

ALASKA GEOLOGY

Newsletter of the
Alaska Geological Society



Active Tectonics of the North Pacific: Interplate and Intraplate Deformation in the Icy Ring of Fire

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The North Pacific plate boundary zones from California through Alaska to Japan contain a range of deformation styles, from orthogonal convergence through transtension. Upper plate deformation is similarly varied, in some cases localized on the plate boundary and in others spread for hundreds of kilometers inboard. Because of the great size of this region, it is difficult to develop a synoptic picture of the kinematics of the North Pacific that accurately captures the details of individual regions while consistently integrating them across plate boundary and orogenic transitions. However, recent work by the Global Earthquake Model Foundation and collaborators has produced a high-resolution kinematic block model covering much of the northern hemisphere. This model inverts GPS geodetic velocities and Quaternary geologic slip rates to solve for the relative motions of crustal blocks, fault slip rates and subduction zone locking. The results clearly depict the diverse patterns of deformation in each region, including the often-complex zones at the transition between plate boundary types.

About the Speaker:

Dr. Richard Styron is a geologist and geophysicist with a particular focus on faulting. His work has spanned a range of space and time scales, from orogenic evolution over millions of years to individual earthquake ruptures, and from bedrock and Quaternary geologic mapping to numerical simulations. For the past 5 years, he has worked at the intersection of tectonics and seismic hazard, seeking to better characterize faulting and earthquake occurrence to increase the accuracy of seismic hazard analyses.

AGS Meeting

Date & Time:	Thursday, January 20; Announcements 11:45 am, Talk 12:00 – 1:00 pm
Program:	Active Tectonics of the North Pacific: Interplate and intraplate deformation in the icy ring of fire
Speaker:	Richard Styron, Global Earthquake Model Foundation
Place:	Virtual online presentation
Reservations:	Reservations are not required
Login:	For instructions on how to log in see: http://www.alaskageology.org/events.html
How to Join:	Join with Google Meet: https://meet.google.com/kdd-navw-mkg or join by phone: (US) +1 413-758-2991; PIN: 885 859 080#

Richard Stryon in southern Peru



From the President's Desk:

Happy New Year colleagues and friends! I wish for each of you an open mind, fresh ideas, and geologic adventures in 2022. Our January speaker, Dr. Richard Stryon from the Global Earthquake Model Foundation, will take us on a great geologic adventure of the North Pacific with his talk titled: Active Tectonics of the North Pacific: Interplate and Intraplate Deformation in the Icy Ring of Fire. Please join me in welcoming Dr. Stryon to our AGS community.

What a thrust of atmospheric energy to the tail end of 2021 and beginning of 2022 in Alaska! High winds, cold temperatures, and damaging outcomes for communities around the state. Each day, for the past two weeks, my phone has been buzzing with texts and emails about State of Alaska building closures due to weather, road conditions, and bursting pipes. Please be supportive of our neighbors and colleagues as they manage and recover from these extreme weather events. A special shout out goes to our energy and power servicemen and women who are actively working hard to keep and restore power to our communities.

Today I received an email from the BP Energy Center that they will remain closed to the public through May of 2022. We will continue to offer our monthly presentations online while our 'in-person' venue, the BP Energy Center, remains closed to public meetings. In the spirit of fostering more communication amongst our geologic community, I offer up a challenge to all of you. If you are a long time geology professional, please set an intention to mentor someone who is up and coming. Be open to their energetic ideas and thoughts. If you are in the earlier stages of your professional development, reach out to some long timers for a walk, a talk, or maybe go for a lunch or coffee. Connect.

My best regards,
Laura Gregersen



Alaska Geological Society



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This is a challenging year for students at all levels, and 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. **AGS is a 501c3 nonprofit organization and all contributions are tax deductible.**

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**Warren J. Nokleberg
(1939-2021)**



Warren Nokleberg undated

By Thomas K. Bundtzen (P.O. Box 81906 Fairbanks, AK, 99708), Robert B. Blodgett (2821 Kingfisher Dr., Anchorage, AK 99502, and David W. Scholl, (USGS Emeritus, Earthquake Science Center, Moffett Field, CA, 94035)

Noted geologist Warren J. Nokleberg passed away at his home in Fremont, California on December 27th, 2021 after a two-year battle with cancer. He was 82. Warren was born in Fargo, North Dakota and spent his early childhood years in Spokane, Washington before moving to California, where he lived for most of his adulthood. He worked many summers in Alaska and in various international addresses conducting geological investigations.

