rip rapped a couple of times before being given up. From 1995 to 2002, stream bank retreat has averaged 98 ft. per year - 490 feet of shoreline has eroded away since 1995.

El Nino/La Nina events produce a lot of sediment transport, which causes build-up along one part of a sub-cell and erosion in another part. Recent El Nino and La Nina events caused severe erosion of the accreted beach. Significant erosion along Clatsop beach and foredune occurred several times during the '70's, once in the early '80's, and in 1998-9. La Nina of 1998-9 caused an erosion scarp

up to 3 m (9.7 ft.) to form during late winter and early spring. The event took away about 30 meters of shoreline by South Jetty, and was significant as far south as Camp Rilea. Most of the vertical bluff has now been covered with summer sand (9/03), except for remnants north of the Peter Iredale between Parking Lot B and South Jetty. Modifications in the jet stream that spin off cyclonic storms can also cause continuous erosion.

DUNES (see "Dune Ridges of Clatsop County", by Reckendorf, Peterson, & Percy.) Clatsop County's dunes are much bigger than south Washington's. They diminish as we go south. For dunes to form, the shoreline must be stable. The goal is to predict what will happen to foredunes. Australians drop radioactive sand on a beach to trace where it goes!

EARTHQUAKES: GPR readings across the Willapa Barrier Spit (Long Beach Peninsula to most of us) show 8 buried scarps unconnected to dune development, which are interpreted to be earthquake/tsunami scarps. When an earthquake hits the land drops ½ to a couple of meters, then slowly rebounds. The 1964 AK quake rebounded in about 10 years. The rebound can be up to a couple meters a year (!); it will take forests about a hundred years to grow again.

COLUMBIA RIVER VIBRACORE STUDY 7/00
Places: bays, tide flats, shallow shoals in the Columbia River estuary; the shipping channels; lower Columbia River islands.

Objectives: to check changes in various bays; find relative abundance of sand and mud over time; find latest-prehistoric rates of sedimentation; get core samples that record historic, datable time intervals.
Results: Sediment composition in the lower Columbia River valley from late prehistoric to modern times was recorded by more than 30 cores, most with 14C material, so prehistoric sedimentation rates could be established. 10-15 of the core sites showed subsidence events for prehistoric earthquakes. How can you tell when a subsidence earthquake made the land drop? Some signs: buried spruce roots, a layer of sand over organic soil, change from freshwater to brackish water diatoms, scarps.

Lower Columbia River tidal basin deposits are and have been mainly sand. Mud is restricted to deltas at the heads of back bays, wind protected shorelines (Baker Bay) and abandoned channels protected by windward shoals (Cathlamet Bay.) Surface coseismic subsidence features are restricted to back bays and flood plains. 3 or 4 showed up in Clatskanie flood plains east of Skamakawa. At the Skipanon entrance, 3 cm of tsunami sand overlies buried peat (1700 AD). Patchy tsunami sand overlies a second buried peat (1190 AD). At low tide the Lewis River marsh shows evidence of the last two Cascadia earthquake subsidence events. Oregon has good 1190 AD event sites; Washington doesn't.

OCTOBER ROCK SHOW

Clackamette's 40th Annual Gem and Rock show

The members of the Clackamette Gem Club announced their 40th Annual Gem and Rock show to be held October 30-31 at the Clackamas County Fairgrounds. The hours of event, which has free admission, are 9 a.m. to 6 p.m. on Saturday, October 30, and 10 a.m. to 5 p.m. on Sunday, October 31. For additional information, contact Earle Stocker, 503-632-6680, or Bea Settle, 503-631-3128. Information is also available these websites: www.clackamettegem.com or show@clackamettegem.com.

