



## PALEOGEOGRAPHIC RECONSTRUCTION OF THE ARCTIC ALASKA-CHUKOTKA TERRANE

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\*Speaker

*Note: AGS meetings will be at the BP Energy Center for 2010-2011.  
Please check the website ([www.alaskageology.org](http://www.alaskageology.org)) and issues of the AGS newsletter for updates.  
This newsletter promotes the December luncheon talk of the Alaska Geological Society,  
to be held Thursday, December 9<sup>th</sup>, at the BP Energy Center.*

The Arctic Alaska-Chukotka terrane is one of several blocks of continental crust that sit in a framework of Mesozoic basins and structures between the Laurentian and Siberian cratons (see Figure). The Arctic Alaska-Chukotka terrane and other blocks near the Laurentian craton (e.g., Farewell terrane) contain early Paleozoic fauna that are not strictly Laurentian; the blocks originated elsewhere and have moved into their present positions since the early Paleozoic. Combined geologic, detrital zircon, and paleontologic data from Seward Peninsula and other parts of the Arctic Alaska-Chukotka terrane restrict options for Neoproterozoic and early Paleozoic paleogeographic reconstructions.

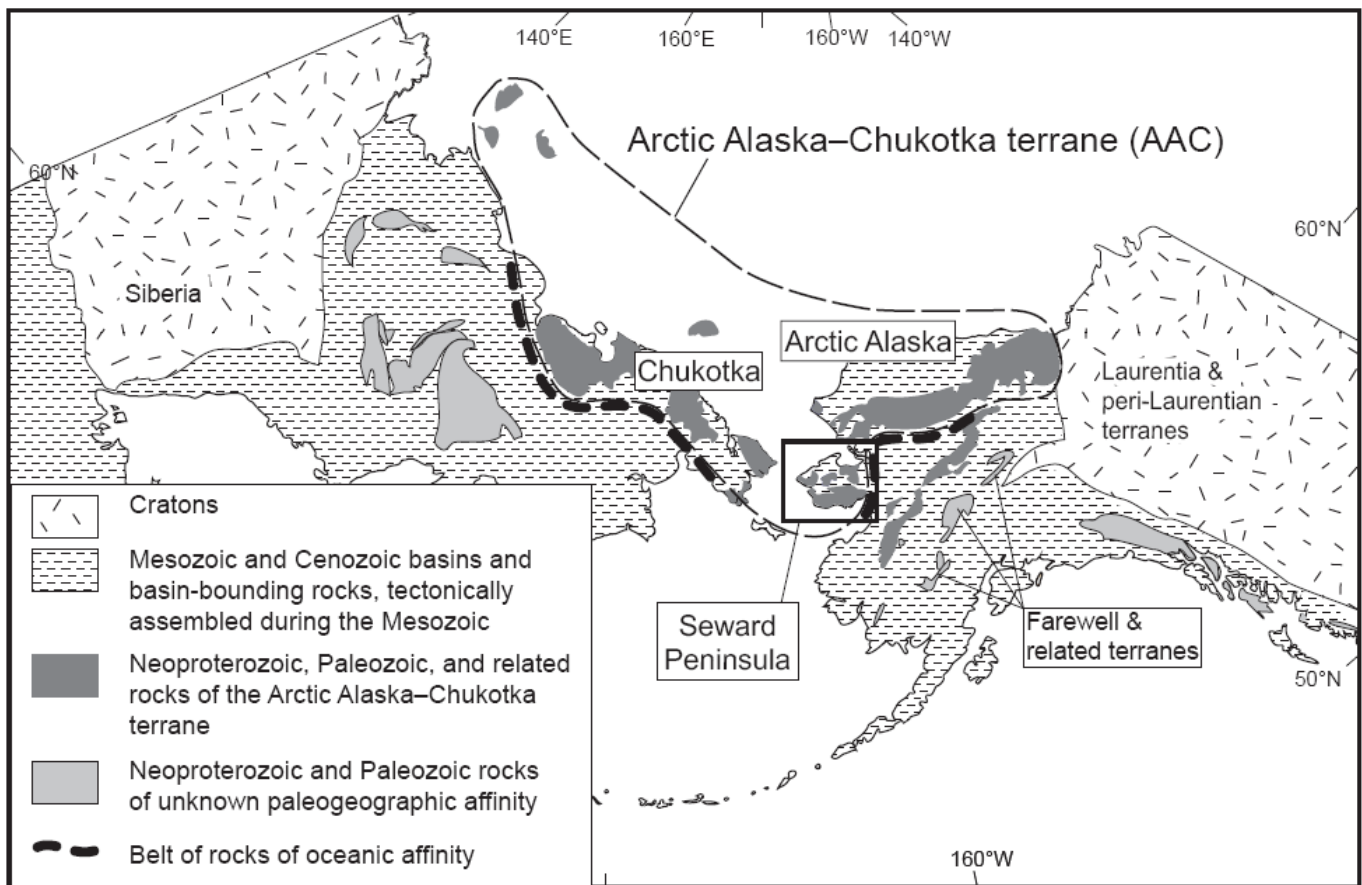
Basement of the Arctic Alaska-Chukotka terrane is composed of Neoproterozoic igneous rocks, Neoproterozoic metamorphic rocks, and Ordovician(?) and older sedimentary rocks. On Seward Peninsula, the Nome Complex contains lenses of 670-680 Ma orthogneiss that represent this basement (Amato et al., 2009).

