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Propagating Atlantic rifts and Pacific slabs battle it out in the Arctic: A summary of extensional provinces in the Alaskan-Russian Arctic

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Relevant data are compiled and synthesized across Arctic Alaska and Russia with the goal of establishing spatial and temporal connections between rifting in the Eurasia and Amerasia basins of the Arctic Ocean and extension within the circum-Arctic landmasses. Although timing, direction and magnitude of continental extension are still poorly known, geochronologic and thermochronologic studies have proven to be an excellent means of bracketing extension-related tilting, uplift and denudation (e.g. Brooks Range, Seward Peninsula, Lisburne Hills and Wrangel Island).

The south flank of the Brooks Range, Seward Peninsula, Bering Strait, Chukotka and Wrangel Island all underwent large magnitude N-S extension that regionally overlaps in age with the intrusion of 120-90 Ma plutons and the formation of deep marine basins in Alaska. This widespread extension is traditionally attributed to paleo-Pacific slab rollback following Jura-Cretaceous ($\sim$160-140?Ma) convergence and shortening. Westward across Chukotka, extensional (and strike-slip?) structures were also coeval with $\sim$120-90 Ma magmatism, but are more poorly documented. By contrast, extensional structures west of longitude 175° in Chukotka (and offshore Siberian Shelf) appear to have developed in response to E-W, rather than N-S extension. The South Annui Zone and its inferred continuation to the Siberian Islands appears to separate (by $\sim$1300 km) similar sequences with identical source regions, suggesting right-lateral transform or accommodation of E-W to WNW-ESE extension to the north. Its motion was likely over by the $\sim$88-90 Ma eruption of the Okhotsk-Chukotka volcanic belt, linked to the reconfiguration of paleo-Pacific subduction. Large $\sim$E-W trending shelfal basins in the Bering Strait region formed in latest Cretaceous (?) to early Tertiary (N. and S. Chukchi, Hope, Norton, Anadyr and St. Matthew basins). In Siberia, N-S trending extensional structures of the Laptev Sea are related to southward propagation of Gakkel Ridge spreading. Rifting extends south into a broad faulted region within and east of the Verkoyansk thrust belt which includes an older well-defined belt of magmatism and E-W extension that is Cretaceous in age ($\sim$ 125-90? Ma Indigirka belt).

In the Arctic Ocean, the Lomonosov Ridge separates E-W spreading in the Eurasia Basin from the older Amerasia Basin. The general N-S structures of the western Amerasia Basin are compatible with E-W extension mapped on land as Cretaceous (post 140? and syn$\sim$125-90 Ma). The gravity low (interpreted as an extinct spreading ridge) in the Canada Basin is at a high angle to this fabric and closer in orientation to the E-W trending Bering Shelf basins, suggesting it may be the youngest, not the oldest, part of the Arctic Ocean. In general, the age and location of slab magmatism, crustal stretching and the superimposed younger shelf basins of the Bering Strait allow their genesis to be linked to paleo-Pacific subduction zone move-out. Similarly, young structures in Siberia are related to southward propagation of Atlantic rifting. Geochronology and thermochronologic studies in critical locations could provide better timing constraints and added insight into the dynamics of these important plate interactions through time across the Arctic.