

## **Is the North Slope a Displaced Part of the Caledonian Orogenic Belt?**

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The pre-Mississippian basement rocks of the North Slope have characteristics that suggest they may once have formed part of the Caledonian orogenic belt. Isotopic and fossil ages and an expanding publically available seismic reflection database reveals that across the North Slope these strata consist largely of structurally thickened Ordovician, Silurian and Devonian thin-bedded argillite. Well cores and seismic data show that these strata are penetratively deformed and imbricated. The western front for this deformation lies in the Chukchi Sea west of Barrow where seismic data suggest these rocks are thrust westward onto a thick undeformed, eastward-prograding, clastic clinoform package and underlying high velocity reflective unit. Detrital zircon (DZ) grain ages from deformed argillite from wells east of Barrow display abundant 410-450 Ma grains accompanied by variety of grains between 1-2 Ga that are similar to DZ ages from southern Baltica. Rocks west of the limit of the deformation are not exposed but may be represented by the Silurian Iviagik sequence on the Lisburne Peninsula. This sequence consists of thick-bedded turbidites containing abundant 550-600 Ma zircons that correspond to Timanian magmatism in northern Baltica.

The eastern limit of the pre-Mississippian deformation lies east of the NE Brooks Range where Neoproterozoic coarse-grained metaclastic rocks (Neroukpuk Quartzite) and overlying Cambrian to Early Devonian strata were penetratively deformed prior to the Middle Devonian. The Neroukpuk is a thick sequence of turbidites analogous to the Windermere Supergroup that accumulated along the rifted margin of northwest Laurentia; DZ ages from the Neroukpuk support this correlation. All of the deformed units are intruded by post-magmatic ca 370 Ma plutons and overlain by the regional sub-Mississippian unconformity, which represents >2 km of exhumation.

The pre-Mississippian units are interpreted to comprise a deformational belt involving strata of both Laurentian and Baltica affinity that were tectonically juxtaposed in the Early Devonian. The deformed belt may represent a northern extension of the Caledonian orogen that was separated from NW Canada by the rifting that opened the Amerasia Basin in the Jurassic and Early Cretaceous. This scenario is best explained by the rotational opening of the Canada Basin because the provenance of the Neroukpuk suggests a close linkage to northwest Laurentia.