The Geological Newsletter

News of the Geological Society of the Oregon Country

2021 Archive of Club Activity

Volume 87, Number 1

CLUB ACTIVITIES

GSOC BOARD OF DIRECTORS 2021-2022

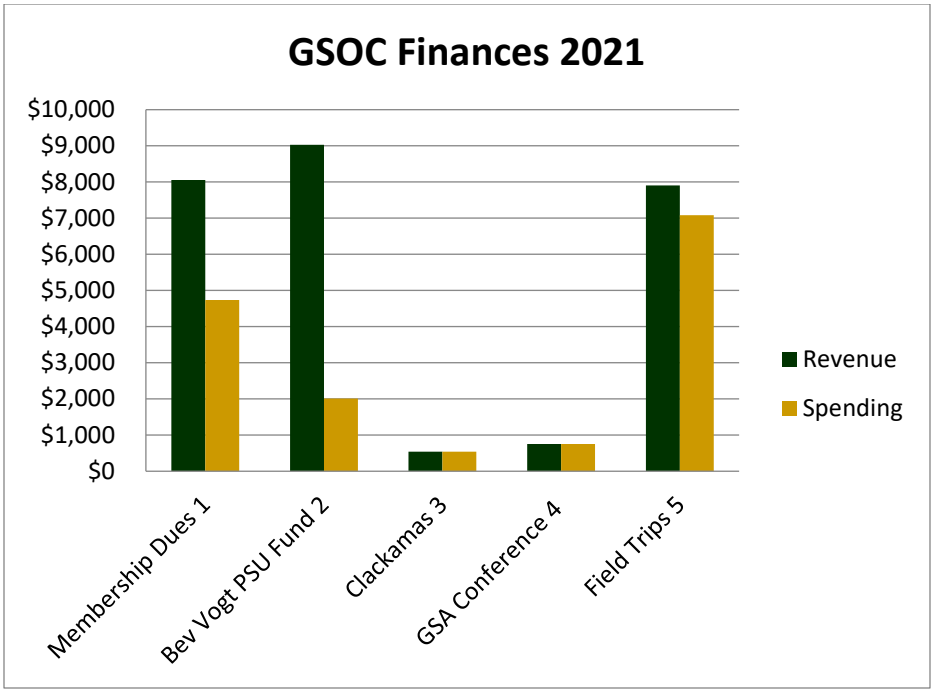
Board of Directors serves from March 1, 2021 to March 1, 2022. Slate of nominees for Board of Directors was voted and approved at the Annual Business meeting on February 12, 2021.

President	Clark Niewendorp
Past President	Sheila Alfsen
Secretary	Bonnie Prange
Treasurer	Barbara Stroud
Programming Director	Sheila Alfsen
Membership Director	Barbara Stroud
Field Trip Director	Carol Hasenberg
Communications Director	Paul Edison-Lahm
Outreach Director	Carole Miles
Member at Large	Dawn Juliano
Member at Large	Dennis Chamberlin
Member at Large	Scott Burns

GSOC ACTIVITIES 2021

In 2021, COVID 19 was still a huge presence in our everyday lives, and we continued having the GSOC Friday night lectures via the Zoom platform. This also allowed GSOC to expand its lecture audience across the US, and as a result we have increased our membership quite a bit. The organization plan and new bylaws adopted by the board and membership, respectively, in 2020 worked great and we tested out the capabilities of the Wild Apricot platform in 2021 for the resumption of GSOC field trips. It performed well in this task and the board made some recommendations on planning trips for 2022.

The Wild Apricot platform was also a huge success in 2020 and 2021 in organizing our membership data and reminding members to give their yearly membership dues. As a result, our financial picture has improved as well. In 2017, GSOC was about half the size it is today, and membership dues and Friday night donations paid the overhead bills and honorariums but not much more. Since then, the Board realized that there is room in the budget to consider giving more to the PSU Geo-Science Department.



2021 GSOC finances: GSOC Membership Dues pay for overhead expenses and speaker honoraria; Bev Vogt fund for grants/scholarships at PSU; Clackamas donations for Clackamas River Basin Conference sponsorship; GSA for the exhibitor's table; and Field Trips pay for their own expenses through field trip fees.

THE NEW GSOC BEVERLY VOGT PSU GRADUATE STUDENT FUND

A beloved long-time GSOC member, GSOC Past President, and graduate of PSU's master's program, Beverly Vogt, passed away in 2021. If you were on a GSOC field trip in the 90s or 2000s you likely will remember the amazing duo of Bart and Bev! To honor Bev and create a legacy for her work and that of the society, the GSOC Board of Directors created the Beverly Vogt PSU Graduate Student Fund. The Board formed a new committee to make recommendations as to the administration of this fund. The committee will be arranging for PSU grad students to present their projects and proposals, not only related to scholarships but also in the interest of developing a closer relationship between GSOC and the PSU Geology Department.

GSOC FRIDAY NIGHT MEETINGS, BANQUETS, PICNICS

Most of the 2021 GSOC Friday night lectures are recorded and available on our website, gsoc.org.

- January 8 – "Eyewitness to an Exploding Volcano: Mount St. Helens," by Keith Ronnholm.
- February 12 – "Central American vs. Cascadian Volcanoes," by Bill Burgel
- March 12 – "Exploring the Crooked River Caldera," by Carrie Gordon (in lieu of the annual banquet)
- April 9 – "On the Trail of Ice Age Floods," by Bruce Bjornstad
- May 14 – "Volcano Hazards in the Pacific Northwest," by Jon Major
- June 11 – "Sunstone Clues to Flood Basalt Magmatism," by Dr. Emily Cahoon

- July 9 – “Rocks, Minerals & Geology of the Pacific Northwest,” by Leslie Moclock
- August 20 – “The Oregon Gold Rush,” by Clark Niewendorp (in lieu of the annual picnic)
- September 10 – “20 Scientists I've Known and Admired,” by Dr. Bill Orr
- October 22 – “Growth of the Oregon Basin and Range Extensional Province,” by Dr. Andrew Meigs
- November 12 – “Ice Age Floods Geological Trail,” by Dr. Scott Burns
- December 4 – Annual Christmas Party was held at the home of John and Carol Hasenberg. Field trip slide shows were shown at the party covering all the field trips except for the Coaledo field trip (due to time constraints).

GSOC FIELD TRIPS IN 2021

The following GSOC field trips were done in 2021. GSOC board members Carol Hasenberg and Barbara Stroud devised a lottery system to ensure that most, if not all, GSOC members wishing to do so were able to go on a field trip this past year. And there were some really good trips too!

- May 26-30 and May 31-June 4, “Rafting on the John Day River with Ouzel Outfitters,” Dr. Gordon Grant, former Research Hydrologist, USDA Forest Service, and courtesy professor, Oregon State University Geology and Geophysics discipline in the College of Earth, Ocean, and Atmospheric Sciences, guest leader. These trips were planned and executed by Ouzel Outfitters, who planned the trips especially for GSOC members. A total of 23 members attended. Barbara Stroud assisted with the organization.

- June 25-28, “Eastern Oregon Volcanics related to the Yellowstone Plume,” planned in conjunction with AWG (Association for Women Geoscientists) Pacific NW Chapter. 24 attendees, leaders Dr. Emily Cahoon and former USFS geologist Carrie Gordon. Carol Hasenberg, trip organizer. Highlights of the trip were a visit to the Ponderosa Sunstone Mine and the PGB/Tuff of Dale contact along the north fork of the John Day River led by Emily Cahoon. Carrie Gordon also took the group on a tour of the Crooked River Caldera. This trip took place in spite of the 115-degree record shattering temperatures in the Portland area. The temperatures in Eastern Oregon were thankfully a bit cooler.

