



# THE GEOLOGICAL NEWSLETTER

NEWS OF THE GEOLOGICAL SOCIETY OF  
THE OREGON COUNTRY

January/February 2016  
Volume 82, Number 1

The Geological Society of the Oregon Country  
P.O. Box 907, Portland, OR 97207-0907  
[www.gsoc.org](http://www.gsoc.org)

## Cookie Dough, Jelly Sandwiches, and Structural Geology: A Beginner's Guide

by Carol Hasenberg

Dr. Nancy Price, a recent addition to the faculty at Portland State University and a structural geology specialist, spoke to GSOC about her research in rheology. As she described her work in the course of the lecture, Price looks at metamorphic rock outcrops and samples in order to determine the histories of events which have been recorded in their structure.

*see Jelly Sandwich, Page 4*



## Calendar

### Nicholas Steno Lecture

January 8, 2016

Friday Night Lecture, Kyle Dittmer, GSOC member and faculty member, PCC Southeast Campus and Portland State University, will present "Steno."

*see Steno, Page 2*

### Investigative Geology Lecture

February 12, 2016

Friday Night Lecture, Dr. Ashley Streig, Portland State University Department of Geology, will present "Investigative Geology; Combining Historic and Paleoseismic Data to Characterize Earthquake Hazard."

*see Investigative Geology, Page 2*

### Annual Banquet with Alan Mix

March 13, 2016

81<sup>st</sup> Annual Banquet, Dr. Alan Mix, Oregon State University and co-chief scientist for the international research project on Petermann Glacier in Greenland, will present "[Viewing Climate "Tipping Points" from Petermann Glacier.](#)"



*see Banquet Flyer  
on Page 8*

**GSOC Friday Night Lectures** are held the second Friday evening of most months, 7:30 p.m., Rm. S17, Cramer Hall, PSU, SW Broadway at SW Mill St., Portland, Oregon. Join GSOC members at Pizzicato Pizza, 1708 SW 6th Ave., at 6:00 p.m. before the lectures for an informal dinner and conversation. Check the GSOC website ([www.gsoc.org](http://www.gsoc.org)) for more information and updates to the calendar.

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

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**STENO**

*January 8, 2016, lecture from the Calendar*

Prof. Dittmer will talk about a little known but smart Renaissance Danish scientist named Steno. What were Steno's contributions to Geology? Why is his story unique? Come join us and find out! Prof. Dittmer has taught Earth Science for 25 years. Come hear this interesting thought-provoking science-history talk!

**INVESTIGATIVE GEOLOGY**

*February 12, 2016, lecture from the Calendar*



Dr. Ashley Streig has sixteen years' experience in active tectonics, paleoseismology, structural geology and tectonic geomorphology. Her research experience includes the study of

active faults and folds, earthquakes and associated hazards, earthquake recurrence, fault behavior, and rupture characteristics. Dr. Streig has investigated pre-historic seismic activity of fault systems around the world, including local studies of the San Andreas Fault, CA and crustal faults along the Cascadia Subduction Zone.

**NOMINATING COMMITTEE RESULTS**

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

President .....	Bo Nonn
Vice President.....	Rik Smoody
Secretary.....	Paul Edison-Lahm
Treasurer .....	Dawn Juliano
Director, 3 years .....	Kirben Smoody
Director, 2 years .....	Larry Purchase
Director, 1 year.....	Martha Muncie

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

The Nominating Committee members were Janet Rasmussen, Paul Edison-Lahm and Carol Hasenberg. Our thanks to the selected members and members of the Nominating Committee!

## GSOC Board Meeting Notes

December 5, 2015

President Janet Rasmussen called the meeting to order at the home of Rosemary Kenney. Other board members in attendance constituting quorum were Bo Nonn, Dawn Juliano, Paul Edison-Lahm, Kirben Smoody, Marty Muncie, and Larry Purchase. Also in attendance were Rosemary, Carol Hasenberg, Rik Smoody, and Doug Rasmussen. The minutes of the October 10th, 2015 board meeting were approved.

Treasurer's Report was approved. PSU has acknowledged our scholarship check of \$1,000 which places us in their "Dean's Circle."

### EVENTS

#### Friday night lectures

Upcoming speakers include GSOC member Kyle Dittmer in January and Dr. Ashley Streig in February. Janet is working on setting up a PSU AV Training for January 8th at 6:30 p.m. Marty has Snack Committee volunteers through February and needs more sign ups.

#### Field Trips

Downtown Tour Part 2, North Tour is planned for this Wednesday at 10:00 a.m. GSOC member Eric Wheeler will be a guest field trip guide. Since this is advertised as a GSOC event, our standard waiver form should be signed by participants.

Urban Cave field trip: Bo is still researching this.

Neogene Geology of Eastern Columbia River Gorge. The board enthusiastically approved Dave Olcott's proposed trip for June 11-12th, 2016, noting that this would be a good event to invite PSU student members to.

Carol will be researching a possible Delintment Lake/Solar Eclipse field trip for August 21, 2017.

President's Field Trip: Bo is considering Southwest Oregon for this trip in the first week of September 2016.

#### Community Outreach/PSU: AEG/CORIBA

We are still interested in outreach to AEG and CORIBA. Bo plans to go to an AEG event.

Paul & Eric gave a presentation on Downtown Building Stone to the Architectural Heritage Center on November 10th.

Sheila and Paul are presenting at Woodland charter school next Friday. SW Charter School has invited us to attend their presentation on their project incorporating the Downtown PDX field trip.

Bo responded to an inquiry from a Pennsylvania Cub Scout leader and is creating a set of Oregon geology specimens for them.

#### Holiday Party recap

The board extended its hearty thanks to Carol for hosting last night's very successful holiday party!

#### Annual Banquet

Dawn has reserved the Monarch Hotel for our banquet at noon on March 13th, 2016. We will need both vegan and gluten free options. Board approved buffet style instead of a plated meal. Janet is lining up the speaker. She will also be auctioning off a donated theodolite!

### OLD AND NEW BUSINESS

#### Nomination Committee

We are pleased to have Rik back on board as our VP nominee for 2016. The complete list of nominees is Bo for President, Rik for Vice-president, Dawn for Treasurer, Paul for Secretary, Kirben for 3 year Director, Larry for 2 year Director, and Marty for 1 year Director.

The board considered how to recruit members to groom for potential board service. One idea was that we could use volunteers to assist with donations table at Friday night lectures.



## BOARD MEETING NOTES

*continued from Page 3*

Janet will create an updated version of the 2007 GSOC brochure.

### **Media Committee/Newsletter redesign**

In an effort to distribute skills and responsibilities for our communications, Carol has taking over responsibility for creating the MailChimp e-newsletter. Carol and Paul are redesigning the printed newsletter to handle more images, to be in parallel with our web content, and to continue to provide an archiving function.

GSOC Business Cards: Paul is working on this project.

Next board meeting will be 10:00 a.m., February 13th at Rosemary's.

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

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*Price mentioned that in explaining their structural models to others, it is often expedient for structural geologists to use food analogies.*

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## JELLY SANDWICH

*Synopsis of November 13, 2015 Friday night lecture, continued from page 1*

Dr. Nancy Price, a recent addition to the faculty at Portland State University and a structural geology specialist, spoke to GSOC about her research in rheology. As she described her work in the course of the lecture, Price looks at metamorphic rock outcrops and samples in order to determine the histories of events which have been recorded in their structure.

Price's discussion of her work focused on two characteristics that develop in rocks subjected to stress produced by Earth's tectonic forces - fabric and folding. A body of rock develops a fabric when the rock crystals begin to realign themselves so as to minimize internal stress. In the examples shown in the lecture fabric could be discerned as a pattern in the rock perpendicular to the direction of highest stress. Platy minerals such as mica tend to form very noticeable fabric. The fabric is clear at microscopic levels by looking at the crystals in thin sections. Also, fabric development is influenced by the type of stress field exerted by the tectonic forces. Rock subjected to a compressive event develops a straight grained fabric whereas fabric developed in a shear stress event, where rocks are trying to slide past one another, develops a fabric with a wavy texture.

Folding is a more macroscopic response of the rock to the stress field. In folded rock planes become curved or squished in response to the force direction. This occurs due to overall deformation of the rock mass in response to the stress. Price showed the audience some simple diagrams of rock folded about a plane of maximum compressive stress.

Price's work involves using these principals to infer events which have created rock outcrops under observation. In the real world, several factors can complicate the observed structure of the rocks and these complexities must be explained by the theorized model of events. First of all, rock bodies usually contain more than one type of mineral, and the mineral mix may be differentiated in be under tremendous pressure and/or temperatures and some parts of the rock body may melt while others remain solid, so the responses may vary within the rock mass. Also, the response of the rock to the stress field occurs

over a period of time, and it takes time for the fabric and folding to distinctly record an event. On top of all this, there may be more than one event recorded by the rock structure.

Price mentioned that in explaining their structural models to others, it is often expedient for structural geologists to use food analogies. Two examples she mentioned were cookie dough and jelly sandwiches. Food models help to demonstrate the complex responses of non-homogeneous systems.

The first example of her work that Price described is an outcrop in Carson Nation Forest in northern New Mexico. A massive and cross bedded billion year old quartzite in the Ortega Formation overlies an ancient arc volcanic and sedimentary sequence. Some manganese and hematite rich bands interlace the quartzite at the cross bed boundaries. The folding record in the rock indicates two different compressive folding events with two different angles of orientation, but the visible fabric follows a pattern that seems to lie at an angle between the two. What has happened to this rock? The answer lies in observing the fabric of the rock more closely at an enlarged scale. In the enlargement one can see solid chunks of quartzite surrounded by crisscrossing veins aligning with both of the folding event directions. What this shows is that the rock is recording the process of moving from one orientation to the other. The solid blocks of quartzite are in the process of rotating into the new orientation. To the naked eye the two directions merge into one, misleading the casual observation of the fabric.

The next example Price referred to as the “Jelly Sandwich”. This rock outcrop contains hard amphibole chunks in a schist matrix. The amphibole pieces have been flattened in two different directions (boudinages) while the schist matrix indicates slippage on a plane. So the amphibole looks like it has deformed in compression events, while the schist appears to have sheared. At the microscale the schist clearly indicates that it has done some melting and thus has little resistance to shear stress, but that has not occurred in the amphibole. This example shows the response of two very different materials in the rock to the same event, just as the jelly sandwich responds to squishing by sliding in the jelly and flattening in the bread.



*The “Jelly Sandwich” example*

### ADDITIONAL READING

**Haakon Fossen's Structural Geology textbook** covers structural geology and does a good job of taking rheology into account.

The picture-rich, relatively accessible rock texture specific text is **A Practical Guide to Rock Microstructure** by Ron Vernon

For the more technical treatment of thin section analysis (for the strong of heart): **Cees Passchier's Microtectonics**

### WELCOME NEW MEMBERS!

Mark Foster  
 Phil Hallenborg  
 Eneida Hallenborg  
 Jack Arendt  
 Penelope Collins  
 Andy Hall  
 Jaime Fantauzzi  
 Wes Mahan  
 Terry & Trudi Hewett  
 David Mitchell & Judith Bradley  
 Julian Gray  
 Michael A. Christenson  
 Christopher Brickert

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Volume 81, 2015

compiled by Carol Hasenberg

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The Geological Society of the Oregon Country (GSOC) is a non-profit organization based in Portland, Oregon. The society is dedicated to the study of geology in the Pacific northwest and is open to persons with all levels of education and professional backgrounds. GSOC was formed in 1935.

In addition to Friday Night Lectures, GSOC offers field trips. Schedules vary year to year for the field trips. You must be a GSOC member or guest of a member to attend most GSOC field trips.

Schedules for all GSOC events are available on the GSOC website, [www.gsoc.org](http://www.gsoc.org). Online payment is also available for most activities and membership.

GSOC also maintains a library at Rm. 69, Cramer Hall, Portland State University. Open 7:00 p.m. prior to meetings.

**THE GEOLOGICAL NEWSLETTER** (ISSN 0270 5451) is published bimonthly and mailed to members only at their request. Subscriptions are available to libraries and organizations only at \$20.00 per year. Single Copies are available at \$2.00 each. Order from:

Geological Society of the Oregon Country  
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**APPLICATION FOR MEMBERSHIP**

**THE GEOLOGICAL SOCIETY OF THE OREGON COUNTRY**

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

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

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

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

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

Please indicate Membership type and include check for appropriate amount:

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

Make Check Payable to: The Geological Society of the Oregon Country  
 PO Box 907

# GSOC Eighty-first Annual Banquet

Sunday, March 13, 2016

The Geological Society of the Oregon Country invites you to its 81st Annual Banquet. Speaker Dr. Alan Mix, Oregon State University and co-chief scientist for the international research project on Petermann Glacier in Greenland, will present “Viewing Climate “Tipping Points” from Petermann Glacier.”

