

# ALASKA GEOLOGY

Newsletter of the  
*Alaska Geological Society*



## Magmatic Ni-Cu-PGE Exploration in Alaska's Wrangellia Terrane

**Peter Illig**

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Mafic and ultramafic intrusions that formed underneath and during the eruption of the Wrangellia flood basalts have been sporadically explored for nickel, copper and platinum group elements since the 1990s. This talk will introduce a genetic model for magmatic Ni-Cu-PGE sulfide genesis during the formation of the Wrangellia flood basalts, and new geochemical data demonstrating the potential for high grade mineralization.

Dunite intrusions up to 15km in length are intruded by smaller gabbro and melagabbro intrusions. Melagabbro intrusions are variably mineralized with pentlandite, chalcopyrite, and other iron sulfide phases. The silicate melts that formed melagabbro equilibrated with an exsolved sulfide melt that contained 6% Ni, 6% Cu, 10ppm Pd and 8ppm Pt. Some sulfide bodies appear to be comparatively enriched with a potential to reach concentrations up to 13% Ni, 7% Cu, 19ppm Pd and 18ppm Pt. We hypothesize that deformation of Wrangellia during accretion onto North America caused varying degrees of sulfide kinesis, which is commonly recognized in other districts to increase nickel and PGE concentrations.

With metal grade potential of the district demonstrated, KoBold is conducting large scale ground electromagnetic surveys to reduce drilling uncertainty in the search for massive sulfide. The talk will end on the fundamental theory of electromagnetic exploration of sulfide bodies, survey design and the practical realities of conducting the work in the steep terrain of the Eastern Alaska Range.

### **AGS Meeting**

Date & Time:	Thursday, March 21; Doors open 11:00 am, announcements 11:15 am, talk 11:30 am – 12:30 pm
Program:	Magmatic Ni-Cu-PGE exploration in Alaska's Wrangellia terrane
Speaker:	Peter Illig, KoBold Metals, Berkeley, CA
Place:	BP Energy Center, Birch room - in person presentation ONLY. NO virtual presentation this month.
Reservations:	Reservations are not required
Events:	For more information on AGS events see: <a href="http://www.alaskageology.org/events.html">http://www.alaskageology.org/events.html</a>
How to Join:	There will not be a virtual presentation via Google Meet this month.

## **About the Speaker:**

Peter Illig is a geologist with KoBold Metals, a copper-nickel-cobalt-lithium explorer based out of California. He manages global nickel generative efforts and carries out active exploration projects in Alaska, Greenland, Canada and Western Australia. Peter is a Certified Professional Geologist in Alaska and a registered Professional Geoscientist in Ontario. He received his Masters in Economic Geology at the University of Alaska Fairbanks and his Doctorate in Geology at the Colorado School of Mines.

### ***2023 AGS Scholarship Award Update Report***

***Jason Craig, PhD candidate, Stanford University, Stanford, CA***

#### **Ancient and active tectonics of Arctic Alaska: Structural framework of the south-central Brooks Range and geothermal potential of the Kigluaik Mountains, Seward Peninsula**

Student grant support provided to Jason Craig, 4th year Ph.D. student at Stanford University working with Elizabeth Miller, was used to acquire accessory phase split-stream LA-ICP-MS U-Pb dates with paired trace elements from the University of California, Santa Barbara from metamorphic and igneous rocks of the Seward Peninsula, Brooks Range, Ruby Terrane, and Yukon-Koyukuk Basin of northern Alaska. Microstructural analysis was completed at the University of Nevada, Reno to establish the timing of selected phase growth, degree of intracrystalline deformation, and to map specific grains for in-situ U-Pb spot placement. Titanite and rutile petrochronology was completed on twenty-six samples that targeted grains that are associated with blueschist facies assemblages in the Nome Complex of the Seward Peninsula and Schist Belt of the metamorphic core of the Brooks Range. In general, titanite and rutile U-Pb results consistently yield early to mid-Cretaceous dates, but, unfortunately, are characterized by low uranium and high common lead resulting in large errors that preclude differentiation between the age of blueschist facies metamorphism and mid-Cretaceous deformation and thermal overprint. Metamorphic monazite in two samples from the Schist Belt of the John and Alatna rivers produced mid-Cretaceous dates that potentially place new age constraints on the development of the youngest metamorphic fabric of the metamorphic core of the Brooks Range. Apatite U-Pb from seven samples of mid-Cretaceous granites of the Ruby Terrane and Yukon-Koyukuk Basin consistently yield high-quality mid-Cretaceous cooling ages that are only slightly younger than prior zircon U-Pb ages. Much of this data will supplement low-temperature thermochronology (ZHe, AFT, and AHe) from many of the same samples to understand the thermal history after the crystallization of mid-Cretaceous granites and peak temperatures of metamorphic rocks. Collectively, this was a significant analytical effort utilizing samples from many projects across several decades of fieldwork to answer fundamental questions about the tectonic history of northern Alaska. Funding was partially sourced through student grant support provided by AGS. Thank you!