- July 29 – August 1 - Mary’s Peak and Table Mountain. 23 attendees, organizers/leaders Clay Kelleher, Clark Niewendorp and Sheila Alfsen, all from GSOC. This trip explored two Early Oligocene Coast Range intrusions (sills) and a Miocene sill along the Oregon Coast, and the folded and landslide prone sedimentary rocks of the Eocene Tyee Formation along Oregon Highway 20.

- August 12-15 - Coaledo Formation and South Central Coast. 26 attendees, leaders Dr. John Armentrout, David Blackwell and Frank Hladkey. Carol Hasenberg and Sheila Alfsen, trip organizers. This trip emphasized the sedimentary Eocene Coaledo Formation along the coast near Charleston, Oregon, and its connections to the sedimentary Tyee Formation, the docking of Siletzia and the formation of the Coast Range in Oregon. John Armentrout, retired from Mobil Oil corporation as a sedimentary geologist, assembled a team to re-study this area of his PhD thesis armed with modern radiometric dating, structural geology, paleontology and paleomagnetism techniques. He led two days of the trip with team member Dave Blackwell. Frank Hladkey then took the group to Blacklock Point and the oceanic rocks metamorphosed in the Cascadia Subduction Zone.

September 17-20 - Port Townsend Area Geology. 22 attendees, leaders Kitty Reed and Michael Machette of the Quimper Geological Society. Bonnie Prange, trip organizer. This trip explored the Quaternary geology that can be viewed along the beaches in and around Port Townsend. Michael Machette, a former USGS research geologist, prepared an exquisite field trip guide which is available online to GSOC members.

NEW MEMBERS FOR 2020

At the latest count, GSOC has 296 memberships and 366 members. That's more memberships than the club has had in its history for the second year in a row.

Donna Acord
Larry Alfieri
Hima Aramona
Debbie Asakawa
Isaac Ball
Carrie Beveridge
Effy Bishop
Bruce Bjornstad
David Blackwell
Josh Bretthauer
Sherry Bullard-Blanchard
Samuel Bussan
Steve Carlson
Joyce Caudell
Srirama and Deepika Chandra
Steve Chang
Derek and Alexander Clark
Gail Clement
Elisabeth Clyne
Gil Cobb
Trevor Contreras
Skye Cooley
Emma Cooney
Doug and Dustin Corkum
Lynn and Andrea Cottin
Terry Crotwell
Rowan and Christina Debold
Kendal Dragotto
Erin Dunbar and Travis Konold
Andrew Dunning
Richard Eberhart
Dave Eberle
Neil Elfrink
Pixie Freeman
Alex Fu
Segovia Garcia
Steve Gibson
Kenneth Giles
Signe Gilson
Reba Good
Michael and Randi Goodrich
Gordon Grant
Laurie Green
Calin Grimm
Karen Grove and Jay Ach
Addison Guynn
Hillary Hagen-Peter
Donnel Hansen
T Harper
Daniel Hershly
Brandin Hilbrandt
Jill Hoyenga
Leslie Hruby
Randall and Cheryl Humiston
Jay Hutchins
Tayla Isensee
Justin Iverson
Jorg Janke and Kathy Pink
Shelley and Robert Jaye
Ana Jed
Maximilian Jennings
Bruce Jividen
Gary Joaquin
Joe King and Len Hendricks
Meryl King
Josh Klein Valente
Andrei Klimenko
David Kretzing
Hannah Kuder
George and Kathy Long
Lena Low
Michael Machette
Sue Mackey
Jon Major
Chris Malloy and Josephine Hatton
Dan Malmon
Phillip Marcy
Andrey Marsavin
Michael and Patricia Martin
Kev McDonald
Becke McVey
Andrew Meigs
Wendy and Jim Meusey
Hart Monyatovsky
Donald Myers
Laurel Narizny
Chris Natenstedt
Matthew Nenninger
Barbara and Jack Oakes
Richard Odonnell
John Ogden
Diane Pearson
Phil and Peggy Pickering
Christopher and Felice Pierce
Gretchen Quigg
Crystale Reason and Trevor Reid
Sage Reuter
Bob Reynolds
Mathis Richards
Cleo Schaumann
Henry Scheffer
Benjamin Schifrin
Isaac Schuman
David Scofield
Debra Seltzer
Nancy Shrader
Anne Sivers
Shelly Skolfield
Benjamin Sloan
Anna St. John

Angela Stetson
Julie Stohler
Mimi Surgeon-McKenney
David Taylor
Meredith Theus
Brook Thompson
Patrick Tomassi
Cara Tomlinson
Whitney Treadway
Amegbor Tsikata
Lynsey Tyler
Mark Underhill
James Verheyden
Nathan and Christina Villeneuve
Judy Warren
Eileen Webb
Kevin and Lara Weberling
Kieran Wharton
Gwynne Woodward
Anthony Woodward
Larry Yamaoka
Alice Ziring

DONORS

The society would like to thank all the members who made donations to GSOC in 2021:

Sheila Alfsen
Mark Anderson
Robert Baker
Ann Bakkensen
Lucinda Bidleman
Steve Boyer
James Bull
Linda Hathaway Bunza
William Burgel
Scott E. Burns PhD
Kimberly Burroughs
Bonnie Campbell
Steve Carlson
Bruce Castle
Joyce Caudell
Dennis Chamberlin
Steve Chang
Darlene Conrad
Justina Cotter
Keith Dickson
Herb Dirksen
Paul Edison-Lahm
Kate Ely
Annie English
Laurie Feinswog
Thomas D. Fouch
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Martha Jo (Marty) Muncie
Sarah Munro
Michael Neunzert
Clark Niewendorp
Mary Lou Oberson
Neal Olson
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Christina Peterson
Doug Rasmussen
Charlie Raymond
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David Scofield
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Christina Sells
Kevin Shanley
Fred Shipley
Nancy Shrader
Vicki Sironen
Anne Sivers
Benjamin Sloan
Cynthia Smith
Anna St. John
Barbara Stroud
Robert Timmer
John Ullrick
Yumei Wang
David Wilson
Larry Yamaoka

GSOC WEBSITE ARTICLES

EASTERN OREGON VOLCANICS TRIP REMEMBERED

August 01, 2021

Trip Report: Jun 25-28, 2021 written by Bill Burgel and Emily Cahoon and edited by Carol Hasenberg

With forecasts in the Willamette Valley due to surpass 115 degrees, suddenly a four-day geology field trip in traditionally hot Central Oregon seemed to be a very cool place to visit indeed! So, off to the (relatively) cool hills and mountains surrounding Prineville and John Day did 25 geologists and geologist-wanna-be's travel. Led deftly by three intrepid women: Carol Hasenberg (primary trip organizer), Carrie Gordon (Day 1 & Day 4 Geologist) and Emily Cahoon (Day 2, 3, & 4 Geologist), the group caravanned in up to 14-vehicles to incredibly important and fascinating geologic formations that only friends-of-rocks and aficionados-of-prevailing-geologic theory would appreciate!

