



MAR geochemical segmentation at 12-17N and 29-33N as reflection of the mantle source composition

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This study presents data on a collection of basalts and basaltic glasses sampled at two axial zone areas of the Mid-Atlantic Ridge (MAR): 1249' - 1723'N and 2959' - 3341'N. The data obtained allow the following conclusions to be made: 1) magmas with enriched, plume-like compositions are widespread in the MAR region between 12–17N, whereas basaltic lavas in areas between 29–34N are typical NMORB. 2) Magmas with plume-like characteristics occur within a wide region between 13–15.3N, at 16.1–16.2N, and also further north, where sharply localized narrow zones of plume-like magmatism have been identified. 3) Overall, lavas from the MAR 29–34N region are characterized by the degrees of melting of their mantle source which are comparable to those for the plume-like magmas from the MAR region between 12–17N. However, plume-like lavas from the narrow localized zones at 16.1–16.2N and further north along the ridge are characterized by the lowest degrees of melting. 3) High $\hat{I}_2\hat{I}/\hat{E}_2\hat{I}$ values, indicative of the dominant role of H₂O in the volatile budget of the mantle source, have been found in the low-potassium, typical NMORB lavas from 29–34N, 12.82N and 17N. Lower values of $\hat{I}_2\hat{I}/\hat{E}_2\hat{I}$, but higher absolute concentrations of these components, occur in plume-like magmas sampled at 13–15N and 16N. 5) The mantle sources of the plume-like magmatism between 12–17N are distinct from the mantle sources of the typical NMORB lavas from at 29–34N by having lower $^{143}\text{Nd}/^{144}\text{Nd}$, higher $^{87}\text{Sr}/^{86}\text{Sr}$ and $^3\text{He}/^4\text{He}$, higher concentrations of Cl and K, and lower S contents. These differences are more pronounced in the narrow, localized sources of plume-like magmas at 15.03N and 16.15N. 6) Three main types of MAR magma series have been identified: a) typical NMORB (29–34N); b) transitional lavas

with isotopic and geochemical characteristics intermediate between typical NMORB and plume-like lavas (12–17N); c) pure plume-like lavas (15.03N, 16.1–16.2N and further north along the ridge); 7) The mantle source of plume-like magmas from 12–18N is characterized by geochemical heterogeneity. It is also possible that two distinct sources, which differ mainly in their $\hat{I}_2/\hat{E}_2$ values, coexist in this MAR region. This study was financially supported by the Russian Foundation for Basic Research, project no. 03-05-64018.