

ALASKA GEOLOGY

Newsletter of the
Alaska Geological Society



The Unseen Contributor: Investigations into Submarine Groundwater Discharge in the Gulf of Alaska

Aeon Russo

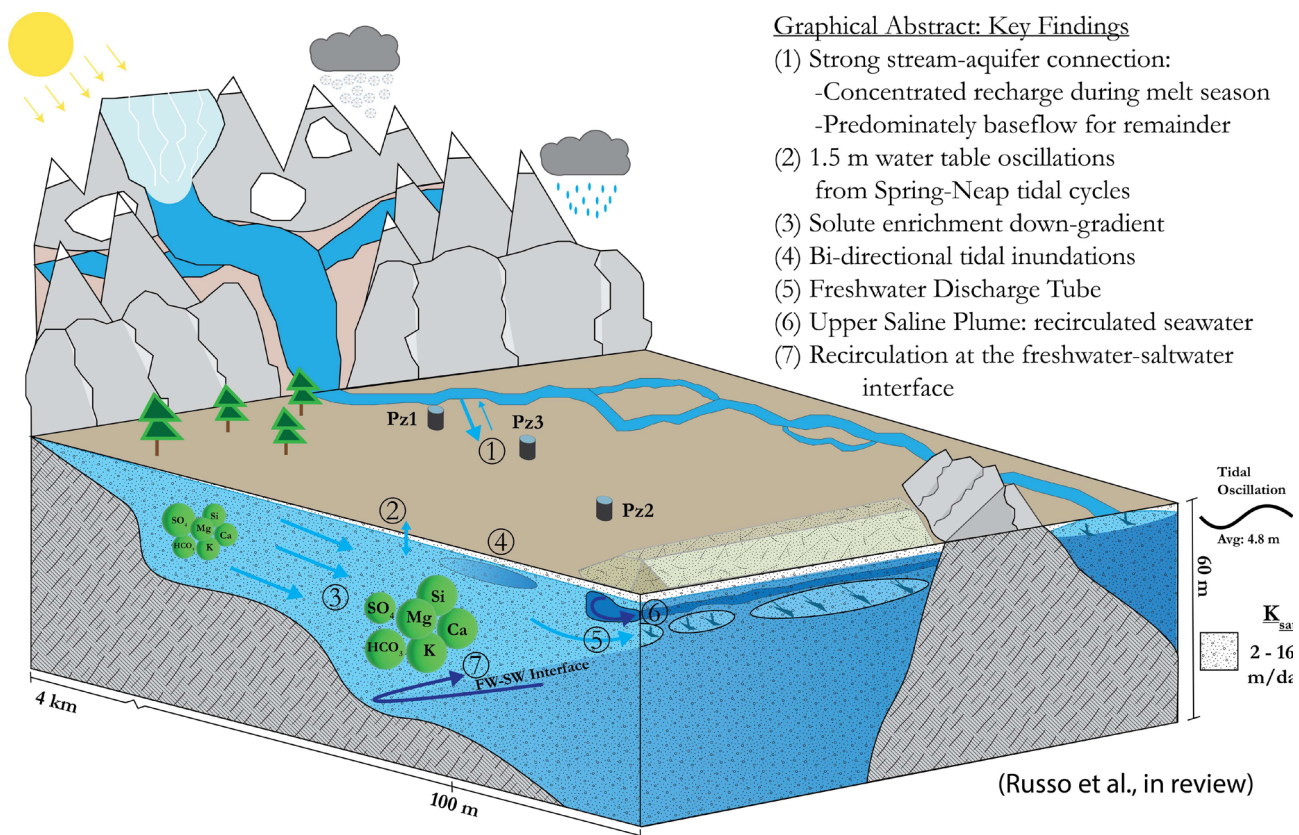
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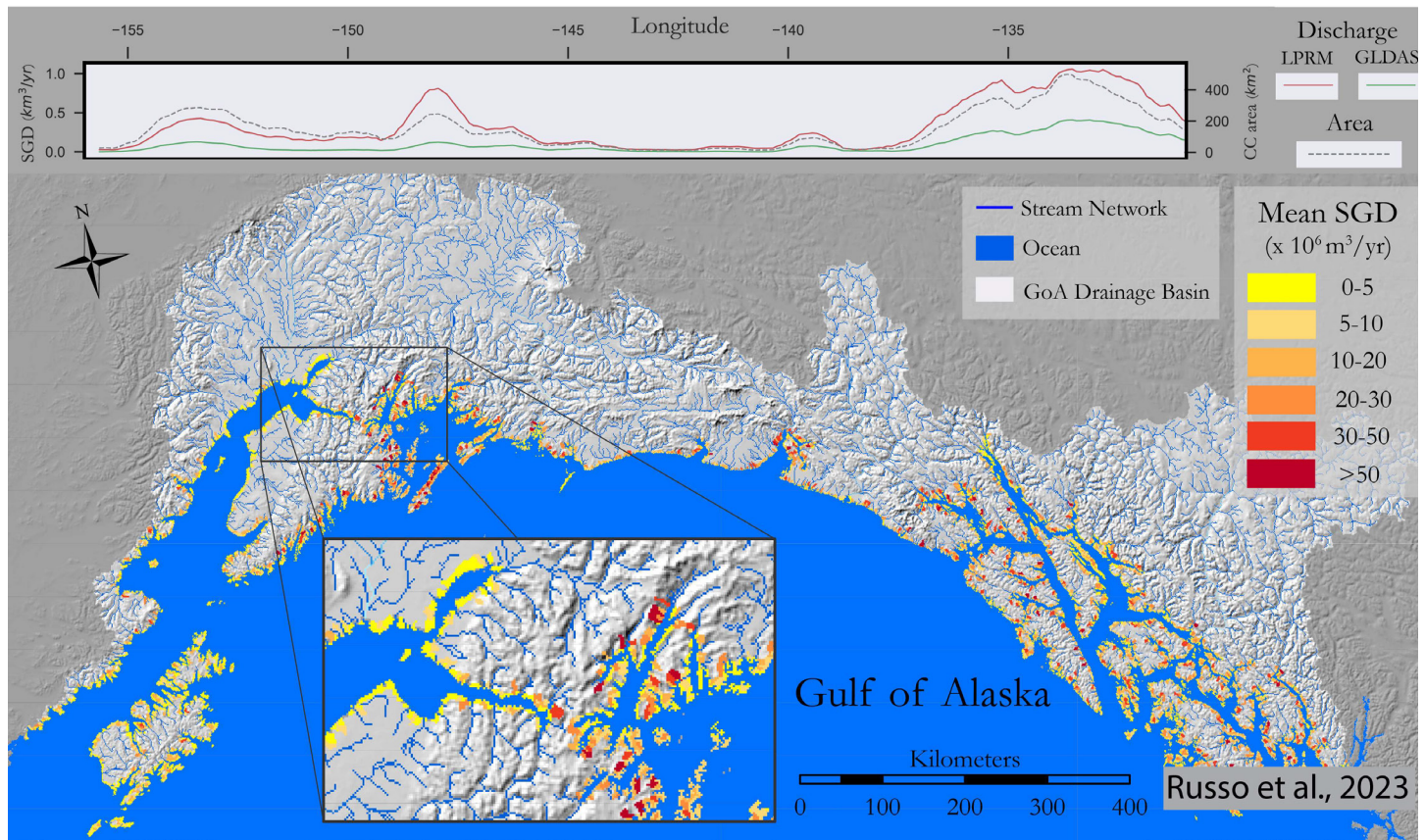
Coastal aquifers play an essential role in near-shore ecosystems by providing disproportionately high fluxes of nutrients and solutes via submarine groundwater discharge (SGD) pathways. SGD from coastal aquifers remains markedly understudied in the Gulf of Alaska (GoA), although it has gained increasing attention globally due to its enriched composition and influence on coastal productivity. In this talk, I will describe a catchment-scale experimental field site in Kachemak Bay, Alaska. This research has applied a suite of multidisciplinary methods to thoroughly represent the complexity of coastal aquifers in proglacial environments currently undergoing rapid transformations. I will present results from our hydrogeologic (grain size analyses, aquifer tests, and tidal response analyses), geochemical (sampling for major ions and stable water isotopes), and geophysical (electrical resistivity tomography and horizontal-to-vertical spectral ratio analyses) investigations. This approach may be applied for low-cost, large-scale hydrogeologic studies in coastal areas across the GoA, and may be particularly useful for remote sites where access and mobility are challenging. I will also provide the first recently published regional estimates of fresh SGD to the GoA using two water balance modeling approaches. An improved understanding of these systems is necessary to guide effective water resource management decisions for the protection of these economically, culturally, and ecologically significant resources.