# 2024 AGS Technical Conference

Saturday, April 6, 2024 - University of Alaska, Fairbanks



The Alaska Geologic Society (AGS) and the University of Alaska Fairbanks (UAF) are excited to announce the upcoming Joint AGS Technical Conference-UAF Geoscience Student Colloquium. This distinguished event will be held on the University of Alaska Fairbanks campus, promising a day rich with scholarly presentations, engaging discussions, and invaluable networking opportunities. Geoscience students, professionals, and enthusiasts are warmly invited to partake in this academic gathering.

The AGS Technical Conference-UAF Geoscience Student Colloquium will foster connections between academic research and practical applications in the geosciences, providing a stage for students to present their latest research findings and for professionals to share their expert insights.

This year's conference is not just an event; it's a gathering of minds passionate about the geosciences. It's an opportunity to learn from leading figures in the field, to present and discuss your research, and to network with fellow geoscience enthusiasts. Whether you're presenting, attending, or engaging in discussions, this colloquium is where your academic and professional journey in the geosciences can take a significant leap forward.

For more information on abstract submission, registration, or general inquiries, please visit our website: <https://www.alaskageology.org/2024-ags-technical-conference.html> We eagerly await your participation in Fairbanks for a day dedicated to the exploration and celebration of geosciences.

## **Keynote Speakers:**

Barrett Salisbury, from the Alaska Division of Geological & Geophysical Surveys, will illuminate our understanding with his talk on "Removing the Guesswork from Tsunami Evacuations: New Insights into the Tectonic Tsunami of 1964." His expertise and research contribute significantly to enhancing safety and preparedness in the face of natural disasters.

Claudia Canatelli, a renowned volcanologist from the University of Alaska Anchorage, will share her profound knowledge and experiences in the field of volcanology, offering attendees a closer look into the dynamic world of volcanic activity and research.

## **Program Features:**

**Morning Sessions:** The colloquium will commence with presentations from students and professionals alike, covering a wide array of topics within the geosciences.

**Afternoon Poster Session:** A dedicated poster session will provide an interactive platform for students and professionals to display their research, engage with attendees, and discuss their findings in a visually compelling format. This session is a cornerstone of the colloquium, encouraging direct interaction and knowledge exchange among participants.

## **Call for Poster Presentation Abstracts:**

Abstracts for oral presentations are no longer being accepted, but you can still submit an abstract for a poster presentation!

## **Registration Information:**

Registration is now: <https://www.alaskageology.org/2024-ags-technical-conference.html> We encourage early registration to secure your participation. Registration is free for students. Please visit our website for registration details and to confirm your attendance.



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# AN EXCITING NEW DISCOVERY OF EMSIAN (LATE EARLY DEVONIAN) BRACHIOPODS IN THE WERNECKE MOUNTAINS OF EAST-CENTRAL YUKON TERRITORY

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Paleontological and stratigraphic studies and geological mapping go hand-in-hand in restoring the past paleogeography of the surface of the Earth's lithosphere. Understanding the basic paleontological framework of the Paleozoic of the Yukon has been an active area of study since the 1960's, mainly through auspices of the Canadian Geological Survey and Canadian academic scientists. Work currently being conducted by the Yukon Geological Survey is now dominating the study of Yukon geology. They are doing an excellent job of maintaining the work in this area. Their work is especially exemplary in its multidisciplinary approach in this task.

The Early Devonian fossil fauna of the Yukon is especially diverse and dominated by brachiopods, followed to a lesser extent by gastropods (see end of article for complete listing of all literature – references include several from cratonic east-central Alaska). Mapping by the Yukon Geological Survey during 2022 and 2023 revealed two new Emsian (late Early Devonian) sections bearing rich megafauna and their general location along that of the nearby classic Royal Creek sections (first recognized in the 1960s) are shown on a general terrane map of the Yukon (Fig. 1). These faunas are remarkably well preserved and some of the more significant elements are illustrated below. Paleontological work is a critical contribution to our understanding of the Paleozoic evolution of this part of the Cordillera.

We are presently trying to document and describe the brachiopod element of this fauna, with the intent to better characterize the taxonomic content of not only the Yukon Territory Devonian fauna, but also parts of nearby North American craton-bound strata of east-central Alaska. These two areas are closely related biogeographically, but show some critical points of taxic differentiation from the various accretionary terranes (i.e. Farewell, Alexander, etc.) which form the bulk of Alaska and appear to be more Eurasian in origin.