Mima-Mounds along US-197 just southeast of Maupin. – photo by Bill Burgel

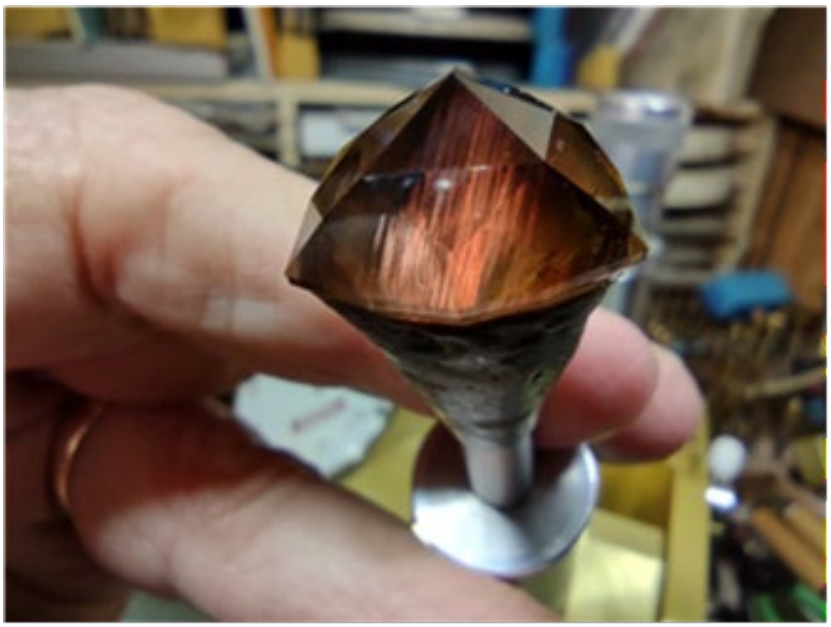
Several folks journeyed to the Prineville area the day before our planned rendezvous at the Peter Skene Ogden overlook mid-day on Friday June25th. We were rerouted Thursday evening through Maupin and were treated to a sunset that illuminated thousands of Mima-Mounds on the highway between Maupin and Madras.

Carrie led our Eastern Oregon Volcanics tour with a discussion of our Friday's itinerary which included a visit to Haystack and Prineville Reservoirs, located on or near ring fractures that marked the northern and southern edges of the Crooked River Caldera respectively. Carrie described recent geologic findings that included descriptions of geothermal deposits on the flanks of Smith Rock, the nearby Wildcat Mountain and Tower Mountain Calderas, groundwater issues within the Crooked River Caldera and the extent of recent lava flows (including the Prineville and Newberry Flows) that covered the Crooked River Valley.

We started early on Saturday in an attempt to avoid the forecasted temperatures of 106 degrees. Emily Cahoon led off Saturday's tour with a description of the Picture Gorge Basalt (PGB), a member of the Columbia River Basalt Group that erupted between 16.06- to 17.23 Ma., as determined by the dating done in Emily's PhD. research. With an eruptive time that bracketed the flows of the massive Grand Ronde member of the Columbia River Basalt Group, the smaller Picture Gorge basalt is chemically more

representative of the magma chamber "clearing its throat" than that of the purer, deeply seated plume mantle signature of the Grand Ronde. Lavas of the PGB are also significant because they contain Oregon's state gemstone, known as sunstones! Sunstones are gem-quality plagioclase crystals that contain macroscopic inclusions of copper, and they crop up in two locations in Oregon.

After a drive of a couple of hours, we stopped at Delintment Lake in Ochoco National Forest, and listened to Emily describe the boulders of Picture Gorge Basalt that surrounded us. After leaving this lovely spot, our group was treated to a fabulous lunch hosted by the Ponderosa Sunstone Mine, followed by tour of the mine and its facilities. Bruce Moore, one of the mine's co-owners, was indeed generous and we were able to walk into the excavation of the weathered PGB outcrop from which the sunstones emerge. He also toured us through the process of sorting the large pieces from the powder, and the sorting of the gem quality pieces from the matrix and lower quality plagioclase crystals. We got to examine several trayfuls of the gem pieces, and Carol and helpers picked out quite a few crystals from the tailings pile for the name cards at next year's Annual Banquet (we're going to have one we hope!).



Sunstones uncovered in the PGB turn into exciting gemstones when faceted or carved – photo by Emily Cahoon

After the sunstone mine, our journey to view several dikes within the Picture Gorge was "highlighted" by a transportation SNAFU: One of the vehicles in the caravan suddenly experienced a "vapor lock" that necessitated that the fuel tank of the distressed vehicle cools to so as to "unlock" its fuel flow. In English, the darned thing refused to go up the hill. However, foresight, dumb luck, and great teamwork saved the day! Carol Hasenberg pulled out a towing cable with which her husband John had thoughtfully equipped her car, and Kevin Brown and Nancy Collins quickly hitched their van to the disabled vehicle to tow it to a nearby hill to allow the vehicle to coast down the hill thereby cooling the fuel tank. These efforts were highly successful as we all made it into the town of John Day just before the brew pub closed for the night!

Another hot day loomed on Sunday morning. With each attendee seeking out pockets of shade, we listened to Emily recap our Saturday tour then described our itinerary for Sunday. Our destination via a 2-hour drive along the North Fork of the John Day River was to an outcrop that spectacularly exposed the unconformity between the 33 Ma old Tuff of Dale that originated in the Tower Mountain Volcanic Field and the overlying 17.02 Ma Picture Gorge Basalt. On the way over we had a 20 minute stop to change a flat tire on one of the vehicles. This was facilitated by our (by now) experienced pit crew and a portable compressor that Dennis Chamberlin had conveniently packed. We then proceeded to the "contact" stop,

which provided an opportunity to observe different degrees of welding in a single volcanic tuff, a volcanic ash deposit containing a high percentage of silica. Welding occurs due to overlying pressure while the tuff is still hot, resulting in highly variable appearances!

Unconformity between the Tuff of Dale and the overlying PGB – photo by Emily Cahoon

We then retraced our path to the Middle Fork of the John Day River to view a "stitching pluton" of tonalite, an intrusive igneous rock, that was generated as the Baker terrane accreted to the North American coastline in the Cretaceous. Next, we made our way to Monument and traveled down the North Fork of the John Day River. All along this road we could see basalt dikes of the Monument Dike Swarm, the feeders of the Picture Gorge Basalt, crowning the hills above the road. We stopped at Big Bend Campground and cooled off in the river. The heat took its toll as we visited our last site for the day at the Mascall Formation overlook. Attendees then scattered to various places to cool down. Several folks zipped off to the Cant Ranch to hear Hunter Noack of 'In A Landscape' play his piano under the setting sun at Sheep Rock. Unfortunately, earlier in the evening, Carrie Gordon was admitted to the John Day Hospital's emergency room with heat exhaustion. Thankfully, she soon recovered and rejoined our group the following day.

Monday was our last day, and the hottest day – so some attendees departed early. Consequently, we held an informal "appreciation" ceremony at the Grant County Fair parking lot. We then traveled to the John Day Fossil Beds to hear Emily and Carrie one last time before we scooted back to Portland to experience its 116 degree record heat!

Enjoy the following slides of the Eastern Oregon Volcanics Field Trip! Photos courtesy of Emily, Bill and Carol

In the sunstone mine pit.

Car trouble on the road.

Carrie and the Tuff of Smith Rock.

GSOCers admiring sunstones.

Tuff of Smith Rock.

Last shot of the trip.

RECAP OF THE COALEDO FORMATION FIELD TRIP

Laurie Green took this classic shot of Shore Acres.

