



# THE GEOLOGICAL NEWSLETTER

"NEWS OF THE GEOLOGICAL SOCIETY OF THE OREGON COUNTRY"

VOLUME 80, NUMBER 1  
JANUARY/FEBRUARY 2014

## The Geological Society of the Oregon Country

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

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VISITORS WELCOME AT ALL MEETINGS

## CALENDAR

### JANUARY/FEBRUARY ACTIVITIES

**Friday evening talk, January 10, 2014**, at 7:30 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University. Speaker Tom Pierson, a hydrologist with Cascade Volcano Observatory, will present a talk about the Chaiten Volcano in Chile.

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

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

level one of Parking Structure 1, bounded by Broadway and 6<sup>th</sup> Aves. and Harrison and Hall Streets.

**Friday evening talk, February 14, 2014**, at 7:30 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University. Speaker Dr. Stephen Taylor, Western Oregon University Professor of Geology, will present "Morphology and Spatial Distribution of Cinder Cones at Newberry Volcano, Oregon: Implications for Relative Ages and Structural Control on Eruptive Processes."

Newberry Volcano in Central Oregon is associated with over 350 basaltic cinder cones, located in a complex, extensional tectonic setting. Digital mapping of cinder cones and spatial analyses of vents were used to learn more about the eruptive history of this fascinating area. Click on [this link](#) for a poster with more information. The project website is available from [this link](#).

## FUTURE ACTIVITIES

Plans for the Seventy-ninth Annual GSOC Banquet are in progress. The banquet is tentatively scheduled for Sunday, March 16, 2014. Full details and a registration form will be available on the GSOC website as plans unfold.

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

## BOARD MEETING NOTES

November 10, 2013

President John Piccininni called the meeting to order at the home of Rosemary Kenney. Board members present were John, Julia Lanning, Janet Rasmussen, Rik Smoody, Sheila Alfsen, and Bo Nonn. Also present were Rosemary, Bart Bartels, Jan Kem, and Dave Olcott. The minutes of the September 14, 2013, meeting were approved.

*Treasurer's Report:* Deferred, since Dawn was not present.

### Events

*Holiday Party committee:* Plans for the holiday party were reviewed by the board.

*Field Trip Planning:* Field trip leaders for the coming year are reminded to plan/schedule trips prior to the March banquet so that announcements can be made. Sheila is still working on the President Field Trip plan. Bo, Larry Purchase, and John hope to offer the Mt. Hood trip that was cancelled last year due to road damage. Dave Olcott has a 4-day trip planned for the north end of Hell's Canyon/Snake River area, which will include a jet boat excursion from Lewiston, Idaho, to the confluence of the Imnaha and Snake Rivers. This trip would ideally be scheduled in September.

### Old and New Business

*Nominating Committee:* Janet is nominated for Vice President, Marty Muncie is nominated for 3-year Director, and Bev has agreed to fill in the remaining

one year of Janet's term as Director. This was announced the previous night at the Friday meeting.

*PSU Security and Computer Access:* The doors to Cramer Hall were locked shortly after our November meeting began. Signs need to be posted in future listing Janet's cell number so that she can let latecomers in to the lecture if all the doors are locked. Janet brought nametags for guests and members, which were well received. She will continue the practice of greeting guests at the room door and handing out nametags & thus be available to go up and open doors once the meeting begins. Sheila suggested that we might need to use our own technology since only she (and other PSU staff/students) have computer log-ins at PSU.

*Newsletters:* Alternate possibilities for the mailing of the newsletter were discussed, including our current bulk mailing costing \$1052 per year, new mailing service option for \$840 per year, or electronic newsletter option with paper copies mailed to a limited number of members estimated to be \$369 per year. Voting on this was deferred.

*Library Committee:* Larry was not present. Bo is scanning the books with photos and bios of previous GSOC presidents.

*Need for permanent GSOC newsletter storage:* this topic was deferred.

*Use of Google Drive for access to membership list, email list:* Not all board members have viewed the list online, and some stated they were unable to do so. Janet not only viewed the list, but also deleted her deceased father's name from it. There was discussion of who should be able to view the list and who should be able to edit it. At minimum, we agreed that the treasurer must be able to edit, and other Board Members should be able to view it. The discussion of email list was deferred.

*Newsletter scanning:* Topic deferred.

### New Business

*Banquet committee:* Dawn and John will be on the committee. There was no third volunteer from the

ranks. Sunday the 16<sup>th</sup> was the best possible date for the banquet.

Next board meeting: Saturday, February 15, 10:00 am, at Rosemary's house.

Notes compiled from board meeting minutes submitted by Director and Past President Janet Rasmussen (filling in for Paul Edison-Lahm).

## **New Electronic Mailing List for GSOC Members**

GSOC will send electronic newsletters every two months to members. The mailing list will also provide a means to send occasional messages in case of unexpected changes or cancellations of GSOC events, such as lectures or field trips. Members will still receive the paper newsletter in the mail. If you believe that we don't have your email address, and would like to be included in this list, please send an email to Paul Edison-Lahm at [edisonlahm@comcast.net](mailto:edisonlahm@comcast.net) with "subscribe" in the subject line.

Likewise, if you prefer NOT to receive the newsletter and messages electronically, please send an email with your name and "unsubscribe" in the subject line.

## **NOMINATING COMMITTEE RESULTS**

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

**President** ..... **Sheila Alfsen**  
**Vice President**..... **Janet Rasmussen**  
**Secretary** ..... **Paul Edison-Lahm**  
**Treasurer** ..... **Dawn Juliano**  
**Director, 3 years** ..... **Martha Muncie**  
**Director, 2 years** ..... **Bo Nonn**  
**Director, 1 year**..... **Beverly Vogt**

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

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

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

PS – If you joined GSOC in September 2013 or later, your 2014 dues are paid, good deal!!!

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compiled by Carol Hasenberg

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VISITORS WELCOME AT ALL MEETINGS

## MARCH/APRIL ACTIVITIES

Upcoming Friday night meeting dates are April 11, May 9, and June 13, 2014. There will be no March Friday night meeting due to the annual banquet. Meeting details are available on the GSOC website ([www.gsoc.org](http://www.gsoc.org)). Members also will either receive details on the email calendar or, per their request, receive a calendar mailed to them.

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

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

## FUTURE ACTIVITIES

The **Seventy-Ninth Annual GSOC Banquet** is scheduled for Sunday, March 16, 2014. Full details and a registration form is available online and in the January/February issue of *The Geological Newsletter*.

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

## BOARD MEETING NOTES

February 15, 2014

The meeting was called to order at the home of Rosemary Kenney. Board members in attendance constituting quorum were John Piccininni, Sheila Alfsen, Dawn Juliano, Paul Edison-Lahm, Julia Lanning, and Bo Nonn. Also in attendance were

Directors-elect Marty Muncie and Bev Vogt, as well as GSOC members Dave Olcott, Larry Purchase, Clay Kelleher, Bart Bartels, and (via video remote) Carol Hasenberg. The minutes of the November 10th, 2013, board meeting were approved.

*Treasurer's Report:* The Treasurer's report was approved. Dawn will email her Annual Report to the board.

Carol suggested that GSOC should get in the practice of drawing up an annual budget. Dawn has agreed to prepare a draft budget for review at the next board meeting.

*The election results* for the term beginning March 1<sup>st</sup>, 2014 are as follows: President Sheila Alfsen, Vice-President Janet Rasmussen, Treasurer Dawn Juliano, Secretary Paul Edison-Lahm, 1-year Director Bev Vogt, 2-year Director Bo Nonn, and 3-year Director Marty Muncie. Paul distributed the bylaws and the Oregon Nonprofit Board Guide to new board members.

## Events

*Holiday Party Recap.* Thanks were given to Julia for her contribution of the party venue and also for Mark's assistance. The 2014 Holiday Party Committee will reconvene in August and use of the Benson House may be considered at that time.

*The Annual Banquet* will be held March 16<sup>th</sup>, 2014 at Ernesto's in Beaverton. Dawn reports that the tickets are already halfway sold. A no-host wine bar was approved. Banquet plans were discussed.

*Friday Night Lectures:* Tom and Diana have stepped down from their long-appreciated role providing snacks and coffee following the Friday night lectures. Thanks very much to Tom and Diana for being such gracious and reliable hosts!

### Field Trips:

*President's Trip:* Sheila welcomes suggestions; she would like to include both western and eastern Oregon settings, possibly Madras and Silvercreek Falls. She will investigate reserving the Silvercreek site.

*Mt. Hood Trip* (Bo, Larry, Rik) is again being planned this year for August; however this will depend on snow pack and the access road opening.

*Lewiston Basin and Vicinity Trip* (Dave) is planned for May 1<sup>st</sup> - 3<sup>rd</sup>. Reservation forms need to be in by April 11<sup>th</sup>. However reservations for the Riverquest Excursions Snake River Jet Boat Trip led by Dr. Keegan Schmidt will need to be made sooner. Publicity and liability releases will make it clear that the jet boat trip is not being organized by GSOC. Dave will coordinate a discussion of carpooling as we get closer to the date.