Location of the banquet will be at the Monarch Hotel, 12566 SE 93rd Ave., Clackamas, Oregon near I-205 and Clackamas Town Center. There is ample free parking, and the MAX Green Line stop at Clackamas Town Center is about 3 blocks from the hotel, walking south on the I-205 multi-use path. Doors to the banquet room open at 11:00 a.m. Lunch at 12:00 p.m. Program and speaker will begin at 1:15 p.m.

Menu is the Mt. Hood Buffet:

- *Mixed Greens with Balsamic Vinaigrette, Bleu Cheese and Candied Walnuts*
- *Fresh Fruit Tray*
- *London Broil with Pinot Noir Demi-Glace*
- *Petite Filet of Salmon*
- *Baby Red Potatoes*
- *Fresh Seasonal Vegetables*
- *Rolls with Butter*
- *Dessert*
- *Choice of Coffee, Tea, Ice Tea, or Decaffeinated Coffee*



Please contact Dawn if you have special dietary requirements. (503) 367-7708.

## GSOC 81st ANNUAL BANQUET RESERVATION FORM – clip at line and mail.

\_\_\_\_\_ Number of tickets at \$26.00 each (includes gratuity).

Names of persons attending:

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\_\_\_\_\_ Amount enclosed. *Reservations must be received by Friday, March 4, 2016.*

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





# THE GEOLOGICAL NEWSLETTER

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

## Founding Father of Geology: Steno

by Kyle Dittmer

On January 8, over 70 GSOCers gathered in Cramer Hall 53 to hear a science-history talk given by GSOC member and Portland Community College professor Kyle Dittmer, which revealed new findings on how the field of geology got established.

*see Steno, Page 15*

## Paleoseismicity Research: From Trench to Earthquake Hazard Map

by Carol Hasenberg

Dr. Ashley Streig, Assistant Professor in the Geology Department of Portland State University and NSF Postdoctoral Research Fellow, gave a talk to GSOC on February 12 about her paleoseismology research on the San Andreas Fault in California.

*see Paleoseismicity, Page 12*

## Calendar

### Friday Night Lecture

April 8, 2016, Cramer Hall, Portland  
State University

There will be a GSOC Friday Night Lecture in April. Topic and speaker TBA.

### Annual Banquet with Alan Mix

March 13, 2016, 12:00 pm -4:00 pm,  
Monarch Hotel, Clackamas

81<sup>st</sup> Annual Banquet, Dr. Alan Mix, Oregon State University and co-chief scientist for the international research project on Petermann Glacier in Greenland, will present "Viewing Climate "Tipping Points" from Petermann Glacier."

*see Banquet Flyer  
online and the January/February edition  
of The Geological Newsletter*



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

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Public Outreach Coordinator Sheila Alfsen –  
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**IN MEMORIAM**

*John Whitmer, GSOC longtime member*

**Reprinted by permission from Northwest Geological Society. Dr. Whitmer was a long time GSOC member and avid amateur geologist, remembered for his field trips and his beautiful reports and guidebooks.**

Our colleague, friend, and former NWGS President Dr. John Whitmer passed away on January 13 at the age of 92. He was born in Spokane, Wash., where he spent much of his youth, but he graduated from Billings High School, Montana, in 1941. It was during his freshman year of high school in Spokane before moving to Montana that a teacher there inspired what would be a lifelong passion for geology. John went on to attend college at Montana State College in Bozeman, where he majored in electrical engineering, but this was disrupted by World War II. He ended up in Oregon and in 1946 was accepted into the University of Oregon Medical School.



*Photo from the 2002 Memorial Day GSOC trip to Wenatchee, led by John Whitmer. Articles about the trip can be read in the July and August 2002 editions of the Geological Newsletter.*

**WELCOME NEW MEMBERS!**

Rex Breunsbach  
 Alice Brocoum  
 Jaclyn Phillips  
 Connie Reightler  
 Patricia Reed  
 William Auel

Ryan Westling  
 Ann Goetcheus  
 April Avery  
 Susan Anderson  
 Diana and Fred Bradshaw

## GSOC Board Meeting Notes

February 13th, 2016

President Janet Rasmussen called the meeting to order at the home of Rosemary Kenney. Other board members in attendance constituting quorum were Bo Nonn, Dawn Juliano, Paul Edison-Lahm, Kirben Smoody, Marty Muncie, and Larry Purchase, Sheila Alfsen, John Piccininni. Also in attendance were Rosemary, Rik Smoody, Jane Walcott, Dave Olcott, Julia Lanning, and Doug Rasmussen. The minutes of the December 5th, 2015 board meeting were approved.

Oops, the board forgot to hold the election of officers at the February meeting! They have decided to hold the election at the annual banquet.

The Treasurer's report was approved. Contributions are coming in at the club's Friday night meetings. Thank you members!

### EVENTS

#### Friday night lectures

Rik is taking recommendations for upcoming speakers.

Snack committee: Marty needs volunteers, no cooking required.

Janet reports that the audio visual training at PSU was very helpful and notes that the AV department is open until 7:00 p.m. and phone number is posted if we need help on Friday nights. Janet is now trained to run the equipment.

#### Field Trips

Downtown Tour North Tour (Paul) went well with about a dozen people showing up in the middle of December. We will want to offer another full sized multi-guide Downtown trip for the summer.

Urban Cave: (Bo) 16 people came, including several GSOCers, for this Mazama hike.

#### Field Trips, cont.

Eastern Gorge Trip, June 11-12<sup>th</sup>: Dave Olcott reports that planning is moving along. He has commitments from geologists Steve Reidel, Terry Tolan and Jim Anderson; and has reserved two vans reserved to accommodate about 24 people. Trip signup will begin at the banquet.

President's Trip to SW Oregon: (Bo) this post-labor day September trip will include the Oregon Caves and the Josephine Ophiolite. Bo is making connections with geologists in SW Oregon and welcomes suggestions.

Eclipse Aug. 21st, 2017 field trip: Rik will research possible locations including Delintment Lake and Mitchell, Oregon.

GSOC Iceland trip: Sheila and Jane will research.

#### Community Outreach/PSU: AEG/CORIBA

Sheila has been responding to numerous school requests. She will be presenting with Bill Orr at Pacific NW College of Art. Kirben reports that AEG may be scheduling a field trip to Bull Run and may invite GSOC members.

#### Annual Banquet

Planning for this event is coming along; speaker and food are planned. Janet needs volunteers after board meeting for folding and taping place cards.

#### Annual Picnic

Dawn and Larry will research Tualatin area sites.

### OLD AND NEW BUSINESS

Storage of DOGAMI materials: Larry will hand out some Oregon Geology magazines at banquet. Rosemary has donated two books for auction.

## BOARD MEETING NOTES

*continued from Page 11*

### Media Committee/Newsletter redesign (Carol/Paul)

Carol has done a great job with the newsletter design which now captures our web content including images and also provides us with pdf archives. Paul reports that the media survey was not needed because Wes Mahan has stepped up and volunteered as Media Assistant to assist with our Meetup site.

GSOC Brochure: Janet circulated draft of the brochure to general approval. Only change is to the dues notice will now read "Dues paid after *November* will count for the following year." Printing options were discussed.

GSOC Business Cards: the board approved Paul's rough draft of the business card. He will send out a final draft for review and then print 500 business cards.

Board/Officer Recruitment. Ideas for volunteer opportunities to develop future GSOC leadership are needed. The brochure does mention that there are opportunities for leadership.

New Member Outreach: Janet will continue as New Member Outreach Coordinator when her term as President expires.

Dave Olcott notes that people are having problem hearing at lectures. Rik will insure that speaker has laser pointer. Janet will bring the microphone.

Next board meeting at Rosemary's at 10:00 a.m., April 9<sup>th</sup>.

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

## PALEOSEISMICITY

*Synopsis of January Friday night lecture, continued from page 9*

Streig began by describing the seismicity of the United States looking at a USGS earthquake probability map (ie., acceleration contours with a 2% chance of exceedance in 50 years). These maps are updated by the USGS every few years, and are used to develop seismic resistant design regulations and other earthquake mitigation efforts. Looking at the map, Streig compared the seismicity of Oregon to that of California, where California has a bit higher shaking hazard. She described the data needed to generate such a map as a preface to describing her research on the San Andreas Fault.

In generating the earthquake probability map, seismologists consider the earthquakes that are generated on faults that can affect the map area. Data needed to analyze shaking hazard associated with the faults are the average earthquake displacement along the fault, the rupture length, the timing of earthquakes on the fault and the style of deformation associated with the earthquakes. The magnitude of individual quakes can be determined from the first two of these data. Paleoseismicity, the study of the geologic record of past earthquakes, combined with historic earthquake records give seismologists this data so they can determine the earthquake shaking hazard.

Streig also mentioned paleoseismicity research efforts done in Oregon to determine the seismicity of the Cascadia Subduction Zone with which the audience may have been familiar. She discussed the research on turbidite deposits that has been conducted by Dr. Chris Goldfinger of Oregon State University. Using underwater coring techniques, Goldfinger obtained a stratigraphic record of all the turbidite (ie., underwater landslide) deposits in the underwater canyons of the Oregon coast, and by dating and correlating the deposit records, assembled a comprehensive record of large subduction zone earthquakes on the Oregon coast during the last several thousand years. Other types of paleoseismic records along the Cascadia Subduction Zone that have been researched include fossil remains from ghost forests and salt marsh subsidence.

Getting back to her research on the San Andreas fault, which is exposed on dry land, Streig discussed her use of



trenching equipment to expose fault rupture zones in stream valleys along the fault zone. Low lying land accumulates sediment which can be cross-sectioned by trenching and its geologic history interpreted. A number of possible cross section scenarios were presented in a diagram and discussed by Streig. An ideal cross section shows a fault which has offset stratigraphy delineated by a clean fault line which is somewhat rounded at the top of the fault scarp which was exposed and eroded immediately after the quake. A colluvial wedge of material eroded from the material above the scarp will further emphasize the depiction of the effect of a single quake.

Several conditions can complicate the picture for the interpretation, such as the occurrence of liquefaction in wet, loose alluvial soils during the quake. Liquefied sediment will appear folded and wavy in the cross section, and sand volcanoes can be seen cutting through the liquefied sediment to a patch of sand on the historic surface at the time of the quake. The San Andreas is a strike/slip fault, and fault displacement will have a significant horizontal component. The rupture from an earthquake may be just be a crack which fills with colluvium in this case.

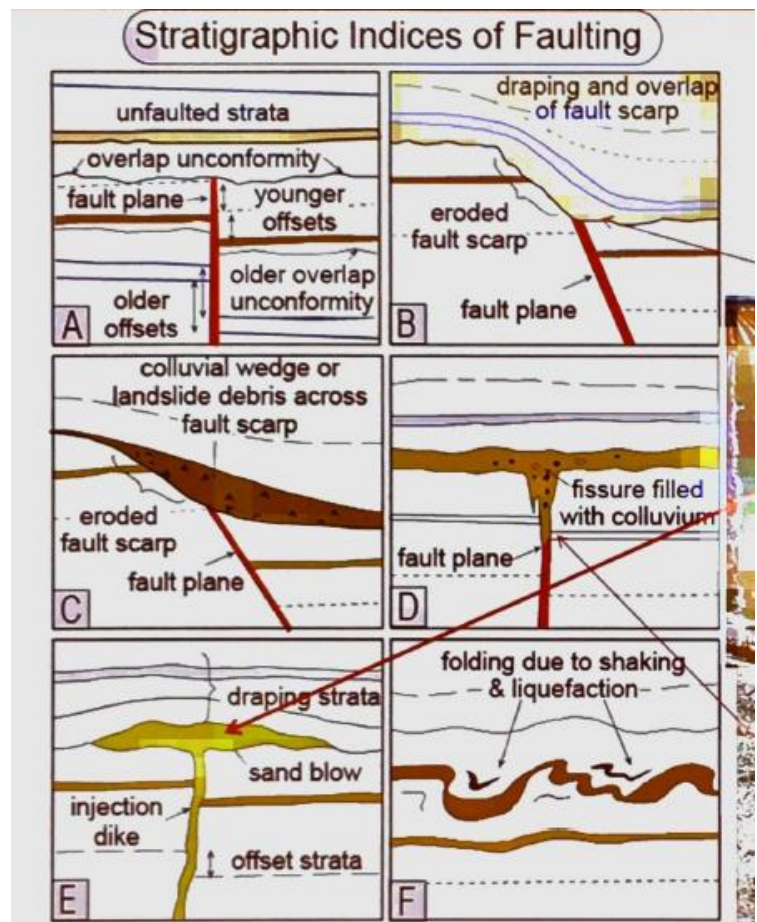
Streig's research in the Hazel Dell site in the Santa Cruz Mountains was interpreted as showing the results of 3 significant earthquakes happening since the land was settled and logged by the first Spanish settlers. The settlement strata were identified by the presence of logged stumps which the researchers were able to carbon date as having lived into the late 1700's. She was able to use the stratigraphic and historic records to date the earthquakes as having occurred in 1838, 1890, and the 1906 San Francisco quake. Correlation with other sites gave a rupture length of about 100km for the 1838 quake, 25km for the 1890 quake, and 470km for the 1906 quake. Streig compared this to the previously accepted seismicity model for the region of one event similar to the 1906 quake occurring approximately every 200 years. Clearly at least 2 modes of strain relief behavior is occurring on this section of the San Andreas fault.