By Carol Hasenberg

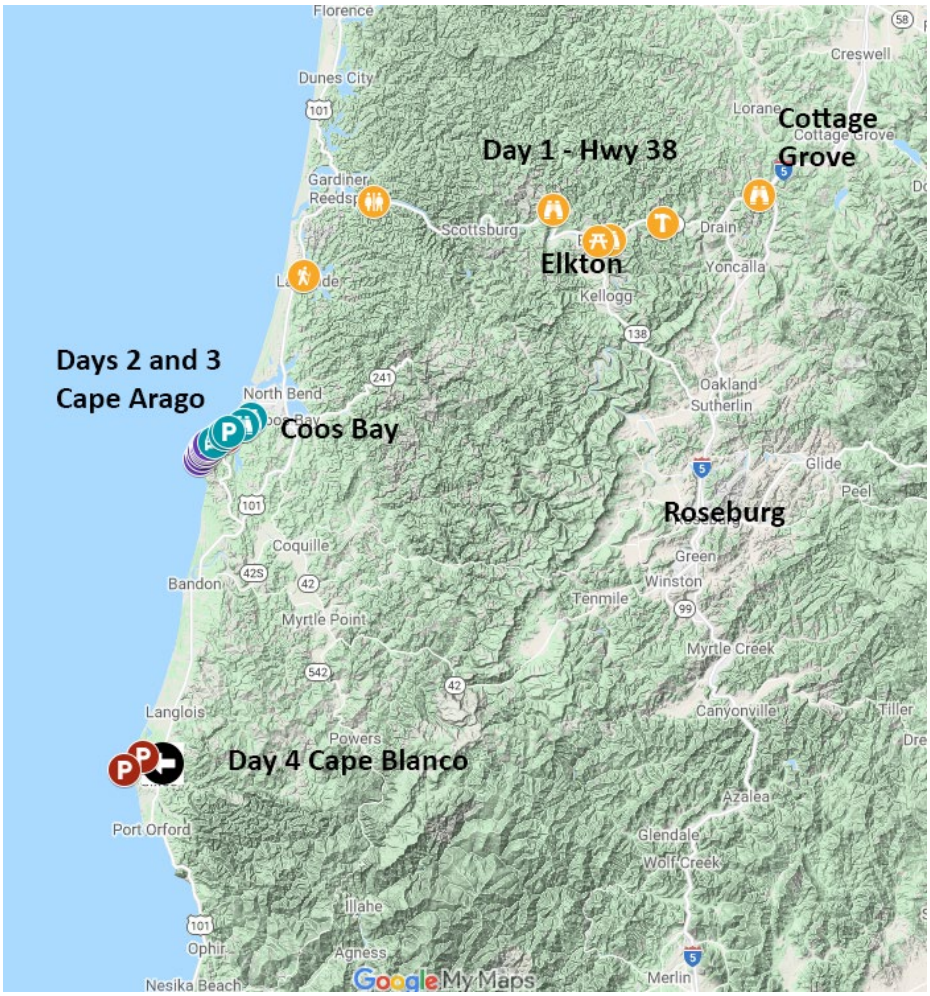
The Coaledo Formation field trip began about two years ago when Dr. John Armentrout, a native Oregonian and sedimentary basin stratigrapher with a long career at Mobil Oil, came to talk to GSOC about a project he was working on. He was revisiting a part of Oregon that he had studied in the early days of his career, the Coaledo Formation centered in the Coos Bay and Cape Arago areas. He had assembled a team of researchers from the University of Oregon and elsewhere to work on the multidisciplinary project. And he proposed the GSOC field trip as a precursor to a GSA field trip he would be organizing for the GSA annual meeting in 2021.

So, we were all preparing to go on the trip in August 2020 and then COVID struck. We subsequently revised the trip date and finally this year got the trip ready to go. It turned out to be quite a fun trip and well worth the wait!

The Coaledo Formation and its older counterpart, the Tyee Formation, are sediments that were deposited in the sea above the newly docked Siletzia Terrane in the Eocene epoch, starting about 50 million years ago. These formations remained relatively undeformed, as the subduction zone had jumped to the western margin of Siletzia before they were deposited. Think of Siletzia as being similar to the Hawaiian Islands coming in for a landing on the Oregon shoreline. As the Tyee and then the Coaledo were deposited, the shoreline gradually prograded (grew seaward) to the northwest as large amounts of sediment from the Klamath Mountains and the ancestral Cascades were eroded and deposited along the seashore and down to deeper water.

These formations gave participants on the field trip an opportunity to not only look at the details of flow and deposition in a sedimentary basin, but the structural environment in which it was formed, what

changes occur in the basin over time, and how the details embedded in the basin give clues to what is happening in other areas of the basin (like where oil is likely to be found in the basin).



Map of all the stops on the trip.

On the way over to the Charleston area from the Willamette Valley, the majority of participants needed to cross the Oregon Coast Range, and what better place to cross is there but Highway 38, going from the Cottage Grove area south downslope to Drain, then east following Elk Creek and the Umpqua River to Reedsport, where one can pick up Highway 101 south to the Coos Bay area? Not only is the route convenient, but it cuts through the heart of the Tyee Formation. And so this was the focus of the first day, and a great warm-up for the rest of the field trip.

DAY 1

On our journey between Drain and Reedsport, we looked at the Tyee formation, deposited roughly between 49 and 45 million years ago. The stops we made showed the contrast between the thin, mostly mudstone layers deposited on the basin slope and the massive sandstone flows that collected in the deeper parts of the basin from channels carved through the slopes. The massive sandstone cliffs of the lower Umpqua river canyon are quite thick and impressive, and the solid chunks of sandstone that occasionally fall along this stretch of highway are truly frightful. At one point we passed a quarry where the underlying Siletzia peeks through the Tyee due to a compression fold in the crust. We also squeezed

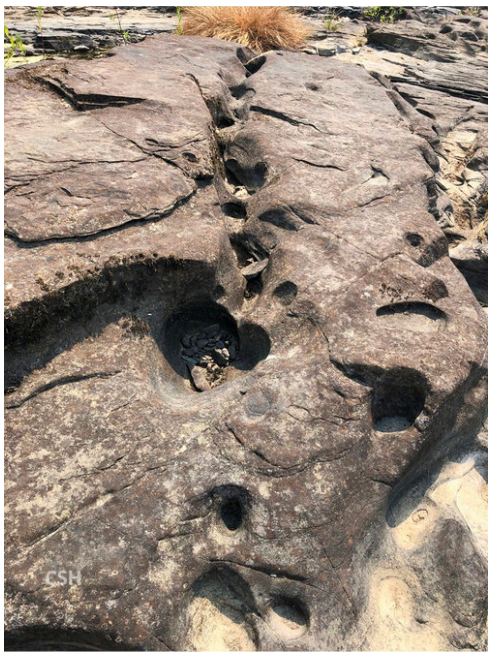
in a stop featuring the Oregon Dunes at John Dellenback Dunes Trail and discussed the Pleistocene and Holocene history of this area.

The photos you will see in this article were taken by multiple participants and are watermarked by this participant key:

Carol Hasenberg…CSH Dennis Chamberlin…DC
Laurie Green…LGR Alberto Gonzales…AGZ
Marty Muncie…MM

Day 1 photos (including some reconnaissance photos):

On the Umpqua River riverbed. Tyee Formation bedrock is exposed.



Holes are gouged in the softer sandstone by denser basalt pebbles from Siletz River Volcanics.

Sheila examining the Elkton Formation foreset beds above Elkton, Oregon.