*Wallowa Lake/Baker trip* (Bart, Bev, Larry) will be planned for either the last week of July or the first week of August. The 9,000 foot Wallowa Mountains peaks can cause the area to be snowed in during spring. The trip will include the following highlights: (Part 1) Black Ammonites and Cycads, possibly late Permian, from near Wallowa Lake at Black Marble Quarry in the north end of the Wallowa Mountains; (Part 2) from Martin Bridge, creek side, camp ground: a) Summit Point's Triassic sponges, algae, mollusks, sea urchins, corals, and pelecypods (reef environment), b) Spring Creek's corals, sponges, and pelecypods, c) Excelsior Gulch's Jurassic clams, belemnites, and trace fossils, and d) more of the same at Eagle Creek and possibly other sites.

## Old and New Business

*Newsletter/Email List:* Newsletters and announcements will now be distributed via email list. However printed versions of the newsletter will still be mailed to those members who have requested them. Jan has stepped down after long service as Business Manager. Carol will continue to contribute her articles for the newsletter, but requests that the organizational responsibilities of calendaring be redistributed. Sheila, Paul, and Janet will work on integrating the content from the newsletter, email announcements, and website.

*Library committee and scanning of President Volumes:* Bo, Tara, and Paul are working on storing our paper copies and scanning old newsletters for online storage.

*The next board meeting will be April. 12<sup>th</sup>, 2014, 10:00 a.m. at Rosemary's house.*

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

## **New Electronic Mailing List for GSOC Members**

GSOC will send electronic newsletters every two months to members. The mailing list will also provide a means to send occasional messages in case of unexpected changes or cancellations of GSOC events, such as lectures or field trips. Members will still receive the paper newsletter in the mail. If you believe that we don't have your email address, and would like to be included in this list, please send an email to Paul Edison-Lahm at [edisonlahm@comcast.net](mailto:edisonlahm@comcast.net) with "subscribe" in the subject line.

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

PS – If you joined GSOC in September 2013 or later, your 2014 dues are paid, good deal!!!

## **Do we need this Aggradation?**

synopsis of GSOC Friday night lecture, January 10, 2014, "Acute Sedimentation Response to Rainfall Following the Explosive Phase of the 2008-2009 Eruption of Chaitén Volcano, Chile" by Dr. Thomas C. Pierson, Hydrologist, USGS Cascades Volcano Observatory, Vancouver, Washington.  
by Carol S. Hasenberg

Tom Pierson's talk to GSOC focused on his study of the aggradation and erosion of volcanic sediment that occurred in the Rio Chaiten valley as a result of the December 2008 and February 2009 eruptions of the Chaiten volcano in the southern region of Chile. Pierson, who has worked at the USGS Cascades Volcano Observatory since 1981, has traveled the Pacific rim studying hydrologic and geomorphic responses to volcanic eruptions.

Chaiten began an eruptive phase in May of 2008. The Chaiten eruption was notable for two things – the speed at which the movement of ash and rocks took place, and the rhyolitic character of the magma, which has been rare in the past century. The character of the ash that fell around the volcano was important in that the fine-grained material effectively paved over the watershed of the Rio Chaiten, which flows 10 km down from the volcano to the town of Chaiten and the Bahia Chaiten (Chaiten Bay), adding runoff to the river's flows. The volcano produced about as much material as Mt. St. Helens. In February 2009 the dome experienced a partial collapse which sent a large debris flow down the Rio Chaiten and inundating the town with sediment. The flow was up to 8 meters thick.

The climate of the area is extremely rainy and there is no distinct dry season. Coupled with a fast extrusion rate for lava produced by the volcano, the speed of the build-up and erosion of sediment was much faster here than previously studied. Pierson compared the 3 year cycle of the process at Chaiten with the 100 years it took the Sandy River to do a similar cycle after the last eruption of Mt. Hood. Peak annual sediment yield for the Rio Chaiten was the largest ever measured.

The damage done to the town was extensive but not complete. Houses filled with sediment but were not destroyed. Streets became channels for the flow of water and debris. As time passed, braided channels formed in the streets; new channels widened, created waterfalls into the bay, and eroded away homes. The sediment yield rate was computed by measuring the growth of the sediment delta in the bay.



The study of human society interacting with the volcanic damage was interesting to observe as well. The residents of the town were evacuated during the eruption and inundation of the town. After the inundation scientists found evidence that eruptions of this volcano occur on the average of 400 years and that the town is built on a delta of sediment produced by the eruptions. (Previously it was thought that the volcano had not erupted in 9000

years.) The government of Chile tried to persuade the town residents that it would be foolish to rebuild the town on the current site and make them move the town to a new location north of the delta. Many of the residents, whose livelihood depends on salmon farming and adventure tourism, would have nothing to do with that. So the human cycle will repeat as well as the natural cycle.





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VISITORS WELCOME AT ALL MEETINGS

## MAY/JUNE ACTIVITIES

Upcoming Friday night meeting dates are May 9 and June 13, 2014. At this time no July speaker is planned. Members will either receive details on the email calendar or, per their request, receive a calendar mailed to them.

Friday, May 9, Dr. Curt Peterson, of Portland State University, will speak on "Accommodation Space in the Lower Columbia River Valley." Dr. Peterson will discuss his work on assessing the distribution of sediments within the lower 125 km of the Columbia River over the past 16,000 years.

Friday, June 13, Dr. Maxwell Rudolph, a new faculty member of PSU Geology Dept., will discuss

his research on the ongoing eruption of the Sidoarjo (Lusi) mud volcano in Indonesia.

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

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

## FUTURE ACTIVITIES

Upcoming field trips are scheduled:  
Lewiston Basin – April 30-May 3

Wallowa Lake/Baker – Late June or July  
Mt. Hood Glacier – August  
President's Field Trip – September 3-6  
GSOC Annual Picnic – August 17

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

## **BOARD MEETING NOTES**

April 12, 2014

The meeting was called to order at the home of Rosemary Kenney. Board members in attendance constituting quorum were Sheila Alfsen, Janet Rasmussen, Dawn Juliano, Paul Edison-Lahm, Bev Vogt, Bo Nonn, Marty Muncie, John Piccininni, and Jane Walpole. Also in attendance were GSOC members Dave Olcott, Larry Purchase, Bart Bartels, Carol Hasenberg, Tara Schoffstall, and Doug Rasmussen. The minutes of the February 15, 2014 board meeting were approved.

### **Treasurer's Report**

The Treasurer's report was approved. Paul provided copies of the GSOC letterhead at John's request. Carol will email copies of the GSOC logo to board members.

### **Events**

Annual Banquet - Kudos and accolades were given to Dawn for the choice of Ernesto's and the consensus was that it should be considered by the Banquet committee for next year's venue as well – although perhaps in a slightly bigger space. After tickets sales and other costs, the net cost of the annual banquet was \$10.58.

Friday Night Lectures - Janet has been focusing on involving PSU geology department faculty. Upcoming speakers include Curt Peterson in May, Max Rudolph in June, and Adam Booth in October. Janet recently gave a PowerPoint presentation on GSOC to PSU geology students and reports that they were very interested in our field trips; she will be speaking to another group this Wednesday. Paul will help Janet upload her PowerPoint to Google

Drive and provide a link to the Ancient Walls Downtown Geology geocaches for the websites. Tara will also provide Janet with a link to online field trip guides for the website.

Friday night snacks committee - Bart will chair this committee for the indefinite future and Sheila will bring the snacks for the May meeting. A sign-up sheet will be circulated at the next Friday meeting. Dawn will collect the donation money.

Annual Picnic - The Annual Picnic is set for 12:00 p.m., Sunday, August 17th. Janet will reserve Guy Talbot State Park. The board meeting will convene prior to the picnic at 10:00 a.m.

### **Field Trips**

President's Field Trip - (Sept. 3rd - 7th) Sheila's trip will focus on sedimentation on both east and west sides of the Cascades. She has reserved the Silver Creek Falls guesthouse. Bill Orr will present his research on the Scotts Mills formation on Wednesday evening of the event (Sept. 3rd) and will lead the trip Thursday. Sheila is looking into accommodations in Madras and requesting permission for access from Warm Springs Reservation; she also is looking for a guide for east side portion of trip.

Mt. Hood Trip - (Bo, Larry) is set tentatively for the first week of August. Larry will investigate whether the access road is open and let the board know by email next week.

Lewiston Basin and Vicinity Trip - (Dave) is planned for April 30th to May 3rd. Dave will be coordinating carpooling. Keegan Schmidt will give an orientation on Wednesday April 30th at Lewis & Clark State College. The trip will start Thursday at 8:30 a.m. at the jet boat ramp. Publicity and liability releases make it clear that the jet boat trip is not being organized by GSOC.

Wallowa Lake/Baker trip - (Larry) will be planned for late June or July. Larry will be scouting the area with a NARG member and is still looking for a trip guide.

## Newsletter/email/website

Dawn sent letters to institutions letting them know that we would be moving to e-newsletter and received only two requests for a hard copy. Motion passed to form a Media/Technology committee which will address our use of newsletter, e-newsletter, website, Twitter and Facebook and allow Dawn to remove non-paying recipients from the online membership list at her discretion. The committee will also address community outreach to high schools and community colleges. The board approved linking of the obituaries of GSOC members to the e-newsletter.

## Library committee and scanning of Presidents' Volumes

(Bo & Larry) two Presidents Volumes have been scanned and Bo will now scan the third volume. Carol will incorporate the Presidents PowerPoint into the website.