Streig described some further research she has

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*Streig's research in the Hazel Dell site in the Santa Cruz Mountains was interpreted as showing the results of 3 significant earthquakes happening since the land was settled and logged by the first Spanish settlers.*

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done on the southern San Andreas fault near Frazier Mountain. She had a broad site which was bracketed by two parallel fault expressions, called a releasing stepover by seismologists. In this large site they used a cone penetrometer to determine the stratigraphy over the bulk of the site. Infill stratigraphy from 3 earthquakes were determined from the testing. The most recent earthquake (1857) with 5 m of slip shows 1 meter of sag across the stepover. Older earthquakes had nearly equal dimensions to this one. Streig's conclusion was that either the earthquakes were similar in size or some other physical constraints in the site can only accommodate a specific amount of slip.

Streig then described some recent work she has done on the Meers Fault in Oklahoma. This fault is 35 km long and generates earthquakes up to M6.5. This may not seem to be impressive when compared to the large fault zones in the far west, but earthquake waves transmitting through the continental craton of the Midwest and East travel much farther in distance because of the more solid base rock. Also, wastewater is being injected underground in the area and some of these injection wells are near the end of the fault zone. It is feared that the wells may increase the slip on the fault and up the potential magnitude to M7.2.

The siting of the Meers Fault test trench was accomplished with the help of LIDAR imagery which can show the fault characteristics in great detail, and has been a great tool for seismologists since the 1980's. The results from the trench shows at least 2 earthquakes have occurred in last 2900 yrs.

Streig's work is an important part of the research being done to educate scientists, engineers, legislators and citizens of the potential hazards of earthquakes. Through her work and the work of similar researchers hazards can be quantified and plans can be made to keep our dwellings and lifelines resistant to damage.

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*The siting of the Meers Fault test trench was accomplished with the help of LIDAR imagery which can show the fault characteristics in great detail, and has been a great tool for seismologists since the 1980's.*

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## Founding Father of Geology: Nicolas Steno

*Friday night lecture synopsis, January 2016, continued  
from page 9*

Kyle asked, "How many of you have heard of Steno?" About 25% said yes (and this compares to 10% for a Danish audience).

Niels Steensen (later Latinized to Nicolas **Steno**) was born in Copenhagen, Denmark. He lived only 48 years (1638-1686). At age 19 he pursued medical studies at the University of Copenhagen. Steno's careers were first Scientist, then Priest (that order was unusual back then).

Partly because of the Sweden-Denmark War of the 1640s, Steno sought to broaden his academic pursuits by traveling through Europe – spending time as a visiting scientist in France, Holland, Germany, and Italy. It was in Italy, benefiting from the post-Renaissance support of the arts and science and local peers, that Steno came up with his science discoveries.

During 1666 to 1675, Steno did studies in Medicine (Anatomy, Physiology), Paleontology, Historical Geology, Stratigraphy, and Crystallography. Steno had great powers of observation. It was his early medical studies that provided the unexpected jump into Paleontology. In 1666, a group of fisherman in Italy brought Steno a large dead shark. He examined the teeth then compared with fossilized shark teeth in the nearby rocks. He concluded that fossils were former living creatures preserved in rock (and not some "mystical thing" that appeared in the rocks).

Steno's fame came after he published his geologic/paleo work in 1669: *De solido intra solidum naturaliter contento dissertationis prodromus* (The Prodrumus of Nicolaus Steno's Dissertation Concerning a Solid Body Enclosed by Process of Nature Within a Solid), which laid the foundation for Historical Geology as we know it today! In this book came the Five Principles of Stratigraphy that Steno is best known for: (1) Law of Superposition – oldest strata at the bottom, youngest at the top. "...at the time when any given stratum was being formed, all the matter resting upon it was fluid, and, therefore, at the time when the lower stratum was being formed, none of the upper strata existed." (2) Principal of Original Horizontality – a




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*Steno's geologic/paleo work in 1669 laid the foundation for Historical Geology as we know it today...In this book came the Five Principles of Stratigraphy that Steno is best known for...*

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rock layer was originally flat. "Strata either perpendicular to the horizon or inclined to the horizon were at one time parallel to the horizon." (3) Principal of Cross-Cutting Relationship – the “chicken or egg?” dilemma. (4) Principal of Lateral Continuity – a stratum will thin-out and end. (5) Law of Faunal Succession – the record of various creatures spanning over time. Some historical reconstruction examples of Steno’s Laws were walked through with our GSOC audience. On top of all his work, Steno even started the science of Crystallography, as he invented its First Law: the angles between the crystal faces of a given species are constant, whatever the lateral extension of these faces and the origin of the crystal, and are characteristic of that species.

Steno’s last years were intriguing with his turn to theology. He converted to Catholicism in 1667. In 1670, he traveled to Hungary, Austria, and then Amsterdam, Holland. Steno accepted a job as Professor of Anatomy, University of Copenhagen. In 1675, his religious studies led to ordination as a Priest, and then he became the Vicar for the Nordic Missions, Hanover. In 1680, he became the Bishop of Münster. Steno died while doing ministry work for the poor in Germany.

Steno is on track to becoming a Saint within the Catholic Church. He has passed three of the four tests. If Steno becomes a Saint, then he would be the first Geologist in history to do so!

Steno’s legacy has grown in recent times. In 1960, Steno made the front cover of the magazine *GeoTimes*. In 1962, the mineral Stenonite was named in his honor. In 1964, the *Istituto Niels Stensen* was founded in Florence, Italy. In 1950, the *Niels Steensens Gymnasium* (equivalent to a college-prep high school) was founded in Copenhagen. In 1991, the *Steno Diabetes Center*, in Gentofte, Denmark, was founded as a research/teaching hospital. In 1994, the *Steno Museum* in Aarhus, Denmark opened with displays of science, medicine, and a planetarium. A 2012 Google “doodle” went live to commemorate Steno’s Birthday. Most importantly, Steno’s Laws are a standard part of all Historical Geology courses, which are required for any geology degree.

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*Steno is on track to becoming a Saint within the Catholic Church...he would be the first Geologist in history to do so!*

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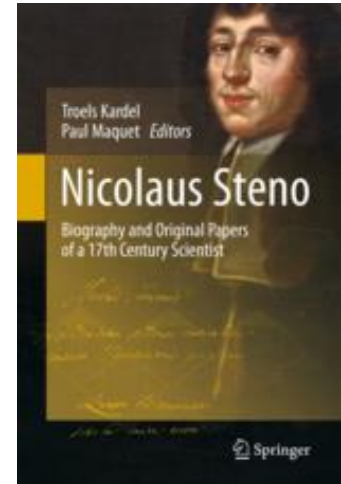
A new 2013 release of Steno's biography and his original papers is offered by [Springer Publishing](#). Steno's work and biography has only been translated from Danish to English in the last 30 years. Kyle is reading the book.

A resurgent interest in Steno is growing in Denmark, now that the Danes have discovered a long lost cultural/scientific hero. In fact, a new [TV movie](#) about the life-and-times about Steno came out in 2015.

In conclusion, Kyle argued that Steno is the true "founding father" of geology and not James Hutton and Charles Lyell (1800s) who are normally credited with that title. Kyle mentioned that Hutton and Lyell did build upon Steno's work but Steno has never been given proper credit.

After his engaging lecture, Kyle took questions from the audience. GSOC Past President Rik Smoody joked, "What do you call the guy that wrote the book on Steno?"

(PS – a Stenographer!)



*Nicolaus Steno: Biography and Original Papers of a 17th Century Scientist*  
Editors: **Kardel, Troels, Maquet, Paul**  
"By far the most exhaustive biography of Niels Stensen "Nicolaus Steno", anatomist, geologist and bishop"





# THE GEOLOGICAL NEWSLETTER

NEWS OF THE GEOLOGICAL SOCIETY OF  
THE OREGON COUNTRY

May/June 2016  
Volume 82, Number 3

The Geological Society of the Oregon Country  
P.O. Box 907, Portland, OR 97207-0907  
[www.gsoc.org](http://www.gsoc.org)

## Are We There Yet? Teams Led By OSU Scientist Seek To Discover Answers On Climate Change At Petermann Glacier In Greenland

by Carol Hasenberg

Dr. Alan Mix, Professor of Oceanography in the divisions of Ocean Ecology and Biogeochemistry and of Geology and Geophysics in the College of Earth, Ocean, and Atmospheric Sciences at Oregon State University and Chief Scientist of the Petermann Glacier 2015 research expedition, spoke at the GSOC 81<sup>st</sup> Annual Banquet about the research he led at Petermann Glacier in Greenland. His talk stressed the value of the research in helping to further our understanding of climate change and drive the political policies needed to help us face the changes.

Photo of Oden by Laurence Dyke,  
[www.LaurenceDyke.com](http://www.LaurenceDyke.com).

see Petermann, Page 22



**GSOC Friday Night Lectures** are held the second Friday evening of most months, 7:30 p.m., Rm. 53, Cramer Hall, PSU, SW Broadway at SW Mill St., Portland, Oregon. Join GSOC members at Pizzicato Pizza, 1708 SW 6th Ave., at 6:00 p.m. before the lectures for an informal dinner and conversation. Check the GSOC website ([www.gsoc.org](http://www.gsoc.org)) for more information and updates to the calendar.

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

## Calendar

### Friday Night Lecture

May 13, 2016, Cramer Hall, Portland  
State University

Dr. William Orr, University of Oregon, will  
present "Lagerstätten!"

see Lagerstätten, pg 20

### Friday Night Lecture

June 10, 2016, has been cancelled in  
favor of the June 11-12 GSOC field trip

There will be a GSOC Friday Night Lecture on  
July 8. Topic and speaker TBA.

### GSOC Field Trip

New Light on the Neogene Geology of  
the Eastern Columbia River Gorge Area,  
June 11-12, 2016

This field trip, organized by GSOC member  
Dave Olcott, will focus on the tectonic,  
volcanic and stratigraphic history of The  
Dalles Basin, the Klickitat Canyon, and the  
Simcoe Back Arc Volcanic Field. Due to the  
nature of its organization, this trip was  
announced early and participants  
preregistered in April 2016. Final payments  
of participants are due on May 16, 2016.

see GSOC website, [www.gsoc.org](http://www.gsoc.org), for  
more information

### Downtown PDX Geology Tour

Jun 25, 2016, 10:00am – 12:30pm,  
Pioneer Place Mall Fountain, 700 SW 5th  
Ave, Portland

GSOC presents "Ancient Walls" walking tour  
of our city's buildings. Open to public,  
children under 12 must be supervised. Fee  
\$10.

see GSOC website, [www.gsoc.org](http://www.gsoc.org), for  
more information

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**LAGERSTÄTTEN**

*May 13, 2016, lecture from the GSOC Calendar*

A Lagerstätte (German from Lager 'storage, lair', Stätte 'place'; plural Lagerstätten) is a sedimentary deposit that exhibits extraordinary fossils with exceptional preservation—sometimes including preserved soft tissues. These formations may have resulted from carcass burial in an anoxic environment with minimal bacteria, thus delaying decomposition.