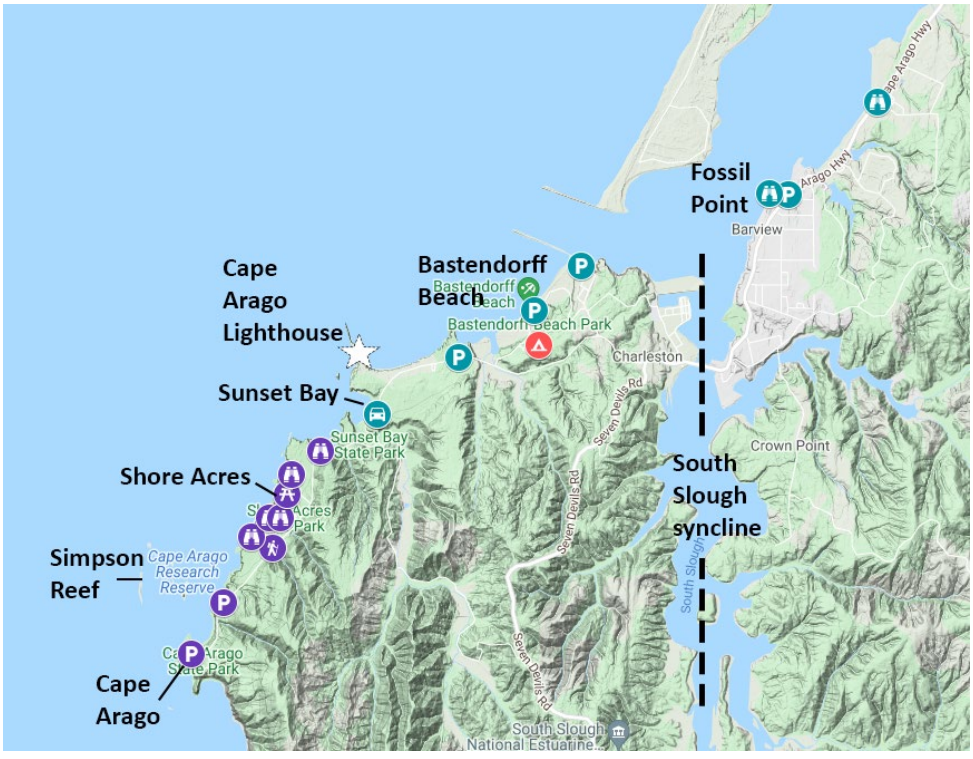
GSOCers examined the notch that the rockfall below came from.

DAY 2

The next morning we met John Armentrout and David Blackwell, another University of Oregon geologist who has been working on the Coaledo project. They had a great introductory presentation in the parking lot there at Sunset Bay State Park, reviewing the tectonic environment, the directions of stress on the sedimentary material, etc. The Coaledo Formation, deposited between 45 and 39 million years ago, was folded in at least two wave-forms from compression stresses generated by the Cascadia subduction zone in the Eocene and Oligocene. There is an anticline (hump) between the offshore Simpson Reef formation and the Cape Arago shoreline. Thus the Coaledo layers at the shoreline dip eastward at a steep angle. The sedimentary layers younger than 25 million years do not have nearly the same steep angle, and this brackets the time of the deformation.

After the presentation, we literally got our feet wet heading out into Sunset Bay to the exposed terrace on the north side of the bay. Armentrout pointed out how the cyclical processes involved in the deposition create patterns, called parasequences, that begin as muddy layers in a flooded area that gradually give way to sandy shoreline strata as the shoreline progrades seaward. The group carefully made their way out over the muddy and slimy rock outcrops to examine the sandier early Middle Coaledo stratigraphy towards the entrance to the bay. Shoreward the parasequences contained much more mud, showing a deepening trend to the basin in the later parts of the Middle Coaledo.

I've mentioned the Middle Coaledo being found at Sunset Bay, and as one goes from the Fivemile Point area north of Bandon, the sediments along the Oregon coast get progressively younger as one travels northward. Therefore, as the group headed southward from Sunset Bay to Cape Arago, the shoreline goes deeper into time to the Lower Coaledo Formation and then to the Beds of Sacchi Beach. So, on stop 2 at Simpson Reef one sees the Lower Coaledo atop the Beds of Sacchi Beach, and at stop 3 Cape Arago all the stratigraphy is the Beds of Sacchi Beach.



Map of the Cape Arago area showing the planned stops of Days 2 and 3. We deviated from the original plan, so I have just labeled the main features to orient the reader.

Armentrout chose for the group to visit the North Cove at Cape Arago rather than the easier-to-reach South Cove because he and his research team had made significant finds there. One of these was a massive channel form in the cliff face. Although the channel had been carved by abrasive sand, it eventually fills with “mud, glorious mud” and is the “smoking gun” pointing in the direction of flow to where oil prospectors might find where all that mud is resting. If the deposited organic-rich mud gets a chance to be cooked it may produce oil or natural gas. Another feature was a cliff face whose lower part consisted of large blocks of layers tilted in a variety of angles, probably the result of a landslide. Since this material was mud and sand layers sitting on a sloped surface, it was often subject to instability. Armentrout pointed out a swirly layer between two tabular sections, indicating an unstable layer that had produced a slide.

Map of the Cape Arago area showing the planned stops of Days 2 and 3. We deviated from the original plan, so I have just labeled the main features to orient the reader.

The group lunched at Shore Acres State Park between Sunset Bay and Cape Arago. This stretch of shoreline is famous for the massive waves that form here during storms. You’ve all probably seen Oregon calendars featuring this spot. But no giant waves were crashing here during the field trip, thank goodness! After dining on bagged lunches in this scenic area, the group walked north along the cliff edge to the edge of Bather’s Cove to the north of the gazebo in the park. Armentrout pointed out that the sandy layers in the Lower Coaledo found here have hummocky cross bedding patterns that indicate wave-worked material.

After this, the group walked back and headed to the beach at Simpson’s Cove south of the gazebo area. More hummocky layers were noted and Armentrout pointed out how sedimentologists determine the direction of transport from their shapes. Armentrout noted that the presence of hummocks indicates that the water depth at deposition has to be shallow enough for waves to affect it. There are many other indicators that the deposition water depth was shallower in this part of the Coaledo – shark and ray fossils, clams, etc. The waves will typically affect a certain distance below the water surface, but the research team must also consider the effect that climate has on wave height and depth. The warm Eocene climate probably produced some massive waves, so that hummocky bedding could occur a bit deeper than would occur today.

But there is a problem in that the foraminifera found (mostly in the mud adjacent to these hummocky deposits) are a deeper water variety, according to Carole Hickman of UC Berkeley and Kristin McDougall of USGS. There has to be some mechanism for these creatures to get closer to the surface in order for the environment to make sense to the research team. They are currently checking models of the Eocene to see if upwelling could account for the presence of the creatures.

At some point in the day, someone asked Armentrout why the coves existed, and the answer is that they are the sites of strike-slip faults that run generally east to west through the formation. Armentrout’s colleague Laird Thompson, an ex-Mobil Oil structural geologist who also has been involved in the research team, has done an inventory of the faults and the stress regimes which created them. Interestingly, he found that the direction of maximum compressive stress has shifted from the east-west subduction zone-oriented stress of the Eocene to the modern north-south San Andreas Fault movement than is shoving western Oregon and Washington into Canada.

To finish off the day, complete all the stops of the tour, and give Armentrout an opportunity to leave early on the following day, the group did three more stops. At Yoakam Point, the group stayed on the cliff top

and looked down Lighthouse Beach to the Cape Arago lighthouse. Directly around Gregory Point from the north arm of Sunset Bay, this beach also features Middle Coaledo parasequences. The three earliest sandy parasequence caps stand out in relief from the more easily eroded mudstone layers. Also, Armentrout mentioned that the Middle Eocene stratigraphic record contains tuffs from the earliest Cascade eruptions and that these were dated by research team member Michael Darin from University of Nevada-Reno. He told us to be on the lookout in the next year or two for some exciting research papers by Darin featuring the dating work he has done on this project.