AGS Meeting

Date & Time:	Thursday, February 15; Doors open 11:00 am, announcements 11:15 am, talk 11:30 am – 12:30 pm
Program:	The unseen contributor: investigations into submarine groundwater discharge in the Gulf of AK
Speaker:	Aeon Russo, Dept. of Geological Sciences, University of Alaska Anchorage, Anchorage, AK
Place:	BP Energy Center, Birch room - in person presentation. Virtual presentation via Google Meet.
Reservations:	Reservations are not required
Login:	For instructions on how to log in see AGS website: http://www.alaskageology.org/events.html
How to Join:	Join with Google Meet: meet.google.com/zvb-hroc-dnm or join by phone: (US) +1 765-391-5154, PIN: 940 741 821#



Geochemical characterization of sampled shallow groundwater and river water within the WRD across seasons. The color of data represents the month sampled and shapes refer to our four experimental site locations. Relationships of basic ions with chloride are provided, as well as a plot of stable isotopes. The $\delta^{18}O$ vs δD values of average rain, snow, glacier, and seawater collected over 5 years are provided in the inset in the stable isotopes plot. The purple oval within this inset provides the location of our data. CDSO = carbonate dissolution via sulfide oxidation; CDCA = carbonate dissolution via carbonic acid; an * indicates that concentrations were corrected for precipitation.



Map of mean annual fresh submarine groundwater discharge (fresh SGD) volumes from the lumped parameter regional model (LPRM) along the Gulf of Alaska coastline. Fresh SGD from the LPRM (red) and GLDAS (green) are plotted with coastal catchment area as a function of longitude on the top panel.

About the Speaker:



Aeon Russo is a Research Professional working for Dr. LeeAnn Munk's lab in the Department of Geological Sciences at UAA where he conceptualizes and implements research projects on the hydrogeochemistry of coastal waters with a focus on terrestrial freshwater, nutrient, and elemental transport to coastal margins. Aeon received two bachelor's degrees in Environmental Science and Quantitative Geoscience from Appalachian State University in North Carolina before receiving an M.Sc. in Hydrogeology from the University of Massachusetts Amherst. His work in hydrogeology focuses on both surface and subsurface water to examine how subarctic water resources are evolving in a changing climate. He uses a combination of field instrumentation, geophysics, remote sensing, geochemical sampling, and numerical modeling as tools to identify and address modern, big-picture issues. His curiosity and fascination with the hydrosphere began as a river guide and avid whitewater kayaker, and you can still find him exploring the remote rivers and recharge areas of Alaska on the weekends.

From the President's Desk:

In this month's column, I would like to expound of the structure of the Alaska Geological Society or AGS and update membership on what AGS has planned for the spring of 2024.

The Alaska Geological Society has been governed by a statement of purpose and AGS By-laws since 1960. Geologists from the academic, mining, petroleum, and engineering fields are represented in AGS membership.

Much of the work of the Society is done by standing committees. The AGS has a Board of 6 officers and 6 directors that plan the agenda and direct the budget of the various committees. This AGS Board meets a minimum of 6 times each season. Upcoming spring meetings are scheduled in March, April, and May of 2024.

The AGS Board has approved the 2023-2024 operating budget. The Board has agreed to new oversight of the legacy Pathfinders committee and has secured and approved funding for the April 6 Spring Technical Conference in Fairbanks.

The society is not interested solely in itself. Volunteer geologist speakers give monthly talks open to the public.

Also, after expenses, the society designates most of its earned income to student scholarships. The Board approved AGS Scholarship committee is currently reviewing scholarship applicants. Winners will be chosen in March by the committee, with some \$6,000 to \$9,000 of AGS and PSAAPG Foundation funds awarded to students in April.

Until next month,

Monte D. Mabry
President, Alaska Geological Society, 2023-2024



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SCHEDULE FOR 2023-2024 LUNCHEON SPEAKER SERIES



MONTH	DATE	SPEAKER	ROOM*	"TITLE"/THEME
Septmeber	9/14/23	Jake Colvault	Birch	"Shelf-margin reservoir analogs for the Brookian Sequence, Alaska"
October	10/30/23	Elizabeth Miller	Birch	"The Brooks Range, Alaska: An orogenic belt with a complex history"
November	11/28/23	Bernard Coakley	Birch	"Chukchi edges - Understanding the history of the Arctic Ocean through mapping the Chukchi Borderland and the adjacent Canada Basin"
December	12/14/23	Trystan Herriott	Birch	"High-precision, zircon-based chronostratigraphy in Alaska: Advances and insights from Mesozoic strata in the Cook Inlet forearc and Colville foreland basins"
January	1/25/24	Esther Babcock	Birch	"Mapping Near-Surface Lithology in Alaska with Geophisic"
February	2/15/24	Aeon Russo	Birch	"The unseen contributor: investigations into submarine groundwater discharge in the Gulf of Alaska"
March	3/21/24	Peter Illig	Birch	Mineral Exploration/Mining
April	4/29/24	Josh Long	Birch	Brookian Stratigraphy, North Slope/Beaufort Shelf
May	5/21/24	Dave Larimer	Birch	Alaska Mining

