

ALASKA GEOLOGY

Newsletter of the
Alaska Geological Society



Chukchi Edges - Understanding the History of the Arctic Ocean Through Mapping the Chukchi Borderland and the Adjacent Canada Basin

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Since 2011, I have collected approximately 11,000 km of new multi-channel seismic reflection data across the Chukchi Borderland and the Canada Basin. This data, particularly in conjunction with a large MCS data set collected by the Geologic Survey of Canada in the Canada Basin for Law of the Sea, illuminates the stratigraphy and structure of the Southeastern Arctic Ocean like never before.

All tectonic models for the Amerasia Basin make predictions about the relationship between the continental Chukchi Borderland and the structures beneath the Canada Basin. Tectonic reconstruction of the Canada Basin of the Arctic Ocean is difficult due to lack of direct evidence of seafloor spreading and absence of clear conjugate margin pairs. The basin is shallow compared to other oceanic basins, which draws into question its crustal composition; yet, a central low gravity anomaly has been suggested to represent an extinct spreading axis. If true, then this plate boundary must connect with other, presently unknown, plate boundaries.

The tectonic setting of the extinct mid-ocean ridge (MOR) that bisects the Canada Basin argues that it was formed by ultra-slow seafloor spreading. Using the Gakkel Ridge as an analog for the extinct spreading center, in conjunction with other observations of the basin history, offers some constraints on the history of the region. The Canada Basin is composed of continental-ocean transitional (COT) and oceanic (*continued on page 2*)

AGS Meeting

Date & Time: Tuesday, November 28; Doors open 11:00 am, announcements 11:15 am, talk 11:30 am–12:30 pm
Program: Chukchi Edges - Understanding the history of the Arctic Ocean through mapping the Chukchi Borderland and and the adjacent Canada Basin
Speaker: Bernard Coakley, Department of Geosciences, University of Alaska Fairbanks, Fairbanks, AK
Place: Networking at BP Energy Center, Birch room. 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/pxx-jcqc-tff
or join by phone: (US) +1 414-909-7172, PIN: 639 813 597#

(mid-ocean ridge; MOR) crust. A relict MOR is recognized from a linear gravity low and associated weakly bilateral-symmetric magnetic anomalies in the central basin. Approximately 300 km separates the outermost magnetic anomalies, which appear to define the limits of oceanic crust.

Two oriented well cores from the Early Cretaceous Kuparuk Formation on the North Slope of Alaska document consistent paleomagnetic pole orientations distinct from contemporaneous poles for the North American craton. The two poles can be brought into alignment by 65–70 degrees of counter-clockwise rotation of the “Arctic Alaska–Chukotka microplate” with respect to the North American craton. This rotation accounts for the complete opening of the Canada Basin. As a result, the entire opening of the Canada basin by extension must postdate Kuparuk deposition.

Spreading rates on Gakkel ridge range from 1.25 cm/yr near Fram Strait to 0.5 cm/yr full rate, where the ridge disappears below the Laptev Shelf as it approaches its pole of opening on mainland Eurasia. Taking the highest spreading rate observed on the Gakkel Ridge (1.25 cm/year), the 300 km wide zone of oceanic crust would have taken 24Ma to form. This may require that the Canada Basin is younger than currently believed.

About the Speaker:

I was born in Detroit, Michigan. After the initial 12 years of education there, I attended Michigan State, the University of Michigan, Louisiana State, and Columbia University, earning four degrees at those institutions. I had a two-year post-doc at the University of Wisconsin focused on Mid-Continent Gravity High and the Michigan Basin. After that I returned to Lamont-Doherty as a soft money research scientist. During the five years I was there my research developed a focus on the Arctic Ocean and its periphery starting with an unclassified science cruise on the USS Pargo, a Sturgeon-class fast attack submarine. Since then I’ve sailed on two other submarines, a few icebreakers and a few other ships in pursuit of mapping and understanding the history of the Arctic Ocean. Since 2002 I have been on the faculty at the University of Alaska Fairbanks.

From the President’s Desk:

Change and Course Correction

We logically assume that tomorrow will be much like today. However, we are told that change is inevitable. That there are forks in the road ahead and it takes purpose and direction to stay on course.

