Melts migrating through the mantle wedge: evidences from Patagonian and Western Pacific mantle xenoliths

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A suite of anhydrous spinel-bearing mantle xenoliths from Estancia Sol de Mayo (ESM, Patagonia) has been studied and compared with a large number of mantle xenoliths from other Patagonian localities. ESM xenoliths are devoid of modal metasomatic features as well as of amphibole. ESM cpx and opx plot on the high mg# side of three different trends, depicted by peridotites and pyroxenites of the other Patagonia localities. On the whole the three trends point towards refertilization/metasomatic events caused by saturated and undersaturated melts which largely affected the Patagonian sublithospheric mantle. These melts are similar to those responsible for the formation of various plateaux located behind the Austral Volcanic Zone. Cpx and opx of mantle xenoliths found in calc-alkaline lavas from the western part of the Pacific plate are also included in the comparison. They appear to be substantially depleted in Al_2O_3 and depict the fourth distinct trend. Investigation is currently undertaken to evaluate if this difference can be 'simply' related to different partial melting degree or to compositionally distinct metasomatic agents.

Diverse mantle sources for Ninetyeast Ridge volcanoes

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The Ninetyeast Ridge (NER) is a 5, 000 km long N-S oriented submarine volcanic ridge in the eastern Indian Ocean. The N to S linear decrease in age, 77 to 43 Ma, is consistent with the NER forming as a hotspot track as the Indian Plate migrated northward over the Kerguelen hotspot. In 2007 the R/V Revelle recovered over 2, 000 kg of dominantly tholeiitic basalt from 22 dredge sites along 3, 200 km of the NER. The basalts have been variably altered in the submarine environment and 7 whole rock-glass pairs show that Rb and U are enriched and Ba is depleted in the altered whole rocks. Based on abundance ratios of REE and HFSE, and their correlations with Nd and Hf isotopic ratios, we identify several mantle sources that contributed to formation of the NER (see Fig. 1). We infer that two are related to the hotspot: one enriched in incompatible trace elements similar to the source of flood basalt in the Kerguelen Archipelago and the other is depleted in incompatible elements, but some trace element ratios (like Y/Nb) differ from the source of recently erupted SEIR MORB [1] (see Fig. 2). A third source is incompatible element-depleted similar to the source of SEIR MORB; this source is consistent with the inferred proximity of the hotspot to a spreading ridge during NER construction. However, Sr and Pb isotopic ratios of acid-leached whole rocks are not consistent with this inference [2, 3].

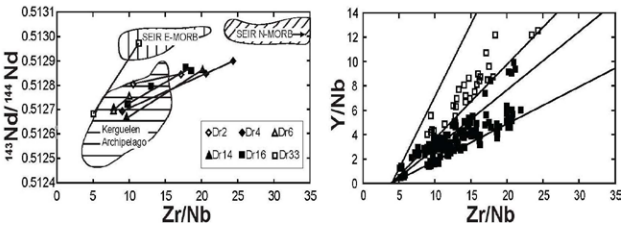

Figure 1: Dredges show trends between KA and SEIR E-MORB and N-MORB
Figure 2: Y/Nb anomalies in NER basalts.

[1] Frey *et al*. (2011) *EPSL* **303** 315–224. [2] Nobre Silva *et al*. (2007) *GCA* **71**, 15S A721. [3] Nobre Silva *et al*. (2011) *PhD Thesis* UBC.