## Newsletter scanning

Tara beta-tested scanning by hand and reports that it is a time consuming, tedious process that will require a lot of computer storage space, and the product will not be searchable. Motion passed to allow Paul to get one box of the most recent newsletters professionally scanned and OCR'd if within \$250 range.

## Adjournment

*The next board meeting will be June 21st, 2014, 10:00 a.m. at Bev and Bart's house.*

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

## Electronic Mailing List for GSOC Members

GSOC will send electronic newsletters every two months to members. The mailing list will also provide a means to send occasional messages in

case of unexpected changes or cancellations of GSOC events, such as lectures or field trips. Members will still receive the paper newsletter in the mail. If you believe that we don't have your email address, and would like to be included in this list, please send an email to Paul Edison-Lahm at [edisonlahm@comcast.net](mailto:edisonlahm@comcast.net) with "subscribe" in the subject line.

Likewise, if you prefer NOT to receive the newsletter and messages electronically, please send an email with your name and "unsubscribe" in the subject line.

## WELCOME NEW MEMBERS FOR 2014!

Mary Turner  
Jennifer Frykman  
Clair Klock  
Tim Kirkpatrick

Lucy Barnet  
Jim Johnson  
Holly Olseon

## Geology Raft Trip in Dinosaur National Park

The Geological Society of America is offering a raft trip to Dinosaur National Park, June 5-11, 2014. Here is their description of the trip:

Spanning over a billion years of geologic time, this amazing Geo-venture will unravel the spectacular geologic history of the Dinosaur National Park region. After a day of exploring and hiking the Mesozoic rocks and the famed dinosaur quarry, we will embark on a guided, five-day whitewater journey down the Yampa River, the last undammed section of the Colorado River system.

This remote and scenic canyon system exposes classic Colorado Plateau stratigraphy, textbook examples of structures from the Laramide Orogeny, and amazing geomorphology. Your geology guide is experienced at communicating effectively with both technical and non-technical audiences so we

invite students, teachers, retirees, and geology enthusiasts of all backgrounds.

Cost of the trip is \$1675 (\$1575 for GSA Members) Price does not include transport to/from Vernal, UT.

If you are interested in this trip or want more specifics, email trip leader Shawn P. Willsey on [swillsey@csi.edu](mailto:swillsey@csi.edu). To register, contact Gary Lewis on [glewis@geosociety.org](mailto:glewis@geosociety.org).

Shawn Willsey is a Geology Professor at the College of Southern Idaho. He earned his M.S. in geology from Northern Arizona University and his B.S. in geology from Weber State University. He is also a licensed professional geologist in the state of Idaho and previously worked as a hydrogeologist for an environmental consulting firm and an exploration geologist for a mining company. He has led multiple field trips to various locations of Western North America including the Colorado Plateau, Hawaii, the Pacific Northwest, and the Mojave Desert.

## GSOC Banquet Recap

synopsis of the 79<sup>th</sup> Annual GSOC Banquet, Sunday, March 16, 2014

After outgoing GSOC President John Piccininni gave his farewell address, President Sheila Alfsen was presented with the GSOC memorabilia- the pick axe, gavel and the copy of The Two Islands by Thomas Condon that each GSOC president has signed since GSOC's inception. Sheila then introduced the 2014 board members.

During her inaugural address, Sheila stated that she was pleased and honored to be a part of GSOC because of its rich history of fostering geologic interest and supporting geologic study in the Pacific Northwest. As such, her goal as president was to maintain and continue what we have been doing well for nearly 80 years.

There were a few additional items that Sheila wanted to address as president. She feels the need to reaffirm and strengthen our association with Portland State University, an objective which has

been nicely initiated, thanks to the efforts of Vice President Janet Rasmussen. Janet has lined up PSU professors as GSOC speakers as well as introducing herself and GSOC to student geology clubs. Sheila also expressed that she has seen the need for geology to be introduced to high school students and would like GSOC to reach out to local schools.

Finally, in light of our 80th anniversary approaching, Sheila asked us to take a look back in time when GSOC was started in 1935 and the vision that Edwin Hodge had. At that time, Alfred Wegener's proposal of Continental Drift has only been published in the United States for barely a decade, and it would be another 40 years before it would cease to be ridiculed and taken seriously and developed as the modern theory of plate tectonics.

When GSOC was started, the focus of geology was to map the territory and find mineral resources. Here, 80 years later, the need for geologic education is no less relevant, for today we grapple with geologic hazards and the continuing need to conserve and manage the natural resources. As our environmental problems become global in today's world, the need to educate and interest people in geology is every bit as important as it was in our beginning.

## Two-Minute Geology of the Kittitas Valley

synopsis of the Seventy-Ninth GSOC Annual Banquet lecture by Nick Zentner, M.S., Senior Lecturer at Central Washington University, Ellensburg, WA  
by Sheila Alfsen

Nick Zentner gave a riveting lecture on the geology of the Kittitas Valley where his home is located. Starting out with an old fashioned "chalk talk" on a large blackboard that he had rolled in, Nick first depicted the location of Ellensburg on a hasty but accurate drawing of Washington State. He noted that the subject of his lecture was in the center of the state, using letters to represent other points of reference such as Seattle, Spokane and Tri Cities.

On the light side, when someone in the audience pointed out that Nick had labeled the Tri Cities area as being in Oregon, he adjusted its location by moving it somewhat to the north. All the while he was drawing, he motioned behind his back towards the audience a gesture which roughly translated to, "Picky, picky, pick-ee!". This became a focal point of humor throughout the rest of the lecture, where he always made a point of specifically noting the precise location of Tri Cities.

Nick showed that the Kittitas Valley was a lenticular, elongated valley oriented Northwest to Southeast. This fact becomes important later as he discussed the tectonic forces acting on the area.

The geology of the area was completed in four main stages. The first, occurring during the Cretaceous period was the acquisition onto a young, developing west coast of North America of the accreted terranes. These terranes were large pieces of land that were too buoyant to subduct into the trench of the Juan de Fuca plate as it slides under the North American plate. Nick showed how the terranes were "pasted" onto the continent in layers, one by one, gradually causing the ancient coastline to retreat westward as more land was added on. He noted how these terranes became the "basement" rock to which the rest of the state was resting on.

The second stage was one of volcanism from two main sources. Continuing subduction during the Eocene and into the Miocene brought periods of volcanism. The young Cascades were getting their start, blanketing the area with alternating layers of white ash and lahars of today's Ellensburg Formation. He was careful to mention that these young Cascades were not the familiar peaks today of Mt Rainier, Mt St Helens, and Mt Adams, but rather older cones that have long since eroded away.

A second form of volcanism had its genesis in great fissures that opened along the boundary of eastern Washington and Idaho, which spewed out tremendous volumes of black lavas collectively called the Columbia River Basalts. Nick pointed out that these younger lavas made their way across the state, building the Columbia Plateau and

terminating at the edge of the Kittitas Valley during the Miocene.

In the third stage of development, Nick showed how the whole coast of the Pacific Northwest is being tectonically altered. A network of GPS stations had been installed a decade earlier into the bedrock of areas of North America. Tracking the motion of the various stations by satellite shows that the western part of our continent is rotating around a central point located in today's Pendleton area. The motion of the warping land is clockwise. Vectors which denote plate motion as arrows show more rotation on the outermost area of the circle as one would expect, while the area around Pendleton is barely moving at all. This tectonic motion has a profound effect on the structure of the landscape, causing the NW-SE up-warped folds of what is called the Yakima Fold Belt. These valleys and ridges, called anticlines and synclines, account for the parallel ridges that characterize the area. Rivers such as the Yakima cut their way through these folds in what is referred to as "gaps".

The final stage of development is the huge influence that Pleistocene glaciation had on the area. The Cascades were heavily mantled in ice and snow as Alpine glaciers carved out spectacular valleys that are enjoyed today. On an even larger scale, the area was shaped by the great ice sheets that covered North America during the Ice Ages. Although these great masses of ice did not reach as far south as Ellensburg, the outpouring of flood waters from glacial Lake Missoula left a spectacular effect on today's landscape.

Nick's blackboard talk was followed up by the recent technology using a Power Point presentation in which he showed images of various scenes from the area. A particular interesting part of the lecture was the use of various short videos from a series that Nick created entitled, "Two Minute Geology", in which he explains and illustrates the local geology in small vignettes. Decked out with a red bow tie, and strumming a guitar, Nick delights audiences of all types with these informative presentations which can be easily streamed as YouTube videos. Nick's lecture to GSOC did not fail to entertain and educate all.

## Afterward and Additional Reading

Zentner has been with CWU Geology since 1992. He advises geology undergraduates and mentors graduate students teaching in the field and in the lab. Nick teaches a popular "Geology of Washington" course to CWU students every quarter - and his course is open to townspeople for free! He received the 2011 CWU Most Inspirational Faculty Award and the 2012 CWU Presidential Faculty Award. To see some of Nick's work follow these links: [Nick's Website](#) and [2-Minute Geology](#).