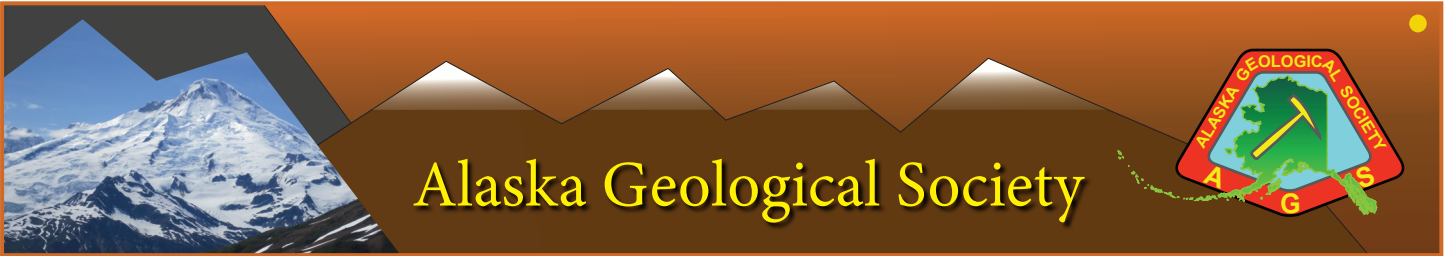
* Location for in-person viewing of presentations will be at the BP Energy Center, 1014 Energy Court, Anchorage, AK 99508



AGS Members,

The AGS Pathfinders in Alaska Geology Committee wishes to thank those who made nominations for the 2024 Pathfinders Class. Nominations are now open for the 2025 Class. A bit of history about this exciting program and the nomination forms and instructions can be found on the AGS website: <https://www.alaskageology.org/pathfinders.html>

Also, if you are interested in joining the Pathfinders Committee, please contact Tom Homza at 907-301-2851 or Thomas.homza@shell.com



Alaska Geological Society

SEEKING DONATIONS FOR AGS SCHOLARSHIP FUNDS

This is a challenging year for students at all levels. Geoscience students in the universities need our support more than ever. When you pay your membership dues this year, please consider a contribution to an AGS scholarship fund. You can also contribute to AGS scholarships through Pick, Click, Give when you apply for your Alaska Permanent Fund Dividend.

The Alaska Geological Society is a 501c3 nonprofit organization and all contributions to these scholarship funds are tax deductible.

2023 AGS Scholarship Award Update Report

Breauna Murry, MS candidate, South Dakota School of Mines and Technology, Rapid City, SD

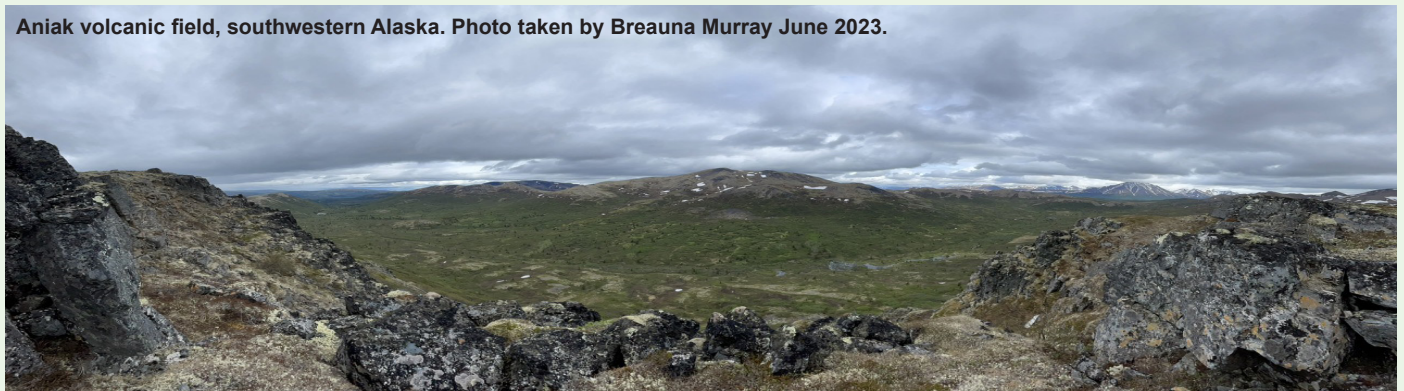
New geologic bedrock mapping and analytical results from the Aniak volcanic field, southwestern Alaska