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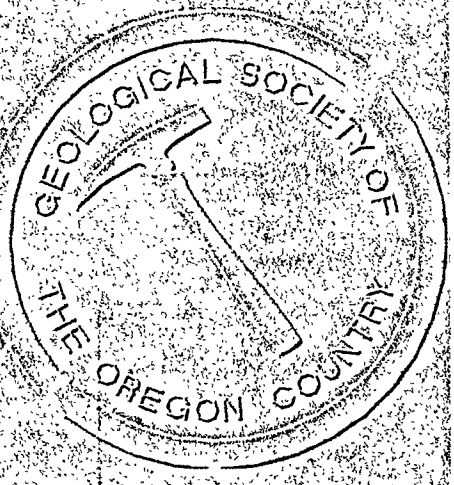

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NOVEMBER 2004

THE GEOLOGICAL NEWSLETTER

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ACTIVITIES:

ANNUAL EVENTS: President's Field Trip—Summer or Fall; Banquet—March; Annual Business Meeting—February.
FIELD TRIPS: About 6 per year. Fees: see field trip announcements on the calendar next page.
GEOLOGY SEMINAR: Usually held on the third Wednesday of some winter months, 8:00 p.m., Rm. S17, Cramer Hall, PSU. See calendar for details
GSOC LIBRARY: Rm. S7, Open 7:30 p.m. prior to meetings.
PROGRAMS: EVENING: Second Friday evening most months, 8:00 p.m., Rm. 371, Cramer Hall, PSU, SW Broadway at SW Mill St., Portland, Oregon. NOON: Usually first Friday monthly except June, July, August, and holidays, usually at noon, Oregon State Office Building, 800 NE Oregon St., Portland, Oregon (near Lloyd Center), Crooked River Suite room 120B. Consult current calendar (next page) or verify by phone: 503/235-5158 or 503/892-6514.
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VOL. 70, No. 11
NOVEMBER 2004

NOVEMBER ACTIVITIES.

Friday evening talk, November 12th, 2004, 8:00 P.M. The Sky is Falling, Northwest Meteorites and the Cascadia Meteorite Laboratory. Presented by Melinda Hutson, Alex Ruzicka, and Dick Pugh, Portland State University, at Room 371, Cramer Hall, PSU. The speakers are looking for old stories and "new" meteorites from the Pacific Northwest; bring your meteorites and meteorite stories!!!

No Wednesday night seminar scheduled for November

PLEASE NOTE: PARKING AT PORTLAND STATE UNIVERSITY IS AVAILABLE AFTER 7 P.M. IN THE PARKING STRUCTURE ON BROADWAY DIRECTLY ACROSS FROM CRAMER HALL

PREVIEW OF DECEMBER ACTIVITIES

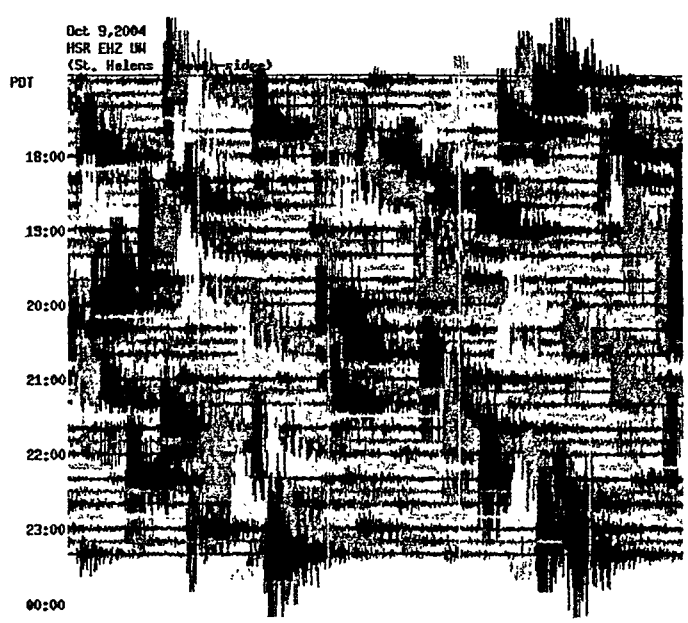
NO INFORMATION AVAILABLE AT THIS TIME

Calendar items must be received by 15th of preceding month.
Call John Teskey, 503-641-7746 Lawlib@Teleport.com

It's Alive!

Earthquakes at Mt. St. Helens on the Pacific NW Seismograph Network at the University of Washington
http://www.pnsn.org/WEBICORDER/GREEN/welcome.html
Cascade Volcanoes Observatory, USGS, Mt. St. Helens page:
http://vulcan.wr.usgs.gov/Volcanoes/MSH/framework.html

USGS



Part of a seismograph from the University of Washington's PNSN site for October 9, 2004.