## Reference Geologic Time Scale

- II. Geologic Time Scale (oldest to youngest)
  - A. Eras
    - 1. Paleozoic (600 - 245 m.y.)
    - 2. Mesozoic (245 - 66 m.y.)
    - 3. Cenozoic (66 m.y. - present)
  - B. Periods
    - 1. Cambrian (600-500 m.y.)
    - 2. Ordovician (500-430 m.y.)
    - 3. Silurian (430 - 400 m.y.)
    - 4. Devonian (400 - 360 m.y.)
    - 5. Mississippian (360-320 m.y.)
    - 6. Pennsylvanian (320-280 m.y.)
    - 7. Permian (280-245 m.y.)
    - 8. Triassic (245-210 m.y.)
    - 9. Jurassic (210 - 140 m.y.)
    - 10. Cretaceous (140 m.y. - 66 m.y.)
    - 11. Paleogene (66 m.y. - 23 m.y.)
    - 12. Neogene (23 m.y. - 1.6 m.y.)
    - 13. Quaternary (1.6 m.y. - present)
  - C. Epochs (for Cenozoic)
    - 1. Paleocene (66 m.y. - 58 m.y.)
    - 2. Eocene (58 m.y. - 37 m.y.)
    - 3. Oligocene (37 m.y. - 23 m.y.)
    - 4. Miocene (23 - 5.0 m.y.)
    - 5. Pliocene (5-1.6 m.y.)
    - 6. Pleistocene (1.6 m.y. - 10 k.y.)
    - 7. Holocene (<10 k.y.)

from Orr and Orr, *Geology of Oregon*, Kendall Hunt Pub Co; 5th Edition (October 1999)

## *Adventures in Mazama Pumice*

synopsis of GSOC Friday night lecture, April 11, 2014, from PSU Geology Department Chair Dr. Michael Cummings  
by Carol Hasenberg

PSU Geology Department Chair Dr. Michael Cummings spoke to GSOC about the "Water and Pumice...Adventures in South-Central Oregon" that he and his students have been having for the last several years. The landscape studied by Cummings and his students were areas to the north and east of Mt. Mazama (now Crater Lake) that were greatly affected by the output of pumice and pyroclastic flows from the eruption of this great volcano about 7700 years ago. These studies feature both the formation and stratigraphy of the output of the volcano and the subsequent interaction of the stratigraphy with water which produce the hydrogeological characteristics and landforms that we see today.

Cummings' talk described three types of studies he and his students have conducted in this system – stream characteristics in eastward flowing streams from the Cascades highlands, the creation and life cycle of a post-eruptive lake as a result of damming the Williamson River by pyroclastic flows, and the existence and hydrologic characteristics of high elevation marshy plateaus south of Walker Rim.

As a result of the plinian Mazama eruption, a blanket of pumice settled first to the east, then north of the mountain as the wind carried it. Pyroclastic flows generated later in the ring vent eruptive phase covered the pumice on the eastern flank of the Cascades. The permeability of these layers affected streams evolving along this flank.

Initially, and in the upper reaches of these streams today, the water was perched atop the impermeable pyroclastic flows and thus continued to flow in the topography blanketed by the eruption. The streams flowed down to the valley below creating alluvial fans where the slope became gradual. As the years progressed, the water incised the pyroclastic deposits in the less steep slopes and eroded the permeable pumice beneath it, forming steep-walled canyons. The alluvial fans were displaced eastward as a result of this process. Not only that, but as the streams flow into the canyons they lose water into the groundwater system. The stratigraphy and water flow have been studied by Cummings' group in



streams such as Cottonwood Creek flowing from Mt. Thielsen.

The second group of studies involved the lake that formed as a result of pyroclastic flows damming the Williamson River after the eruption of Mt. Mazama. This lake was short-lived and fluctuated in elevation, so it never cut shorelines into the topography, but its existence was determined from eroded sand dunes, other erosional and depositional features of the pumice around the lake edges, rounded pumice boulders below the level of the lake, and other such evidence. The pumice layer was quickly eroded into a glassy silt deposit within the lake.

Cummings' group determined a life span of the lake using water budget calculations involving rain and snowfall, evaporation rates, etc., as about 30 years. Eventually the lake overtopped the flow stopping it and quickly drained away. The area we know today as the Klamath Marshes was contained within this lake, which covered approximately 230 square miles.

The last group of studies covered by Cummings was of a high plateau north of the Klamath marsh area, and bounded on the north by the Walker Rim. This area was blanketed by a layer of pumice from the Mazama eruption, and the pumice layer behaves much like a sponge in retaining water released by the yearly snowmelt. Cummings' group has studied the character of the pumice, whose volume is 75-88 percent vesicles (air holes). This material absorbs water over time and slowly releases it, and low

relief areas have become unique high altitude marshes.

The group also has taken measurements of the water on the plateau in a number of sites. The measurements included the sample depth, electrical conductivity, and temperature and were taken at multiple times. Iron content was inferred from the conductivity, which in turn revealed the source of the water, as well as the temperature readings. Although much of the water in the region comes from the snowmelt, the research group found places where the water is much higher in iron and moderates its temperature out of sync with the ambient snowmelt. Thus they believe that structural faults in the bedrock below the pumice act as conduits for a deeper, possibly geothermal aquifer.

### **References and Additional Reading**

Cummings, Michael L. and Conaway, Jeffrey S., "Landscape and hydrologic response in the Williamson River basin following the Holocene eruption of Mount Mazama, Cascade volcanic arc," published in GSA Field Guide #15, 2009, Volcanoes to Vineyards: Geologic Field Trips through the Dynamic Landscape of the Pacific Northwest, edited by Jim O'Connor, Rebecca Dorsey and Ian Madin. Geological Society of America, October 2009, p. 271-294. This out of print book is now available in ebook format from Google Books for \$7.99.





# THE GEOLOGICAL NEWSLETTER

"NEWS OF THE GEOLOGICAL SOCIETY OF THE OREGON COUNTRY"

VOLUME 80, NUMBER 4  
JULY/AUGUST 2014

## The Geological Society of the Oregon Country

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VISITORS WELCOME AT ALL MEETINGS

## JULY/AUGUST ACTIVITIES

At this time we are not planning a July or August speaker. Friday night lectures are planned to resume in September. Please refer to the GSOC website for further announcements on speakers.

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

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

## FUTURE ACTIVITIES

Upcoming 2014 field trips are scheduled:

- Mt. Hood/Eliot Glacier – July 19 and 20 – see attached flyer (mailed newsletter recipients)
- President's Field Trip – September 3-6
- GSOC Annual Picnic – August 17

### **GSOC Annual Picnic, Sunday, August 17, 2014:**

This year's annual picnic will be held at [Guy W. Talbot State Park](#), which is located west of Bridal Veil State Park and east of Vista House on the Historic Columbia River Highway in the Columbia River Gorge. At this year's annual picnic, we plan to gather at the shelter in the park at noon. Take the Bridal Veil #28 exit off east-bound I-84, and go west on the Historic Columbia River Highway about 2 miles to the park.

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.

After the picnic the participants may wish to take the short walk to Latourell Falls, or drive to the trailhead near the freeway exit and hike up to Angel's Rest. Participants are encouraged to look for last-minute announcements on the calendar page of the GSOC website, [www.gsoc.org](http://www.gsoc.org).

### **President's Field Trip: Tertiary Sedimentary Geology of the Oregon Cascades**

Wednesday, September 3, 2014 – Saturday, September 6, 2014

Join us for this year's President's Field Trip to Silver Falls State Park and the Eastern Cascades! Led by GSOC President Sheila Alfsen, this trip will feature Dr. William Orr as guest speaker on the western side of the Cascades and Jason McClaughry of DOGAMI on the eastern side.

Fee: \$75, includes lodging for the nights of September 3 and 4 at Silver Falls State Park New Ranch House. Participants must supply their own bedding and mattress pad for this facility, or book their own motel room in nearby Silverton (not included in trip fee).

Limit of participants: 25

Deadline for registration: August 17, 2014

Participants will want to secure their motel reservations for the night of September 5 in Madras. We have registered for group rates at the [Inn At Cross Keys Station](#) (\$95 single king/\$99 double queen) 541-475-5800 or the nearby Econolodge Madras Chateau Inn (\$63+tax single /\$72+tax double) 800-227-6865. Participants need to tell the reservation clerk that they are with the Geological Society of the Oregon Country to get the group rate.

Online registration for the President's field trip is already available. Please visit the GSOC website ([www.gsoc.org](http://www.gsoc.org)) to register for the trip. Call or email Sheila if you have additional questions.

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

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

## **BOARD MEETING NOTES**

June 21, 2014

The meeting was called to order at the home of Bev Vogt and Bart Bartels. Vice-president Janet Rasmussen chaired the meeting in President Sheila Alfsen's absence. Board members in attendance constituting quorum were Janet, Dawn Juliano, Paul Edison-Lahm, Bev Vogt, Bo Nonn, Marty Muncie, and John Piccininni. Also in attendance were GSOC members Dave Olcott, Larry Purchase, Bart Bartels, Carol Hasenberg, and Tara Schoffstall. The minutes of the April 12, 2014 board meeting were approved.

### **Treasurer's Report**

The Treasurer's report was approved.

Dean Garwood contributed his \$100 from GSOC to the University of Idaho Foundation in GSOC's name. We thank him very much!

Dawn presented this year's projected budget to the board. She notes that dues are down this year. Possible ways to increase revenue were discussed, including increasing membership fees, increasing field trip fees, taking donations at the Friday night lectures, accepting membership payments online, and using email to remind members to renew. Paul will send email reminders to members who have not yet paid their dues.

