Geophysical Research Abstracts, Vol. 8, 07997, 2006
SRef-ID: 1607-7962/gra/EGU06-A-07997

Paleomagnetic, geochemical and U-Pb geochronological study of mafic dykes of Ellesmere Island, Devon Island and Greenland: Implications for the Nares Strait Problem, and for episodes of rapid drift of Laurentia during Proterozoic time

S. W. Denyszyn, H. C. Halls, and D. W. Davis.
Department of Geology, University of Toronto, Toronto, Canada
(steve.denyszyn@utoronto.ca)

High-sensitivity U-Pb dating of ca. 20-micron baddeleyite grains from mafic dykes in Ellesmere and Devon Islands in Canada and the Thule area of northwest Greenland identifies magmatic events in the Paleoproterozoic (the 1628 Ma Melville Bugt swarm), Mesoproterozoic (a previously unknown 1337 Ma swarm), and Neoproterozoic (the 720 Ma Franklin swarm).

The Franklin swarm, only now proven to exist in Greenland, is used to test the possible location of the Greenland-North America Cenozoic plate boundary which was long presumed to underlie the Nares Strait between Ellesmere Island and Greenland, a hypothesis supported by geophysical observations based on marine magnetic anomalies in the Labrador Sea. However, geological markers have been interpreted to be continuous across Nares Strait and therefore indicative of minimal offset between the two plates, giving rise to the so-called “Nares Strait Problem”. The Franklin swarm intersects the Strait at a high angle, and appears to be offset by the $\sim$200 km required by plate tectonic reconstructions. Paleomagnetic, geochemical and U-Pb geochronological techniques are employed in testing this hypothesis. Geochronological and geochemical results conclusively indicate that the two offset sets of dykes are of the same swarm, though the resolution of the paleomagnetic data is insufficient to resolve the small difference in paleopole position that the offset would require. The results are most consistent with a location for the plate boundary along the western side of Nares

Strait, despite recent proposals that place it wholly within Ellesmere Island, or diffusively dispersed across the Canadian Arctic islands.

Paleopoles from all three sets of dykes are compared with the apparent polar wander (APW) path of Laurentia in the Proterozoic, where they fill significant gaps in the record of key poles, and indicate periods of rapid ($>$20 cm/yr) drift of the continent.