Recap of the ***Mount Hood Volcanic Hazards*** talk by Ken Cameron, Oregon Department of Environmental Quality, pinch-hitting for Patrick Pringle, WDNR geologist who was monitoring the recent Mt. St. Helens activity and could not make the scheduled Friday meeting. Ken did a marvelous job discussing the volcanic hazards of Mt. Hood, with a bonus talk about the recent activity at Mt. St. Helens as the finale.

There are several ways in which Mt. Hood could threaten populated areas if it erupts. These include

- pyroclastic flows – laterally moving ash clouds lubricated by hot air
- lahars – ash deposits which include melted snow, creating large mudflows in valleys and river channels
- magmatic eruptions – hot lava and ash ejected from the mountain

- acid rain – gases spewing from volcanic vents can mix with water in the air and cause widespread damage from acid rain
- sector collapse – a huge landslide caused by an instability of a large section of the mountain slope

We can determine the approximate magnitudes of the danger from these events by examining the remains of previous volcanic activity at Mt. Hood. For example, deposits from lahars have been found approximately 60 miles in both the southeast and west directions from the Old Maid Flats series of eruptions which ended around 1810. These deposits occur in the White and Sandy Rivers. Lahars can be dangerous for several reasons. They can erode down slope obstructions very fast. They are highly acidic. Ken has first-hand knowledge of this from the lahars of the Mt. St. Helens eruption, which disintegrated his boot seams overnight. And of course the mudflows produced by lahars can inundate areas. The average depth of the mudflows on the Sandy River were about 35 feet. The outlet stores near the Marine Drive exit of Interstate 84 are sited on a mudflow at the mouth of the Sandy River.

Possibly the most catastrophic result of a volcanic eruption has happened previously on Mt. Hood. A huge landslide collapsed a large section of the north slope of the mountain in a previous eruption. Today, the town of Hood River sits on the site of this event.

One can also get a glimpse of possible dangers from looking at results of activity of other volcanoes around the world. Acid rain deforestation is very pronounced east of Kilauea in the Hawaiian islands, for example. And of course the explosive eruption of Mt. St. Helens is clearly etched in the memories of many Oregon residents.

Although it is not possible for scientists to predict, or precisely determine, when the next Mt. Hood eruption will occur, monitoring methods can warn of a possible impending eruption. These methods include:

- monitoring the **temperature** of the mountain
- monitoring the **deformation** or swelling of the mountain
- seismograph records can monitor **earthquakes** and tremors produced by the mountain

Recent Mt. St. Helens Activity

Ken discussed the recent volcanic activity of Mt. St. Helens which started September 23, 2004. By his account, the activity began on this day with two small earthquakes. By Friday afternoon, lots of quakes were occurring – about 6 per minute. By Saturday, the short period weak ground motion station records were saturated. Then, by the beginning of October, steam and pulverized rock erupted from the mountain. The following Monday another eruption occurred. A new bulge of material was spotted, adjacent to the old dome from the 1980's eruptions. This material had punched through the 500-foot deep glacier in the crater bowl surrounding the old dome. At first, the bulge was "phreatic", which means that the material in it was not new magma. However, this began to change just before the October 8 GSOC meeting.

About 36 hours before the meeting, some new earthquake activity, called tremors, began from deep below the mountain. The tremors originated at a depth between 25 and 65 km below the mountain, and differed from the previous earthquakes by having low, steady activity. It was believed that these tremors are caused by the movement of magma in the plumbing of the volcano. And, sure enough, a few days later new magma appeared in the new dome building on the mountain.

Since the siting of the new magma, steady activity has continued at Mt. St. Helens. For updates on the activity, consult the two links listed in the beginning of this article. The latest photos show the volcanic activity in contrast to a new dusting of snow and are quite beautiful.

Although the current activity of Mt. St. Helens has some elements of possible danger, Ken was quick to assure us that scientists monitoring the mountain do not believe that a large eruption such as the one which occurred in May 1980 is imminent.

Carol Hasenberg

BOARD MEETING NOTES

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY
October 16, 2004

The meeting was called to order at the home of Rosemary Kenney, 7000 SW 15th Ave., Portland. Board members present included Clay Kelleher, Charles Carter, Beverly Vogt, Marvel Gillespie, Rosemary Kenney, Tom Gordon, John Teskey, and Richard Meyer.