### **Events**

#### **Friday Night Lectures**

Janet has commitments from speakers for upcoming lectures through the end of the year (with dates TBA). Janet will now be scheduling a speaker for September also. Dr. Adam Booth is scheduled to speak in October. The Board decided to request a \$3 donation at the door. (This will be free for students.)

**Snacks.** The new donations are intended in part to cover the cost of the after-lecture snacks. Marty will

be recruiting new members to do snacks – September and November positions have been filled.

### **Annual Picnic**

The annual potluck picnic will be held at Guy Talbot State Park on August 17<sup>th</sup> at noon, preceded by the board meeting at 10:00 a.m. Last year's potluck assignment by last-name will be shuffled for posting on the website.

### **Lewiston field trip recap**

To cover costs, people purchasing the field trip guide without going on the field trip were charged the full field trip price.

### **Field Trip Planning**

Registration forms will need to go into the newsletter and could also be submitted online in the future.

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

Most recent itinerary information is on the website. Sheila has not set a fee or a participant cap yet.

### **Mt. Hood Trip**

Larry submitted a draft of the Mt. Hood field trip info and registration. (*Flyer is attached to this newsletter*). Participants have been warned in the registration form that adequate vehicle clearance is required for driving on Cloud Cap Inn Road. The trip fee will be increased to \$40 for the first day and \$60 for both days.

### **Celebrating our 80th birthday**

To commemorate our 80<sup>th</sup> birthday, Sheila is investigating getting a prominent geologist to speak at the annual banquet, although cost is a concern here. Other ideas include: posting "80 years ago today" excerpts from the newsletters, posting information about past presidents which have been added to the website; scanning and posting old photos, having an historical theme for next year's picnic, and connecting with the Oregon Historical Society.

### **Old and New Business**

### **Media Technology Committee;**

Recognition was given to Paul for setting up the Squarespace website. The board approved paying for the Squarespace website at the \$16/month rate [for an annual cost of \$192].

### **Library committee and scanning of President volumes**

Janet will contact our recent Presidents who have not yet submitted their bios.

### **Newsletter scanning**

The board approved scanning the remaining two boxes of newsletters from 1935 to 1989.

### **PSU Student Liaison**

Janet will explore this issue further.

### **Benefactor appreciation**

The board approved the purchase and engraving of a rock hammer for appreciation of an anonymous benefactor.

### **Announcements**

Larry called our attention to an upcoming Oregon Experience on "Quest for First People" which replays tomorrow (6/22/14) 8:00 p.m on OPB.

Larry will provide Paul with information for posting about NARG's July Wallowa Mountain field trip.

### **Next board meeting,**

The next board meeting will be held before the annual picnic at 10:00 a.m., Aug. 17<sup>th</sup> at Guy Talbot State Park.

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

## **Website v3.0: GSOC Communication in the 21<sup>st</sup> Century**

by Carol Hasenberg

In the past six months GSOC members may have noted some dramatic changes in the way we are communicating to our members. I'd like to outline what has been happening and the reasons and advantages for those changes. Broadly, we are making these changes so that we can disseminate

upcoming events as well as our archival information to all of our existing as well as potential members. We think that this is the way to keep our club vigorous and long lasting.

First of all, if you have looked at our website recently ([www.gsoc.org](http://www.gsoc.org)), you may have noticed that it looks completely different! But if you look closely you can see that a lot of the old content has been shifted to the new site. We have Paul Edison-Lahm to thank for setting up our new site and ISP to Squarespace, an online authoring and webhosting site. He has done a terrific job in doing the initial work and enthusing many of the rest of us in a push to make this site the best GSOC website ever.

The biggest changes you might note to the website have been in the presentation of the home page and the calendar. The upcoming events (i.e, the calendar) is now a sidebar on the home page and some of the other website pages. There are additional pages that describe GSOC field trips and lectures and information about attending those as well. Links to those pages are in the main menu of the home page.

The main body of the home page is now in blog format. In other words, there are articles and announcements that have a shortened version or excerpt and thumbnail image, with a “more” link so that the reader can expand and read the complete article. The articles include those published in the newsletter and other related announcements. One great advantage of having an online version of the articles is that pictures, video clips, or slideshows can be included with the article. That has been a problem with the Xeroxed paper newsletter that we have traditionally done.

Some things we’re considering doing with the website in the near future are to add social media links so that articles can be disseminated to a wider audience, and making links or otherwise integrate our Facebook and Twitter presence into our website. We are also testing an online payment system for membership dues and possibly other activities.

So far we have been reaching into the future with our discussion of the website, but would you believe that we are also going back in time too? For you history buffs, GSOC has been embarking on an ambitious project to get some of our chief archives to the fingertips of all our members. These archives have largely been languishing in our library and cupboard and deserve to be seen! You’ll notice that in the About link in the main menu there is a link to the History page. You can read the history articles on the page (transferred from the old website) or link to the history archives section. So far we are putting up the GSOC Past Presidents books from our cupboard to the site. Some of the past presidents were really heavy hitters in the geology professionals of our state, so the articles are very interesting. Thanks to Bo Nonn and Carol Hasenberg for working on that!

The other history project is that we are having all of our past newsletters scanned on searchable pdf’s. Did you hear me say searchable? You did! Huge thanks to Tara Schoffstall, Bo Nonn, and Paul Edison-Lahm for researching the possibility of doing this work and getting the vendor, Scan-It, Inc., in Beaverton to implement it. We’ve gotten one third of the project completed and look for completion of that this year.

History projects we may be contemplating in the future include revamping our past field trip archives. If you have any interest in helping with one of these projects, the GSOC board of directors would love to hear from you!

So now I can hear some of you wondering or worrying what will happen to the old paper GSOC newsletter and whether you will be able to keep up with the club from home. Not to worry! GSOC still plans to publish a bimonthly newsletter. It will be sent to the majority of the membership via electronic link (email) and through the mail to members who request a paper copy. Reducing the printing and mailing costs has been extremely beneficial to the GSOC budget, so we are encouraging the members who can to get the electronic version. The newsletter will also be available on the website in pdf format (look at the

homepage calendar sidebar). See the details on the newsletter service below:

GSOC will send electronic newsletters every two months to members. The emailing list will also provide a means to send occasional messages in case of unexpected changes or cancellations of GSOC events, such as lectures or field trips. Members who do not sign up for the email list will still receive the paper newsletter in the mail. If you believe that we don't have your email address, and would like to be included in this list, please send an email to Paul Edison-Lahm at [pauleidisonlahm@gmail.com](mailto:pauleidisonlahm@gmail.com) with "subscribe" in the subject line.

Likewise, if you prefer NOT to receive the newsletter and messages electronically, please send an email with your name and "unsubscribe" in the subject line.

## **NARG trip to Wallowa Mountain**

The GSOC trip to Wallowa Mountain being organized by Larry Purchase has been postponed until 2015. However, NARG (North American Research Group) will be going this July 24-31. The trip will visit 5 fossil sites and other activities in the Wallowa Lake area. GSOC members may join this trip by joining NARG and contacting Larry Purchase (360-254-5635).

Larry also says that NARG members are getting involved in a project called FOSSIL, which is building bridges between the amateur and professional paleontological communities, and creating more field opportunities for fossil enthusiasts. For more information see the website [www.myfossil.org](http://www.myfossil.org).

## **LUSI Mud Eruption: Natural or Man-Made Disaster?**

Synopsis of the June 13, 2014, Friday night lecture by Dr. Maxwell Rudolph, assistant professor, PSU Geology Department  
by Carol Hasenberg

Ever since the mud started spewing from the Lumpur Sidoarjo (aka "Lusi") mud volcano in the subdistrict of Porong, Sidoarjo on East Java Island, Indonesia, on May 29, 2006, an opportunity to study the feature and, fortunately or unfortunately, become embroiled in the political controversy over it opened in the geological community. Newly appointed Assistant Professor Maxwell Rudolph of Portland State University was involved in studies related to this phenomenon during his doctoral years at UC Berkeley ending in 2012, and spoke to GSOC at the June Friday night lecture describing his work.

Lusi is the world's largest mud volcano, and at its peak it discharged 180,000 cubic meters of mud per day, and the current discharge is 10,000 cubic meters per day. The Lusi volcano inundated an area of several square kilometers within a mixed use suburban area, and the mud has destroyed the homes and livelihood of thousands of people, with damage and cleanup costs estimated to exceed \$1 billion.

Two incidents occurred immediately prior to the eruption which ignited the controversy over its origin. On May 27, 2006, a MM6.3 Yogyakarta earthquake occurred more than 250 km away to the southwest of the eruption site. Also, on May 28, 2006, a PT Lapindo Brantas gas exploration well being drilled at a distance of 200 meters from the eruption site produced a "kick" or blowout. It is significant that the well was nearly 3 kilometers deep with only the top 1100 meters of the well having steel casing.

The drilling company subsequently blamed the mud volcano on the earthquake and claimed that their drilling activity was coincidental to the eruption of the nearby mud. Rudolph's research group, advised by Michael Manga of UC Berkeley and in

collaboration with a team of American and international geologists, got involved to work out the mechanics of naturally produced mud volcanoes and ascertain what sort of earthquake event might produce mud volcano activity.