*Photo of Ottoia, a soft-bodied worm, from the Burgess Shale by Martin R. Smith - Smith MR, Harvey THP, Butterfield NJ (2015) Data from: The macro- and microfossil record of the middle Cambrian priapulid Ottoia. Dryad Digital Repository. <http://dx.doi.org/10.5061/dryad.km109>, CC0, <https://commons.wikimedia.org/w/index.php?curid=40128882>*

**WELCOME NEW MEMBERS!**

Gregory Martin  
 Frances Hicks  
 Kent & Gail Waggoner  
 Lois Stow

Elizabeth Richards  
 Karla Roady  
 Jeremiah Faught



*Photo of GSOC Past Presidents at 81<sup>st</sup> Annual GSOC Banquet. From left to right, Richard Bartels, Beverly Vogt, Larry Purchase, Evelyn Pratt, Jane Walpole, Carol Hasenberg, Rik Smoody, Sheila Alfsen, Clay Kelleher, Janet Rasmussen*



## GSOC Board Meeting Notes

April 9, 2016

President Bo Nonn called the meeting to order at the home of Rosemary Kenney. Other board members in attendance constituting quorum were Rik Smoody, Dawn Juliano, Paul Edison-Lahm, Kirben Smoody, Marty Muncie, and Larry Purchase, Janet Rasmussen, and Sheila Alfsen. Also in attendance were Rosemary, Carol Hasenberg, Dave Olcott, and Doug Rasmussen. The minutes of the February 13th, 2016 board meeting were approved.

The Treasurer's report was approved.

### EVENTS

#### Friday night lectures

Rik has scheduled Dr. Bill Orr in May to talk about lagerstätten and has a potential speaker lined up for June as well. Dave notes that many people are still having a hard time hearing the speaker and he will research the feasibility and cost of obtaining a better portable audio speaker system.

The board discussed plans for having a welcoming system for our new Meetup participants. Janet will make up a sign with the Meetup logo. Larry, Wes, Janet, Paul, Julia will act as ambassadors for these first-timers.

Snack committee (Marty): people have been signing up; however we need a volunteer for July.

Because of the Columbia River Gorge field trip in June, the June 10th Friday Lecture and June 11th Board Meeting are moved to July 8th and 9th respectively.

#### Field Trips

Downtown Tour: Oregon Field Guide will be taping one of our tours in early May and taping another in-depth tour with Bill Orr. Paul is open to having multiple tours a year, but capping them at a smaller number. Larry, Sheila have volunteered to assist. The next downtown tour will be on June 25th.

#### Field Trips, cont.

Eastern Gorge Trip, June 11-12<sup>th</sup>: Dave Olcott reports that planning is proceeding. The trip registration form will be put online. However payment will be by check only, not online.

President's Trip to SW Oregon: Bo Nonn reports that planning is proceeding for the trip to start on a weekday after Labor Day and end on the following Sunday (September 6-11). High and low activity segments of the trip will be planned.

Eclipse Aug. 21st, 2017 field trip: Rik will be going on a scouting trip for places to view the eclipse and also researching places to stay.

Johnson Creek/Crystal Springs: Bo, Sheila, Paul will be meeting to plan this (possibly bicycle) tour, perhaps for next year.

GSOC Iceland trip: Sheila and Dave are researching this in the long term as a possible future trip.

#### Community Outreach/PSU: AEG/CORIBA

Sheila's presentation with Bill Orr at Pacific NW College of Art went well. Kirben will be keeping us informed about possible AEG field trip.

#### Annual Banquet

In recapping the banquet the board felt that people were happy with the food and parking at the Monarch hotel.

#### Annual Picnic

Dawn and Larry will continue researching sites.

### OLD AND NEW BUSINESS

Election results from the vote take at the March 13th banquet were read into the record:

Bo Nonn – President; Rik Smoody – Vice-President; Dawn Juliano – Treasurer; Paul Edison-Lahm – Secretary; Marty Muncie – Director Year 1; Larry Purchase – Director Year 2; Kirben Smoody – Director Year 3

## BOARD MEETING NOTES

*continued from Page 21*

Storage of DOGAMI materials: Larry will continue to distribute at meetings.

GSOC Brochure (Janet): brochure draft is done and will be printed soon.

GSOC Business Cards (Paul): cards are printed and Paul has more if anyone needs them.

Bylaws Committee: Our current practices have been getting increasingly out of step with our bylaws. Janet and Paul will review the bylaws for recommendations as to possible changes to either conform our practices and procedures, or make amendments to the bylaws. For members interested in learning more about board governance issues, Paul recommends workshops by Non-profit Association of Oregon.

Next board meeting will be at Rosemary's at 10:00 a.m., July 9th.

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

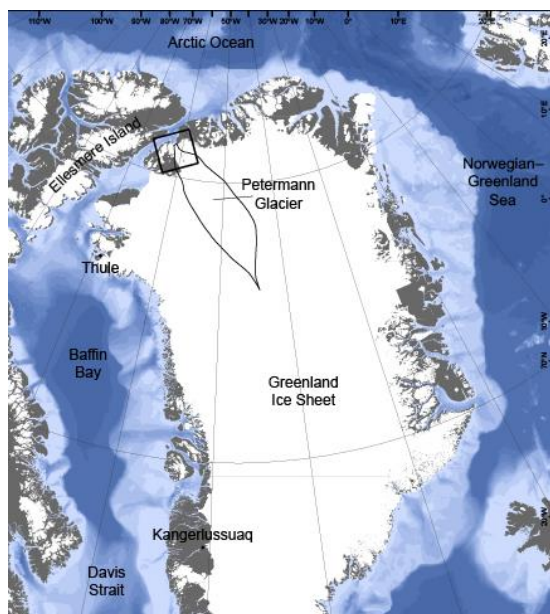
## PETERMANN

*Synopsis of talk from GSOC 81<sup>st</sup> Annual Banquet, continued from page 19*

As it becomes more certain that global, human activity-generated climate change is a reality, US policy makers and their counterparts in other parts of the world have been working to get information about anticipated changes in the climate. How much of a change are we talking about, in terms of surface, atmospheric, and oceanic warming, melting of polar ice caps, sea level changes, ocean current changes, and other effects? How fast are these changes anticipated, and what effects can be prevented by government policies? What should our policies be over the next several decades to best prepare our countries for the effects of climate change?

All big questions, and questions that are not easy to answer. With the development of computers, climate simulation and prediction models have been developed over the last several decades. These models have gradually increased in complexity, always straining at the limits of computational power. In his talk Alan Mix showed a number of slides of the results of climate models to date. These model results can be reviewed by the readers in the Intergovernmental Panel on Climate Change (IPCC) 5th Assessment Report (2014). The IPCC, established by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) in 1988, is the leading international body for the assessment of climate change.

The climate simulation model results shown in the IPCC report show a high confidence of accuracy for global climate effects from about 1900 to the present. Many complex environmental interactions are simulated in these models. Over the past couple decades the models have shown significant improvement in their accuracy modeling known climate parameters from the past century, although some minor climate deviations have yet to be simulated. Ultimately the models must be accurate enough to be used for climate prediction and policy decision making. So far climate prediction models have been made for near future trends, and most do not show predictions beyond the year 2100. In order to calibrate long term climatic prediction models, the scientific community is turning to paleoclimatic data to help them simulate long term climatic trends. The project at Petermann



Glacier was funded by the National Science Foundation and the Swedish Polar Research Secretariat in order to gather paleoclimatic data from a crucially important part of the world, the Greenland Ice Sheet.

In his discussion of the importance of the Greenland Ice Sheet, Mix stressed two results of melting the sheet that could significantly affect climate and human habitation of the planet:

the rise in mean sea level, and the effect of so much fresh water being introduced into the North Atlantic and its effect on oceanic circulation currents. The Greenland Ice Sheet is the smallest of the three polar ice sheets (the other two are West and East Antarctica) and the first to possibly melt.

Currently the Greenland Ice Sheet is exhibiting a net mass loss, mainly due to the draining of ice through outlet glaciers such as Petermann. Policy strategy must be based upon whether or not it is too late to stop the melting of the Greenland Ice Cap. Mix displayed model result graphs from the IPCC report which showed that we are approaching the zone where the melting is inevitable, without signs of world carbon dioxide production slowing. One positive factor in the melting of the Greenland Ice Sheet is that it seems to be occurring more slowly than originally thought; current research points to the melting occurring over a period of about one thousand years, rather than in the current century.

Mix also explained that current climate models predict that the effects of the greenhouse gas infusion will ramp up more slowly than originally thought and there still is time to reduce the effects by reducing our carbon footprint; however, it will take millennia for carbon dioxide to return to preindustrial levels and humanity will be living with its effects for a long, long time. For example, Mix stated that predictions of sea level rise in the next 100 years are not as dramatic as atmospheric changes because of the length of time it takes to melt the ice. It appears that we can limit the sea level rise to 10 to 20

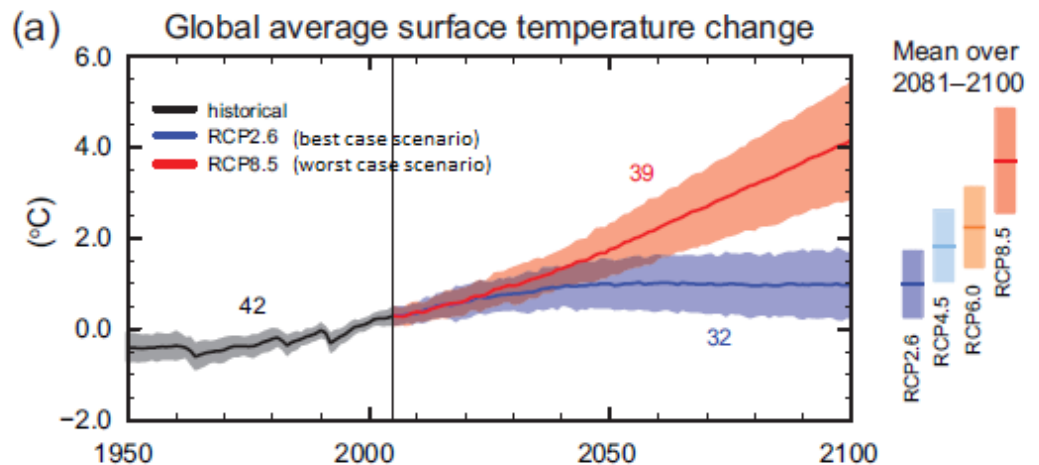


Figure SPM.7a Multi-model simulated time series from 1950 to 2100 for change in global annual mean surface temperature relative to 1986–2005, adapted from IPCC, 2013: Summary for Policymakers. In: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

meters in 1000 years if good policies are in place, otherwise the future change will be greater than sea walls can solve.

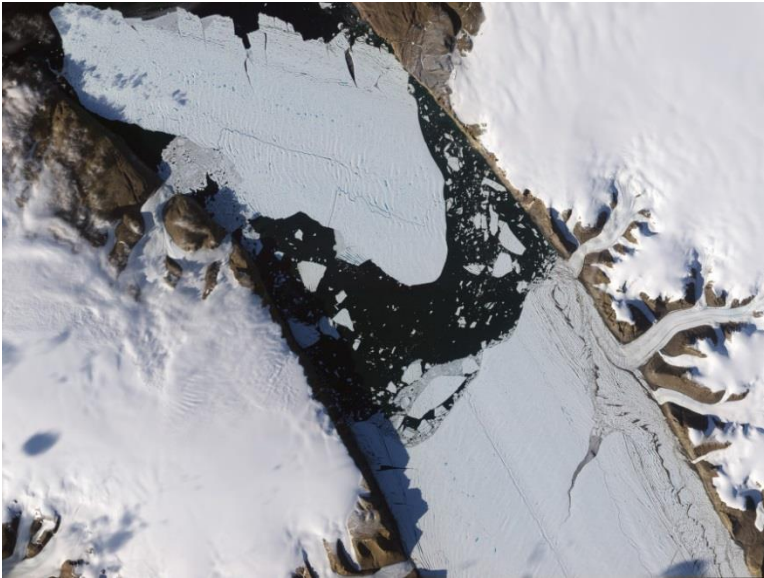
Petermann Glacier is one of the largest outlet glaciers draining ice from the Greenland Ice Sheet, and it is situated on the northwest side of the subcontinent. It lies along the Nares Strait, which runs between Greenland and Ellesmere Island. Petermann Fjord which contains the glacier is very deep, and the seaward section of the glacier is floating on water in the

fjord. This floating ice shelf helps buttress the ice sheet behind it. As they were writing the proposal for the 2015 expedition to Petermann, the ice shelf experienced two major calving episodes, one in 2010 and another in 2012. Petermann Glacier is one of the most difficult places on earth to access.

