Temporal variations of a heterogeneous mantle plume source; Santiago, Cape Verde

A.K. BARKER[1], P.M. HOLM[1], D.W. PEATE[2] AND J.A. BAKER[3]

[1]Geological Institute (Danish Lithosphere Centre), University of Copenhagen, Øster Voldgade 10L, 1350 Copenhagen, Denmark (akb@geol.ku.dk)
[2]University of Iowa, Department of Geoscience, 121 Trowbridge Hall, Iowa City, IA 52242, USA
[3]School of Earth Sciences, Victoria University of Wellington, P.O. Box 600, Wellington, New Zealand

The Cape Verde Archipelago is known to display source heterogeneity on a 100-200 km scale, with different isotopic domains sampled in the northern islands (dominated by a HIMU signature), compared with the southern islands (a mixed EM-I, HIMU and DM character). A detailed investigation of one of the northern islands (Santo Antao) revealed small scale variations that show unique temporal variations between four components. Further investigation of small scale variations within the southern islands and a temporal comparison between the northern and southern islands is imperative to understand the dynamics of mantle flow and the lengthscales of compositional heterogeneities.

We have investigated several lava suites from one of the southern islands (Santiago) that erupted over the last 6 million years. We will present high precision Pb isotope data (using a ^{207}Pb-^{204}Pb double spike) and Sr-Nd-Hf isotope data that highlight small scale temporal variations in source compositions.

The evolution of the different components through time on Santiago is best illustrated by variations in ^{208}Pb/^{204}Pb. The submarine lavas of the earliest Flamengos Formation record the highest ^{208}Pb/^{204}Pb. The intermediate volcanics erupted subaerially have lower ^{208}Pb/^{204}Pb, forming an oblique trend to the submarine lavas. The youngest lavas also have low ^{208}Pb/^{204}Pb and form a parallel trend to the submarine lavas extending to lower ^{206}Pb/^{204}Pb. The submarine lavas have lower ^{87}Sr/^{86}Sr than the intermediate volcanics. The young volcanics overlap the ^{87}Sr/^{86}Sr of the submarine and intermediate lavas, extending to higher ^{87}Sr/^{86}Sr.

Santiago shows contrasting positive $\Delta 8/4$ relative to the negative $\Delta 8/4$ of the northern islands confirming the presence of the north-south compositional divide for at least 6 million years. There are significant local variations produced by mixing of HIMU, DM, EM-I and a carbonatite related source.

Isotopic and geochemical characteristics of the Réunion hotspot: Evidence from the lavas of Mauritius

S. NOHDA[1], I. KANEOKA[2], T. HANYU[3]

[1]Dept. Environ. Sci.,Kumamoto Univ.,Kumamoto 860-8555, Japan (snohda@sci.kumamoto-u.ac.jp)
[2]ERI, Univ. Tokuo, Tokyo, Japan (Ikaneoka@aol.com)
[3]IFREE, JAMSTEC Yokosuka, Japan (hanyut@jamstec.go.jp)

We report Sr, Nd, and Pb isotopic compositions for the lavas of Mauritius, the second youngest volcanic island in the Réunion hotspot. The lavas of the Older Series (7.8-5.5 Ma) have identical isotopic compositions with those of Réunion where the center of volcanic activity is currently located. The lavas of the Intermediate Series (3.5-1.9 Ma) and Younger Series (0.70-0.17 Ma) are shifted to the depleted isotopic signatures. The diagram of Zr/Nb *vs.* Ba/Y also revealed that the strong geochemical similarity between the Older Series lavas and those of Réunion and the involvement of a depleted MORB-source mantle component in the genesis of the Younger Series lavas. During the volcanic history of Mauritius, the magmas lost the principal isotopic and geochemical characteristics of the Réunion hotspot with time, and became gradually imprinted with the isotopic signature of a shallower source that produced the Central Indian Ridge basalts.