The studies done by the research team focused upon a group of mud volcanoes produced by seismic and geothermal activity associated with the terminus of the San Andreas fault beyond the southeastern margin of the Salton Sea in California. Here lacustrine and deltaic deposits are underlain by relatively shallow heat sources, so that hot mud and gaseous emissions create a group of mud eruptions. Shortly after the study began, a major earthquake, the April 4, 2010 El Mayor-Cucapah MM7.2 Earthquake, produced strong shaking in the area. Several smaller quakes hit the area during the study as well, and enabled the research group to measure the heightened activity of the mud eruptions immediately following the earthquakes and compare it with normal eruptive activity.

In the Salton Sea mud volcanoes, a definite relationship was found between earthquake shaking and mud eruptions. The researchers measured gaseous output from the mud eruptions as well as counting the number of fresh eruptions in the field. These output results were plotted on a seismic energy density contour map, this being a function which combines the magnitude of the quake and the distance from the quake. They found that there is a seismic energy density threshold below which the earthquake shaking did not result in eruptive activity for the study site. Several smaller earthquake events during the study did not have a noticeable effect on the mud volcanoes. They also noted that duration of shaking and frequency response of the earthquake affected the mud volcanic output. The researchers also compiled a database of earthquake triggered mud volcano eruptions worldwide which were plotted on the graphs.

And how can these results be used to compare the mud volcanoes at the Salton Sea to the Lusi volcano? The ground shaking relationships with mud volcano output suggested that the Yogyakarta earthquake did not produce enough shaking at the

site of the Lusi eruption to be a causal factor. No other mud volcanoes erupted as a result of this earthquake, either.

In addition to the field measurements the research team analyzed the gaseous discharge and studied the mud's mechanical responses to stress (i.e., its rheological properties). They looked at the mechanisms that the conduits of the mud volcano had for conveying the mud to the surface. They believe that the main mechanism leading to a mud eruption is an increase in the permeability of the overburden, effectively "unclamping" the conduits to the surface, as well as bubble propagation which is stimulated by ground shaking.

The geology of the Lusi mud volcano is somewhat different than that of the Salton Sea mud volcanoes as the mud source is a bit deeper. Marine carbonates and muds are folded into an anticline that has been over-pressured since the Miocene. Scientists who support the idea that the drilling produced the mud volcano believe that the pressure at the drilling depth exceeded the ability of the uncased well sides to withstand it, causing the observed "kick" and a chain reaction of fracturing in the mud strata resulted, which propagated to the surface. Several studies, which both support and refute this idea, have been put forth and analyzed by the scientific community.

What will happen to the Lusi mud volcano in the future? Currently the mud is being contained by levees constructed around an area of several square kilometers and excess mud is being drained off into a manmade river nearby and sent out to the coast, with the associated environmental degradation implied by that scheme. The discharge has been decaying so that by 2017 it is expected to drop below 1000 cubic meters per day. There has been measurable ground subsidence in the area surrounding the mud volcano and gas well which reflects the evacuation of the mud from the source chamber below. Some reparations have been paid to the victims but they only have amounted to a fraction of the damages.

Other studies are being conducted to better understand the eruption of mud volcanoes. They



are found at plate boundaries throughout the world, usually underwater. Rudolph cited studies at the most violent of mud volcanoes in Azerbaijan and a newly formed mud island off the coast of Pakistan. Hopefully the knowledge gained in the study of these eruptions will be put to responsible use in preventing events like those that created Lusi.

## References and Additional Reading

[Wikipedia: Sidoarjo mud flow](#) web page has good background on the Lusi mud volcano.

Cyranoski, D. (2007). Indonesian eruption: Muddy waters. *Nature*, 445(7130), 812–815. doi:10.1038/445812a

Davies, R., Swarbrick, R., & Evans, R. (2007). Birth of a mud volcano: East Java, 29 May 2006. *GSA Today*, 17(2), 4–9.

[Maxwell Rudolph publication page](#) includes links to many of his articles.

Rudolph, M.L., Tingay, M., Manga, M., Davies, R.J., Wang, C.-Y. The Lusi mud eruption was not triggered by an earthquake. *Comment submitted to Nature Geoscience*.

## *Studying The Columbia River and Its Sediment*

Synopsis of May 9, 2014, Friday Night GSOC Lecture by Dr. Curt Peterson, Portland State University, Department of Geology.  
by Carol Hasenberg

When Portland State University hired Dr. Curt Peterson twenty-five years ago, one of the tasks they gave him was to research the geographic extent and stratigraphy of the Lower Columbia River channel. Prior to charging this task to him, Portland State University had not conducted any geologic research into this important local geologic feature, and the only geologic section that had been done of the channel was at the Astoria Bridge.

The Columbia River is unique on the West Coast of North America, as it is the only river to have eroded its way through the Cascade Mountains and Coast Range. It drains an enormous area, which includes the Snake River Basin of Idaho, its own origins in Washington, Idaho, Montana and British Columbia, and the Willamette River Basin of Oregon. It is also the largest river in the Pacific Northwest and the fourth largest river by volume in North America.

There are also many stakeholders in the Columbia River system, from navigation to municipalities to agriculture to transportation across the river. Fortunately this made it easy to access funding for studies of the river's channel, and also there were private interest groups willing to share their data with the research group in order to gain a comprehensive picture of the system. Data collected by the researchers and private companies included seismic profiles, sonic rotary drill cores, well log data, and SPT data (drill hole stratigraphic consolidation info). Peterson's group confined their study to the Lower Columbia River Valley, which stretches from the mouth of the Columbia River Gorge on the east to the mouth of the Columbia River near Astoria, Oregon.

Peterson's work focused on the sedimentation within the channel in modern and previous geological times. The research group studied the modern Holocene sediment by examining its geometry, consolidation, and the mineralogical content of the sample cores for the origins of the sediment. They also located key temporal marker layers such as Mt. Mazama ash (eruption of 7700 years ago) and several eruptions of Mt. St. Helens, the most active local Cascade volcano in recent times, within the core samples they took. The group also studied the stratigraphy below the Holocene sediments, which included the Missoula Flood gravels of the Pleistocene and older river gravels of the Troutdale Formation. Below these layers were rocks such as Sandy River Mudstone and Columbia River Basalt.

Peterson's group generated isopach maps of the river channel. The channel sediments are widest directly northwest of Portland and between Clatskanie and Astoria. Between these wider zones

the channel is cutting through the hills of the Coast Range and is much narrower. The group also generated river channel stratigraphic sections at key points along the valley, including the Astoria Bridge, Oak Pt.-Clatskanie, Longview-Rainier, Sauvie Is.-Vancouver, I-5 CRC (proposed Columbia River Crossing site), and the I-205 bridge. The channel sections generally have variable width as discussed above, decreasing grain size and increasing depth. The Holocene sediments vary from about 35 meters in most of the I-205 cross section (with one 60m dip) to 120m at the Astoria Bridge. Some peculiarities characterize some of the sections, such as muddy sand to mud sections along the outside edge of the great bend the river makes in the Portland area, a huge thick deposit of Missoula flood gravels under the very wide section at Sauvie Island, and an island of bedrock (Mt. Solo) in the river at the Longview Bridge.

Probably the most significant finding in the study of the Lower Columbia River stratigraphy is the unusual depth of the Holocene sediments. The Lower Columbia River has one of the deepest sediment fills in North America. The stratigraphic layers below the Holocene are particularly important for siting building foundations for large structures such as the I-5 bridge crossing using current seismic design practices, as they are much more consolidated than the Holocene sediments. The current interstate bridge foundations are all sited within the Holocene sediments, which are too unconsolidated to survive the seismic shifting expected during a Cascadia Subduction Zone Earthquake.

A key environmental factor in the depositional environment of the Holocene sediments of the Columbia River was the effect that rising ocean levels had on the flow of the river in the lower reaches. At the end of the Pleistocene the continental glaciers were melting swiftly, so that the early Holocene saw rapidly rising ocean levels. This push of rising water had the effect of increasing the depth of the river in its lower reaches, and as the river valley was not steep sided, widening the river considerably, creating an accommodation space for the sediment. The increased channel area

subsequently slowed the current sufficiently (as total flow = area x current speed) so that the fine grained mud sediments were able to deposit out of the moving water rather than being washed into the ocean basin. Peterson's group was able to demonstrate that the deposition of sediment in the lower reaches kept up with the rising ocean level by comparing independent determination for ocean level rise against temporal markers in the Columbia River Holocene sediments. Also, this effect has lessened over time since ocean level rise has slowed.

In the middle and upper reaches of the Lower Columbia River Valley the Holocene depositional environment differed from the lower reaches. In the middle section the Coast Range mountains prevented the river from spreading much laterally, so the increased water velocity generally prevented the finest material from settling. Thus the channel sediments are narrower and the grain size of the deposited material is larger. In the upper reaches the river channel is somewhat less constrained and there are areas of mud and sandy mud but also large volumes of sand deposits.

Peterson's group also studied the abundance of three key minerals in a number of the borehole samples in order to determine the contribution of sediment from the three provenances of origin over time. During the early Holocene large amounts of postglacial sediment came from the northeastern Washington/Idaho/Canadian provenance. As more modern times approached and the climate shifted, higher percentages of the sediment load in the river came from the Willamette River/volcanic arc provenance. The contribution of the Snake River to the sediment load was more or less steady throughout the Holocene.

So, Peterson's body of work on this river channel encompasses the origin of its sediment, the processes that put it in place, its makeup and extent. This knowledge is beneficial in navigation, planning the building of structures in and near the river and locating wells and other subsurface work along the river channel.

