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Os Isotopic and PGE Results from Spinel Peridotites of the East African Rift

Laurie Reisberg (reisberg@crpg.cnrs-nancy.fr)[1], **Jean-Pierre Lorand** (lorand@mnhn.fr)[2], **Rosa Maria Bedini** (rosy.bedini@dstu.univ-montp2.fr)[3] & **Jean-Louis Bodinier** (bodinier@dstu.univ-montp2.fr)

[1] CRPG/CNRS, BP 20, 54501 Vandoeuvre-les-Nancy cedex, France
[2] Muséum National d'Histoire Naturelle, 61 rue Buffon, 75231 PARIS CEDEX 05, France
[3] Géofluides-Bassins-Eau, ISTEEM, CNRS et Univ. de Montpellier II, Cc 57, Place Eugene Bataillon, Montpellier Cedex 05 34095, France

Spinel peridotite xenoliths carried by alkaline lavas in rift zones allow us to study the effects of the rifting process on the geochemistry of the subcontinental mantle lithosphere. We have determined Os isotopic compositions and PGE spectra from a series of these xenoliths from the East African Rift, collected in the Sidamo region of SE Ethiopia. These samples, which are exceptionally fresh, range in composition from fertile lherzolite to depleted harzburgite. Except for the presence of interstitial apatite in several samples, they show no evidence of having been affected by modal metasomatism. The mineralogy, texture and major and trace element contents of these xenoliths were studied by Bedini et al. (1997). These authors identified two main textural types, granular and deformed, both of which include samples ranging in modal composition from lherzolite to harzburgite. The deformed peridotite trace element patterns display marked LREE enrichment and strong negative anomalies of the HFSE. In contrast, the trace element patterns of both lherzolites and harzburgites with granular textures are much smoother, and display depletion or only mild enrichment of LREE, without significant anomalies of the HFSE. In the model developed by Bedini et al., the deformed peridotites reflect metasomatism involving small melt fractions, while the granular peridotites result from extensive recrystallization and re-equilibration with large fractions of basaltic melts. Both trace element signatures are thought to be associated with melt infiltration linked to thermal-mechanical erosion of the subcontinental mantle lithosphere during the early stages of rifting in East Africa.

Os isotopic results from these samples are quite systematic. With the exception of one deformed harzburgite, samples of both textural types plot on well-defined trends relating Os isotopic composition to alumina or HREE content (Fig. 1). These trends predict a $^{187}Os/^{188}Os$ ratio of 0.129 for fertile subcontinental mantle peridotite (Lu = 0.068 ppm), identical to the value proposed by Meisel et al (1996). If the trend in Fig. 1 is interpreted as an isochron analogue (Reisberg and Lorand, 1995), the y-intercept suggests a model age of 2.1 Ga for mantle lithosphere formation in this region, very similar to the Re-depletion ages (Walker et al., 1989) obtained from the two most depleted harzburgites (2.0 Ga). It is interesting that samples of both textural types plot on the same trend. This suggests that melt infiltration related to rifting did not significantly alter the Os isotopic ratios of the subcontinental lithospheric mantle represented by these xenoliths, regardless of the melt fractions involved. This reflects the low Os concentrations of the percolating melts relative to those of the peridotites.

The whole rock PGE contents of the xenoliths are generally low. Chondrite-normalized PGE abundances, while variable, are quite reproducible and usually decrease from Ru to Rh to Pt to Pd. No correlation is observed with textural type. In contrast to the Os isotopic ratios, the PGE spectra are likely to have been modified by melt percolation processes, as suggested by the lack of correlation with alumina content and by the low overall PGE abundances. The sulfides in these samples have been largely altered (70 - 80%) to Fe hydroxide phases. This alteration process may also have affected the PGE abundances, since sulfides are the main hosts of PGEs in mantle rocks.

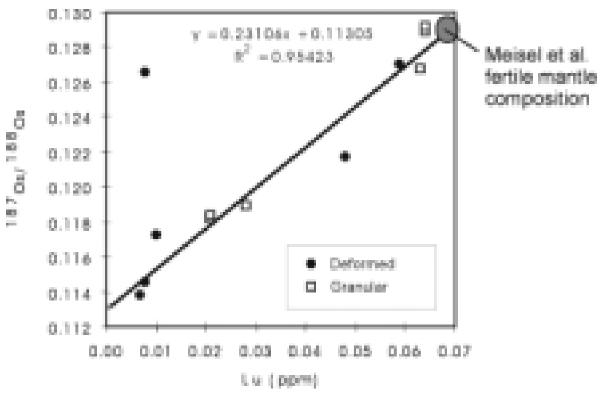

Figure 1: Os isotopic ratio vs. whole rock Lu content

Bedini RM, Bodinier J-L, Dautria J-M & Morten L, *Earth Planet. Sci. Lett*, **153**, 67-83, (1997).
Meisel T, Walker RJ & Morgan JW, *Nature*, **383**, 517-520, (1996).
Reisberg L & Lorand J-P, *Nature*, **376**, 159-162, (1995).
Walker RJ, Carlson RW, Shirey SB & Boyd FR, *Geochim. Cosmochim. Acta*, **53**, 1583-1595, (1989).