The Arctic Alaska-Chukotka terrane basement is overlain by a latest Neoproterozoic to Middle Devonian carbonate platform. The Paleozoic platform rocks, especially those of Ordovician age, are characterized by fauna of mixed Laurentian, Siberian, and Baltic affinities. This characteristic is shared with rocks of the Farewell terrane, but is otherwise not known outside the Arctic Alaska-Chukotka terrane. The mixed fauna place requirements on the relative positions of the Laurentian,

### AGS Luncheon

- Date & Time:** December 9<sup>th</sup>, 11:30 am – 1:00 pm
- Program:** Paleogeographic Reconstruction of the Arctic Alaska-Chukotka Terrane
- Speaker:** Alison Till, US Geological Survey
- Place:** BP Energy Center
- Reservations:** Please make your reservation before noon Tuesday Dec. 7<sup>th</sup>, 2010.
- Cost:** Seminar only, no meal: Free
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Siberian, and Baltic continents during the early Paleozoic; the carbonate platform must have been in position to receive fauna from all three continents.

In addition to lenses of basement, the Nome Complex of Seward Peninsula contains mafic rocks that formed in an incipient continental rift during the Early to Middle Ordovician. These mafic rocks are metamorphosed sills, dikes, and flows that have minor element (REE, trace elements) and isotopic characteristics typical of incipient continental rift settings (Ayuso and Till, 2007). Elsewhere on the Arctic Alaska-Chukotka terrane carbonate platform, sedimentary facies record deepening during the Early to Middle Ordovician that is likely related to the rift event. Rift deposits in the Nome Complex contain detrital zircons dominated by 700-570 Ma ages; since these zircons were derived from the rifted basement, the ages are an important clue to the location of the Arctic Alaska-Chukotka terrane during the Early to Middle Ordovician. These detrital ages are a close match with igneous and detrital zircon ages from elements of the Timanide orogen, which now sits along the northern Russian coast between Scandinavia and the Ural mountain range. Components of the orogen are exposed along the west flank of the Urals, on Novaya Zemlya (a northern extension of the Urals), and possibly further east in Taimyr. The orogen formed on the margin of Baltica during the Neoproterozoic. The Timanide orogen, like basement of the Arctic Alaska-Chukotka terrane, is a composite of Neoproterozoic sedimentary, metamorphic, and igneous rocks.