The research team that participated in the Petermann 2015 expedition was comprised of about 80 individuals, with Oregon State University and Stockholm University heavily represented. Oregon State University has become one of the world's top research facilities for marine science and climate change.

Other members of the expedition included a smattering of other American and Swedish academic researchers, members of the British Antarctic Survey and other technical experts needed for the project's particulars. The expedition sailed on the Swedish icebreaker Oden from the port of Thule, Greenland, and the time frame for the expedition was one month, August 2015, after about a decade of planning.

The goals of the Petermann 2015 Expedition were to collect paleo data on the extent of the glacier at particular times in the past, sample the current conditions of the water in the fjord and adjacent Nares Strait, and to make detailed bathymetry maps for future expeditions. Upon arrival in the fjord the ocean mapping team of the expedition used echo sounding equipment to prepare the bathymetry maps as the Oden moved up and down in parallel tracks in the fjord "mowing the lawn". Or as near as they could get to such an ideal in the windy, ice strewn environment. After this important task the other exploration teams got up and running to collect the data.



*Photo by NASA of the 2010 calving event at Petermann Glacier.*



Some of the teams worked away from the ship. The ice drilling team worked at several points on the ice shelf, and at the point where the glacier became the ice shelf, called the grounding point. They used hot water to drill through the ice shelf, which was 200-300 meters thick. They sampled the water below the ice shelf and also drilled core samples of the fjord bottom below the ice shelf. The water below the ice shelf was warmer than expected and teeming with life. It became clear that the ocean is melting the glacier and not the atmosphere.

Another team went on land to look for clues of the retreat of the glaciers. They found fossil clam shells to radiocarbon date, and also chipped samples from glacially-deposited erratic boulders in order to determine their concentration of the nuclide beryllium-10, which decreases the longer the sample is exposed to the bombardment of cosmic radiation. They also noted physical features such as stream terracing to make a complete picture as they could of the positions and times of the glacial retreat.

Several teams worked aboard the Oden collecting data and samples. A seismic reflection team used high frequency sound emitters and a battery of receivers to make a profile of the earth's crust below the fjord in order to analyze the stratigraphy below the water. Core samples were collected, especially at points in the past where the ice shelf had been grounded, which could be determined by studying the bathymetry maps generated by the expedition. Many samples were taken in different locations of the water in the fjord and Nares Strait so that ocean currents in the area could be better understood.

After an extremely busy month, the expedition took its leave of the fjord and headed back to Thule. Mix expressed a hope for the expedition to return to Petermann next year. He thought that it also might be possible to bring guests in future trips which might help to get the word out on what the group is trying to accomplish. This past year a filming team from 60 Minutes went to Petermann for 2 days at a cost of about \$250,000. The reader is encouraged to read the [Petermann's Glacial History website](#) for more details.



*Boulder team sampling its wares.  
From "Boulder Sampling Alongside Petermann  
Glacier; camping logistics and lateral moraines,"  
article posted on Petermann's Glacial History  
website by Elizabeth Ceperley and Melissa  
Reusche of University of Wisconsin, Madison.*





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The Geological Society of the Oregon Country  
P.O. Box 907, Portland, OR 97207-0907  
[www.gsoc.org](http://www.gsoc.org)

## Lagerstätten!

by Carol Hasenberg

Dr. William Orr, curator of the University of Oregon Condon Fossil Collection and frequent GSOC speaker, entertained and amused the GSOC crowd on Friday, May 13. He also provided an informative lecture about the prima donnas of the fossil world, those that come from lagerstätten. Lagerstätten is a German word meaning “storage places”.

*see Lagerstätten, Page 30*

*Unidentified bird species from the Fossil Butte Member in southwestern Wyoming (Green River Shale), USA, Field Museum of Natural History, Chicago, Illinois, by Matt Mechtley from Tempe, Arizona.*



**GSOC Friday Night Lectures** are held the second Friday evening of most months, 7:30 p.m., Rm. 53, Cramer Hall, PSU, SW Broadway at SW Mill St., Portland, Oregon. Join GSOC members at Pizzicato Pizza, 1708 SW 6th Ave., at 6:00 p.m. before the lectures for an informal dinner and conversation. Check the GSOC website ([www.gsoc.org](http://www.gsoc.org)) for more information and updates to the calendar.

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

## Calendar

### Friday Night Lecture

July 8, 2016, Cramer Hall, Portland State University

GSOC Past President Sheila Alfson, MAT, GIT, professional consultant and local college instructor and research assistant, will present “Salvage Paleontology-Fossil Rescue at Construction Sites.”

*see Fossil Rescue, pg 28*

### Friday Night Lecture

October 14, 2016

There will not be a GSOC Friday Night Lecture in August or September. Topic and speaker for October TBA.

### GSOC Annual Picnic

August 14, 2016, 11:00am – 3:00pm,  
Tualatin Community Park., 8515 SW  
Tualatin Rd, Tualatin, OR

GSOC Annual Picnic is open to all GSOC members and their guests. There will be an optional hike at 10 am and a lecture in the nearby Tualatin Public Library, 18878 SW Martinazzi Ave, Tualatin, OR, at 1:15 pm.

*see GSOC Annual Picnic, pg 29, and GSOC website, [www.gsoc.org](http://www.gsoc.org), for more information and updates*

### GSOC President’s Field Trip

Oregon Coast to Oregon Caves and  
More, September 6-11, 2016

This field trip, organized by GSOC President Bo Nonn, will focus on the geology of the Oregon coast and the Oregon caves.

*see PFT, page 33, and GSOC website, [www.gsoc.org](http://www.gsoc.org), for more information and updates*



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**Fossil  
 Rescue**

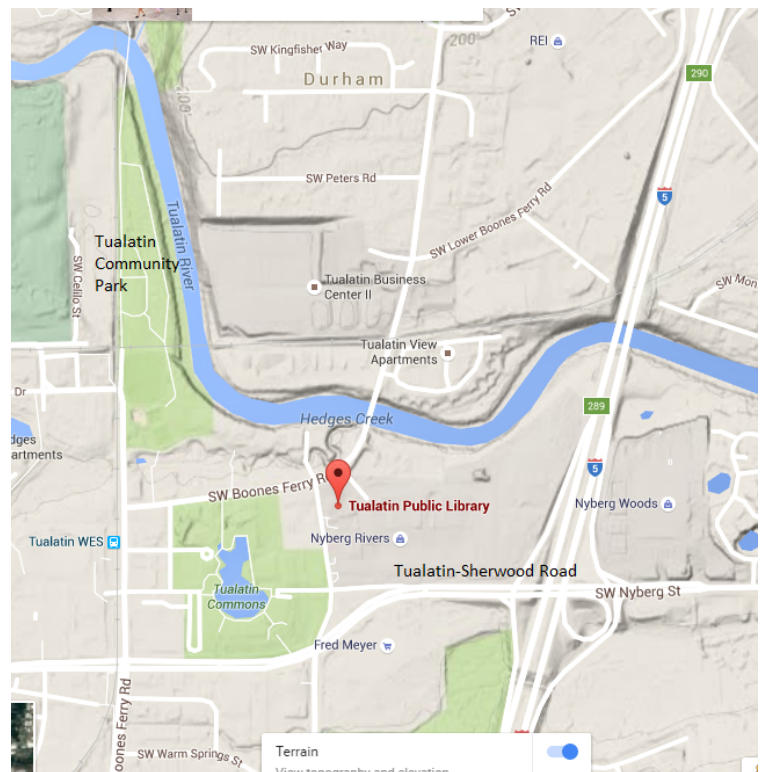
*July 8, 2016,  
 lecture from  
 the GSOC  
 Calendar*

Fossils are protected resources at ground-disturbing construction sites on public lands in the United States. A matrix of federal, state, and county laws require the retrieval of fossil objects that might be used for display,



research or teaching. Sheila Alfson will speak on her experience in the geology industry, working in the states of the western United States. Lucinda Bidleman Susan Cole  
 GSOC Past President Sheila Alfson currently teaches at Chemeketa and Linn-Benton Community Colleges and Portland State University. This has extensive experience in teaching and is involved in a wide range of geologic-related projects.

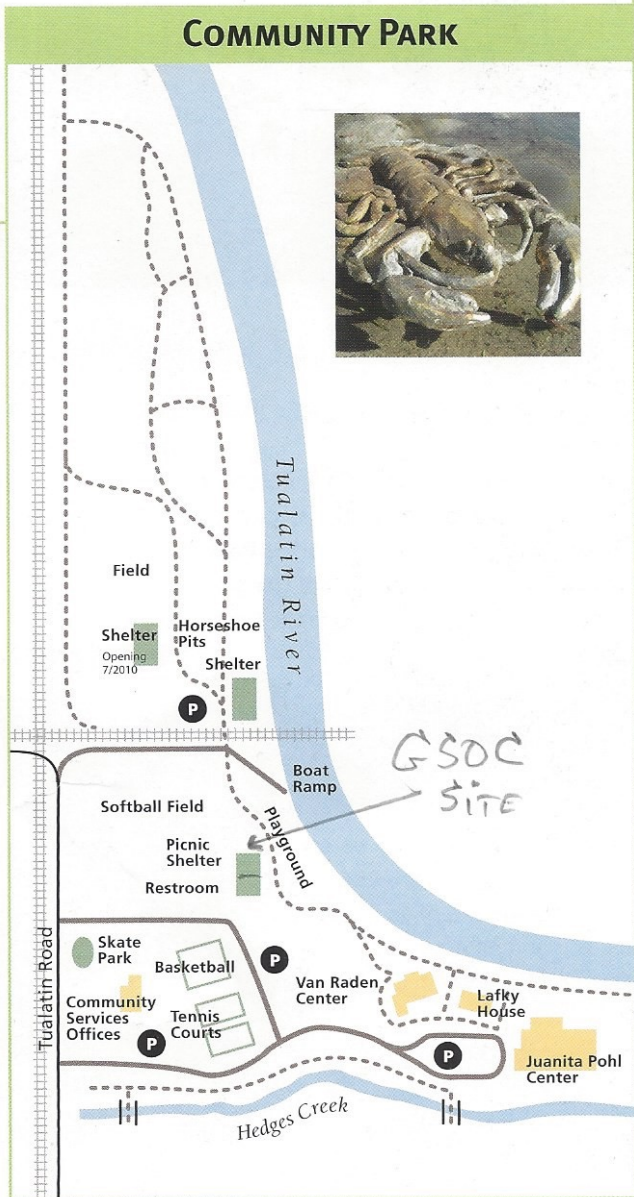
*Vicinity map for GSOC picnic.*





# GSOC Annual Picnic

August 14, 2016



This year's annual picnic will be held at Tualatin Community Park., 8515 SW Tualatin Rd, Tualatin, OR. At this year's annual picnic, we have reserved the north side of the main picnic shelter, which also has rest rooms, from 11:00 am to 3:00 pm. Electricity is provided, and alcohol is permitted. The shelter will accommodate about 75 people.

GSOC will supply the paper plates, napkins, paper cups, and utensils. The format for the picnic will be a potluck meal. Attendees bring their own beverages. If your last name begins with A through G bring a main dish; H through P bring a side dish or salad; Q through Z bring a dessert. Or if you're a free spirit, just bring whatever appeals.

Clay Kelleher has volunteered to lead an optional hike at the park. He will arrive at 10:00 am, and will come equipped with some information about the natural and possibly historic setting, but any knowledge others can contribute would be appreciated. The total distance will be about 2.5 miles on level trails, which appear to be totally accessible. Time would be 1.0 to 1.5 hours, depending on how much stopping is done along the way.

We have reserved the community lecture room at the nearby Tualatin Library for an Ice Age Floods lecture by Rick Thompson from 1:15 to 3:00 pm., complements of the Tualatin Heritage Center. His lecture will include recent inclusions for Tualatin in the "National Ice Age Trail" as well as an explanation of the Tualatin landscape's Ice Age Flood features. The Library's community lecture room seats 60, with a 147 maximum occupancy. To get the complimentary room, we are allowing the library to advertise for the lecture within the city.

See pg 28 for vicinity map of park and library.