The budget for next year was discussed. It was noted that our disbursements are greater than our receipts because we have fewer members this year than last year (10 new members and 39 lost members). Marvel will check on the status of the $500 donation we make to the PSU Geology Department each year. Marvel will prepare a 2005 budget for board discussion at the January meeting. At that meeting, the board will also authorize her to make routine payments for the society for the year. Charles Carter will check on the cost and possibility of renting a smaller meeting room at PSU because the rental has gone from $45/night to $60/night. The possibility of meeting for no cost in the Wed. night seminar room was also discussed but rejected at this time because of the small size and layout of the room.

Clay Kelleher and Rosemary Kenney will be the nominating committee for next year and were given the authority to find a nominee for the new vice president and new board member so the nominations can be announced at the November and December meetings and also appear in the December Newsletter.

Beverly Vogt gave the field trip committee report for the year. There were four field trips—one for half a day and the other three for a full day. Leaders were Beverly Vogt, Scott Burns, Evelyn Pratt, and Ken Cameron. There were 91 participants—36 were GSOC members, and 55 were nonmembers. Recommendations were to (1) get a new field trip committee chair next year; (2) have four trips/summer plus something extra such as a president's trip; (3) hire a professional geologist when possible to lead trips and be prepared to pay him/her $100/day; (4) have a GSOC trip assistant handle pre-trip phone calls and handle logistics during the trip such as collecting money, collecting signatures on waivers, keeping track of cars and people, and keeping people safe—all so the leader can focus on leading the trip; and (5) transfer equipment and field trip forms from Beverly's custody to new chair's custody. Off-season suggested field trips are to Eugene to see William Orr"s museum plus the archaeological museum—and another trip to CVO to see how all the equipment works. It was also suggested that one of the trips next year be somehow connected to Mount St. Helens. (Secretary's note: Evelyn Pratt called after the meeting and said she would be willing to lead another coastal field trip next year, and Beverly says that if her health permits, she would do the Gorge trip again next year.)

Tom Gordon reported that the membership committee suggests that its mission be to increase membership and solicit ideas from the current membership about ways to get new members. The board approved the mission. Suggestions made to accomplish this goal were to (1) use email to ask members for ideas, (2) look over old directories to find who did not rejoin and call them to ask why they did not continue, (3) contact new members to welcome them to the society and see what they want from their GSOC experience—and if the organization is meeting their expectations, (4) contact some of the geology teachers in public schools or colleges, and (5) increase visibility of GSOC by getting some publicity in the newspapers or on TV or by getting onto other web sites as a place to contact for geology. A suggestion at the last meeting was to contact organizations and get mentioned in their newsletters. Carol Hasenberg and John Teskey are to be commended for the work they do on the web site, calendar, and newsletter, because that is the main way we make ourselves visible and attract new members.

Getting a roster to members was discussed. Beverly will send out copies of the current roster to board members, Clay will update the roster in a printable form from the database and send it via email to Beverly, and Rosemary will see that a notice is put

into the Newsletter to tell any members who want rosters to contact Beverly and she will sent them by mail. Beverly also sends the roster to new members with the welcoming letter each new member receives. Clay noted that some of the email addresses in the roster are out of date.

Charlie Carter will be the new chair for the banquet committee, and other members are Marvel Gillespie, John Teskey, and Rosemary Kenney. Richard Hill of the Oregonian has been suggested as a guest speaker, and if someone else is the speaker, Hill could be invited as a guest in thanks for what he has done for the society.

Clay will ask people he calls about the possibility of chairing the noon programs. Clay also read a letter from OMSI about the Margaret Steere Endowment Fund at OMSI that has grown to $26, 281.01. Marvel will contact them to check on the $500 donation for this year they mentioned.

Beverly noted that Tom and Diana Gordon are doing a wonderful job in taking care of providing coffee and treats on Friday night—and cleaning up each time. We all thank them for their hard work. It is really appreciated.

Beverly will email minutes and meeting announcements to members who have email and send them by snail mail to non-email board members and committee chairs.

It was suggested that at some time we need to reactivate a phone committee.

The next Board meeting will after the January 15, 2005, Friday night lecture, at Portland State University. Subjects to be discussed will include the 2005 budget, authorization for Marvel to pay bills, and the spring banquet.