In addition to the zircon ages, geographically restricted endemic fauna from the Arctic Alaska-Chukotka terrane are consistent with a Timanide origin for the terrane. Early Ordovician trilobites from Seward Peninsula are most like those in Novaya Zemlya, and Late Ordovician trilobites are similar to those in Taimyr, the Siberian platform, and several peri-Siberian terranes. The rift basin on Seward Peninsula likely formed on the Timanide margin of Baltica during the Ordovician opening of the Uralian ocean. The Arctic Alaska-Chukotka terrane was close to Baltica, Siberia and Laurentia in Ordovician and Silurian time.

The Arctic Alaska-Chukotka carbonate platform is overlain by Devonian and younger siliciclastic rocks. In the Nome Complex, and elsewhere in the Arctic Alaska-Chukotka terrane (e.g., the Brooks Range), the siliciclastic rocks contain a large 440-420 Ma detrital zircon population. This population is also seen in northwest Laurentia (Gehrels et al., 1999; Beranek et al., 2010), suggesting that by Late Devonian, the Arctic Alaska-Chukotka terrane was adjacent to northwest Laurentia and both were receiving a significant supply of 440-420 Ma zircons. Neither northwest Laurentia nor the Arctic Alaska-Chukotka terrane contain igneous rocks that could have been the zircon source. The source of these zircons and the exact timing of their appearance in northwest Laurentia and the Arctic Alaska-Chukotka terrane are important unknowns in tectonic reconstructions of the area.

References cited:

- Amato, J.M., Toro, J., Miller, E.L., Gehrels, G.E., Farmer, G.L., Gottlieb, E.S., and Till, A.B., 2009, Late Proterozoic-Paleozoic evolution of the Arctic Alaska Chukotka terrane based on U-Pb igneous and detrital zircon ages: Implications for Neoproterozoic paleogeographic reconstructions: Geological Society of America Bulletin, v. 121, no. 9/10, p. 1219-1235.
- Ayuso, R.A., and Till, A. B., 2007, Geochemical and Nd-Pb isotopic evolution of metabasites from attenuated continental lithosphere, Nome Group, Seward Peninsula, Alaska [abs.]: Geological Society of America Abstracts with Programs, v. 39, no. 6, p. 489.
- Beranek, L.P., Mortensen, J.K., Lane, L.S., Allen, T.L., Fraser, T.A., Hadlari, T., and Zantvoort, W.G., 2010, Detrital zircon geochronology of the western Ellesmerian clastic wedge, northwestern Canada: Insights on Arctic tectonics and the evolution of the northern Cordilleran miogeocline: Geological Society of America Bulletin, v. 122, no. 11/12, p. XX [December 2010, available on line]
- Gehrels, G.E., Johnsson, M.J., and Howell, D.G., 1999, Detrital zircon geochronology of the Adams Argillite and Nation River Formation, East-central Alaska, U.S.A.: Journal of Sedimentary Research, v. 69, no. 1, p. 135-144.

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### **From the President's Desk ....**

Best wishes for the holiday season everyone, and I hope that you had a very happy Thanksgiving weekend. I'm writing this as I sit by the fireplace in my son and daughter-in-law's recently purchased house in the foothills near Denver. The house is built on a granite pegmatite, and my software engineer son has suddenly become geologically curious. ("What's that shiny, flaky stuff all over my yard?") I was more than happy to explain granite mineralogy, controls on crystal growth, book mica cleavage, and the age and extent of the Pike's Peak batholith, but I didn't get very far before his eyes glazed over. I guess curiosity has its limits.

When I travel Outside and meet new people, the second question that I usually get about Alaska is "How do you get through those short winter days?" (The first question is always about you know who.) What I tell them is that they cannot imagine how much fun we have throughout the winter season. Festivals, galas, plays, concerts, sporting events, and private parties abound, and in some areas, particularly Anchorage, there are substantial lighted skiing opportunities, both downhill and Nordic. And, we don't have to compete with tourists to get a seat in our many good restaurants and watering holes!