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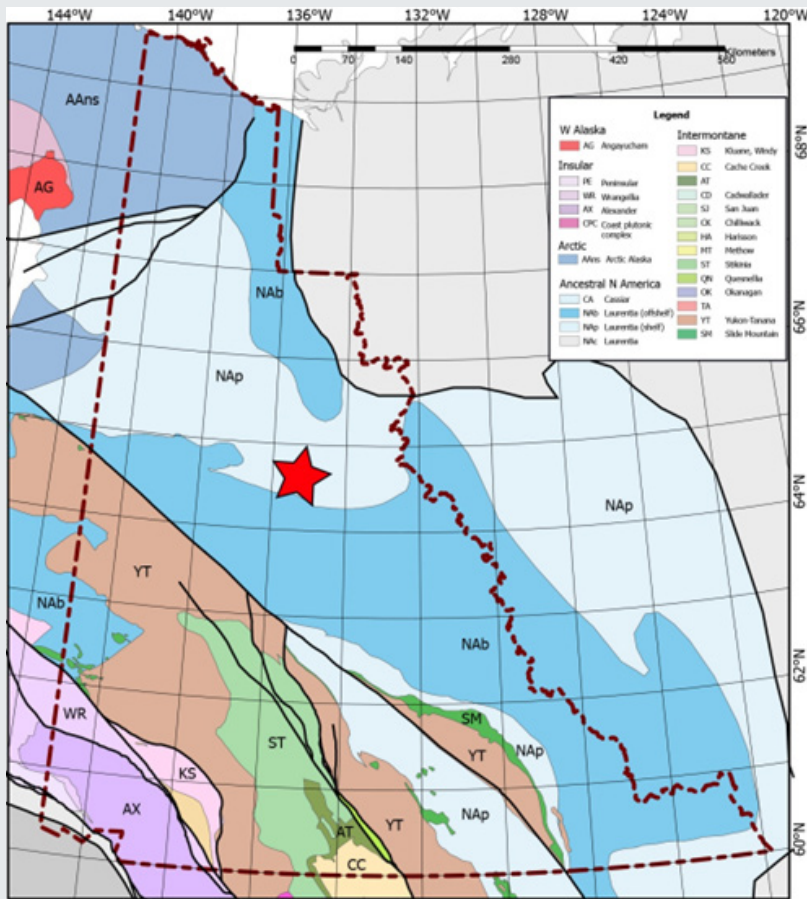


Figure 1. Terrane map of the Yukon. Star shows approximate location of the two new Yukon Geological Survey Early Devonian (Emsian) brachiopod collections and those of the World renowned Royal Creek Sections.



Figure 2. *Ivdelinia* sp. This is the first occurrence of this genus in the Yukon Territory. Typical Eurasian taxon, but found previously in North American in the Canadian Arctic Islands, but also the Farewell and Alexander terranes of accretionary Alaska.

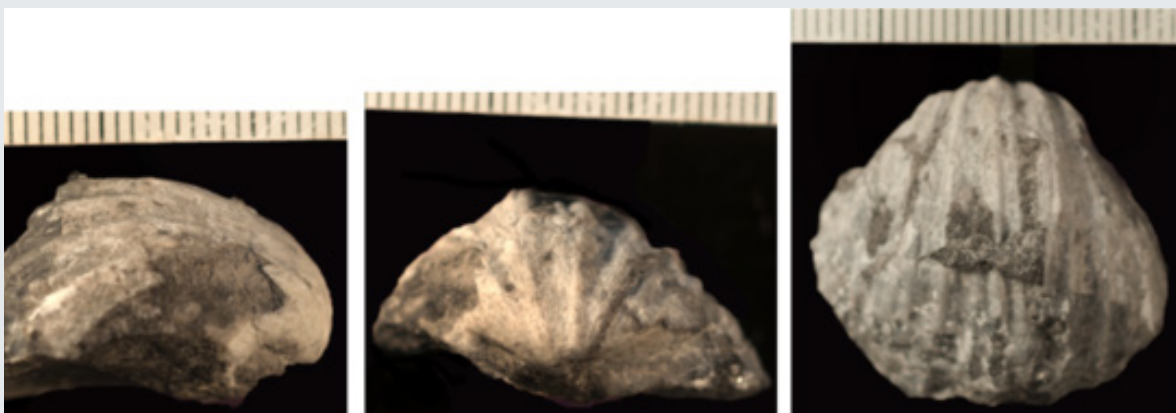


Figure 3. *Sieberella* sp.



