

Geochemical nature of the mantle in the Celebes Sea Basin

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Mantle heterogeneity has been highly focused for a long time, and researching mantle inhomogeneous of the marginal sea basin will contribute to constrain the problem. The western Pacific, developed the typical trench-arc-basin system, has a large number of marginal seas, which is a natural experiment field to study the mantle heterogeneity. Basalts, as the direct medium connect the outer layer of the earth with the mantle, carried much information about mantle source. Samples are selected from Site 767 and Site 770 of ODP Leg 124 in the Celebes Sea Basin for analyses of bulk-rock major and trace element. The Samples are tholeiite based on the plot of total alkaline versus SiO₂. The trace element pattern shows that the samples deplete Large Ion lithophile Elements (LILE) and enrich Light Rare Earth Elements (LREE). Two Sites basalts are all Mid-Ocean Ridge Basalts (MORB). On the basis of trace element variations, samples can be classified into two groups. One group shows slightly enriched than typical E-MORB and the other group is typical N-MORB. The samples can not only generate by partial melting of depleted mantle member through element ratio plots. The phenomenon indicates the enriched end member exists in the mantle source. The result shows that the mantle source of Celebes Sea basin is inhomogeneous. The E-MORB type samples slightly enrich High Field Strength Elements (HFSE) and deplete LILE, which indicates the enriched end member is may related to subducted oceanic crust with dehydration.

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