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Geochemical signatures of rift-related volcanism in the Vøring Plateau and the S.E. Greenland margin.

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Drilling during the Ocean Drilling Program (ODP) on the mid-Norway margin at the Vøring Plateau (Leg 104) and along the 63˚N transect off SE Greenland (Legs 152 & 163) recovered volcanic rock successions, erupted during the initial stages of the opening of the NE Atlantic Ocean. These rocks are not only important to understand the nature and development of the Seaward-Dipping Reflector Sequences (SDRS). Because all the break-up stages of the continental margin are represented, the rocks also provide important constraints on the extent of interactions of hot "plume" material from the mantle with the overlying continental crustal section during the break-up. The contribution of the continental crust to either the production of melt or to the contamination of mantle melts during the magmatic episodes accompanying continental break-up is still a matter of debate. An understanding of the mantle-crust interaction is in turn crucial to understand which geochemical and isotopic characteristics of the magmatic rocks reflect in fact deep mantle "plume" properties, and which signatures result from mixing of components from the mantle and continental crust reservoirs.

The drilled rocks from the Legs 152 & 163 range from pre-break-up continental tholeiitic flood basalt, through syn-break-up picrite, to truly oceanic basalt forming the main part of the SDRS. The ODP Leg 104 Hole 642E core of the Vøring Plateau consists of a ca. 320m thick sequence of marine sediments, a 770m thick magmatic "Upper Series"of transitional-type, "enriched" mid-ocean ridge tholeiites (E-MORB), and an underlying "Lower Series" of basic tholeiitic dikes, basaltic andesites and peraluminus dacites. The Lower Series assemblage is clearly indicative of interaction of mantle melts with crustal material and/or of significant crustal melting by underplat-

ing. Drilling stopped after 170m penetration into the Lower Series. The discovery of crustal anatectic volcanics dating back to the early stages of rifting was undoubtedly a major achievement of ODP Leg 104. The 'Lower Series' also contains a fair proportion of relatively fresh glassy rocks, which greatly facilitates the characterisation of the uncorrupted composition of pure melt components.

In the framework of a EUROMARGINS sub-project the Leg 104 core was macroscopically reinvestigated and resampled at the ODP Core Repository. The resampling strategy aimed to attain a much improved sampling density of the heterogenous "Lower Series" and the transition to the much more homogeneous "Upper Series"(transitional-type E-MORBs). Representative samples from the "Upper Series" were taken for additional isotopic studies. Work in progress encompasses a thorough petrographic study of the new comprehensive sample set, major element analysis with ICP-OES, and trace element analysis with ICP-MS and WDXRF. A substantial amount of the new samples are analysed by TIMS and multi-collector ICP-MS not only to expand the data set of Sr, Nd, Pb-isotopes, but also for a study of the Lu-Hf isotopic system.

Available geochemical data for SE Greenland and the Vøring Plateau show that the Vøring Plateau "Upper Series" and the SE Greenland "Upper Series" are chemically and isotopically rather similar. The "Lower Series" from both areas do not only differ from the corresponding "Upper Series", but they are also fundamentally different from each other in many respects (e.g. "Lower Series" SE Greenland $^{87}Sr/^{86}Sr < 0.702$ and the "Lower Series" Vøring Plateau $^{87}Sr/^{86}Sr > 0.710$). The unradiogenic Pb isotopic compositions of SE Greenland - which are attributed to interaction with old gneissic crustal material – have not been observed in the Vøring Plateau samples. The same holds for the isotopic signature of the SE Greenland 'Middle Series', characterized by high $^{87}Sr/^{86}Sr$ (0.706-0.710) and more negative εNd (-30 to -45). The marked asymmetry of the geochemical signature of the SE Greenland and Vøring Plateau samples points to a substantial difference in either the pre-break-up crustal composition at the two localities, or to different styles of mantle-crust interaction.

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