As with any organization, AGS is challenged by change and uncertainty. It can be a struggle to stay focused and remain relevant when faced with uncertainty. In the post-merger, post-covid world, AGS has had to rethink how best to accomplish stated goals. In the not-so-distant past, Alaskan energy companies supported AGS through reimbursement of costs for society dues, sit-down luncheons, field trips and travel to regional and national conventions. Corporate sponsorship has since been dramatically scaled back and many geologists feel that their employers no longer want them involved with non-profit, professional societies. This has resulted in diminished in-person opportunities to discuss science and debate geological advances. In short, members have become less connected.

Efforts by a core group of dedicated AGS members, volunteers all, keeps the Society functioning and on course. Current challenges will lead to fresh and meaningful opportunities. And the AGS is financially stable which puts it on solid footing to travel down that next fork in the road.

The AGS Board welcomes input from its’ membership as it sets objectives and goals this coming year.

AGS is affiliated with the international petroleum geology association or AAPG. AGS is organized “to promote interest in and understanding of the geology of Alaska through a common organization”.

“Tis the set of the sails and not the gale that determines the course we take.”

Until next month,

Monte D. Mabry

President, Alaska Geological Society, 2023-2024

Call for volunteers to serve on the 2024 AGS Pathfinders Committee

You will help steer this new “Hall of Fame for Alaskan Geoscientists”. It’s fun and not too demanding!

<https://www.alaskageology.org/pathfinders>



About Pathfinders in Alaska Geology.

This award was established in 2023 to recognize true trailblazers in the geosciences in Alaska; men and women who made enormous contributions to the general understanding of the geology of the Last Frontier.

Current Committee Members.

- Tom Homza (Chair) Shell International Exploration Company
- David Houseknecht, U.S. Geological Survey
- Susan Karl, U.S. Geological Survey
- Paul Layer, University of Alaska
- Steven Masterman, Alaska Division of Geological & Geophysical Surveys (retired)
- Robert Swenson, Alaska Division of Geological & Geophysical Surveys (retired)
- Marwan Wartes, Alaska Division of Geological & Geophysical Surveys

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Please contact
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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	Zircon-based Chrono stratigraphy
January	1/25/24	Esther Babcock	Birch	Environmental/Geophysics
February	2/15/24	Aeon Russo	Birch	Significance of High Latitude Submarine Ground-water Discharge
March	3/21/24	Peter Illig	Birch	Mineral Exploration/Mining
April	4/29/24	Josh Long	Birch	Brookian Stratigraphy, North Slope/Beaufort Shelf
May	TBD	Rick Van Nieuwenhuysse	TBD	Alaska Mining

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



AGS Members,

Please consider nominating a geologist who has made significant contributions to the understanding of Alaska's geology for a 2024 "Pathfinders in Alaska Geology" award. 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

HEROES OF ALASKAN PALEONTOLOGY – EDWIN KIRK, USGS, [1884-1955] – SPECIALIST IN PALEONTOLOGY OF ALASKA AND THE WESTERN CORDILLERA

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Edwin Kirk
(1884-1955)



Passport photo of
E. Kirk from 1920
which notes that
he stood at 5 ft.
10 in., was of fair
complexion, with
light colored hair

This article is the continuation of a planned series of contributions honoring paleontologists who have established much of the basic paleontological and stratigraphical framework of Alaska in the published record of geological studies of our State. The subject here is Edwin Kirk, USGS paleontologist and geologist who was responsible for much of our early understanding of the early Paleozoic (notable Silurian, but also including Ordovician, Devonian, and Mississippian) rocks and fauna.

Edwin Kirk was born December 6, 1884 in Richland, South Dakota. He was the son of Nathan Allan Kirk and Caroline E. (Née Freeman) Kirk (see Fig. 1). Edwin and his wife Page Taylor were married June 26, 1913 at her home “Lego” near Charlottesville, Virginia. She was a descendant of Thomas Jefferson. Together they had a son (Edwin Roger Kirk) and a daughter (Mary Mann Kirk). Edwin Kirk died November 17, 1955 in his USGS office at the Smithsonian Institution, Washington D.C.