Meeting was adjourned.

Beverly Vogt

This url is for the USGS website that lists all the geologic maps for the Portland-Vancouver area. http://wrgis.wr.usgs.gov/wgmt/pacnw/index.html

Beverly Vogt

FIELD GUIDES

If you feel like studying geology at home, or making your own field trip excursions, you can purchase the following GSOC field trip guides from years gone by:

Geologic Trip Log through Eastern Foothills of Oregon Coast Range between Vernonia and Banks, 1964 ..... $0.75
Columbia River Gorge and Grand Canyon of the Deschutes River, 1964 ..... 0.75
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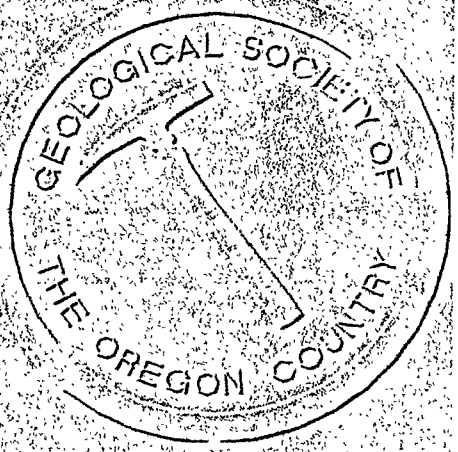
Condon's First Island, Geological Trips in the Siskiyous and along the Rogue River, 1970 ..... 1.25
Field Trips along the Oregon Coast in Lincoln County, 1974 ..... 2.25
Field Guide to Geologic Sites in the Newberry Crater Area, 1976 ..... 2.00
Investigating the Geology of the North Cascades, Washington state, 1977 ..... 2.25
Sawtooth Mountains and the Stanley Basin, Idaho, 1978 ..... 1.75
Lewiston, Idaho, 1984 ..... 3.50
Northern Idaho and Montana, 1988 ..... 6.50
Cascadia Subduction Zone, 1992 ..... 7.00
The Missoula Floods, 2000 ..... 15.00
Roadside Geology of the Eastern Sierrra Region, Bodie, Mono Lake, 2002 ..... 2.25
Field Trip to Southwest Oregon Coast, 2003 ..... 8.00

Contact Rosemary Kenney 503/892-6514.

GEOLOGICAL SOCIETY OF
THE OREGON COUNTRY
P. O. BOX 907
PORTLAND, OR 97207



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GSOC

DECEMBER 2004

THE GEOLOGICAL NEWSLETTER

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

2004-2005 ADMINISTRATION
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Rosemary Kenney – 503/892-6514
Tom Gordon – 360/835-7748

THE GEOLOGICAL NEWSLETTER

Editor:
Carol Hasenberg – 503/282-0547
Calendar:
John Teskey – 503/641-7746

Business Manager:
Rosemary Kenney – 503/892-6514
Assistant Business Manager:
Cecelia Crater – 503/235-5158

ACTIVITIES:

ANNUAL EVENTS: President's Field Trip—Summer or Fall; Banquet—March; Annual Business Meeting—February.
FIELD TRIPS: About 6 per year. Fees: see field trip announcements on the calendar next page.
GEOLOGY SEMINAR: Usually held on the third Wednesday of some winter months, 8:00 p.m., Rm. S17, Cramer Hall, PSU. See calendar for details
GSOC LIBRARY: Rm. S7, Open 7:30 p.m. prior to meetings.
PROGRAMS: EVENING: Second Friday evening most months, 8:00 p.m., Rm. 371, Cramer Hall, PSU, SW Broadway at SW Mill St., Portland, Oregon. NOON: Usually first Friday monthly except June, July, August, and holidays, usually at noon, Oregon State Office Building, 800 NE Oregon St., Portland, Oregon (near Lloyd Center), Crooked River Suite room 120B. Consult current calendar (next page) or verify by phone: 503/235-5158 or 503/892-6514.
MEMBERSHIP: Per year from January 1: Individual--$20.00, Family--$30.00, Junior (under 18)/Student--$10.00.
PUBLICATIONS: THE GEOLOGICAL NEWSLETTER (ISSN 0270 5451), published monthly and mailed to each member. Subscriptions available to libraries and organizations at $15.00 per year. Individual Subscriptions $13.00 per year. Single Copies: $1.00. 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.
WEBSITE: www.gsoc.org. Email address: gsoc@spiritone.com.

