

# Paleocene Alkaline Volcanism in the Nares Strait Region Related to Strike-slip Tectonics

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The tectonic development of the North Atlantic, the Labrador Sea/Baffin Bay and the Eurasian Basin of Arctic Ocean led to relative movements between the Greenland Plate and the North American Plate. There has been a debate for many years, whether the Nares Strait between northwest Greenland and Ellesmere Island marks an ancient plate boundary in terms of a left-lateral transform fault (Wegener Fault) or whether there was no movement between Greenland and Ellesmere Island at all. New data were acquired during joint German-Canadian geological field work on northeast Ellesmere Island 1998-2000 (Mayr 2008), followed in 2001 by a geoscience cruise in Nares Strait (Tessensohn et al. 2006).

Indications for sinistral strike-slip movements followed by compressive tectonics were found at the western margin of northern Nares Strait (Saalman et al. 2005). Paleogene basins on Judge Daly Promontory, northeast Ellesmere Island, are bounded by a complex pattern of strike-slip and thrust faults. The clastic sediments in the basins are rich in volcanogenic material. Volcanic pebbles within the Cape Back basin near Nares Strait are derived from lava flows and ignimbrites of a continental rift-related, strongly differentiated, highly incompatible element enriched, alkaline volcanic suite (Estrada et al. 2009).  $^{40}\text{Ar}/^{39}\text{Ar}$  amphibole and alkali feldspar ages indicate that volcanism was active around 61–58 Ma and was probably contemporaneous with sedimentation within the Paleogene pull-apart basins on Judge Daly Promontory formed by sinistral strike-slip tectonics parallel to the present-day Nares Strait. The Nares Strait volcanic suite is geochemically distinct from other alkaline volcanic suites on the northern coasts of Ellesmere Island and Greenland. However, the explosive Nares Strait volcanism could have served itself as a source for the known bentonite layers in the Paleocene Basilika Formation on west Spitsbergen, what is supported by geochemical similarities between bentonite and pebble samples.

The volcanogenic sediments in the pull-apart basins on Judge Daly Promontory cause positive anomalies of the total magnetic field revealed by an aeromagnetic survey in 2001 (Damaske & Oakey 2006). The magnetic anomalies extend offshore into Nares Strait (Kennedy Channel, Robeson Channel, and Hall Basin) forming narrow, elongated NE-SW trending chains. Thus, an offshore continuation of the Paleocene sediment basins to the northeast towards the Lincoln Sea is indicated. The pattern of magnetic anomalies and

onshore geological observations suggest that the Wegener Fault is not a simple strike-slip fault, but a complex system of synthetic and antithetic faults in a chain of blocks and basins.

## References

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