Geophysical Research Abstracts
Vol. 15, EGU2013-11251, 2013
EGU General Assembly 2013

The Central Indian Upper Mantle 50 MY ago : Continental Crust Versus Oceanic Crust Recycling Contributions within the Central Indian Basin MORB.

Christophe Hemond (1), Hélène Delavault (1), Myriam Janin (1), Pranab Das (2), and Sridhar Iyer (2)
(1) IUEM, UMR 6538 - Domaines Oceaniques, Plouzané, France (chhemond@univ-brest.fr), (2) National Institute of Oceanography, Dona Paula, Goa, India

The central Indian Ocean Basin (CIOB) results from the activity of both the Central and Southeast Indian Ridges; The same area carries also the track of the Rodrigues triple junction and the Reunion Hotspot was in the vicinity when that area formed around 53 Ma ago.
We use that sampling opportunity to discuss the composition of the Indian upper mantle 50 Ma ago i.e. its level of isotope heterogeneities within a model in which the breakup of the Gondwana has introduced continental derived material in it. The potential input of Reunion hotspot derived material is also investigated.
Samples were were dredged in an area comprised between 72-80°E and 9-15°S. They are on axis formed MORB and off axis MORB seamounts. All samples are tholeiitic in composition and slightly depleted in incompatible trace elements.
Isotopes (Sr,Nd, Hf and Pb) lead to class samples in four groups. One contains very depleted samples in Sr-Nd and Hf isotopes including amongst the least radiogenic Pb isotopes found in Indian MORBs and is regarded as the depleted Indian MORB mantle 50Ma ago. Two groups of samples have similar low 206Pb for higher 208Pb and intend to have even lower 206Pb than the previous group. But they have quite to very radiogenic Sr and accordingly unradiogenic Nd isotopes in agreement with a clear DUPAL signature. The last group has more radiogenic Pb isotopes, and slightly lower Nd for identical Sr isotopes of the DMM group. This is clearly regarded as representative of recycled oceanic crust material such as seen in Ocean Island Basalts (C, Fozo, HIMU).
Mixing models suggest that three components and two stages of mixing may account for the results. The local DMM is firstly contaminated by African Lower Continental Crust (LCC) Material such as granulites
during continental breakup. The contaminant does not appear homogeneous and may have contained various amount of phlogopite and/or garnet to account for isotope differences between groups of samples. Beside this, the Reunion hotspot may have input some material, the influence of which is seen in the fourth group of samples.
The geographic distribution of the groups and modeling suggest that the strongly DUPAL component was first involved in the melting zone. Later, the weaker DUPAL component and the Reunion plume material were involved. 0.5 to 3% of African granulitic material is needed within the local upper mantle for the radiogenic two groups whereas 3 to 10% of plume derived material might be necessary to account for the fourth group
sample composition.
In conclusion, the very depleted local DM and the extreme DUPAL compositions support the concept of LCC contamination of the upper mantle during the Gondwana breakup as 50Ma ago, the mixing and assimilation of the LCC being less advanced than in today Indian upper mantle. This leads to more extreme resulting isotope composition than today.