5.6.P07

SWIR off-axis dredging by SWIFT

M. STOREY[1], J.J. MAHONEY[2], S. NIKOLAJSEN[1], R. BURGESS[3], D.M. POULSEN[1] and J.N. LUDDEN[4]

[1] Danish Lithosphere Centre, Øster Voldgade 10, 1350 Copenhagen, Denmark (ms@dlc.ku.dk)
[2] SOEST, University of Hawaii, Honolulu, HI, USA 96822.
[3] Department of Earth Sciences, Manchester University, Manchester M13 9PL, UK.
[4] CRPG-CNRS, UPR 2300, 15 rue Notre-Dame-des-Pauvres, BP20, 54501 Vandoeuvre-Les-Nancy, France.

SWIFT successfully dredged a large lithological range of pillow lavas, breccias, dolerites and gabbros, including highly tectonized varieties, from four off-axis sites along the western flank of the Discovery II FZ and the southern Madagascar Plateau. The primary goal was to examine secular variations in mantle sources along this part of the ridge system, particularly with respect to the interplay between the Marion hotspot and the low $^{206}Pb/^{204}Pb$ segment (39˚-41˚E) of the SWIR.

The Discovery II sites (DR21, DR22, DR24) are situated along a single mantle flow line on approximately 10Ma, 20Ma and 40Ma crust respectively. DR21 consisted of near aphyric pillow basalts having chondrite normalized LREE depleted patterns. DR 22 was a mix of sediments, dolerites, microgabbros, and coarse grained clataclastic clinopyroxene metagabbros, cross cut by numerous veins. REE patterns range from flat to LREE enriched. DR24 consisted of LREE - enriched basaltic breccias and flows.

The DR21 samples have $^{206}Pb/^{204}Pb$ ratios around 18.3 with no evidence for the low $^{206}Pb/^{204}Pb$ component characteristic of the 39˚-41˚E section of SWIR. Samples from DR 22 and DR24, from the more northerly part of the Discovery II FZ, exhibit isotopic and trace element evidence for the influence of the Marion plume. This may be related to the passage of the hotspot beneath the Antarctic plate at 40-50 Ma. Curiously, a subset of DR22 samples have very high $^{207}Pb/^{204}Pb$ ratios, indicative of a locally exotic component within the Discovery II mantle.

5.6.P08

Geochemistry of plagioclase peridotites from the Southwest Indian Ridge (63°to 65°E)

A. VON DER HANDT[1] , M. SEYLER[2,3], J.E. SNOW[1] AND E. HELLEBRAND[1]

[1] Max-Planck Institut für Chemie, Abt. Geochemie, Mainz (avdhandt@mpch-mainz.mpg.de; jesnow@mpch-mainz.mpg.de; ehelle@mpch-mainz.mpg.de)
[2] UFR Sciences de la Terre, Université Lille 1 (seyler@pop.univ-lille1.fr)
[3] Institut de Physique du Globe de Paris (seyler@ipgp.jussieu.fr)

East of the Melville Fracture Zone (~61°E) towards the Rodrigues Triple Junction, the Southwest Indian Ridge becomes anomalously deep, is devoid of transform faults and geophysical data point to an unusually cold mantle. In this region, melt supply is spatially and temporally variable and subaxial mantle-peridotites are highly heterogeneous in composition.

During the EDUL cruise, plagioclase- and spinel-bearing peridotites were recovered in three dredges (DR14, DR21, DR23) between 63°E and 65°E, along with small amounts of gabbros and basalts. The geochemistry of the plagioclase-free peridotites has been reported by [1].

Six peridotite samples (Olivine Fo: 89.9-90.7) from these dredge hauls, devoid of veins but containing matrix plagioclase (An: 89-94), have been analyzed so far. Chrome spinel compositions show the same non-systematic intragrain variations as reported from plagioclase peridotites from Gakkel Ridge. The Cr# spans 17-58 in one sample (DR14-1-1), embracing the range of the whole sample set but shows no consistent correlation with anything but iron. Here, pronounced but systematic changes in FeO and Fe2O3 contents with a given Cr# can be observed in adjacent grains, indicating that multiple processes affect the spinel compositions.

Trace element data from clinopyroxenes and plagioclase reveal compositional variations, from more fertile [$(La/Nd)_N$ ~1, dredge 23] to depleted [$(La/Nd)_N$ ~0.2, dredges 14 and 21].

Plagioclase-peridotites are interpreted to form by reaction between spinel-peridotites and percolating melts. Our preliminary data strengthen the previous observations that the subaxial mantle beneath ultraslow/cold spreading ridges is highly heterogeneous at a regional scale.

References:

[1] Seyler et al. (2003): Evidence for major-element heterogeneity in the mantle source of abyssal peridotites from the Southwest Indian Ridge (52° to 62°E), *Geochem. Geophys. Geosyst.*, **4** (2), 9101.