Our speaker this month is Alison Till of the USGS. I haven't, at the time of this writing, received her abstract, but I see that her title is "Reconstruction of Arctic Alaska". Alison is well published on the structural geology and tectonics of Alaska, and she has co-authored recent work on the Seward Peninsula and Brooks Range. I'm really looking forward to hearing the latest attempt at reconstructing at least part of the jigsaw puzzle that defines our great state.

Plans for next May's joint PSAAPG/Western Region SPE meeting in Anchorage are coming along well, a call for abstracts is out, and volunteers are being sought. Please consider getting involved in this important meeting hosted by our society. Session chairs and judges are being recruited, a spouse activities director is needed, and the abstract submission deadline is February 11. For more information see the PSAAPG website (<http://psaapg.org/>) or contact David Hite.

And finally, our Scholarship Committee is in full swing getting out notices to educational institutions to apply by February 1. Robert Blodgett is coordinating these efforts again this year. If you know of someone who might qualify for an AGS scholarship please encourage him or her to submit an application. Details can be found at: (<http://www.alaskageology.org/scholarships.htm>).

**Tom**

## BLM completes mineral occurrence and potential report for southwestern Alaska:

BLM-Alaska has released Technical Report 60; *Mineral Occurrence and Development Potential Report for locatable and salable minerals, Bering Sea/Western Interior (BWSI) planning area*. The BWSI planning area is located in southwestern Alaska and encompasses 62 million acres of land, including 10.8 million acres managed by the BLM. The planning area contains 445 documented mineral occurrences and a total of 6,618 mining claims, with 219 of those under federal management.

Placer production within the planning area totals 3.2 million ounces gold and 151,750 ounces silver. The planning area contains the Donlin deposit with a resource totaling 29.3 million ounces gold and the Nixon Fork copper-gold deposit containing a 115,000 ounce gold resource.

A total of 57 areas within the BWSI planning area are considered to have high locatable mineral potential. This includes placer and lode gold, platinum group elements, polymetallic veins, zinc-lead skarns, bedded lead-zinc deposits, tin greisens, silica-carbonate mercury, and rare earth element occurrences.

Key issues to be addressed during the planning effort will include mineral development, subsistence use, fisheries, wildlife, and recreational use. To obtain copies of the report contact: Joe Kurtak, (907-267-1256) or John Hoppe (907-271-3218). The report can be downloaded from the BLM Web site at the following address:

[http://www.blm.gov/ak/st/en/info/gen\\_pubs/tr.html](http://www.blm.gov/ak/st/en/info/gen_pubs/tr.html)



BLM geologist John Hoppe samples copper-bearing volcanic rocks in the Kuskokwim Mountains near McGrath, Alaska.

### The Alaska Geological Society

#### LUNCHEON SCHEDULE 2010 - 2011

##### Updates on the web at:

<http://www.alaskageology.org>

September 2010	Thurs., Sept. 16 <sup>th</sup> , David Scholl, USGS, Earthquake and Tsunami Hazards of the Aleutians
October 2010	Thursday, Oct. 21 <sup>st</sup> , Peter Haeussler, USGSNeo-tectonics of Cook Inlet
November 2010	Thursday, Nov. 18 <sup>th</sup> , Joann Welton, EXXON, Evaluating siliciclastic reservoir quality
December 2010	Thursday, Dec. 9 <sup>th</sup> – Alison Till, USGS, Reconstruction of Arctic Alaska
January 2011	Thursday, Jan. 20 <sup>th</sup> – Chris Waythomas, USGS AVO, Eruption of Kasatochi
February 2011	Thursday, Feb. 17 <sup>th</sup> , James Coleman, USGS, Tight-Gas Sandstone Reservoirs (AAPG Distinguished Lecturer)
March 2011	Thursday, March 17 <sup>th</sup> – Lisa Wirth, UAF Alaska Satellite Facility
April 2011	Thursday, April 21 <sup>st</sup> , Erik Hulm, BP Alaska, Heavy Oil of Alaska
May 2011	Thursday, May 19 <sup>th</sup> – Robert Swenson, DGGS, Energy development in Alaska

**If you would like to volunteer a talk or would like to suggest a speaker, please contact Ken Helmold at 269-8673**

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### Local Meetings:

#### American Water Resources Association—Alaska Section

<http://www.awra.org/state/alaska/index.html>

#### Alaska Geological Society

<http://www.alaskageology.org>

Lunch meetings are held monthly September through May in Anchorage. For more information, contact Jim Clough, 451-5030.