The Smithsonian Archives office provides the following biographic information on the career history of Kirk: “Edwin Kirk (1884-1955) was educated at Columbia University where he received his Ph.D. degree in 1911. While at Columbia, Kirk was an Assistant to Amadeus W. Grabau, one of America’s foremost teachers of geology and paleontology. In 1907, Kirk left Columbia to become an Assistant Paleontologist with the United States Geological Survey (USGS). In 1909, he was promoted to Junior Geologist, and subsequently held positions as Assistant Geologist, 1911-1913; Associate Geologist, 1913-1914; Paleontologist, 1914-1920; Associate Geologist, 1921-1952; and Geologist, 1952-1954. In 1920, Kirk interrupted his service with the USGS to become a paleontologist with the Bolivia-Argentina Exploration Corporation. When Kirk joined the USGS he was an Assistant to Edward Oscar Ulrich, studying Ordovician and Silurian sediments of the Appalachians. Later, Kirk made field trips to the Rocky Mountains, the Great Basin, and southeastern Alaska. Kirk also had an avocational interest in the history of science.”

Kirk was honored in his lifetime by several invertebrate genera which were named in his honor, including *Kirkina* Salmon, 1942 (Ordovician brachiopod from the Pogonip Limestone of Utah), *Kirkidium* Amsden, Boucot and Johnson, 1967 (Silurian brachiopod), and *Kirkospira* Rohr and Blodgett, 2003 (Silurian gastropod from Glacier Bay). His most cited Silurian work is that of Kirk and Amsden (1952), a monographic study of the Silurian brachiopod fauna of southeast Alaska. Subsequently, one of their richly diverse localities was re-assigned an Early Devonian (Pragian) age by Savage (1981). In addition to his Silurian Alaskan taxonomic papers, he also author other papers on Ordovician and Silurian of Alaska (Kirk, 1918a, b; 1929) and a paper on Devonian stringocephalid brachiopods from southeast Alaska and the Great Basin (Kirk, 1927c), and a new Carboniferous crinoid from southeast Alaska (Kirk, 1937a, b). His other significant publications include a paper on a Devonian bivalve from China (Kirk, 1927d), one on the Paleozoic stratigraphy of the Inyo Mountains in California (Kirk, 1918), one on a Silurian gastropod from Nevada (Kirk, 1930), as well as numerous papers involving Paleozoic crinoids from outside of Alaska (not cited herein). An earlier published memorial article on Kirk was published in 1956 by G. Arthur Cooper (Cooper, 1956).

The Silurian fauna of the Alexander terrane of southeast Alaska is very similar faunally with the Farewell terrane of southwest and west-central Alaska and both here are suggested to belong to a new unnamed biogeographic province within the Uralian-Cordilleran Region of the North Silurian Realm (see fig. 2 therein). These close Silurian faunal ties of the Alexander terrane of southeast Alaska with those of the Urals and Siberian were earlier noted in Kirk and Amsden (1952), Blodgett (2013), Blodgett et al. (2002, 2010, 2013), and Rohr and Blodgett (2008). Close linkages are also suggested with the Eastern Klamaths of California and the Seward Peninsula although the data is still not robust for those latter areas.

Kirk conducted two intensive summers of field studies in Alaska during 1917 and 1918, his work was limited to the southeast part of the State, where he made large collections of invertebrate fossils which are deposited in the U.S. National Museum in Washington, D.C. Some of his collections were made in Johnson Cove in Glacier Bay National Park (Fig. 2). Other areas of intensive study by Kirk included Chichagof Island, Prince of Wales Island, Heceta Island, and Kosciusko Island.

As noted earlier, Kirk passed away on November 17, 1955. Arthur J. Boucot, the Ph.D. advisor of two of the authors (Blodgett and Rohr) shared an office with Edwin Kirk in the early 1950's. An interesting anecdotal story he related to us was the fact that Kirk lost a leg when he fell into a mine shaft doing geological work in Nevada in the 1920's. He subsequently used a prosthetic leg for the rest of life, and you could hear his "leg" creaking when he walked down the hallway in the Natural History Museum building where the USGS Branch of Paleontology was housed. Just before he passed away, they noted no one had heard his motion down the hallway so they eventually opened the door to find him deceased at his desk.



Figure 1. Gravestone of Edwin Kirk and his wife Page Kirk. The location of their burial is in the family graveyard at Monticello Graveyard, Albemarle County, Virginia.