Nokleberg earned a BA in geology from the University of California-Los Angeles (UCLA) in 1961. Subsequently, he served as a Regular Line Officer aboard a troop carrier in the U.S. Navy from 1961 to 1965. After military service, he resumed his university education and earned a Ph.D. in Geology from the University of California—Santa Barbara in 1970.

Warren Nokleberg was employed with the U.S. Geological Survey (USGS) on a part time, full time, or emeritus basis since 1966, or for 56 years. He was an Associate Professor of Geology at California State University, Fresno from 1970 to 1977; Research Geologist with the U.S. Geological Survey in Menlo Park, California from 1969 to 970 and 1977 - 2006; and USGS Emeritus Research Geologist from 2007-to-2018. Warren is an author or co-author on 260 scientific papers. In 2002, Nokleberg was awarded the Meritorious Service Award of the Department of the Interior for exceptional scientific research and leadership during his Alaska and Circum-North Pacific studies.

Notable early economic geology studies undertaken by Nokleberg include: 1) the 1970 release (with Paul Bateman) of underground mapping and structural analysis of the Strawberry tungsten mine area in the Bishop district of California; featuring a very early use of the electron microprobe in the study of skarn and ore mineralogy; 2) 1970 release (with Norman Page) of the geological framework map of the Stillwater Complex in Montana; now the nation's premier producer of platinum group elements; and 3) the late 1970s investigation of the Drenchwater Creek lead-zinc-silver deposit (with Gary Winkler), one of the earliest published studies of a syngenetic deposit in the Noatak district of northwest Alaska.

Since completion of graduate school at the University of California-Santa Barbara, Nokleberg's major research emphasized mineral deposits, metallogenesis, bedrock geologic mapping, and tectonic analyses associated with the Alaska Mineral Resource Assessment (AMRAP) of the Mount Hayes Quadrangle in the Eastern Alaska Range, the Trans-Alaska Crustal Transect (TACT) project in Eastern and Northern Alaska, and metallogenesis and tectonic summaries for both the Circum-North Pacific (Russian Far East, Alaska and Western Canada) and Northeast Asian regions (Eastern and Central Russia, Japan, China, Taiwan, South Korea, and Vietnam). For all of these projects, Warren led and coordinated large and complex teams of geoscientists that compiled, synthesized, and published interpretive articles on regional geology, tectonics and metallogenesis. Mineral deposit summaries in Asia included resource data for several thousand mineral deposits, information of which was publicly released for the first time.

In 1990, the Alaska Miners Association (AMA) sponsored a symposium in Anchorage, Alaska that featured Russian, Canadian, and American geologists from the Circum-North Pacific study managed by Nokleberg. Summary presentations from the symposium were published by AMA in 1995.

Subsequent to his 2007 retirement, Warren led a team of five geoscientists to produce an E-Book on the 'Dynamic Geology of the Northern Cordillera (Alaska and Western Canada)'. Released as a University of Alaska Scholarworks Publication in 2018, the 1,500+ page document, along with numerous figures, tables and maps, describes the many geological, tectonic features and energy and mineral resources. (see <https://scholarworks.alaska.edu/handle/11122/7994>). The E-Book is designed for use by earth science teachers from secondary school through college levels. A reviewing precis of the E-Book was also published in 2019 as an invited contribution to the Geological Society of America's educational and outreach section (Geosphere's Theme Volume 16), 'Subduction, Top to Bottom'.

After final retirement, in early 2020, Warren assembled and submitted (with Nora Shew and others) a comprehensive geological map and text of the Eastern Alaska Range, utilizing much unpublished materials obtained during previous USGS 'AMRAP' and 'TACT' programs. We believe this final 'Nokleberg et al report', when released, will be a valuable addition to the geological map base of eastern Interior Alaska.

Warren Nokleberg was a generous and kind man who was very good at organizing complex groups of professionals; with as many as twenty-five co-authors in his publications. And he always finished his projects. Upon notification of his passing, geoscientist Nikolai Goryachev, a corresponding member of the Russian Academy of Sciences and who worked on the Circum-North Pacific Project stated: "Warren Nokleberg was the man that brought us all together". Warren played a mandolin 4-5 times a week for most of his adult life and was an active member of several amateur folk musical groups in the San Francisco Bay area. He is survived by son Chris and daughter Julie, their spouses and children, and his partner Diane.