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 $20.00 _____ **Family $30.00** _____ **Student $10.00** _____

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

GEOLOGICAL NEWSLETTER

The Geological Society of the Oregon Country
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VISITORS WELCOME AT ALL MEETINGS
INFORMATION: www.gsoc.org
Clay Kelleher, President, 503-775-6263
Calendar Editor, John Teskey, 503-641-7746, Lawlib@Teleport.com

VOL. 70, No. 12
DECEMBER 2004

DECEMBER ACTIVITIES.

Friday evening talk, December 10th, 2004, 8:00 P.M, The Largest Floods Ever Documented in the U.S: Oregon's Contribution. Presented by John Costa, U.S. Geological Survey, at Room 371, Cramer Hall, Portland State University.

No Wednesday night seminar scheduled for December

PLEASE NOTE: PARKING AT PORTLAND STATE UNIVERSITY IS AVAILABLE AFTER 7 P.M. IN THE PARKING STRUCTURE ON BROADWAY DIRECTLY ACROSS FROM CRAMER HALL

PREVIEW OF JANUARY ACTIVITIES

NO INFORMATION AVAILABLE AT THIS TIME

REMINDERS:

ANNUAL DUES ARE PAYABLE STARTING JANUARY 1, 2005

ANNUAL GSOC BANQUET TO BE HELD IN MARCH. MORE INFORMATION TO FOLLOW IN SUBSEQUENT NEWSLETTERS

Calendar items must be received by 15th of preceding month.
Call John Teskey, 503-641-7746 Lawlib@Teleport.com

It's Alive, and It's Growing!

If you haven't yet linked to Mt St. Helens' current activity, check out these websites.

Earthquakes at Mt. St. Helens on the Pacific NW Seismograph Network at the University of Washington
http://www.pnsn.org/WEBICORDER/GREEN/welcome.html
Cascade Volcanoes Observatory, USGS, Mt. St. Helens page:
http://vulcan.wr.usgs.gov/Volcanoes/MSH/framework.html
Current photos of the erupting dome from the CVO (these are outstanding):
http://vulcan.wr.usgs.gov/Volcanoes/MSH/Images/MSH04/framework.html

IN MEMORIAM – HILDA TAYLOR

We have recently heard of the passing of old-time GSOC member Hilda Taylor, who we understand was very active in the club in the 1950's through the 1970's. We would like to extend our deepest sympathies to her family. We are also very grateful that the family is asking for remembrances to the GSOC scholarship fund.

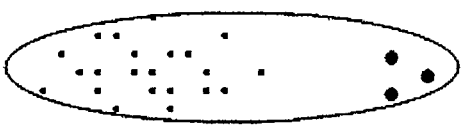

Fig. 1. Typical Meteorite Strewn Field

Bombardment from Outer Space!

Recap of the Friday, November 12, GSOC lecture

Carol Hasenberg

Some of you might not be aware of this, but even as we speak the earth is being bombarded from space. This is not an attack from Mars or other hostile place, but the natural meteoric bombardment of the planet.

We had three excellent and knowledgeable speakers from the Cascadia Meteorite Laboratory (CML - website http://meteorites.pdx.edu/) at Portland State University on Friday, November 12. Alex Ruzicka, Melinda Hutson, Dick Pugh of CML spoke to the GSOC assembly about meteors and meteor falls, meteorites, and their work at CML.

Alex Ruzicka began the talk with some general information about meteorite falls and some historic fall data. When referring to these objects, they are called meteors when they are blazing through the atmosphere and are called meteorites after they fall. Meteorites are usually named from the geographic area where they fall or are discovered. A meteor usually breaks up as it falls through the atmosphere so the name usually refers to a group of meteorites.

A meteorite fall usually follows an elliptical pattern of distribution, with the long axis of the ellipse parallel to the flight path. The largest pieces of the meteor land near the furthest point of the ellipse, since the atmosphere affects their motion the least (see Fig 1.). Freshly fallen meteorites are usually not hot as one would think. They usually can be handled immediately, because only the outer shell of the object gets hot in its passage through the atmosphere.