Next we visited Bastendorff Beach for a brief discussion about the Bastendorff Shale stratigraphy from the Oligocene. This area of the Coos peninsula had seen the most change over the 20th century due to the construction of the jetty enclosing the Coos Bay shipping channel starting in 1926. What used to be shoreline cliffs is now a vegetated bluff at least a quarter mile inland from the beach. There is a natural cave in this bluff which we did not visit.

Our last stop was at the Coos Head and south jetty area at the north end of Bastendorff Beach. In the headland enclosing this area is a tunnel through which the Army Corps of Engineers brought huge boulders by rail for the construction of the jetty. All that remains visible of this work is the tunnel and a slab of concrete near the base of the headland. And of course, the jetty itself. The original rock used in the construction of the jetty is black basalt of the Siletz River Volcanics (Siletzia) and the newer rock brought in is blueschist from the Klamath Mountains, a metamorphic product of the Cascadia subduction zone. On the tunnel headland, one can see a layer of eight-million-year-old tuff running through about halfway up the cliff. This headland is part of the much younger Empire formation.

Day 2 photos:

Sunset Bay is the first stop on Day 1. John Armentrout describes the coarsening upward sequences of strata in the Middle Coaledo.

Dave Taylor and GSOC participants listen to John talking about some of the stratigraphic details of Sunset Bay.

GSOC participants make their way down to North Cove at Cape Arago to observe the older stratigraphy in the Beds of Sacchi Beach. You can just make John out at the bottom of a huge channel in the cliff wall.

GSOC participants wander around the corner from the north cove to a wave-cut terrace and interesting stratigraphy on the cliff face. Note the variously tilted blocks below the large channel that takes up the top half of the cliff.

John pointed to the wavy layer as a plane of instability in the strata. The layers above would have moved downslope towards the viewer.

Armentrout pointed out that the sandy layers in the Lower Coaledo found at Bather's Cove, left, have hummocky cross bedding patterns that indicate wave-worked material.

More hummocky layering found at Simpson's Cove, below.

Coos Head and south jetty area at the north end of Bastendorff Beach. Halfway up the Empire Formation headland is a tunnel through which the Army Corps of Engineers brought huge boulders by rail for the construction of the jetty. An 8-million year old tuff layer is the target of the arrow.

DAY 3

We convened the next morning, bright eyed and bushy tailed, at Sunset Bay to finish the Armentrout and Blackwell tour. We had rearranged the trip schedule somewhat the day before, so two stops situated between Simpson Reef and Simpson Cove had not been visited. These sites, Ocean View Lookout and Collapse Cave Point, featured Lower Coaledo stratigraphy. We arrived in the morning mist from a short walk to the edge of the cliff.

The stratigraphy here is largely sandstone which is resistant to erosion despite the waves that pound the shoreline. We descended to the sandstone shelf just below the 80,000-year-old Whiskey Run terrace that caps the Coaledo stratigraphy. Dave Blackwell pointed out a disconformity contact from channel scour. Just above the contact he showed us the remnants of a log that had been nearly consumed by ship worms (Teredo worms). Nearby this was a jutting sandstone layer which contained ripple marks showing the direction of the paleocurrent which has been bored in several places by the paleomagnetics team, which includes David and his son Noel. Scott Bogue from Occidental College has also done some of this work. In this area the organics-rich mud layers have been scoured out to deeper water where they might be forming petroleum. John and Dave point out some mud rip up clasts embedded in the sand which confirm this.

Dave points out the ship worm log.

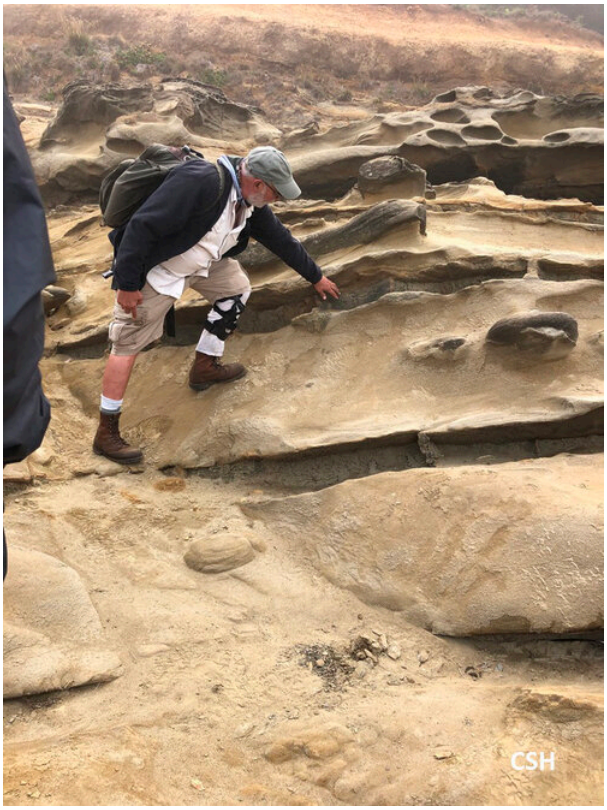
The group then made its way a bit further north along the cliff top to the Collapse Cave Point. Armentrout told the group that all the parasequences of the Coaledo formation had been carefully correlated and mapped on the Cape Arago shoreline, even across the cove faults. This stop featured parasequences #5 and #6 in the Lower Coaledo. Armentrout and Blackwell pointed out sandstone dikes through thin mudstone layers between the layers of sandstone. Sandstone is both porous and permeable, but the mudstone layers are not. Therefore, when the layers settle after deposition, the sand layers compact to more stable configurations and the excess water between the grains become pressurized. The dikes push through the mud to relieve that pressure. From an oil geologist standpoint, if one is looking to find oil in that sandstone, the presence of the dikes would be a bad sign that the oil has probably escaped.

John discusses direction of flow clues.

After visiting these sites, the group headed around Coos Head, through Charleston, and up the east bank of the Coos Bay shipping channel to the area near Fossil Point. We parked near the little pumphouse just to the south of the Dairy Queen on the Cape Arago Highway. John and many of the locals call this “Stinky Cove” because of the rotting organic smells issuing from it, but in the literature, he refers to it as Beacon Lane Cove. Here we were located on the east side of the South Slough syncline, a trough in the folding pattern of the stratigraphy. It was about low tide or shortly after low tide, so the group hurried across the seaweed-strewn point and south over the Empire Formation terrace to get a half mile or so down the shore to the main show. Along the way Armentrout pointed out pectin shells, trace fossils, and other interesting features of this fossiliferous layer.