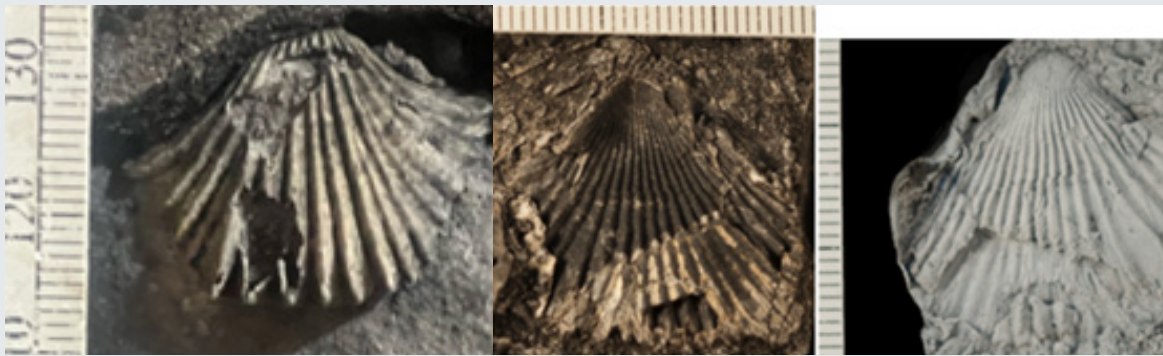


Figure 4. *Thliborhynchia* sp.

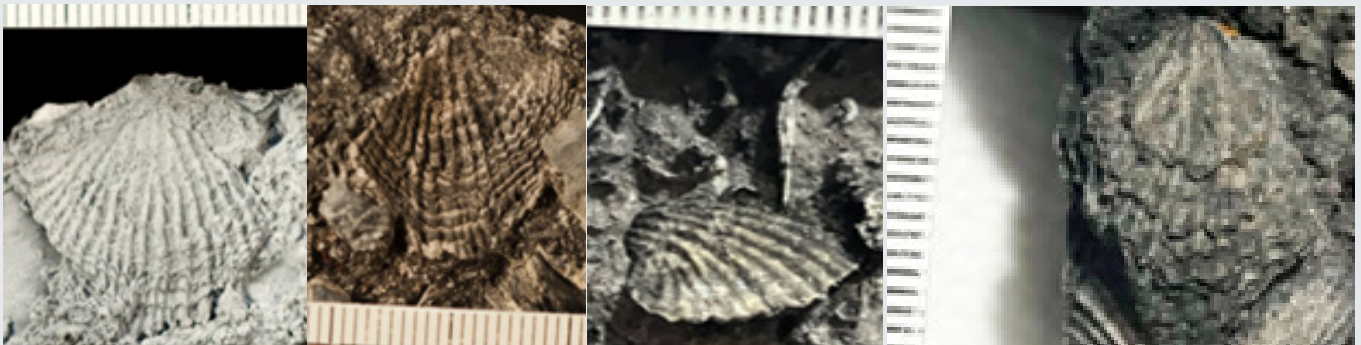


Figure 5. *Spinatrypa* sp.



Figure 6. Spiriferid brachiopod, genus not determined

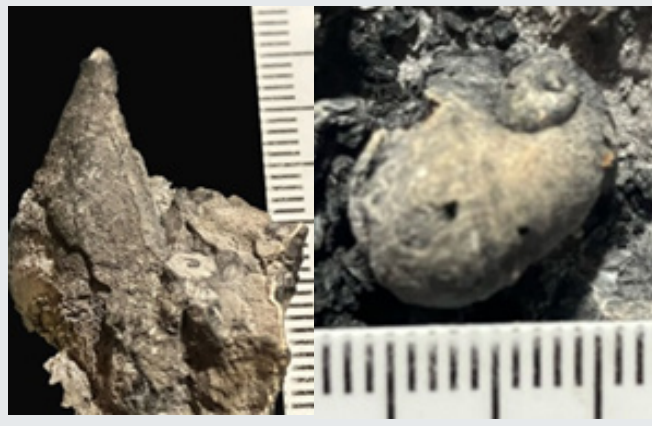


Figure 7. Emsian gastropods: *Orthonychia* (unusual uncoiled gastropod, left) and subulitid gastropod (right).

## 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.**

# 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 Geophysics"
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	"Magmatic Ni-Cu-PGE exploration in Alaska's Wrangellia Terrane"
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](mailto:Thomas.homza@shell.com)



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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](mailto:membership@alaskageology.org); phone: 907-240-2546)

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

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Contact Jennifer Crews at [jennifer.r.crews@conocophillips.com](mailto:jennifer.r.crews@conocophillips.com) to place ad.

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# Alaska Geological Calendar of Events



Date	Time	Organization	Event	Location
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 Geophysics	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 only
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

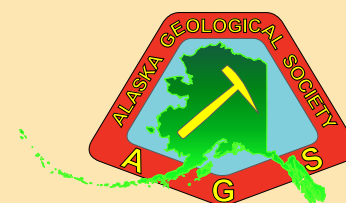
## Membership Note

Membership renewal is November 1; annual dues are:

*Full member - \$25*

*Student member - \$5*

*Lifetime membership - \$250*



## 2023 - 2024 Alaska Geological Society Board, Committees and Delegates

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