## Lagerstätten

*Synopsis of Friday night lecture on May 13, 2016, with speaker Dr. William Orr, continued from page 27*

Dr. William Orr, curator of the University of Oregon Condon Fossil Collection and frequent GSOC speaker, entertained and amused the GSOC crowd on Friday, May 13. He also provided an informative lecture about the prima donnas of the fossil world, those that come from lagerstätten. Lagerstätten is a German word meaning “storage places”. In these sites, fossils are characterized by one or more of the following:

- Outstanding preservation: mummies, frozen carcasses, fossils from tar pits, oil shales, or other anoxic media
- Complete representation of the ecosystem: predators and prey, producers and consumers
- Uninterrupted continuous fossil record: steady rapid sedimentation over eons of time.
- A brief glimpse into a time where we have no fossils at all.

Orr has not had the privilege of working with such fossils very often; his work usually involves identifying “marker species” such as tiny foraminifera, which characterize particular times, depth, latitude, and other key features of geological strata.

For his lecture Orr took us through a tour of lagerstätten, from the familiar to the remote. First stop was at the La Brea Tar Pits in California, which are 20-40 thousand years in age. Bill proclaimed that “petroleum is the best embalming fluid nature



has devised.” At the La Brea Tar Pits, thousands of ice age creatures were trapped in the sticky tar and over time their skeletons

were preserved in a jumble of bones due to the natural stirring of the tar. Bones taken from the site were often assembled into

“chimera” skeletons which came from the bones of many animals.

Normally in geological strata, remains of herbivores far outnumber the carnivores due to the coincidence of the food pyramid biomass ratios with the preservation of the fossils. Not so here. Predators were attracted to other animals trapped in the tar, so the food pyramid became inverted at this site.

Amongst Orr’s favorite denizens of the tar are the following species:

- Dire wolf, a “pony sized dog.”
- Saber tooth “tiger” was really a “bobcat on steroids.”
- Short faced Bear was a “super predator.” Could run fast and was very large.



*Arctodus simus* (short faced bear) reconstruction, photo by Dantheman9758, June 26, 2007.

Next stop on this tour of the world through time was from Southern Australia, the earliest known metazoans (multi-celled critters) dated 550 mybp from the Ediacaran Period. Scientists are hard pressed to classify these creatures that evolved into body types not represented by today’s species. Dickinsonia: Worm? Lichen? Spriggina: arthropod? Tribrachidium: three legged or triskelion-shaped animal. Mawsonites: jellyfish? They all have a quilted, i.e., segmented body types with hydrostatic inflation, similar to a water-filled mattress.

Orr’s third example was the Green River Shale lagerstätte from Wyoming, Colorado, and Utah, dated 50 mybp. About a dozen sites of this oil shale produce fossils. The stratum occurs in flat uniform layers from an ancient Eocene lake. Green River Shales are varved, i.e., contain alternating winter and summer layers. Green River fossilized fish are very famous and found in many museum collections. It is presumed that schools of fish swam into anoxic layers of water and died suddenly. The finds include outstanding fossils of fish eating other fish that presumably choked and died. Freshwater stingrays are found in these sites, and other freshwater species, including turtles and crocodilians, lizards and snakes.

Green River Shales contain much more than fish fossils, and this lagerstätte produced fossils representing an entire ecosystem. The shales record the transition from a moist subtropical to drier temperate climate. Birds fossils are articulate with feathers. More land animal finds include a five toed horse, bats, and squirrels. Insects with colors patterns are preserved. Also included are flora from the era, which tells botanists a lot about the climate.



Fossil of typical Ediacaran fossil *Kimberella quadrata*, photo by Aleksey Nagovitsyn, February 27, 2009.

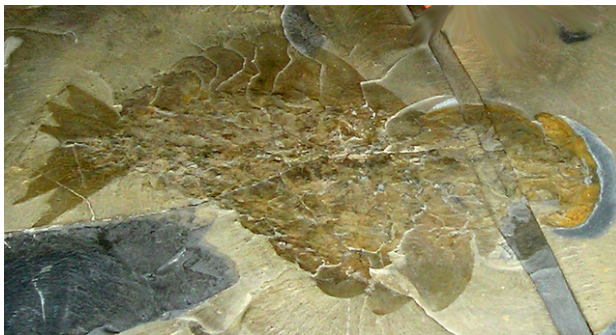




The next lagerstätte on the tour was of a similar time range; the Messel Pit in Germany dated at 47 mybp is a maar crater filled with water. This outstanding site was mined for brown coal and oil shale in the nineteenth century, and then saved from being converted into

a sanitary landfill in the twentieth. In 1995 it was designated as a UNESCO World Heritage site. Petroleum seeped into the bottom of the crater, preserving animals which died and fell in.

The site is famous for its amazing preservation of articulated animal skeletons. Entrails were preserved as well as other soft



tissue remains. Primates, horses, squirrels, frogs, gar, crocodiles and other reptiles were found, and some

were preserved three dimensionally. Birds, bat, and insects fossils show color variations preserved.

Orr's next example was the famous Burgess Shale in British Columbia, Canada. This lagerstätte contains fossils of the earliest known animals, dated to 508 mybp. The formation represented the base of a middle Cambrian reef and preserved remains of many animals, including soft tissue remains. Lace crab, trilobites, and other soft bodied forms were well preserved. One outstanding species was the super predator of its day, Anomalocaris. It grew to six feet long, and ate trilobites. This creature's fossils were found in bits and pieces, thought to



be separate species, until a complete fossil was discovered. Another outstanding fossil, *Piakia*, was the earliest known vertebrate.

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Dr. Orr saved his favorite lagerstätte for last, and of course that is Oregon's own John Day fossil beds. The John Day Fossil Formation is dated 50-5 mybp coming from a single basin, and comprised of shales and silts. Enormous quantities of volcanic ash kept this formation forming over such a long period of time. It is the "styrofoam popcorn of geological formations." The biggest contributor of volcanic ash was the Crooked River caldera centered in Prineville. Also contributing were the nearby Wildcat Mountain and Tower Mountain Calderas, all of which have been recently toured by GSOC.

Orr reviewed his favorite animals from the formation, which captured the John Day ecosystem over time. The species *Egmowechashala*, named for the Sioux word "little cat" was a little lemur that looked like a man. *Borophagus* "the bone eater" was a scavenger that ate bones. Also *Osteoborus*, which was another bone eater. *Entelodon* was the "terminator pig", a super predator. Another Orr favorite was a gopher the size of a tomcat - *Epigalus* the "gopher from hell." "They should have used him on Caddyshack," Orr joked.



*Fossil jewel beetle from Messel Pit, still showing color of the exoskeleton, photo by Torsten Wappler, Hessisches Landesmuseum Darmstadt*

## PFT (President's Field Trip)

*September 6-11, 2016, field trip from the GSOC Calendar*





# THE GEOLOGICAL NEWSLETTER

NEWS OF THE GEOLOGICAL SOCIETY OF  
THE OREGON COUNTRY

September/October 2016  
Volume 82, Number 5

The Geological Society of the Oregon Country  
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## To the Rescue!

by Carol Hasenberg

GSOC Past President Sheila Alfsen described her experiences working as an onsite paleontologist on construction sites for Paleontology Associates, a company run by Oregon paleontologist Dr. William Orr for more than 15 years.

*see Salvage Paleontology, Page 38*

*Construction site on the way to Marsh Hill. Photo by Sheila Alfsen.*



**GSOC Friday Night Lectures** are held the second Friday evening of most months, 7:30 p.m., Rm. 53, Cramer Hall, PSU, SW Broadway at SW Mill St., Portland, Oregon. Join GSOC members at Pizzicato Pizza, 1708 SW 6th Ave., at 6:00 p.m. before the lectures for an informal dinner and conversation. Check the GSOC website ([www.gsoc.org](http://www.gsoc.org)) for more information and updates to the calendar.

**Free parking** is no longer available at Portland State University. See page 36 for article.

## Calendar

### Friday Night Lecture

October 14, 2016, Cramer Hall, Portland State University

Speaker Dr Richard Waitt, USGS CVO, will elaborate from his recent book "In the Path of Destruction: Eyewitness Chronicles of Mount St. Helens."

### GSOC President's Field Trip

Oregon Coast to Oregon Caves and More, September 6-11, 2016

This field trip, organized by GSOC President Bo Nonn, will focus on the geology of the Oregon coast and the Oregon caves.

*see GSOC website, [www.gsoc.org](http://www.gsoc.org), for more information and updates*

### Mt. St. Helens Helicopter Tour

October 1, 2016, 10:00am

GSOC will host a one-day helicopter field trip of Mt. St. Helens. We will be based at Hoffstadt Bluffs Visitor Center (15000 Spirit Lake Hwy 504) on the North Fork of the Toutle River.

*see MSH, page 36, or the GSOC website, [www.gsoc.org](http://www.gsoc.org), for more information*

### Downtown PDX Geology Tour

October 22, 2016, 10:00am – 12:30pm, in front of the Pioneer Courthouse (6th Ave side) 700 Southwest 6th, Portland

GSOC presents "Ancient Walls 2" walking tour of our city's buildings. Open to public, children under 12 must be supervised. Fee \$10. This tour will focus on the north side of the downtown area.

*see GSOC website, [www.gsoc.org](http://www.gsoc.org), for more information*

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**WELCOME NEW MEMBERS!**

Aaron Minoo  
 Jean Massie  
 Stacy & Andrew Brown & Family  
 Jeanne Powrie & Family  
 Charles Montross  
 Mitch & Nancy Madsen  
 Lily Pfeifer  
 Cecily Cedilote  
 Michael Collins

**New Parking Regulations at PSU**

*September 19, 2016, regulation change at PSU*

GSOC has just received a communication from the Portland State University Geology Department office that stated “Please be advised that beginning Monday, September 19th, all PSU parking facilities will require payment or valid permit at all hours, all days, except for university holidays. Vehicles found on campus without proof of payment or valid permit will be subject to citation.” This means that we will no longer be able to park for free in the PSU parking garage on Friday nights.

Our President Bo Nonn suggests that “people look for a convenient park and ride near a MAX train or bus stop. The #19 bus and the orange line MAX drop you off within a block or two of PSU. The bus gets scarce after 9 but MAX runs pretty frequently. It's between 15 and 20 minutes from Sellwood to PSU for us.”

**MSH Tour by Helicopter**

*October 1, 2016, field trip from the GSOC Calendar*

The helicopter tour of Mt. St. Helens is approximately 40 minutes of spectacular scenery as you fly over both the devastated area from the 1980 eruption and the crater itself. An educational presentation by Sheila Alfsen will precede your tour so that you can recognize and interpret the landscape in light of the greatest volcanic event in recorded U.S. history.

The Hoffstadt Bluffs Visitor Center boasts a lounging area, a full restaurant and gift shop, a deck with a marvelous view and educational features. The helicopter tours are offered by Hillsboro Aviation. You may learn more about them at [www.mtsthelenshelicoptertours.com](http://www.mtsthelenshelicoptertours.com).

Don't book a tour individually, we will do it as a group as they have offered GSOC members a group discount. The tour will cost \$257.40 per person, which includes taxes. Please email Sheila and let her know of your interest as soon as possible, as the price is contingent on having the correct number of participants.



## GSOC Board Meeting Notes

August 26, 2016

President Bo Nonn called the meeting to order at the home of Rosemary Kenney. Other board members in attendance were Paul Edison-Lahm, Larry Purchase, Janet Rasmussen, and Sheila Alfsen. We did not have quorum. Also in attendance were Doug Rasmussen and Dave Olcott. The minutes of the July 2016 board meeting were reviewed.

The Treasurer's report was approved.

### EVENTS

#### Friday night lectures

No information was available on upcoming Friday night meetings.

Paul proposed that a having a lecture length recap of a major field trip at a Friday night lecture would be valuable to our general membership who are unable to go, especially considering the extensive work that goes into creating a field guide and all the spectacular photos that people take. Accordingly, Sheila will synopsise and present Dave's Columbia Plateau field trip.

Dave reports that we have gotten excellent support from PSU AV services; however they need more information about what our upcoming events will be. Dave proposed doing a sound check at general meetings to ensure that the speaker can be heard by all.

#### Field Trips

GSOC Mt. St. Helens helicopter tour: is set for Saturday, October 1st. Sheila needs 8-12 people to get the discount for the helicopter tour. Sheila will give talk on Mt. St. Helens at the Hoffstadt Bluffs Visitor Center followed by the helicopter tour. She will provide a few paragraphs to Bo and Bo in turn will provide some information to her from Scott Burns. Sheila will get content to Paul for email/website promotion.