Figure 2. Johnson Cove on northern Willoughby Island, Glacier Bay. Edwin Kirk collected many specimens from the Silurian Willoughby Limestone on Willoughby Island in 1917.

PHOTOS OF FOSSIL GENERA ESTABLISHED IN THE SILURIAN OF SOUTHEAST ALASKA BY EDWIN KIRK

BROOKSINA KIRK, 1922 (SILURIAN BRACHIOPOD)

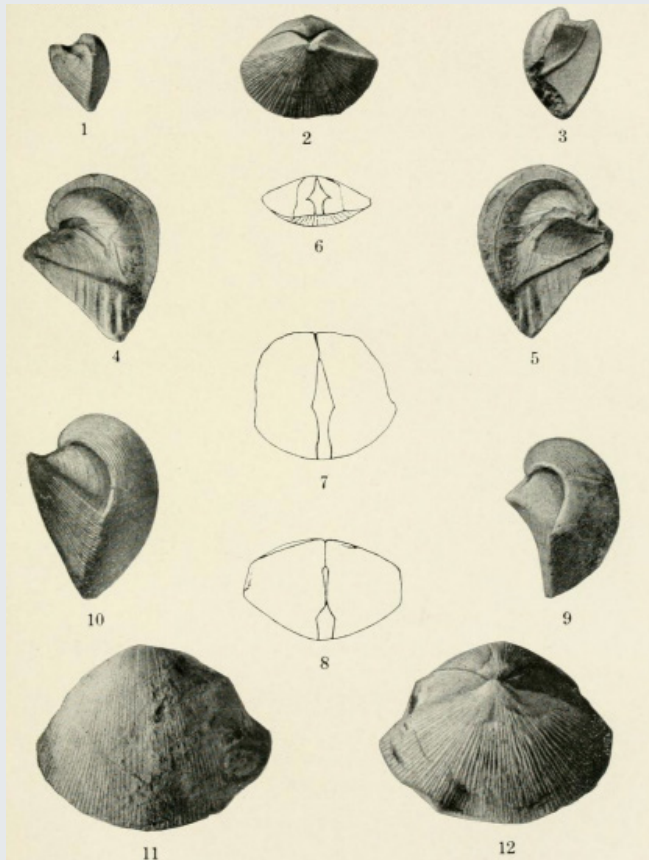


Figure 3. *Brooksina alaskanesis* Kirk, 1922, Silurian age Heceta Limestone, Kosciusko Island, Southeast Alaska.

CYMBIDIUM KIRK, 1926 (SILURIAN BRACHIOPOD)

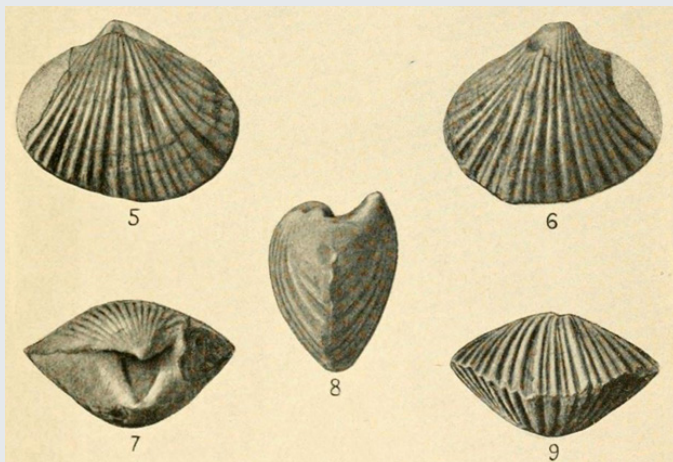


Figure 5. *Cymbidium acutum* Kirk, 1926. Heceta Limestone, Kosciusko Island, Southeast Alaska.



Figure 7. *Pycinodesma giganteum* (Kirk) bed at Johnson Cove, Willoughby Island, Glacier Bay, Southeast Alaska. See Rohr et al., 2023, for additional information on this genus.

