

Heterogeneity of the Sub-Oceanic Depleted Mantle

¹DOSSO, L., ²BOUGAULT, H., and ^{1,3}VLASTELIC, I. ¹UMR6538-CNRS, ^{1, 2}IFREMER, BP70, 29280, Plouzané, France; ³now at Max Planck Institut für Chemie, Abteilung Geochemie, Postfach 3060, D-55020, Mainz, Germany.

From the examples of the north mid-atlantic ridge (10-45°N) and the pacific-antarctic ridge (56-66°S) studies, the geochemical properties of the sub-oceanic depleted mantle are reviewed and the heterogeneous character of the “normal mid-ocean ridge basalts” (N-MORB) source is emphasized.

The trace element and isotopic geochemical variations of the mantle source regions from 10 to 45°N along the north mid-atlantic ridge point out to a strong asymetry in the surface expression of the Azores mantle plume which is also supported by the interpretation of along track geophysical data and the upper mantle thermal structure. South of the Azores, depleted sources with low Rb/Sr and La/Sm $-(\text{Nb/Zr})_N$ - ratios have $^{87}\text{Sr}/^{86}\text{Sr}$ which vary between 0.70215 and 0.70290. To the north of the Azores, incompatible element depleted basalts have $^{87}\text{Sr}/^{86}\text{Sr}$ which can reach 0.70310.

A recent Sr-Nd-Pb compilation of all Pacific MORB samples reveal different “depleted” mantle domains north and south of the Easter microplate (25°S). This evidence is further strengthened by the observation of different average depths of the ridge axes north (2850m) and south (2450m) of the 25°S boundary. This is attributed to differences in the thermal structure of the uppermost mantle on either side of the 25°S boundary.

Both of these recent studies point out to a notion of passive heterogeneities in the upper mantle which in some cases might be put in relation with discontinuities in plate tectonic motions or with intraplate deformation.