#### References and Additional Reading

Peterson's article is available online at [this PDX Scholar library link](#).





# THE GEOLOGICAL NEWSLETTER

"NEWS OF THE GEOLOGICAL SOCIETY OF THE OREGON COUNTRY"

VOLUME 80, NUMBER 5  
SEPTEMBER/OCTOBER 2014

## The Geological Society of the Oregon Country

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VISITORS WELCOME AT ALL MEETINGS

## SEPTEMBER/OCTOBER ACTIVITIES

Friday Night Lecture, September 12, Selicity Icefire, post-baccalaureate student of geology at Portland State University, will speak on "Radon in the Willamette Valley: An Unexpected Hazard".

When one thinks of Oregon a main rock type springs to mind, basalt. This is especially apparent in the Columbia River gorge and the Willamette Valley where this rock is easily visible. Even our majestic mountains are a mixture of basalt and andesite. So why does the Willamette valley have such a high concentration of the carcinogenic radon gas that is often associated with granitic rocks? The answer can be found in the events of the last ice age and the massive changes this time created. Radon is the second leading cause of lung cancer in the US

overall and the leading cause among nonsmokers. Though an unexpected hazard in much of Oregon, there are solutions to the radon problem. It is simple to detect and mitigate, potentially saving hundreds of thousands of dollars in medical costs.

Selicity Icefire graduated from Portland State University in 2007 with a BS in anthropology (emphasis in archaeology) and a minor in geology. She returned to PSU in 2012 as a post-bac to earn her BS in geology. Under the guidance of Dr. Scott Burns her goal is to become an engineering geologist. Selicity is the main author of 'The Importance of Season in the Testing of Radon using Short-Term tests in Residential Structures, Portland, Oregon'. The study's conclusions have been presented at the Geological Society of America national meeting 2013, 2014 Oregon Academy of Science meeting, Portland State University

Research Symposium 2014, and the Geological Society of America regional meeting 2014. She is also one of the recipients of the first annual Burns Scholarship Award.

Friday Night Lecture, October 10, Dr. Adam Booth, Portland State University Department of Geology, will give a talk about a landslide in Norway he has researched titled "Deciphering a Newly Discovered Bedrock Landslide Complex above Hyenfjord, Western Norway."

Catastrophic rock avalanches are relatively common in the steep, inner fjord regions of western Norway and have historically caused hundreds of deaths either directly or by secondary effects such as tsunami-like displacement waves. The landslide team at the Norwegian Geological Survey recently discovered a mile wide, actively deforming bedrock slope above Hyenfjord, and this talk will report our preliminary hazard analysis of the site based on a variety of state of the data including GPS, satellite synthetic aperture radar, airborne and terrestrial laser scanning, and field mapping. For more info visit [Dr. Booth's website](#).

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

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

### **President's Field Trip: Tertiary Sedimentary Geology of the Oregon Cascades**

Wednesday, September 3, 2014 – Saturday, September 6, 2014

Reservations have closed for this exciting field trip to visit Cascades sedimentation sites on both sides of the Cascades mountain range. Led by GSOC President Sheila Alfsen, this trip will feature Dr. William Orr as guest speaker on the western side of the Cascades and Jason McClaughry of DOGAMI on the eastern side.

Call or email Sheila if you have additional questions.

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

## **FUTURE ACTIVITIES**

Friday Night Lecture, November 14, Dr. Martin Streck has been scheduled to speak.

GSOC 6<sup>th</sup> Annual Holiday Party is planned for Friday, December 12, at location to be announced. Party details will follow in the November/December issue of the newsletter and online at [www.gsoc.org](http://www.gsoc.org). We will be accepting donations from members to help cover party supplies and venue rental. Send donations to Dawn Juliano at the GSOC mailing address or give them to her in person at the event.

Friday Night Lecture, January 9, 2015, Dr. Scott Burns has been scheduled to speak.

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

## **BOARD MEETING NOTES**

August 17, 2014

President Sheila Alfsen called the meeting to order at this year's annual picnic site at Guy Talbot State Park. Other board members in attendance constituting quorum were Janet Rasmussen, Dawn Juliano, Paul Edison-Lahm, Bev Vogt, and Marty Muncie. Also in attendance were GSOC members Dave Olcott, Bart Bartels, Carol Hasenberg, Doug Rasmussen and Peregrine Edison-Lahm. The minutes of the June 21, 2014 board meeting were approved.

### **Treasurer's Report**

Treasurer's report was approved. New membership and renewal payments are now being taken online through Stripe and online dues have been raised by \$1.00 to cover the transaction costs.

## Events

Sheila reports that GSOC participation in the Volunteers of America “Kids at Home in the Wild” program went very well and she hopes to participate again next year. Bo Nonn, Ellen Nonn, and PSU student Jiaming Yang did a great job taking small children on a field trip to the Sandy River.

## Friday night lectures.

Janet has commitments for Friday night lecture from the following speakers: Selicity Icefire on mapping radon levels in Portland (September), Adam Booth on landslides in Norwegian fiords (October), Martin Streck (November), and Scott Burns on the Mt. Lassen volcano (January). GSOC will be setting up a donation box for the suggested \$3 donation at lectures.

**Snack committee:** In coming months Friday night lecture snacks will be provided by the following members: September – Bev & Bart, October – Sheila, November – Carol. Marty will recruit future snack committee members.

## Field Trips

Responding to a concern that weekdays are difficult for some members, we discussed clustering field trip dates around a weekend and the possibility of day trips.

**President's field trip:** Sheila has pre-run the field trip and will send out an informational letter to registrants soon. About fifteen people are registered so far. People will need to bring mattresses or foam pads for our stay at the Silver Falls Ranch House. Sheila has also arranged for GSOC discounts at both the Madras Econolodge and the Inn at Cross Keys Station for the second half of the trip. Paul will link a printable field trip form on the website.

## 80th Birthday Activities

**Annual banquet:** Sheila has enlisted plate tectonics expert Tanya Atwater to speak at the 2015 annual banquet. Since Prof. Atwater’s talk will be popular, registration should be opened early to GSOC and

other organizations — and we will also need a big banquet hall, so Dawn will investigate Ernesto’s and other venues. The date for the banquet was set for Sunday, March 8<sup>th</sup>, 2015.

## Other 80<sup>th</sup> Birthday activities may include:

- posting “80 years ago today” items on the website
- Janet’s Steens Area 2015 President’s field trip
- Paul’s Portland Building Stone field trip
- interviewing members about GSOC history.

Sheila will make an announcement at our next Friday meeting soliciting contributions about GSOC history and Bev will also contact Rosemary.

**Holiday Party:** Dawn has reserved the Benson House for December 12<sup>th</sup>, 2014; both Carol and Dawn will be on the holiday committee. However, an 80<sup>th</sup> birthday cake and celebration will be reserved until the 2015 Holiday Party.

## Old and New Business

### Newsletter Archive

All GSOC newsletters back to 1935 have been scanned to PDF format and Paul has linked them on the website. Scanning of the last two boxes from 1935 to 1989 included higher resolution scans of photos and maps and so was more expensive than the first box of 1990 to 2007. All PDFs are backed up in multiple locations and Paul will put the CDs in the GSOC library.

### New member outreach

Paul raised the issue of outreach to new members now that members can sign up online. Sheila will greet and welcome new members at meetings.

**Next board meeting 10:00 a.m., October 11<sup>th</sup> at Rosemary’s.**

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







# THE GEOLOGICAL NEWSLETTER

"NEWS OF THE GEOLOGICAL SOCIETY OF THE OREGON COUNTRY"

VOLUME 80, NUMBER 6  
NOVEMBER/DECEMBER 2014

## The Geological Society of the Oregon Country

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## NOVEMBER/DECEMBER ACTIVITIES

Friday Night Lecture, November 14, 2014, Dr. Martin Streck, Portland State University Department of Geology, will present " Eastern Oregon Rhyolites Provide New Clues to CRB Mysteries".

Dr. Streck's recent work on mid-Miocene rhyolites in eastern Oregon provides a critical clue to the origins of Columbia River Basalt magmatism. Our understanding of the Columbia River Basalt province and its likely connection to the Yellowstone hotspot has grown tremendously over the last decades since the Yellowstone volcanic field was first proposed as the present location of a continental hotspot. There is now strong support for a plume origin of the entire Yellowstone hotspot

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VISITORS WELCOME AT ALL MEETINGS

track and flood basalts of the Columbia River Basalt Group (CRBG). However, the decades-long controversy as to whether this Large Igneous Province (LIP) is indeed due to the arrival of a deep mantle plume is far from over and new non-plume models for the origin of the CRBG have been proposed.

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

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

**GSOC 6<sup>th</sup> Annual Holiday Party** – GSOC Members and their guests are invited to the 6th GSOC Annual Holiday Party and field trip slideshow, Friday December 5th, 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. Music will be organized by Dawn Juliano.

Schedule of Christmas Party activities:

- 6:00 pm: Set-up
- 6:30 pm: Dinner buffet
- 7:15 pm: Welcome presentation. Nominations for GSOC Board members for the 2014-2015 year will be open.
- 7:30 pm: Dessert and musical entertainment
- 8:30 pm: This year's GSOC field trip leaders with present the "Year in Review" program with brief slide show summaries of their trips.
  - Dave Olcott: "Lewiston Basin" – April 30-May 3, 2014.
  - Sheila Alfsen: "Tertiary Sedimentary Geology of the Oregon Cascades," September 3-6, 2014.
- 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..