HARPIDIUM KIRK, 1925 (SILURIAN BRACHIOPOD)

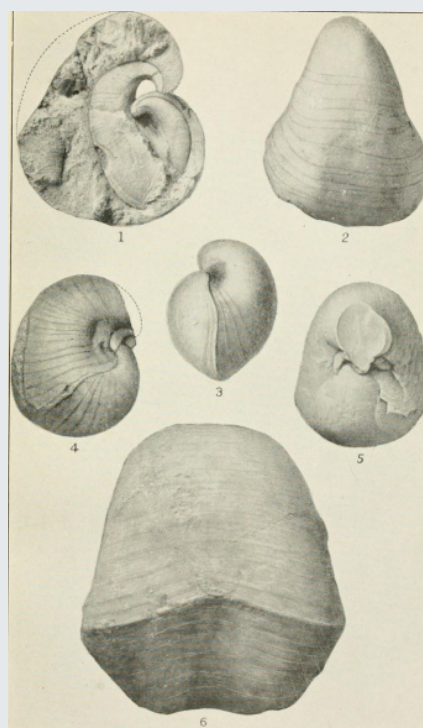


Figure 4. *Harpidium insignis* Kirk, 1925. Silurian age Heceta Limestone, Heceta Island and Kosciusko Island, Southeast Alaska. This is the type species of the genus. In addition, Kirk recognized two other species of this genus (*H. rotundus* and *H. latus*) from nearby strata in Southeast Alaska.

PYCINODESMA KIRK, 1927 (SILURIAN BIVALVE)

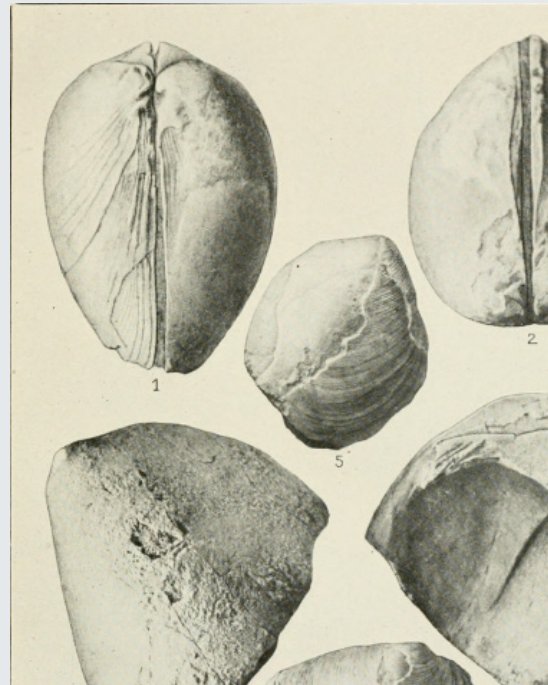


Figure 6. Kirk's (1927a) original illustration of *Pycinodesma giganteum*. Views 1-5 are of the genotype (holotype) specimen. View 6 is of another specimen questionably included in the species. All specimens from Willoughby Limestone, Glacier Bay..

BATHMOPTERUS KIRK, 1928 (SILURIAN GASTROPOD)

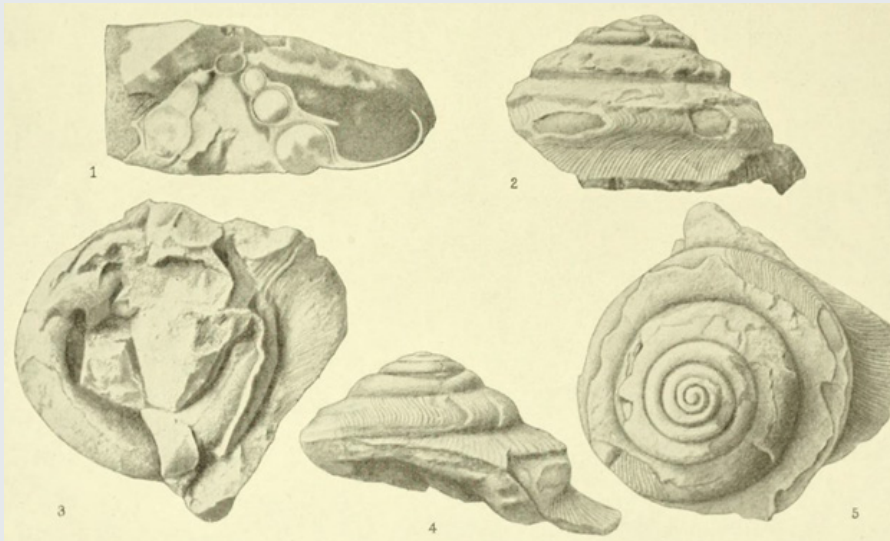


Figure 8. *Bathmopterus liratus* Kirk, 1928 from the Silurian age Willoughby Limestone, Willoughby Island, Glacier Bay, Southeast Alaska.