In view of his enormous contributions to a better understanding of Alaskan geology and tectonics, a Devonian fossil gastropod was established in Warren Nokleberg's honor, *Quadricarina* (*Quadricarina?*) *noklebergi* Frýda and Blodgett, 2004. The source publication was "New Emsian (Late Early Devonian) gastropods from Limestone Mountain, Medfra B-4 quadrangle, west-central Alaska (Farewell terrane) and their paleobiogeographic affinities and evolutionary significance" published in the Journal of Paleontology, v. 78, no. 1, p. 111-132 (authors: J. Frýda and R.B. Blodgett). An illustration of the species is given below:

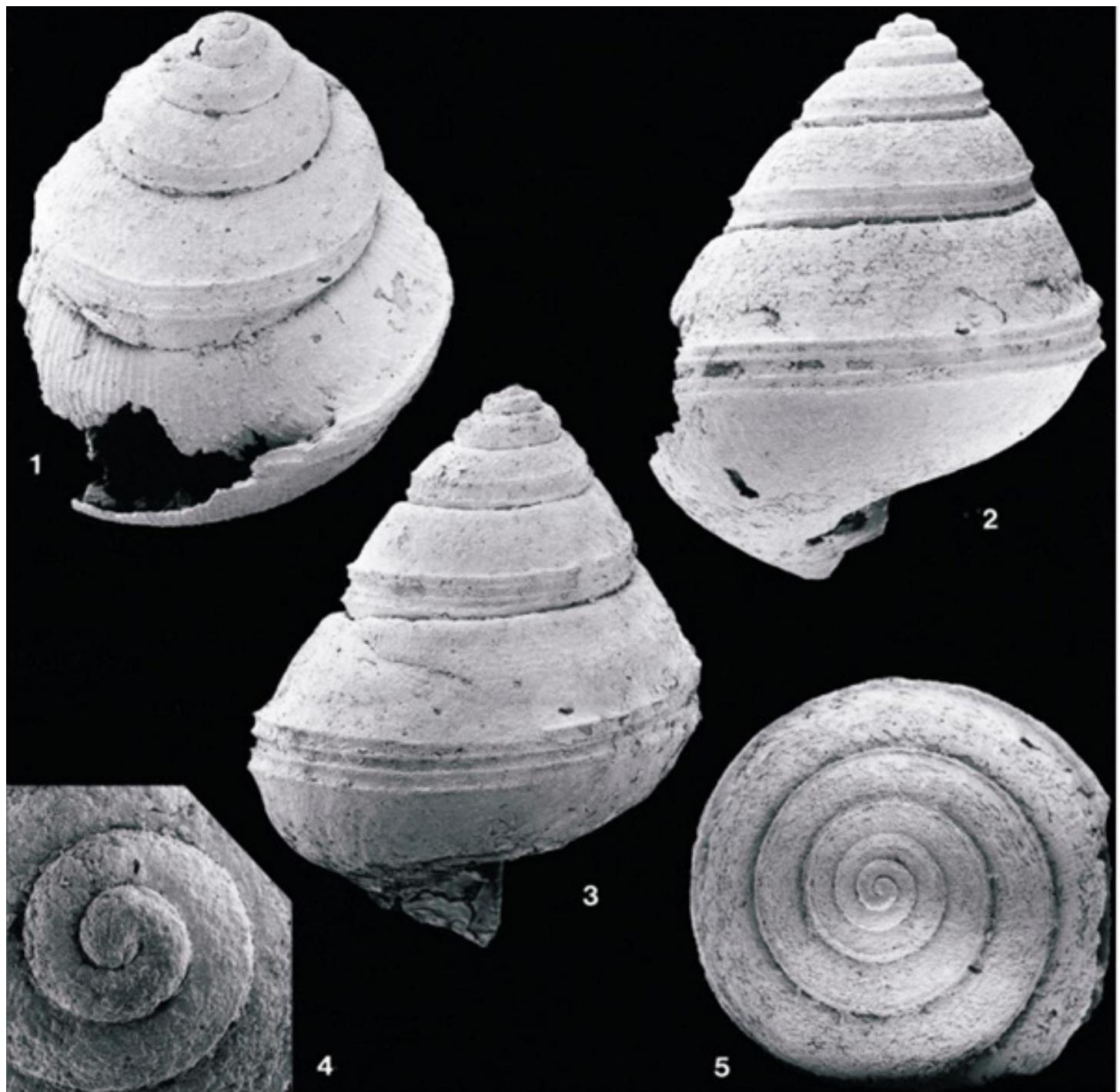


FIGURE 2—*Quadricarina* (*Quadricarina?*) *noklebergi* n. sp. 1, Oblique view on paratype A, CGU JF 786, $\times 25$; 2, 4–5, holotype, CGU JF 785; 2, lateral view, $\times 29$; 4, detailed view showing protoconch morphology, $\times 85$; 5, apical view showing reticulate shell ornamentation, $\times 28$; 3, paratype B, CGU JF 787, $\times 25$.