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

*If you would like to come but are not yet a member of GSOC, you may join now and receive membership benefits throughout 2015.*

## **FUTURE ACTIVITIES**

Friday Night Lecture, January 9, 2015, Dr. Scott Burns has been scheduled to speak.

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

## **BOARD MEETING NOTES**

October 11, 2014

President Sheila Alfsen called the meeting to order at the home of Rosemary Kenney. Present were board members Sheila Alfsen, Dawn Juliano, Beverly Vogt, Marty Muncie, and John Piccinninni. Quorum was not met. Also attending were GSOC members Tara Schoffstall, Bart Bartels, and Rosemary Kenney. Tara Schoffstall stood in as secretary for the meeting in place of Paul Edison-Lahm.

Approval of August 17th, 2014 board meeting minutes (Sheila). No motions were made or approved in today's meeting.

### **Treasurer's Report (Dawn)**

The treasurer's report was reviewed. The President's Day Field Trip had a net gain for the club of \$364 after expenses of \$1,046 were paid. Jason McClaughry donated his \$100 honorarium to the PSU Geology field trip fund. Dr. Orr gave his \$100 honorarium back to the society.

### **Events**

#### Friday night lectures: upcoming speakers

Sheila expressed approval that many of our previous and future speakers are connected to PSU, as we have been losing touch with them, especially with the new staff. We want to keep our presence with PSU and the Geology Department. They have been very generous to us in the past and we appreciate them. Also, since GSOC no longer has an ODIN account to access the computers or internet, we need someone at the meeting with PSU access, or we will need to inform the speaker she/he will need to bring a laptop for their presentation.

#### Donations received by the Friday Lecture Donation Box

Donations to the box at the door for Friday night lectures totaled \$112 for the last two meetings. Sheila will continue to give reminders for donations before each lecture.

### Snack committee update (Marty)

Marty will open up the room and set up for snacks at 7pm. Whoever is in charge of snacks for the month simply needs to drop them off in the room to her and she will take care of it. Marty will be responsible for finding someone to take over if she is unable to attend a meeting. A suggestion was made perhaps each board member be responsible for one month of snacks. Also, the donation bowl will be kept out during snacks, in addition to the black box at the meeting. The donation bowl is for reimbursement, if someone asks.

### Field Trip Planning

President's field trip recap (Sheila)

Sheila noted that when distances are large between field trip stops, it is better to use a specific time and location to meet and let people drive on their own, rather than try to manage a large caravan. Due to safety concerns, it is strongly encouraged that people carpool, including the start drive from Portland.

Sheila also noted that having several different places to register (email, website, snail mail) made it difficult to determine who would actually attend the field trip. This in turn caused difficulty in predicting how many copies of guides to produce. Typically GSOC policy is that only people who have paid prior to the field trip should be allowed to attend and receive materials. It was recommended this item be discussed at the next board meeting.

Field trips for next year were not discussed.

### Holiday Party

Carol Hasenberg will host the Holiday Party at her house on December 5, 2014, starting at 6pm. Dawn Juliano will also help organize the party.

### Annual Banquet (Sheila)

Sheila has enlisted plate tectonics expert Tanya Atwater to speak at the 2015 annual banquet. Sheila is paying her airfare and hotel and will need reimbursement. Sheila is investigating whether coordination with PSU is possible to defray costs and increase community involvement. The Geology Department has indicated interest. Since Prof. Atwater's talk will be popular, registration should

be opened early to GSOC and other organizations. Due to the potentially large registration, it was suggested the payment deadline be strictly enforced. We will also need a big banquet hall, so Dawn will confirm if the Monarch is available for Sunday, March 8th, 2015, and inform Paul so it can be put on the website.

### GSOC 80th Birthday History Project

Many ideas were raised about projects. One idea was to see if any of our longtime members would like to share their GSOC history. Since Rosemary is a valued longtime member of GSOC, Sheila asked if she would give a short talk about her time with GSOC, possibly at the Holiday party. Other suggestions included having a Memory post on the website (and promoted throughout the year) where members could comment with their favorite memories and we could later share them either in the newsletter or at the Holiday party; and running a screensaver-type presentation of old GSOC photographs before each Friday night lecture.

Tara suggested we hold the Portland walking tour during the school year as an outreach to schools and students. Early May (Spring) was suggested. She will contact Paul to see if this is possible, and ask what needs to be done, and who to contact at Fossil Cartel for sponsorship at Pioneer Place. Tara suggested perhaps advertising could be in the form of postcards sent to the schools, as they are more likely to be read than a newsletter.

### **Old and New Business**

#### Nomination Committee (Sheila)

Janet Rasmussen and Bart Bartels agreed to be on the committee. Sheila will ask Dave Olcott or Dennis Chamberlain to join as well. Per the by-laws, they will report their selections at the next meeting.

#### GSOC Business Cards

Interest was expressed in allowing Anne O'Neill to create a business card for GSOC, with final approval by the board. Rosemary brought out an example of an older GSOC business card used years ago for reference. It was suggested that business cards be wallet-size, so when people ask

for more information on GSOC at our events, they can easily store and retrieve it. Dawn contacted Janet about who has the original version of the GSOC brochure, so it too can be updated and used.

New Members: Leslie Moclock, Tina Cobb, Matthew Vaughn, Derek Clark, Mary Eichhorn, Ana Meyer, Tim Kirkpatrick, Deborah Theisen, Heather Herinckx, Greg Aitken, Jiaming Yang, Kenneth Heininge, Steve Boyer, John Kelley, Sally Wojahn have recently joined the society. Welcome!

#### PSU Student Liaison

Sheila mentioned a comment card had a suggestion that perhaps one meeting a month be devoted to PSU students who would like to present their work. It was suggested perhaps this be the duty of a Student Liaison, to organize this night.

Rosemary reminded us that in the past, the recipient of the GSOC scholarship would also present. Sheila will ask Nancy Erickson if the money GSOC donates is an individual GSOC scholarship, or if it is included in a more generalized scholarship fund. Bev suggested that in the future we raise our PSU donation from \$800 to \$1000, but it was decided to discuss the idea more next year instead.

Next meeting will be held Saturday, December 13, 2014, 10am at Rosemary's house.

Notes compiled from board meeting minutes submitted by GSOC member Tara Schoffstall.

## **Slide Identification and Evaluation in Norway**

synopsis of GSOC Friday night lecture, October 10, 2014, given by Dr. Adam Booth, Portland State University Department of Geology, entitled "Deciphering a Newly Discovered Bedrock Landslide Complex above Hyenfjord, Western Norway"

by Carol Hasenberg

Dr. Adam Booth, who has recently been added to the faculty at Portland State University Department of Geology, spoke to GSOC on October 10 about

some work he has done with the Norwegian Geological Survey (NGU). Norway is a country with a landslide problem on its western shore. There some of the world's highest escarpments of gneiss and schist tower over steeply carved glacial fjords. Towns and villages huddle at the bottom of these steep slopes on flat land created by the rock falls and debris flows which come from the slopes above. Blocks of material catastrophically fail periodically along steep foliation planes, sending material plummeting into the fjord below and creating immense waves. Three such events occurred in the twentieth century, leaving a wake of destruction and taking nearly 200 lives.

Naturally Norway wants to monitor its landslide areas so that the problem areas can be identified and the population can be warned of imminent events. With a relatively generous budget, the NGU employs a number of methods to catalogue, assess, and monitor potential landslides. These methods include historical records, helicopter and terrestrial surveys, InSAR measurements, LiDAR scanning, and aerial photography.

Booth demonstrated the use of each method in the Norwegian landslide work. His presentation included a video clip from an old newsreel film made just after the landslide in 1936. The film showed the escarpment just after the slide and the destruction made by the wave it generated, which was about 30 feet in height. Sites can also be identified using helicopter surveys, aerial photography, and LiDAR.

Booth showed a number of slides of each of these methods being used on a landslide complex near Osmundnest on the Hyenfjord, a site he worked on in some detail. He was helping to identify the failure planes of the various blocks of material in the Osmundneset complex. The orientation of fractures is instrumental in the determination of the risk involved in the landslide hazard. It has been found that sedimentary bedding parallel to a steep slope is especially hazardous. The bedding planes of the Osmundneset complex were hard to determine. The location of seeping springs or bulges that often give clues to the base of possible failure planes were not in evidence. The overall geology of the

site is that it is part of a syncline structure that would create steep bedding planes on its edges.

In addition to evaluating the structure of a site, the NGU team typically will evaluate the effects of climate, topography, deglaciation, and seismicity on a potential landslide. Cold air can be trapped in the cracks of the rock when snow arrival is late. Topography can create hazards when compressive stress fields squeeze a local feature creating tension cracks.

Other studies that were done of the Osmundneset complex included terrestrial laser scanning to create a 3D model of the slopes, blocks and cracks. Also LiDAR images showed detailed 2D maps of the area. InSAR, satellite based microwave scanning, was used to detect minute motion vectors for the slide, which yielded rates up to 4 mm per year. A conclusion from this data showed that this site's motion is slowing down over time and has not failed since the ice retreated 12,000 years ago. So the NGU team will be heading off to discover and evaluate a new site. Osmundneset is basically an average site for this slide-prone environment.