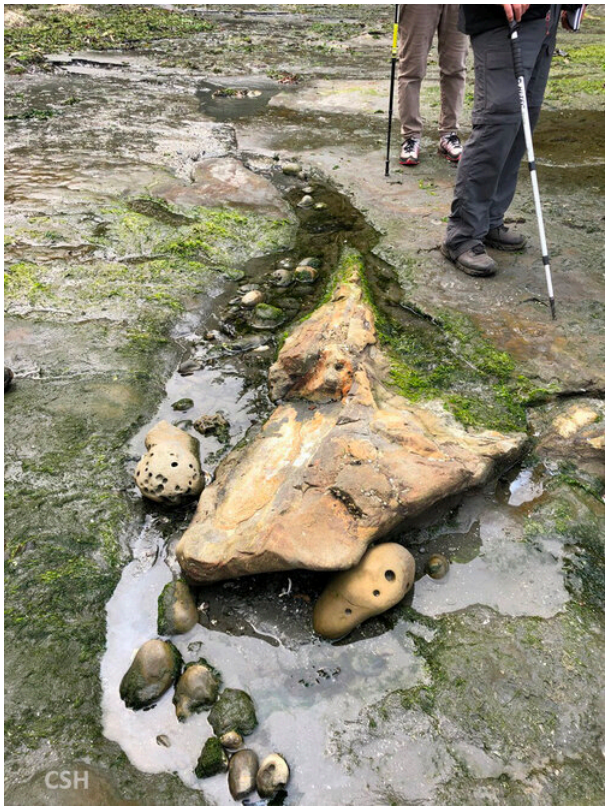
As the group approached a barrier point, John pointed out two fossils sticking out of the Empire terrace that appear to be a whale skull and rib. There have been several whale fossils recovered from the Empire formation here. Then the group assembled at the barrier, where we saw an unconformity between the bulk of the Empire Formation overlain by a spectacularly fossiliferous Coos Conglomerate which forms the "point" of Fossil Point. A short climb over the high point put us onto Fossil Point proper, an incredible mass of 8 million-year-old cemented shells. Armentrout pointed out a number of fossils here, including the slipper shell Crepidula, which can be found in stacked groups in this deposit, which must have formed in a niche of calm shallow water. And with that Armentrout's presentation was completed and he headed off down the shoreline. The rest of the group convened in the picnic grounds at Sunset Bay and had a very relaxing picnic.

More Day 2 photos:



Dave points out the dikes that breach the mud layers from dewatering of the sandy layers.

Whale bone eroding out of the Empire Formation north of Fossil Point.



Contact between the Coos Conglomerate above and the bulk of the Empire Formation below at Fossil Point.

DAY 4

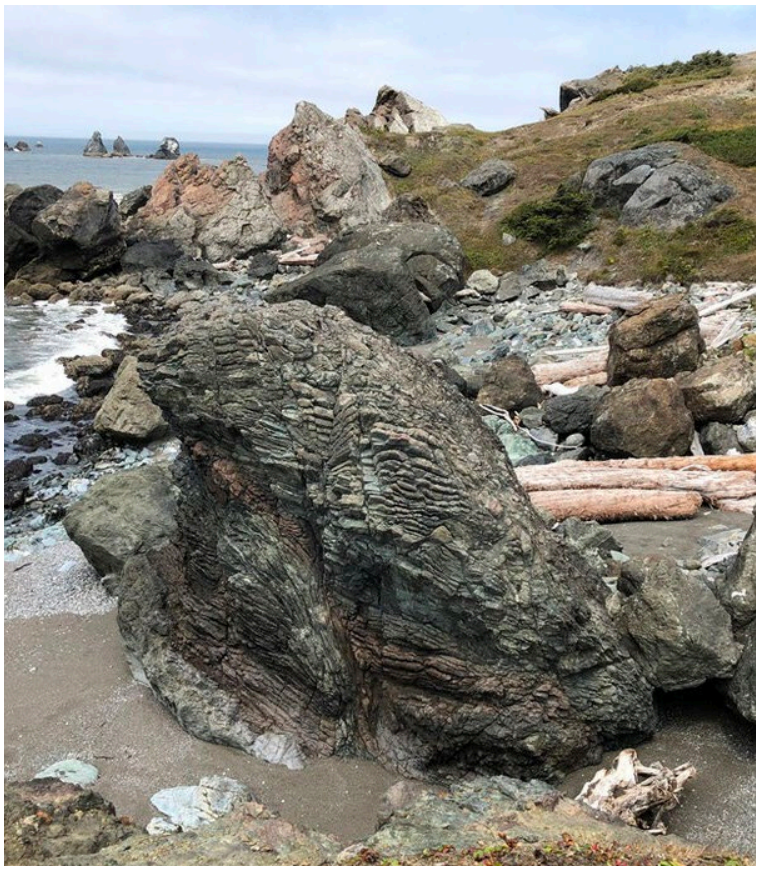
Frank Hladky, a former DOGAMI geologist and geologic educator of the south-central Oregon coast, met us on Sunday morning to do the last leg of the trip. We met near the airstrip in the Sixes/Cape Blanco area to hike out to Blacklock Point. Here we were completely out of the Tyee/Coaledo basin and into the Klamath Mountains, right atop the accretionary wedge built up by the subduction zone that has been in action since the Cretaceous. As I mentioned at the beginning of this article, the Klamaths were the source of a lot of the sediment deposited in the Tyee and Coaledo formations.

We were not disappointed by the rocks of Blacklock Point.

On the seashore bluff and strewn about the beach were products of the subduction zone, a mélange of basalt, radiolarian chert, mudstone, blueschist, and serpentinite. Most of the rocks were black or green in appearance. These Jurassic age rocks had been sent down into the subduction zone, where they were squeezed, folded and cooked. One of the massive boulders of chert exhibited tight folding and faulting patterns.

Hladky told us that some of the minerals associated with the rocks found in subduction zones are the aluminum silicates kyanite, sillimanite, and andalusite, which all have the same chemical formula, Al2SiO5. Serpentinite is metamorphosed from peridotite or gabbro in the presence of sea water with relatively low temperature and pressure. Blueschist, a high pressure, low temperature product of basalt metamorphism, gets its colors from the two minerals, glaucophane (right in photo) and lawsonite (left in photo).

Moving north to the terrace above Blacklock Point, the group looked north across a cove to the sandstone mined from the Cretaceous North Point by a Scottish immigrant named Blacklock in the early Twentieth Century. There are several buildings in San Francisco with facades mined from this brown sandstone. At the base of the cove are some fossiliferous layers. Hladky had brought many of his high school classes here to make geologic sections of the north hillside.



After returning from Blacklock Point, the group went to Cape Blanco and descended from the main parking lot to the beach north of the Cape Blanco headland. Boulders of blueschist could be found in the bed of the wash coming down the slope. In the water were outcrops of a black sandstone.

We headed back up the slope to the parking lot at Cape Blanco and said our farewells. It was a fabulous field trip and I don't think any of the participants were disappointed. We'll be looking forward to the interesting articles to come out from this research, and also looking forward to another great GSOC field trip!

This intensely deformed chunk of radiolarian chert has been folded and faulted in the subduction zone.

GOODBYE TO A DEAR FRIEND, BEV VOGT

Former GSOC President Bev Vogt — who with her partner in life and geology "Bart" Bartels — led a rejuvenation of our club in the 1990s and 2000s, died peacefully in her home on July 28, 2021. For many of us who remember Bev's gentle leadership, Bart's fascinating seminars, and the outstanding field trips they led together, they were very much the heart of the club.

Photo by Dave Olcott

I don't know where to begin talking about Bev Vogt. For one thing, it's really hard to say Bev's name without saying "and Bart," her partner in life and geology. I joined GSOC in 1995, but it wasn't until the GSOC annual banquet in 1998, where Bev asked me if I would step in as Vice President of the society, that I really got involved.

