



## **Petrological characterization of mantle xenoliths from Handler Ridge, Northern Victoria Land (Antarctica)**

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A study of ultramafic xenoliths in Cenozoic alkali basalts from Handler Ridge has been carried out in order to characterize the petrological features of the lithospheric mantle beneath Handler Ridge, Northern Victoria Land (NVL) and to extend the petrological knowledge of the mantle over a large portion of the Western Antarctic Rift, from M.te Melbourne (74°21'S 164°42'E) to Handler Ridge (72°31'S 167°18'E).

Xenoliths are anhydrous spinel(sp) bearing lherzolites. Two textural types were recognized: i) medium to coarse grain protogranular and ii) fine grain equigranular. Some xenoliths present evidences of peridotite-melt interactions, such as spongy textures, cloudy rims and glassy patches. Large primary sp are often lobated. Newly formed, secondary crystals are referred to cpx only.

Regardless textural types, olivine (ol) is forsteritic in composition with Fo varying from 87.5 to 91.0, with a more fertile group ranging between 87.6 and 88.6. NiO contents between 0.31 and 0.44 wt% match the typical mantle values. As observed in ol, orthopyroxene (opx) can be distinguished in two clusters: the more fertile group with mg# [ $=\text{Mg}/(\text{Mg}+\text{Fe}) \cdot 100$  mol] ranging between 87.6 and 88.3 and the more residual one with mg# from 88.9 to 91.0. In cpx mg# varies between 87.06 and 91.7. Cpx in depleted lherzolite and secondary cpx are characterized by high values of Na<sub>2</sub>O (1.3-1.63 wt%) and Al<sub>2</sub>O<sub>3</sub> (4.62-6.62 wt%). Glasses are SiO<sub>2</sub> ( $\geq 55.50$  wt%) oversaturated with TiO<sub>2</sub> content between 0.6 and 1wt% and Na<sub>2</sub>O/K<sub>2</sub>O in the range of 0.80-2.02. Sp are characterized by mg# values between 62 and 78, and cr# [ $=\text{Cr}/(\text{Cr}+\text{Al}) \cdot 100$  mol] from 14 to 42 with the usual negative correlation between the two parameters.

The relationship between ol, opx and sp suggest that partial melting is the main process controlling the chemical variation of these three phases, while cpx were affected by metasomatic event/s.

On the basis of the formalism of Brey & Kohler (1990), Liermann & Ganguly (2003) and Ballhaus (1991) Mg/Fe partitioning between unmetasomatized ol, opx and sp in all samples reflect equilibrium conditions, which can allow to calculate T and fO<sub>2</sub> parameters. Assuming a P of 20 kbar, calculated T ranges from 1061 to 1140°C, while DlogFQM reflects relatively high oxidation condition (-0.59 +0.30) of the unmetasomatized peridotite ambient. These preliminary results compared with data from other localities in NVL (Baker Rocks and Greene Point Coltorti et al., 2004) suggest that the anhydrous mantle domains related to the Antarctic Rift System is more oxidized with respect to amphibole-bearing mantle domains, in agreement with what recently proposed by Bonadiman et al. (2014).

### References

- Ballhaus (1991) CMP 106, 27-40
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- Bonadiman et al., (2014) CMP, in press
- Coltorti et. al., (2004) Lithos 75, 115-139
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