#### Alaska Miners Association

<http://www.alaskaminers.org/>

The Anchorage branch of the AMA holds weekly meetings at 7 AM every Friday at the Denny's on Northern Lights and Denali. They hold regular luncheon meetings in association with SME. For more information, contact the AMA office at 563-9229.

#### American Institute of Professional Geologists

<http://www.aipg.org>

AIPG holds regular quarterly evening Section meetings in Anchorage and Fairbanks. For more information contact Mark Lockwood, President, at Shannon & Wilson, Inc., in Fairbanks, 907-458-3142.

#### Chugach Gem & Mineral Society

<http://www.chugachgms.org>

CG&MS holds all meetings at the First United Methodist Church on 9<sup>th</sup> Avenue. Contact their hotline at 566-3403 for information on regular monthly business meetings, monthly potlucks, and guidebook sales, including the new Alaska Rockhound Guidebook.

#### Geophysical Society of Alaska

<http://gsa.seg.org/>

Luncheon meetings are held monthly September through May at the ConocoPhillips Tower. For more information, contact Phil Rorison, 265-6321

#### Society of Petroleum Engineers

<http://alaska.spe.org/>

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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 \$20/year. 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 Greg Wilson with changes or updates (e-mail: [gregory.c.wilson@conocophillips.com](mailto:gregory.c.wilson@conocophillips.com); phone: 907-263-4690)

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## Alaska Recreational gold panning guidebook now available

The popular **Guide to Recreational Gold Panning on the Kenai Peninsula** has been updated and rereleased in a joint effort by the Bureau of Land Management and U.S. Forest Service. The guide provides background on the geology and mining history of the Kenai Peninsula as well as advice on the best panning techniques to recover gold. It describes four sites on the Kenai Peninsula that have been set aside for recreational gold panning only; the closest being about an hour's drive from Anchorage. For those interested in living a bit of the Gold Rush and maybe discovering a bit of the "yellow metal" this guidebook is invaluable. Free copies are available from the U.S. Forest Service Glacier Ranger District in Girdwood (907-783-3242) and the Bureau of Land Management Anchorage District office (1-800-478-1263).



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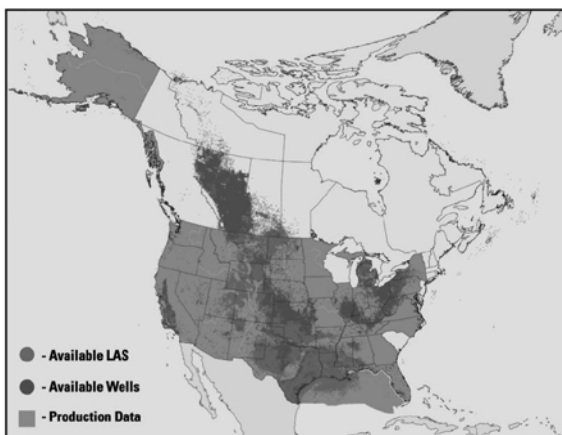
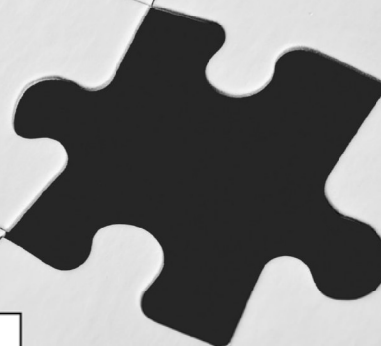
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