

Tectonic Implications of pre-Jurassic Paleogeography, northwestern Laurentia

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Abstract

Canada's Northern Interior Platform extends for over 1000 km from the Mackenzie Delta to the Canadian Shield and merges northward with the Inuitian Platform. Cambrian to Middle Devonian shelf carbonates were widely deposited across this stable cratonic region onto previously deformed Proterozoic dolostones and clastic rocks of the Dismal Lakes Group and Shaler Supergroup. Middle and Upper Devonian clastic rocks of the Ellesmerian clastic wedge overlie the early Paleozoic platform succession. In the north, the Paleozoic rocks are weakly deformed by southward propagating deformation of late-stage Ellesmerian orogenesis. Post-Devonian deposits are thin and only locally preserved (Fig. 1). These successions are truncated by rifting at the continental margin. The pre-rift geology of the conjugate to this rifted margin is predicted to be consistent with that of the widespread Northern Interior Platform.

Pre-rift successions are well exposed in the British and Romanzof mountains of northwestern Yukon and adjacent northeastern Alaska; and are locally intersected in exploration wells across Arctic Alaska. These successions consist of late Neoproterozoic and Cambrian turbidites of the Neruokpuk Formation overlain by basinal chert and graptolitic shales of the Ordovician to Lower Devonian Road River Group. Proterozoic turbiditic carbonates, fine clastic rocks and cherts comprise basement to the Neruokpuk and Road River strata. These successions were tightly folded and thrust faulted in Early Devonian time, and intruded by Late Devonian postorogenic granites. In Alaska, Late Devonian rift faulting, erosion and subsidence led to progressive onlapping of Early Carboniferous and younger rocks of the Endicott, Lisburne and Sadlerochit groups onto the previously deformed sedimentary and intrusive rocks (Fig. 2).

The Alaska rotation hypothesis asserts that Arctic Alaska is conjugate to the adjacent Canadian Arctic margin. However, Arctic Alaska contains none of the sedimentary, tectonic or magmatic characteristics predicted for the rifted conjugate to the Canadian Arctic margin. Accordingly, it must be concluded that Arctic Alaska is not the missing conjugate terrane. A more fruitful approach would be to look elsewhere for a terrane with pre-rift geology similar to that of the Northern Interior Platform.

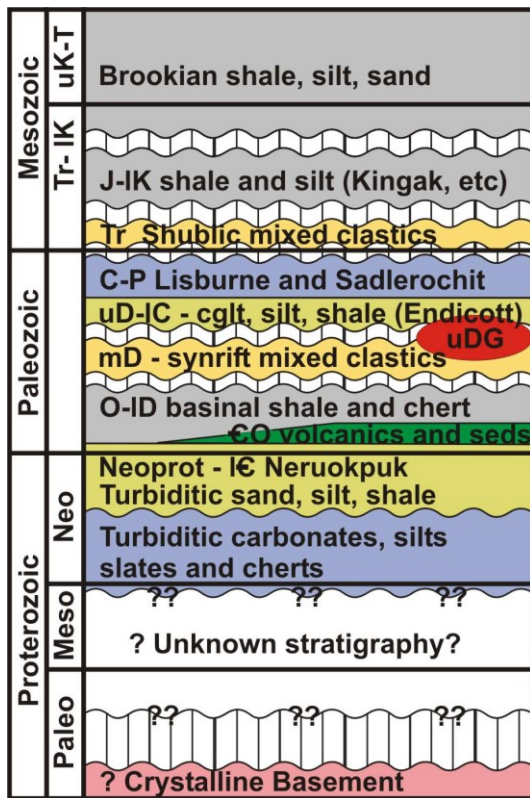


Figure 1. Alaska North Slope Stratigraphy.

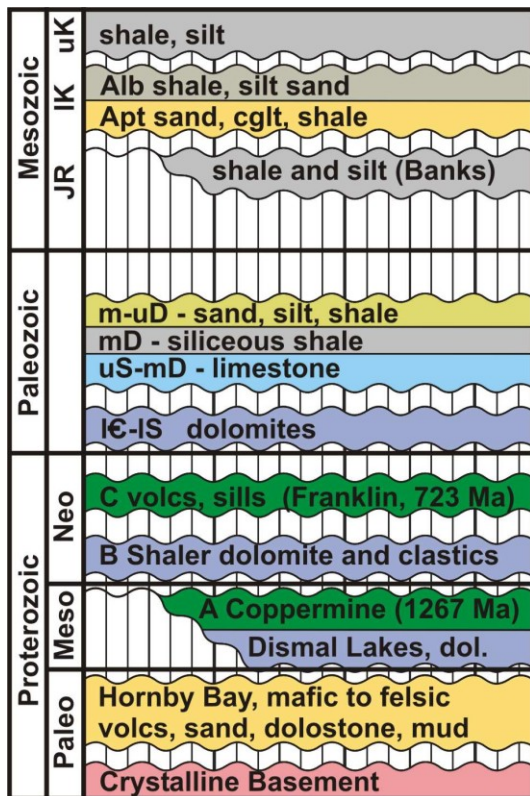


Figure 2. Northern Interior Platform stratigraphy.