Recent advancements in Alaskan tectonics imply that the Alaskan orocline may have developed in response to multiple tectonic processes operating in southern Alaska since 70 Ma. To understand the tectonic evolution of southwestern Alaska, these advancements need to be considered. We present an analysis of geologic bedrock map, paleomagnetic, and geochronologic data collected in the Aniak volcanic field in southwestern Alaska to address the potential for polyphase development of oroclinal bending in Alaska. Our 1:24,000 scale bedrock mapping revealed three petrologically distinct basalt flows, a NE-SW striking dextral strike-slip fault, and a NW-SE striking normal fault. Preliminary paleomagnetic work reveals the presence of high coercivity in the bottom and the top basalt flows and low coercivity in the middle flow. High coercivity in the two flows is important, as they will yield the best results for determining the amount and magnitude of vertical axis rotation in the Aniak volcanic field. The Aniak volcanic field yielded a biotite $40\text{Ar}/39\text{Ar}$ age of 69.5 ± 2.1 Ma (Box et al., 1993). Future age determinations will be completed to better understand the episodes of volcanism in the Aniak Volcanic field and the timing of vertical axis rotation.

Citation:

The abstract will be submitted for GSA Rocky Mountains-Cordilleran section meeting in Spokane in May.

Aniak volcanic field, southwestern Alaska. Photo taken by Breauna Murray June 2023.





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The Alaska Geological Society, Inc.
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The Alaska Geological Society is an organization which seeks to promote interest in and understanding of Geology and the related Earth Sciences, and to provide a common organization for those individuals interested in geology and the related earth sciences.

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MEMBERSHIP INFORMATION

AGS annual memberships expire November 1. The annual membership fee is \$25/year (\$5 for students). Lifetime membership is \$250. You may download a membership application from the AGS website and return it at a luncheon meeting, or mail it to the address above.

Contact membership coordinator Kirk Sherwood with changes or updates (e-mail: membership@alaskageology.org; phone: 907-240-2546)

All AGS publications are now available for on-line purchase on our website.

Complete catalogue at: <http://www.alaskageology.org/publications1.html>

ADVERTISING RATES

Advertisements may be purchased at the following rate: \$200 for 9 monthly issues (September - May) of AGS newsletter (any size up to full page) and companion ad on AGS website for full year (beginning each September).

Contact Jennifer Crews at jennifer.r.crews@conocophillips.com to place ad.

Pick.Click.Give.

It's PFD Application Time!

Did you know that you can support the society through Pick.Click.Give? When you fill out your PFD application, just select Alaska Geological Society, Inc. in the list of non-profits and you can help AGS to promote the uniqueness of Alaskan Geology and provide for education, geologic research, and networking to all who are interested as well as provide scholarships to students across a wide range of geologic topics.

<https://www.pickclickgive.org/index.cfm/pfdorgs.info/Alaska-Geological-Society-Inc>

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Alaska Geological Calendar of Events



Date	Time	Organization	Event	Location
Nov. 28, 2023	11:30 pm	AGS	Bernard Coakley, UAF. Chukchi Edges - Understanding the history of the Arctic Ocean through mapping the Chukchi Borderland and and the adjacent Canada Basin.	BP Energy Center & Google Meet
Dec. 14, 2023	11:30 am	AGS	Trystan Herriott DGGs. High-precision, zircon-based chronostratigraphy in Alaska: Advances and insights from Mesozoic strata in the Cook Inlet forearc and Colville foreland basins	BP Energy Center & Google Meet
Jan. 25, 2024	11:30 am	AGS	Esther Babcock, Logic Geophysics & Analytics,LLC. Mapping Near-Surface Lithology in Alaska with Geophysical	BP Energy Center & Google Meet
Feb. 15, 2024	11:30 am	AGS	Aeon Russo UAA. "The unseen contributor: investigations into submarine groundwater discharge in the Gulf of Alaska"	BP Energy Center & Google Meet
Mar. 21, 2024	11:30 am	AGS	Peter Illig, KoBold Metals.Mineral Exploration/Mining theme	BP Energy Center & Google Meet
Apr. 29, 2024	11:30 am	AGS	Josh Long, DGGs. Brookian Stratigraphy of North Slope theme	BP Energy Center & Google Meet
May 21, 2024	11:30 am	AGS	Dave Larimer, Contango Ore. Alaska mining theme	BP Energy Center & Google Meet

Membership Note

Membership renewal is November 1; annual dues are:

Full member - \$25

Student member - \$5

Lifetime membership - \$250



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