

ALASKA GEOLOGY

Alaska Geological Society
Luncheon Abstract



PALEOGEOGRAPHIC RECONSTRUCTION OF THE ARCTIC ALASKA-CHUKOTKA TERRANE

Alison B. Till*, Julie A. Dumoulin, and Dwight C. Bradley
US Geological Survey, Anchorage, AK
*Speaker

*Note: AGS meetings will be at the BP Energy Center for 2010-2011.
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This abstract promotes the December luncheon talk of the Alaska Geological Society,
to be held Thursday, December 9th, 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.

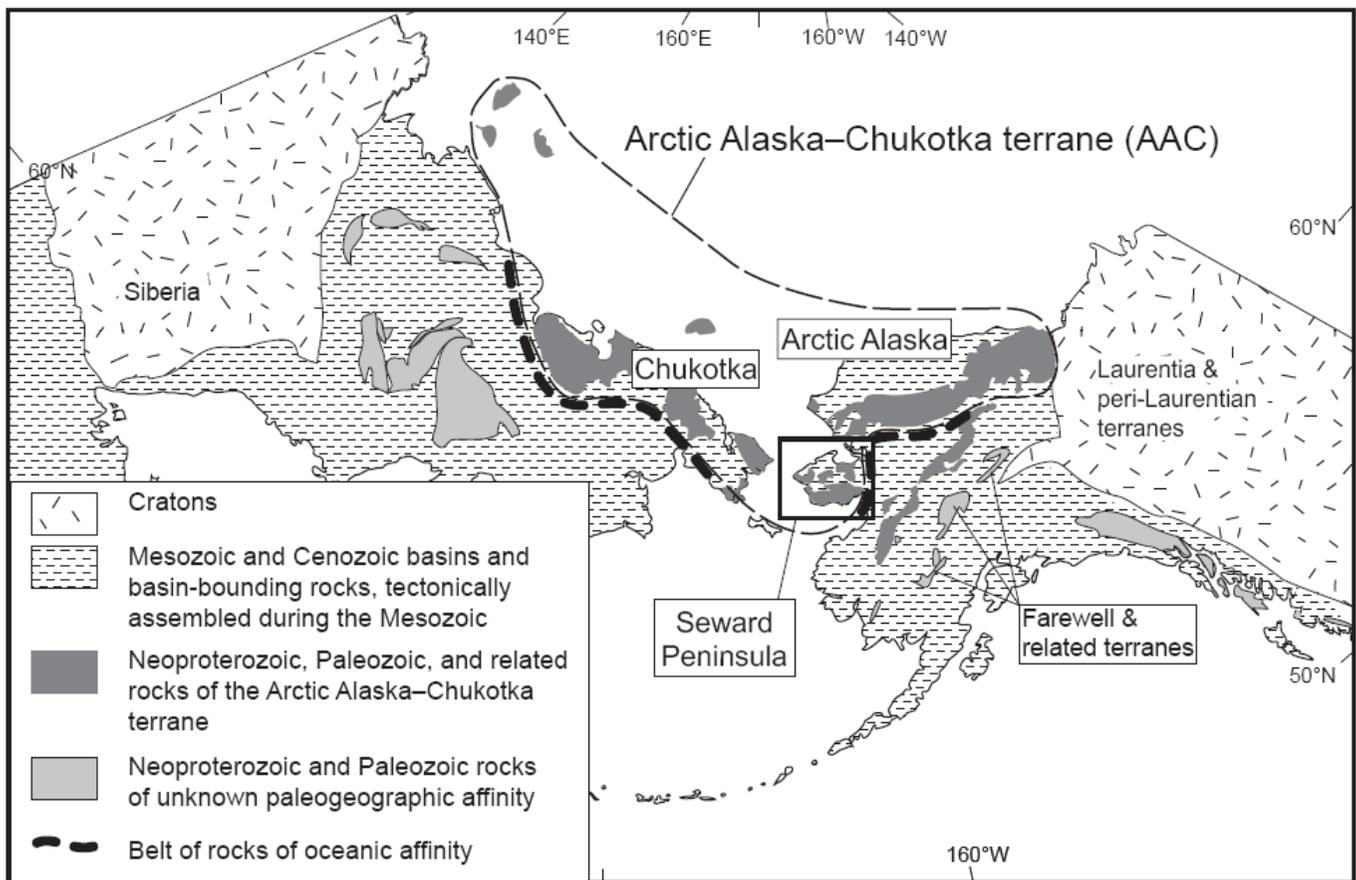
Basement of the Arctic Alaska-Chukotka terrane is composed of Neoproterozoic igneous rocks, Neoproterozoic metamorphic rocks, and Ordovician(?) and older sedimentary rocks. On Seward Peninsula, the Nome Complex contains lenses of 670-680 Ma orthogneiss that represent this basement (Amato et al., 2009).

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 9th, 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. 7th, 2010.
- Cost:** Seminar only, no meal: Free
- Reserve a box lunch: \$15
- Reserve a hot lunch: \$20
- Lunch with no reservation:
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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:

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