#### Field Trips, cont.

President's Trip to SW Oregon: Bo reports that about 15 people are currently registered, so registration will remain open for the time being.

Downtown Tour (North Tour): (Paul) is planned for Oct 22nd.

Eclipse Aug. 21st, 2017 field trip: Board discussed a possible location for the trip.

#### Community Outreach/PSU: AEG/CORIBA

Sheila has three upcoming talks planned.

#### Annual Picnic

The picnic was very successful, with a great diversity of events and very good attendance. Hopefully we can reprise something similar next year.

#### Holiday Party

The party date is set for Carol Hasenberg's on Friday, December 2nd.

### OLD AND NEW BUSINESS

Bylaws Committee: Janet and Paul have reviewed the GSOC bylaws and recommend switching the "Junior" non-voting membership to a "Student" voting membership. Several compliance issues were also noted: honors to membership are apparently not being tracked; and the requirement for fidelity insurance needs to be somehow addressed. The section on the Newsletter Editor, Assistant Editor, and Business Manager is out of step with our current practice.

Member database: With the aim on eventually replacing our current membership spreadsheet, Paul will research low cost databases appropriate for non-profits of our size.

## BOARD MEETING NOTES

*continued from Page 37*

Membership campaign: the membership spreadsheet currently shows that, while we've gained new members, overall our membership may have dropped by as many as 30 members. Paul will initiate a more focused membership campaign, starting in October.

Communications Report: Paul will explore using paid ads for Facebook outreach to increase our pool of potential members and volunteers. Paul will prepare a report to address concerns about the security and extent of our online resources.

Next board meeting will be at Rosemary's at 10:00 a.m., October 15.

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

## Salvage Paleontology

*Synopsis of Friday night lecture on July 8, 2016, with speaker Sheila Alfson, continued from page 35*

Paleontology Associates was created to address the need for preserving important fossil finds on government property when they are threatened by construction projects. This is covered by the National Environmental Policy Act (NEPA) Act of 1969. Construction projects covered by the act must have a biologist, archaeologist and paleontologist. Each project must have an environmental impact statement (EIS) which contains a report of the paleontological survey for the site.

The paleontological survey is done to determine the need for attention from the paleontologist. First, the paleontologist will research the site to see if it contains any known fossil bearing strata and determine precise locations of known fossil locations in the vicinity. The construction site will be assigned a level of risk that incorporates the existence of strata and their exposure to the construction. For Federal and State of Oregon projects, the site will be classified as needing no monitoring, spot monitoring, or continuous monitoring. The US Forest Service has a similar system but classifies sites by 5 different levels of attention. The onsite monitoring must be done by a trained paleontologist or under his/her supervision. The paleontologist must also be associated with a repository for the fossils (a recognized museum or collection).

Alfson described her job as onsite paleontologist as a person who is "construction minded" and coordinates activities to lessen the impact on the schedule and cost of the construction project. Such a field representative must have the experience to recognize important finds quickly and dismiss lesser interruptions in the work. They must also be able to instill in the construction workers a professional pride in finding and preserving important fossils as a part of their work. In fact, it is the equipment operators who can sense finds in their excavations, so their engagement in the process is essential.

Alfson told the GSOC audience that the projects she has been involved with are greatly varied. She has looked at power plant sites, power lines, gas pipelines, fiber optics, highways and bridges and sewers. Pipeline projects are pretty common. One of the pipeline projects utilized horizontal drilling. The contractor was able to drill completely under a wetland and a dairy! Another gas line between Utah and Wyoming passed



*Horizontal drilling under the dairy. Photo by Sheila Alfson.*

close to Dinosaur National Monument. It passed through the Jurassic Morrison Formation that outcrops in the park. Yet another went through Marsh Hill of Cope and Marsh fame, the competing geological pioneers of the nineteenth century.

Alfsen's next example was of a sewer project proposed to pass through the San Onofre Breccia on a headland overlooking Laguna Beach, California. No access to the site was granted from the gated community above who were proposing to build the sewer, so an exploratory field trip was planned at low tide to go around the headland.

There are many challenges to the job of onsite paleontologist. It is important to educate the construction workers about the types of fossils that may be encountered. Also, safety must be emphasized as that will trump the fossil find if there is a conflict. Managerial attitudes may need to be addressed, and training sessions must be repeated often as new hirelings will need to be trained.

Other complications to the job include awareness between site biology, archaeology and paleontology. For example, in the Mojave Desert, paleontologists and construction crews must be trained to work with the desert tortoise, California's state reptile. This animal likes to shelter under your vehicle if left in the open for more than a few minutes, and huge fines are imposed if you run over one. The babies of these large tortoises are teeny-weeny, so every time you drive off you need to scan very completely under your vehicle.

Yet another challenge to the job is that the laws were written by the Society of Vertebrate Paleontology and so they overemphasize that specialty, and there are poorly written specs for the identification and handling of other types of fossils, like plants and marine fossils.

So what kinds of fossils has Alfsen found on these construction sites? Finds include dinosaurs, amphibians, turtles, big bisons from the Ice Age, mollusks, and Green River insects (see the previous newsletter). Steps to salvage these fossils are a decision on whether and how to preserve them, documentation, stabilization, extraction, curation, and repository. All in a day's work for this important job!



*Don't run over the tortoise! Photo by Sheila Alfsen.*

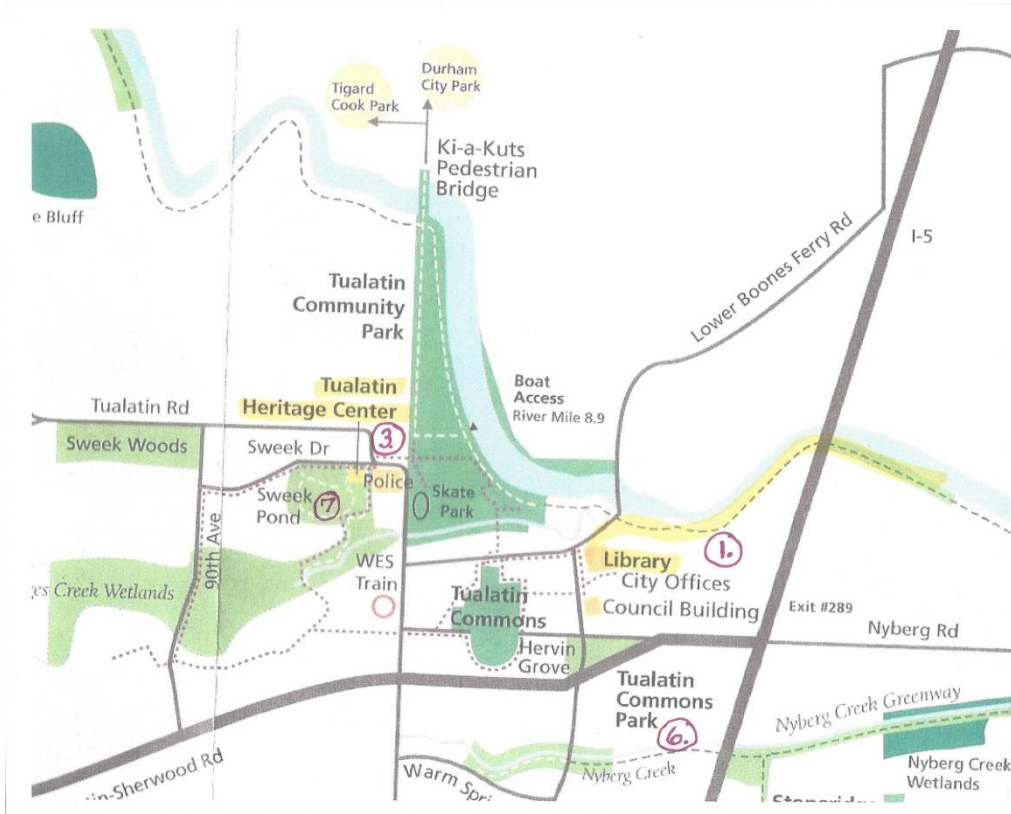


*Stabilizing dinosaur remains. Photo by Sheila Alfsen.*



# Annual Picnic Recap

Here's some of the sights seen at the GSOC picnic in Tualatin on August 14, 2016:



1. Tualatin Library – Mastodon mounted bones, NARG tusk, Woodburn and other fossils located inside.

2. Tualatin River Greenway Path – The ¾ mile newly completed trail exhibits casts of fossils, erratic rocks, and each step represents 25 years of geologic time.

3. Heritage Center – Showing 10 and 2.5 ton flood erratics in front. A group of Tualatin's erratic rocks and other fossils are also displayed inside. The center is open M-F 10-2.

4. Mastodon Bronze Sculpture – and small bronze boy outside the SW corner of Cabela's.

5. Cabela's – Fossil casts are located inside sporting goods store, at the entrance and center back.

6. Mastodon discovery site – Located near the southwest edge of the Fred Meyer parking lot in blackberries, next to Nyberg Creek. Discovered in 1962.

7. Sweek Pond – Short optional art walk.



Tualatin River Greenway Bicycle and Pedestrian Shared Use Path  
SW Barngrover Way to SW Nyberg Lane

The trail is ¾ of a mile long  
in Barngrover Way and  
represents 25 years in geologic time

- The boardwalk decking is made out of 100% recycled plastic
- The boardwalk decking has 67,602 screws
- The trail features 5 overlooks and 9 benches
- The trail features 2+ acres of nature conservation with 3,765 trees and shrubs
- 1,700 pounds of fossils are located within the concrete end of the last lot
- 160 foot crossing



**The Geological Society of the Oregon Country** (GSOC) is a non-profit organization based in Portland, Oregon. The society is dedicated to the study of geology in the Pacific northwest and is open to persons with all levels of education and professional backgrounds. GSOC was formed in 1935.

In addition to Friday Night Lectures, GSOC offers field trips. Schedules vary year to year for the field trips. You must be a GSOC member or guest of a member to attend most GSOC field trips.

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# THE GEOLOGICAL NEWSLETTER

NEWS OF THE GEOLOGICAL SOCIETY OF  
THE OREGON COUNTRY

November/December 2016  
Volume 82, Number 6

The Geological Society of the Oregon Country  
P.O. Box 907, Portland, OR 97207-0907  
[www.gsoc.org](http://www.gsoc.org)

## Dark Noon

by Carol Hasenberg

Dr. Richard Waitt, who arrived in Washington state from the USGS office in Menlo Park, California, shortly after the eruption of Mt. St. Helens, stayed to study the volcano and built the bulk of his career at the Cascades Volcano Observatory (CVO) in Vancouver, Washington.

Photo by Robert Krimmel.

see *Dark Noon*, Page 46



**GSOC Friday Night Lectures** are held the second Friday evening of most months, 7:30 p.m., Rm. 53, Cramer Hall, PSU, SW Broadway at SW Mill St., Portland, Oregon. Join GSOC members at Pizzicato Pizza, 1708 SW 6th Ave., at 6:00 p.m. before the lectures for an informal dinner and conversation. Check the GSOC website ([www.gsoc.org](http://www.gsoc.org)) for more information and updates to the calendar.

**Free parking** is no longer available at Portland State University. Hourly rates for parking are available in some parts of PSU parking structures. There is also on street pay parking, and many mass transit options.

## Calendar

### Friday Night Lecture

November 11, 2016, Cramer Hall,  
Portland State University

Speaker Harish Palani, Sunset High School,  
will present "Quakify!"

see *Quakify!*, pg 44

### GSOC 8<sup>TH</sup> Annual Holiday Party

December 2, 2016, 6:00 pm – 10:00 pm,  
614 NE 114th Ave., Portland

GSOC Members and their guests are invited  
to the 8th GSOC Annual Holiday Party and  
field trip slideshow.