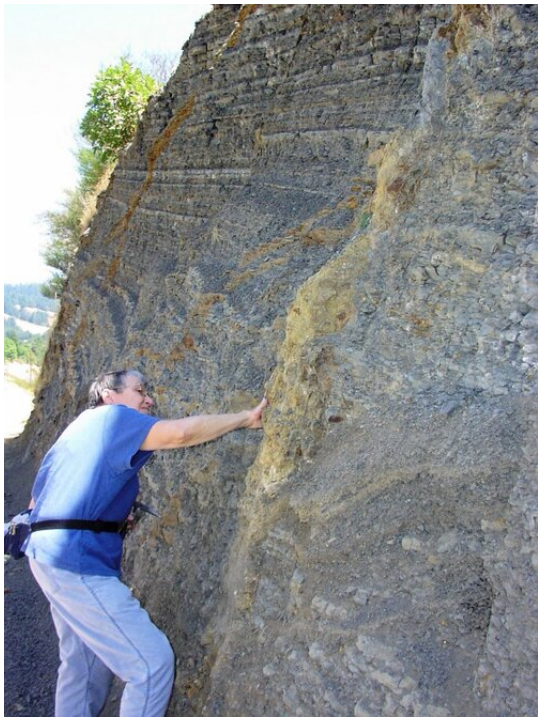
Bev arrived in the field of geology by a circuitous route. She was born and raised in the Midwest., and received a B.A. degree in English with a minor in music from Midland College, Fremont, Nebraska. She taught English and music in public schools for eight years in various places in Nebraska, Missouri, and Minnesota.

Bev moved to Oregon in 1972, and that very year she joined GSOC. She also went back to school, earning her bachelor's and master's degrees in geology from Portland State University. Bev's master's thesis under advisor Marvin Beeson is Vogt, B.F., 1981, "The stratigraphy and structure of the Columbia River Basalt Group in the Bull Run Watershed, Oregon", Portland State University master's thesis, 151 p. Unfortunately, I could not find it online, but it is referenced in a number of other publications, including this article from the August 1984 issue of Oregon Geology: "Exploring the Neogene history of the Columbia River: Discussion and geologic field trip guide to the Columbia River Gorge," by Terry L. Tolan, Marvin H. Beeson, and Beverly F. Vogt.

Bev worked for the Oregon Department of Geology and Mineral Industries from 1977 until 1997 as a geologist, editor, publications

manager, and outreach person. After she retired, she spent time at DOGAMI and the Nature of the Northwest Information Center, which she began, as a volunteer.

I have gleaned much of the above information about Bev from her autobiographical description which she wrote for the GSOC archives after her 1998 presidency. She did not include a lot of personal information in that document, but stated that she was divorced and had two sons, two daughters-in-law, and five grandchildren. Most touchingly, she also wrote, "I have lived with my best friend, Richard Bartels, since 1988. We study, talk, and observe geology whenever we can."



Being VP in 1998 was so easy because as the incoming President, Bev had already lined up almost all of the speakers. Bev and her partner Bart were also very important in the President's field trip that I produced in 1999 to Malheur Field Station, Steens Mountain, and the surrounding area. We went out there for about a week and I didn't have hard and fast plans for one of the days. Bev and Bart stepped up and led the group to look at the inverted topography of Wright's Point and I think we also went through some of the Rattlesnake Tuff outcrops that Martin Streck et al had described in a field guide published in Oregon Geology in May/June 1999. We had an outstanding day and an outstanding trip.

Bev and Bart were the mainstays for the club for quite a few years. In the 1990's, several key members of the society were aging past the point of involvement, and Bart's and Bev's organizational skills and expertise held us together. They got a lot of new people involved in the society and over the next few years, the membership stopped shrinking. Bev helped me plan another field trip to the south Oregon Coast in 2003, and is one of my favorite times spent with her. She also helped out with the GSOC newsletter by putting together the calendar during the 2000's.

About 2005, enough new blood had joined that the society began to reinvent itself a bit and offer a larger variety of field trips and speakers. Bev was Secretary of the society in these years. Bev and Bart also led several very fun field trips, including those to the Klamath River and

Summer Lake, in which I participated. Other choice field trips were planned by Janet Rasmussen, Dave Olcott, and Larry Purchase. Also during this time, there was formed a core group of members who really seemed to care about GSOC and making it a fun place to learn about geology, and Bev and Bart were at the heart of this group.

Eventually time took its toll and both Bev and Bart could not continue at the level of involvement they had formerly done. Paul Edison-Lahm took over as secretary and I recall sadly a little seminar that Bev and Bart gave at their house about rocks and minerals as an acknowledgement of their letting go of their leadership roles. They led a final field trip in 2013 to the Crooked River Caldera and Wildcat Mountain Caldera. Bev was having eyesight problems by this time, and I helped her get the maps and graphics ready for the trip guide.

We who spent so many happy hours with Bev (and Bart) talking about geology, breaking rocks, taking long dusty car rides to see rocks, and meeting monthly to talk about rocks, will miss her forever. We have been so lucky to have known her.

Carol Hasenberg

Many other members of GSOC have benefitted from Bev Vogt's leadership in the group. The following memories are shared as noted:

From Dave Olcott:

I too was saddened to hear of Bev's passing. I've attached a few images of this very special lady. She always brought or displayed a little sunshine no matter what the occasion, leading a field trip or participating in one. Rain, wind, hot temperatures or cold did not dampen Bev's positive disposition. It was always a privilege to have her and Bart on a field trip. On those field trips I coordinated, I was always comforted to see their names on the registration list. They both had such an incurable love for geology and for each other. In more recent years, as Bev's vision waned, her desire to participate on field trips, Friday night speakers, and social get-togethers remained strong. On field trips her special man guided her safely and provided a commentary on what was not clearly visible. Where you saw Bev, you saw Bart, often hand in hand. Bev's indelible spirit will be missed but definitely not forgotten.

From Yumei Wang:

I first met Bev Vogt when I started working for DOGAMI as an earthquake engineer in 1994. I soon learned that Bev, in addition to being a hard-working and super-efficient publication coordinator for DOGAMI, had a wealth of knowledge about Oregon's geology. I admired her warmth and wit, but the fact that she was

passionate about "all things geology" is what truly stood out. In fact, her love for geology was as deep as the earth's core. This included putting her face against rock cliffs (aka rock climbing). It was about my second day on the job when Bev invited me to give a talk to GSOC. In April 1994, Bev brought me over to PSU's Cramer Hall and I presented my geotechnical investigation work on Lyons Dam, California. There, I quickly learned that GSOCers were Bev's second family. Bev's many contributions to both DOGAMI and GSOC are rich and influential. She will be sorely missed!

From Jan Kem:

Bev, and Bart, who was also almost always in the same "picture" in my memory, was certainly one of the most outstanding people in GSOC and among my friends. Ever smiling, curious, and optimistic are ways I would describe her.

From Janet Rasmussen:

I met Bev Vogt when I first began attending GSOC meetings in room S17, about 1997. She introduced herself to me at that first meeting. I was interested to learn that she had begun studying geology after being an English teacher for several decades. I was a nurse at that time, and had begun studying geology a few years before. Throughout my time in GSOC, she and Bart were great friends and excellent resources for many questions I had. We enjoyed field trips, lectures, and social gatherings together.

We appreciated her sharp-as-a-razor wit and fascinating stories of her time studying geology in middle age. I was so impressed that she had become a rock climber during that time too.

From Julia Lanning:

It was your smile and laughter that first caught my attention. I was intrigued and intimidated in equal measure because you were an actual geologist and I was well, geology-ignorant. Your warmth invited me close enough to experience your dry sense of humor and near enough to hear the many stories about your lifetime of adventure. I never told you, but you became and remain my treasured role model. You were an adventurer, trail blazer, teacher and friend. Oh…and a geologist. I so miss you, Bev.