Warren Nokleberg (second from left), with Don Grybeck, Lidia Kobvas and Tom Bundtzen discuss with a Russian geologist an unusual borosilicate skarn deposit near Dalnegorsk in Primorye, Russian Far East—then the USSR's largest boron source, circa 1989—as part of the Circum-North Pacific (Russian Far East, Alaska and Western Canada) metallogenetic Project Photo Credit: Farid Kutyev.



Warren Nokleberg (right) and the late Gil Mull (left) inspect an outcrop of the Late Cretaceous Prince Creek Formation, near Prudhoe Bay, circa 2010. Photo by T.K. Bundtzen



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

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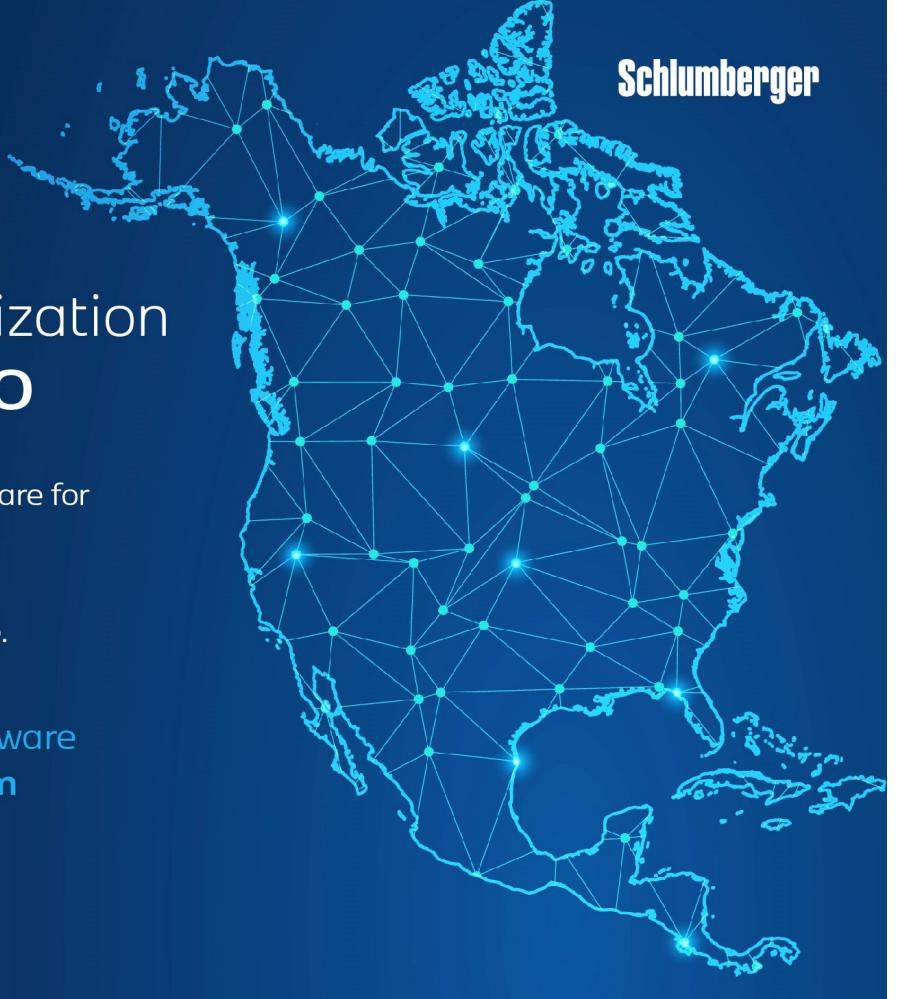
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Alaska Geological Calendar of Events



Date	Time	Organization	Event	Location
Jan. 20 2022	11:45 am	AGS	Richard Styron, Global Earthquake Model Foundation, Active Tectonics of the North Pacific: Interplate and intraplate deformation in the icy ring of fire	Google Meet
Feb. 17 2022	11:45 am	AGS	TBA	Google Meet
Mar. 17, 2022	11:45 am	AGS	Edward A. Duncan, Duncan Petroleum Advisors, LLC, Integrated Seismic Stratigraphic, Geochemical Volatiles Analysis and Petrophysical Quantification of a Brookian Foredeep, North Alaska Campanian Margin Multi-Billion Barrel "Super Trap"	Google Meet

AMA: Alaska Miners Association; **AGS:** Alaska Geological Society; **GSA:** Geophysical Society of Alaska

AAEP: Alaska Association of Environmental Professionals; **SPE** Society of Petroleum Engineers;

UAA University of Alaska Anchorage.

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