There will be no December Friday night  
meeting due to the Holiday Party.

see *Plans for GSOC Holiday Party*, pg 48

**2016 - 2017 ADMINISTRATION:**

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[shealf@viclink.com](mailto:shealf@viclink.com)

**WELCOME NEW MEMBERS!**

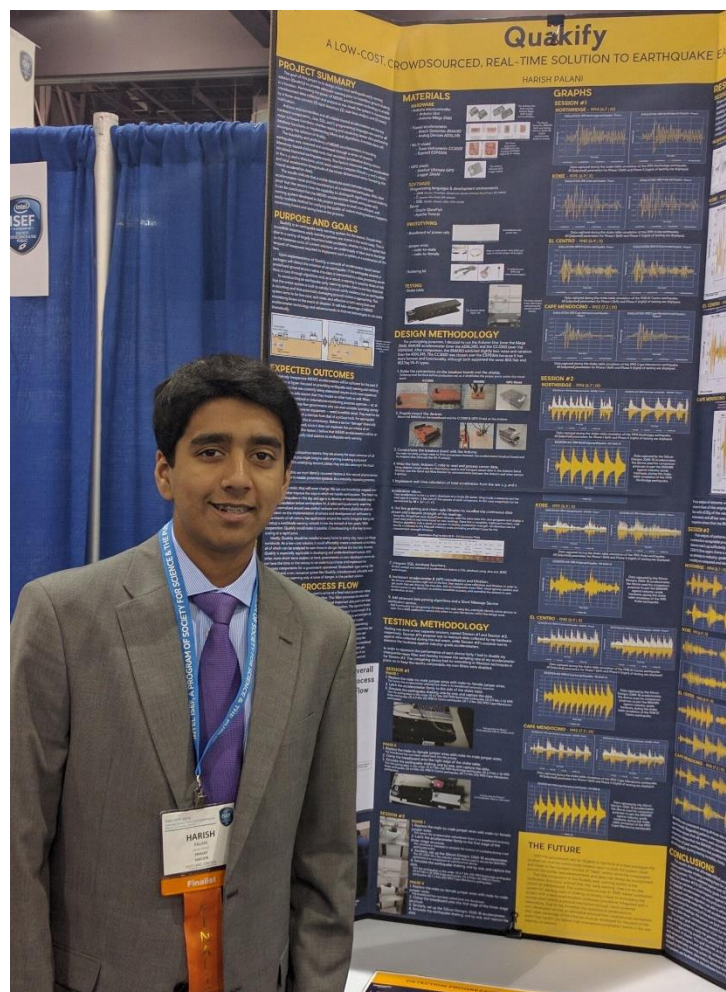
Lynn Pittman  
 Jim & Karen Glass

**Quakify!**

*November 11, 2016, lecture from the GSOC Calendar*

Speaker Harish Palani of Sunset High School, Portland, will present his project “Quakify” which won the second prize at the the Intel International Science and Engineering Fair (Intel ISEF).

The goal of the project was to design a low-cost early warning system (Quakify) to provide adequate warning prior to significant earthquake shaking. Harnessing the power of MEMS accelerometer technology to enable crowdsourced data collection and analysis in the cloud, the system is characterized by a three-step process: (1) rapid detection, (2) real-time analysis, and (3) timely notification.



## GSOC Board Meeting Notes

October 15, 2016

The meeting was called to order at the home of Rosemary Kenney. Board members attending were VP Rik Smoody, Director Larry Purchase, and Treasurer Dawn Juliano. Non board members were Barbara Smoody, Carol Hasenberg, Rosemary Kenney.

Since quorum was not made, the members present used this meeting time to make plans for some of the upcoming GSOC events and table any discussions which required others to complete.

### EVENTS

#### Friday night lectures

Rik has been working on a speaker for November, a local student who came in second place in the Intel international science fair with a project called "Quakify!," which includes the use of social media in earthquake early warning.

#### Field Trips

Eclipse Aug. 21st, 2017 field trip: Rik is working on a Wheeler County location for the event.

#### Holiday Party

The party date is set for Carol Hasenberg's on Friday, December 2nd. Food and serving ware assignments were discussed. Larry plans to bring tables and chairs as before. Slideshow topics and music were determined.

#### Annual Banquet

Monarch Hotel has confirmed a date for banquet as the second Sunday in March. Dawn will also check on the availability of Ernesto's for comparison.

### OLD AND NEW BUSINESS

Nominating Committee: Bo Nonn and Larry Purchase will be on the nominating committee and a third person will need to be announced.

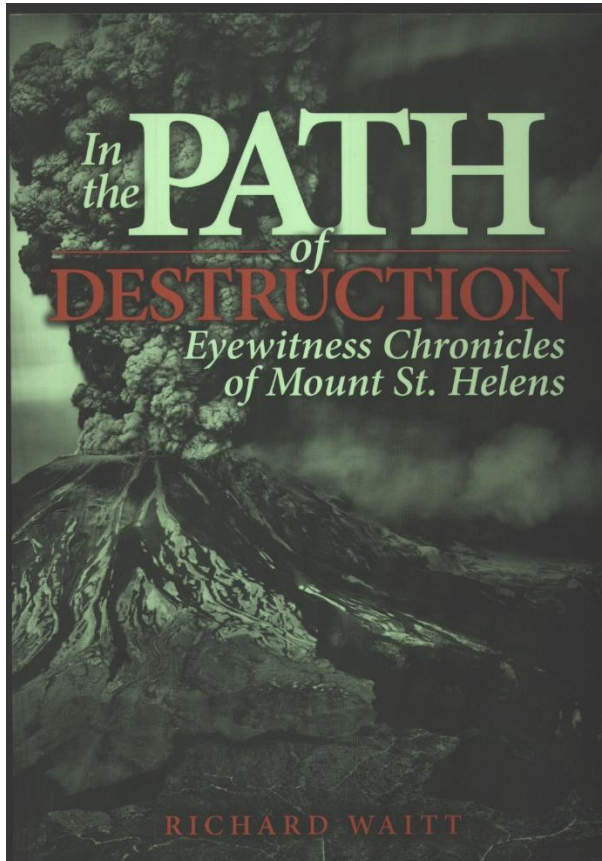
Next board meeting will be at Carol Hasenberg's at 4:00 p.m., December 2, prior to the Holiday Party.

Notes compiled by Carol Hasenberg.



## Dark Noon

*Synopsis of Friday night lecture on October 14, 2016, with speaker Dr. Richard Waitt, continued from page 43*



Dr. Waitt came to promote his new book *In the Path of Destruction: Eyewitness Chronicles of Mount St. Helens*, Washington State University Press, 2015, to the GSOC audience and to describe the book's origin and some of the stories it contains. He said that early in his research into the events of the volcanic eruption, he was focused more on the hard geology that people could describe. However, he became involved more in the stories that people told about their experiences and the process of determining the details of the event by analyzing the interviews of the witnesses.

The witness' accounts impressed upon Waitt that no interview is repeatable. The memories of the witnesses change and can be difficult to objectify. In order to minimize the subjectivity, Waitt verified stories with tangible records such as reports from pilots, journalists' notes and photos, and geologic field notes. He worked on this project off and on during his career at CVO.

The first story described by Waitt was about a witness who did not survive the eruption. Reid Blackburn, a photographer from *The Columbian* newspaper in Vancouver, had set up two cameras borrowed from Nikon that were operated by remote control. It was his plan to take simultaneous photos of the eruption. Unfortunately, Blackburn was killed by the eruption at one of the camera stations, dubbed Coldwater 1, and the photographic film inside the cameras did not survive the blast. However, Blackburn's notes did survive the eruption.

The second story told by Waitt was about Dan Balch, a young man who was camping near Mt. St. Helens when the volcano erupted. The campsite was near the edge of the "blast zone", the area hardest hit by the lateral blast of hot volcanic gases that blew out of the hole left by a massive landslide on the northeast side of the mountain, triggering the eruption. The blast zone was characterized by the fact that virtually all the trees in this area were blown down. Dan's eruption story was that the blast knocked him down, trees blew around him and it got dark. Snow and mud rained down at first, then everything was burning. Almost every tree around him was blown down when he regained sight.

A third story was that of Jim Scymanky, the lone survivor of a party of four loggers who were thinning trees near the edge of the blast zone in a different area. One of their group members announced the eruption by running towards the others and screaming. Trees started to snap off above them, and it got dark, hot, and hard to breathe. Jim felt great pain, and his gloves melted onto the skin of his hands. His skin was badly burned through his clothing. After the blast past, trees were down and everything was covered with ash. Although Jim and two of his companions were rescued, only he survived the experience.

*Photo by Mike Douglas*

Not all of the accounts relayed in the book are of blast zone survivors. One family Waitt described lived on the South Toutle River, which was inundated by the hot mud pouring down from the volcano. It was their experience that a morning flood occurred directly after the eruption, but in the afternoon the flow in the river became like hot cement, over 100 degrees in temperature. They saw a car float by on the river. The hot cement-like flood got higher and higher and by 7:30 that evening it had reached their house. The dense flow caused the house to rise off its moorings and float away. The owner was able to save the family's freezer by loading it in their truck.

Some of the stories in the book are from the rescuers. In one such account, a Huey helicopter tried to rescue Reid Blackburn. As they traveled up the river valley looking for his camera station, they became disoriented due to the fact that the landmarks, and indeed the valley, had disappeared from the blast and ash flow. Eventually they located the Volvo that Blackburn had died in, but were not able to land. The wash from the rotors stirred up great clouds of ash when they were close to the ground.

As the lecture concluded, a member of the audience asked the question that if the eruption happened today, would the date of eruption have been predicted more accurately? "Definitely," said Waitt. "However, the curiosity of people is still the same and probably people would get in and get killed. People also have a right to get to their property."

Waitt's book is a thorough account of tales of survivors and other witnesses to the eruption. Waitt wanted the accounts to be accessible to all people interested in the event, and deliberately wrote the book in everyday prose that "seventh graders could understand." An anonymous Amazon reviewer describes the book "I was there and this is an accurate and factual record of what happened. It took 30 years for the



author to collect, verify and re-verify all these witnesses' statements, for the most part in their own words, and the narrative is written for the non-scientist in a clear and easy-to-read format. It provides a first-hand look at the first modern documented volcanic eruption in the continental United States and is a fascinating read... The author has taken extraordinary pains to ensure that the book is true and accurate, something that's hard to come by these days... The event was exciting at the time and Richard Waitt has captured that sense in this book. What an accomplishment!"

Recommended reading:

Waitt, Richard, [In the Path of Destruction: Eyewitness Chronicles of Mount St. Helens](#), Washington State University Press, 2015

Vogt, Tom, ["Photographer's notebook recovered after St. Helens eruptions," \*The Olympian\*, May 18, 2016](#)

Vogt, Tom, ["Waking to a nightmare: Camping trip ends in injury and death for friends," \*The Columbian\*, April 1, 2010](#)

Galvin, John, ["Mount St. Helens Eruption: Washington, May 1980," \*Popular Mechanics\*, July 29, 2007](#)

## Plans for GSOC Holiday Party

*December 2, 2016, annual event from the GSOC Calendar*

GSOC Annual Holiday Party and field trip slideshow is scheduled for Friday December 2, at 614 NE 114th Ave., Portland. GSOC Board Members will provide main dishes with protein of various sorts. Other members please bring vegetable, side dishes or desserts for 6 to share, plus beverage of their choice. Live music will be led by Dawn Juliano and Barbara Smoody.

Schedule of Christmas Party activities:

-4:00 pm: GSOC Board Meeting

-6:00 pm: Set-up for party

-6:30 pm: Dinner buffet

-7:15 pm: Welcome presentation. Nominations for GSOC Board members for the 2016-2017 year will be open.

-7:30 pm: Dessert and musical entertainment

-8:30 pm: This year's GSOC field trip leaders will present the "Year in Review" program with brief slide show summaries of their trips.

- Bo Nonn: "Oregon Coast and Caves - Accreted Terranes," Sept 6-11
- Paul Edison-Lahm: "Ancient Walls 2016, Exploring South and North Portland Downtown Buildings' Geology," June 25 and October 22
- Dave Olcott: "New Insights Into the Geologic Evolution of the West - Central Columbia Plateau," June 11-12

-9:30 pm: Clean-up

Donations will be accepted for party supplies. Send donations to Dawn Juliano c/o GSOC, P.O. Box 907, Portland, OR 97207, or give them to her in person at the event.

## Don't Forget to Re-up!

### *GSOC Dues are Due Soon*

GSOC members and prospective members, please remember to renew your memberships for 2017. Your membership benefits include:

- Helping serve GSOC's mission of promoting geology education in the Northwest, including PSU geology scholarships
- Welcome to join in all GSOC functions, including field trips, Holiday Party, Annual Banquet and Picnic, and more!
- A printed version of the GSOC newsletter if you choose
- A great time with all your GSOC friends!

See the last page of this newsletter for details, or visit our website [www.gsoc.org](http://www.gsoc.org). PS - If you joined the club after September 1, 2016, your dues are paid through 2017!!!



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