Geophysical Research Abstracts
Vol. 14, EGU2012-8302, 2012
EGU General Assembly 2012

Complete Cenozoic remagnetization of Cretaceous sills and lavas from the High Arctic Large Igneous Province (HALIP) on Svalbard imposed during faulting and burial/ uplift.

E. Halvorsen (1), R. Løvlie (2), A. Andresen (3), S. Polteau (4), H. Walderhaug (5), and J. Faleide (6)

(1) Department of Eduction, Telemark University College, Notodden, Norway (erik.halvorsen@hit.no), (2) Department of Earth Science, University of Bergen, Bergen, (reidar.lovlie@geo.uib.no), (3) Department of Geosciences, University of Oslo, Oslo, (arild.andresen@geo.uio.no), (4) Volcanic Basin Petroleum Research, Oslo Innovation Center, Oslo, (stephane@vbpr.no), (5) Department of Earth Science, University of Bergen, Bergen, (harald.walderhaug@geo.uib.no), (6) Department of Geosciences, University of Oslo, Oslo, (j.i.faleide@geo.uio.no)

Cretaceous mafic igneous rocks of the High Arctic Large Igneous Province (HALIP) crop out all over Svalbard, Arctic Canada (Sverdrup Basin and Ellesmere Island) and Franz Josef Land. They have also been identified offshore on seismic in sedimentary basins in the North-Western Barents Sea. In Svalbard these igneous rocks constitute the Diabasodden suite (DBS). Recent datings of DBS using U-Pb and Ar-Ar methods suggest a magmatic event around 125 Ma.

The magnetization history of the DBS is rather complex and has been studied over a long time period. Sills and dykes from eastern Svalbard carry Early Cretaceous paleopoles concordant with those from North America after correction for sea-floor spreading. One the other hand, the DBS from central Svalbard (Isfjorden) carries scattered paleomagnetic directions attributed to post Cretaceous remagnetization.

Combined alternating field and thermal demagnetization together with magnetomineralogical studies on a new suite of samples from central Svalbard reveal two well defined clusters of paleomagnetic directions. The paleopoles of these two clusters are interpreted to represent the 125 Ma event (56.6ºN, 196.3ºE, dp/dm: 3.3/5.1) and a complete Cenozoic remagnetization pole (88.1ºN, 208.1ºE, dp/dm: 4.5/4.5).

The Cenozoic overprint paleopole agrees with a published paleopole from the lavas on Franz Josef Land (81ºN, 166ºE, dp/dm: 3.8/3.9) and with preliminary results from the Kong Karl Land lavas (82.5ºN, 341.2ºE, dp/dm: 15.0/15.1). It also agrees with the results from lavas of the late Miocene Seidfjellet formation (82.6ºN, 198.6 ºE, dp/dm: 9.5/9.8) in northwestern Svalbard.

Published paleomagnetic and magnetostratigraphic results of the Permian and Triassic sedimentary rocks of Svalbard also reveal persistent partial Cenozoic remagnetization.

A foldtest of the 125 Ma DBS sampled close to the Billefjorden fault zone indicates a post to synfolding remagnetization that may be related to fault activity prior to and during development of the Eocene West Spitsbergen Fold-and-Thrust Belt.

Svalbard and the North Western Barents Sea have seen regional uplift associated with the Early Cretaceous HALIP including flank uplift caused by the Paleocene-Early Eocene sea floor spreading. The entire Barents Shelf was uplifted and eroded during Neogene time. The North-Western Barents Sea and Svalbard are characterized by high heat flow, young magmatism and a thin lithosphere. It is therefore suggested that the extensive regional remagnetization found in magmatic and sedimentary rocks on Svalbard was due to lithosphere thinning causing high heat flow and Neogene uplift.