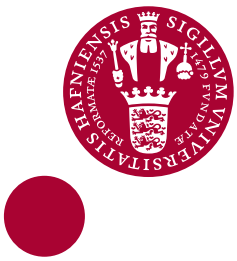

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Geochemistry of basalts from the Continental Margin North of the Faroe Islands results from wells 336 and 337 from DSDP leg 38

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The new geochemical data described in this paper are from the Deep Sea Drilling Project (DSDP) leg 38, sites 336 (northern slope of the Faroe-Iceland Ridge) and 337 (eastern shoulder of the Ægir Ridge), respectively (Figur. 1). Core samples of the basaltic lava sequence from both sites were analyzed for major and trace elements and Sr, Nd and high precision Pb isotopic composition.
The geological settings for these two sites are very contrasting. The Faroe-Iceland Ridge (FIR) is characterized as the bathymetric expression of the time transgressive "hotspot track" formed symmetrically with respect to Iceland and consists of anomalously thick (ca. 30km) oceanic crust. Together with the more classical spreading ridge setting at the Ægir Ridge these data give an opportunity to estimate the various mantle sources feeding the lavas in this submarine region. Initial K-Ar dating of the basalts yielded ages from 18-24 Ma for site 337 and 40-43 Ma [1].
The existence of continental crust beneath the Faroe Islands has also been evidenced geochemically by high $^{86}Sr/^{87}Sr$ values (0,7100 – 0,7163), enrichment in *incompatible elements* in the High-Si lavas [2] and further addressed by using the late dykes and lavas onshore Faroe Island [3, 4] and the High-Ti lava types [4].
The new isotope data from sites 336 and 337 indicate that a similar source component for both sites, which is markedly different than what is seen in the Iceland, Faroe Island and Jan Mayen basalts. Furthermore, the data also show similarities with Øræfajøkull on Iceland. These trends are explained as a mixing with a local enriched component, reflecting the addition of small amounts (0,5%) of pelagic sediments [5], and as a EM2 type component [6]. This indicates a larger lateral extent of this mantle component.
Crustal contamination could explain some of the variations seen in the 336, samples 12 and 13. These are enriched in LILE elements, have relatively high $^{86}Sr/^{87}Sr$ ratios, SiO_2.

1. Talwani, M., G.B. Udintsev, and S.M. White, *Introduction and explanatory notes, Leg 38 DEEP SEA DRILLING PROJECT*, in *Proceedings of the Deep Sea Drilling Project, Initial Reports*1976, College Station, Texas (Ocean Drilling Program). p. 3-19.
2. Gariépy, C., J. Ludden, and C. Brooks, *Isotopic and trace element constraints on the genesis of the Faroe lava pile.* Earth and Planetary Science Letters, 1983. **63**: p. 257-272.
3. Holm, P.M., N. Hald, and R. Waagstein, *Geochemical and Pb-Sr-Nd isotopic evidence for separate hot depleted and Iceland plume mantle sources for the Paleogene basalts of the Faroe Islands.* Chemical Geology, 2001. **178**: p. 95-125.
4. Søager, N. and P.M. Holm, *Extended correlation of the Paleogene Faroe Islands and East Greenland plateau basalts.* Lithos, 2009. **107**(3-4): p. 205-215.
5. Kokfelt, T.F., et al., *Combined Trace Element and Pb-Nd-Sr-O Isotope Evidence for Recycled Oceanic Crust (Upper and Lower) in the Iceland Mantle Plume.* J. Petrology, 2006. **47**(9): p. 1705-1749.
6. Prestvik, T., et al., *Anomalous strontium and lead isotope signatures in the off-rift Öræfajökull central volcano in south-east Iceland: Evidence for enriched endmember(s) of the Iceland mantle plume?* Earth and Planetary Science Letters, 2001. **190**(3-4): p. 211-220.