PHOTOS OF FOSSIL TAXA ESTABLISHED IN THE PALEOZOIC OF ALASKA NAMED IN HONOR OF EDWIN KIRK



Figure 10. Photo of the holotype of the Silurian gastropod *Kirkospira glacialis* Rohr and Blodgett, 2003 from the Silurian age Willoughby Limestone. Specimen collected by E. Kirk from Willoughby Island, Glacier Bay.

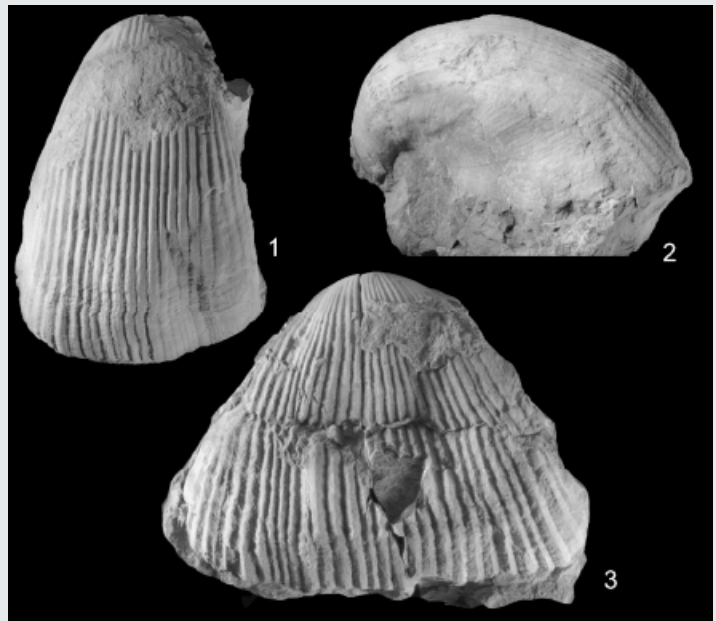


Figure 11. *Kirkidium alaskanense* (Kirk and Amsden), Heceta Limestone, Prince of Wales Island. These illustrated specimens range from 8-12 cm in length. (from Blodgett, 2012, Fig. 1)

Figure 12. Bank-like accumulation of *Kirkidium alaskanense* (Kirk & Amsden), Heceta Limestone, Prince of Wales Island, Southeast Alaska (from Blodgett, 2012, fig. 2).



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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.

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Alaska Geological Calendar of Events



Date	Time	Organization	Event	Location
Nov. 28, 2023	11:30 pm	AGS	Bernard Coakley, UAF. Schist and Central Belt theme.	BP Energy Center & Google Meet
Dec. 14, 2023	11:30 am	AGS	Trystan Herriott DGGS. Zircon-based Chrono-stratigraphy theme	BP Energy Center & Google Meet
Jan. 25, 2024	11:30 am	AGS	Esther Babcock, Logic Geophysics & Analytics, LLC. Environmental Geophysics theme	BP Energy Center & Google Meet
Feb. 15, 2024	11:30 am	AGS	Aeon Russo UAA. "Significance of High Latitude Submarine Groundwater Discharge"	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. 2024	11:30 am	AGS	Josh Long, DGGS. Brookian Stratigraphy of North Slope theme	BP Energy Center & Google Meet
May 2024	11:30 am	AGS	Rick Van Nieuwenhuyser, Valhalla Metals. Alaska mining theme	BP Energy Center & Google Meet

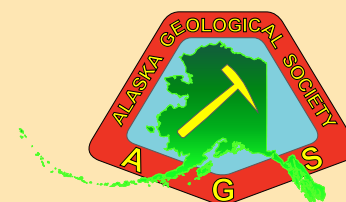
Membership Note

Membership renewal is November 1; annual dues are:

Full member - \$25

Student member - \$5

Lifetime membership - \$250



2023 - 2024 Alaska Geological Society Board, Committees and Delegates

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Field Trips	OPEN			
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