Meteorite falls with subsequent meteorite recovery are really rare events. Meteorites are usually found on the surface of the earth without the fall having been seen. Also, unless the terrain is very even,

uncluttered, and filled with material vastly different than the meteorites, these pieces are very difficult to find. Oregon is not good meteor hunting terrain because all three of these requirements are violated in much of the state. Also, the rain in Oregon can quickly rust away a meteorite with a high iron content.

Some rare and interesting meteorite falls have occurred where the falls actually have impacted humans or buildings. In a fall in Park Forest, Illinois, in 2003, a 5 lb piece came through a house and a number of other pieces were found. In 1954 a meteorite in Sylacauga, Alabama, struck a woman in the hip as it bounced to a stop in her dwelling.

Meteorites have three basic compositions: stony, stony-iron, and iron. By far the biggest number of meteorites which fall are stony meteorites, or meteorites made of silicate-type compounds, similar to rocks found on the earth. This category of meteorites is very fascinating to study because the specimens give scientists clues to the nature of cosmic geologic processes, and these rocks can also pre-date the formation of our sun. Most stony meteorites are chondrites, which are totally unique cosmic sedimentary rocks.

Iron meteorites usually are what people envision when they think of meteorites. They are heavy, black, and have a characteristic pitted surface obtained from their passage through the atmosphere. When cut, ground and etched, their innards, composed of iron and nickel in different percentages, reveal a pattern of criss-crossing lines that are the planes of the crystal lattices of their structures. The last meteorite type, stony-iron meteorites, has both silicate and iron minerals in its composition.

Dick Pugh then described some local meteorite hunting and meteorite identification rights and wrongs. To illustrate how rare meteorite findings are, Dick told the audience that in the 40 years that he has been studying meteorites in Oregon, he has only heard of 4 having been found. These Oregon meteorites may be viewed on the CML website.

In identifying a possible meteorite find, the meteor-"rights", or traits of true meteors, include the following (taken from Dick's talk and the CML website):

- Because of their high iron content, they are often attracted to a magnet.
- They are covered with a fusion coating from their passage through the atmosphere, and they often have smoothed surface features (but are usually not round in overall shape). There is a distinct line between the fusion surface and the interior, unlike a weathering surface.
- They often have pits, or "thumbprints", in their surface (especially iron meteorites).
- They often appear quite different from other rocks in the area (except, alas, in Oregon with all our basalt).
- They usually are heavy (iron content) and solid, not bubbly like a volcanic rock.

In contrast, here are some meteor – "wrongs", or traits a meteorite does not exhibit:

- Meteorites are not shiny or bubbly like slag (ore processing by-product).
- Meteorites never have rock crystals sticking out on their surfaces.
- Meteorites do not have vesicles, or bubbles.
- One of the most common meteorite identification mistakes is ferrochromanganese, which according to the CML website, is "an artificial alloy...used in the making of steel" (see the CML website for pictures).

Melinda Hutson then took the podium to describe the goals of CML and some projects which the CML personnel are currently doing. The goals of CML are to:

- promote meteorite research
- educate students about meteorites at PSU
- promote public awareness of meteorites
- provide specimen identification
- maintain and increase the PSU meteorite collection

There are now 260 samples in the PSU meteorite collection which are currently undergoing classification. CML research projects include NASA grants for studying silicate inclusions in iron

meteorites and relict olivines in type 3 ordinary chondrites (whatever that means!).

Melinda pointed out that the NASA grants are for cutting edge scientific discovery. Ordinary research to classify meteorite specimens, and public awareness projects such as improvements to the CML website, are funded solely by public donations. (Editor's note: This would make an excellent donation target for GSOC members!)

One last CML activity noted by Melinda is a new Rice Museum exhibit which is showing some excellent CML specimens. For new GSOC members, the Rice Museum of Rocks and Minerals is located off U.S. Highway 26 just west of Hillsboro, Oregon. It is an amazingly good museum. The Rice Museum website is http://www.ricenwmuseum.org/.

Carol Hasenberg

For further reading, check out the following meteor/-ite books and articles:

From the CML website, "A nice summary of meteorites from Oregon, Washington, and two from British Columbia can be found in:
Mustoe, George E. (1999), "Meteorites from the Pacific Northwest", Oregon Geology, Vol. 61, No. 2, March/April 1999."

A former GSOC speaker, O. Richard Norton, has a very fine book on meteors and meteorites, replete with his fine photography and illustrations by his wife Dorothy:
Norton, O. Richard, and illustrations by Norton, Dorothy S., *Rocks from Space: Meteorites and Meteorite Hunters*, Second Edition, Mountain Press Publishing Company, Missoula, Montana, 1998.

Also on the amazon.com website, I found:
Norton, O. Richard, *The Cambridge Encyclopedia of Meteorites*, Cambridge University Press, 2002, hardcover, 374 pages.

This latest O. Richard Norton book gets excellent reviews and there are a number of other meteorite books available, including *Rocks from Space.*

WELCOME

We welcome the following new members to the Geological Society of the Oregon Country

Erika Puris
Sarah Mahler
James Powell

FIELD GUIDES

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Northern Idaho and Montana, 1988 ..... 6.50
The Missoula Floods, 2000 ..... 15.00
Field Trip to Southwest Oregon Coast, 2003 ..... 8.00

Contact Rosemary Kenney 503/892-6514.

GSOC Rosters

GSOC members who wish a copy of the GSOC membership roster should contact Beverly Vogt, GSOC Secretary, phone 503/292-6939.

BANQUET SALES TABLE DONATIONS

Rosemary Kenney will be accepting donations of books and other geology/natural history related items for the sale at the upcoming Annual Banquet. Rosemary asks that you do NOT donate the following:

- NO rocks
- NO textbooks older than 5 years

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

SILLY SCIENCE JOKES

(Editor's note: These jokes are located on at least 1390 websites, I'm not sure who gets the credit at this point!!!)

- Ratio of an igloo's circumference to its diameter? = Eskimo Pi
- 2000 pounds of Chinese soup? = Won ton
- 1 millionth of a mouthwash? =1 microscope
- Time between slipping on a peel and smacking the pavement? = 1 bananosecond
- Weight an evangelist carries with God? = 1 billigram
- Time it takes to sail 220 yards at 1 nautical mile per hour? = Knot furlong
- 16.5 feet in the Twilight Zone? = 1 Rod Serling
- Half of a large intestine? = 1 semicolon
- 1,000,000 aches? = 1 megahurtz
- Basic unit of laryngitis? = 1 hoarsepower
- Shortest distance between two jokes? = A straight line
- 453.6 graham crackers? = 1 pound cake
- 1 million-million microphones? = 1 megaphone
- 1 million bicycles? = 2 megacycles.
- 365.25 days? = 1 unicycle
- 2000 mockingbirds? = 2 kilomockingbirds
- 10 cards? = 1 decacards
- 1 kilogram of falling figs? = 1 Fig Newton
- 1000 milliliters of wet socks? = 1 literhosen..
- 1 millionth of a fish? = 1 microfiche
- 1 trillion pins? = 1 terrapin
- 10 rations? = 1 decoration
- 100 rations? = 1 C-ration
- 2 monograms? = 1 diagram
- 8 nickels? = 2 paradigms
- 2.4 statute miles of intravenous surgical tubing at Yale University Hospital? = 1 I.V. League
- 100 Senators? = Not 1 decision

Nominating Committee Results

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

President ..... Charles Carter
Vice President ..... Bonnie Prange
Secretary ..... Beverly Vogt
Treasurer ..... Marvel Gillespie
Director, 3 years ..... Janet Kaye-Rasmussen
Director, 2 years ..... Kehman Shaw
Director, 1 year ..... Richard Meyer

Nominations will also be open at the December club meeting on Friday, December 10, 2004. Consent of the nominees must be secured prior to their nomination. Nominations will be closed after the December meeting. Final nominations will be published in the January newsletter. The slate of officers will be voted on and approved at the February monthly meeting.

The Nominating Committee members are Rosemary Kenney and Clay Kelleher. Our thanks to the selected members and members of the Nominating Committee!

Don't forget that annual **DUES PAYMENTS** are coming up! Think about all those great member benefits for a mere annual fee of $20 (individual)!!!

PS – If you joined GSOC in September or later, your 2005 dues are paid, good deal!!!