

Refertilization vs metasomatism in mantle xenoliths from Greene Point and Handler Ridge, northern Victoria Land, Antarctica

PELOROSSO, B.¹, BONADIMAN, C.¹, COLTORTI, M.¹,
MELCHIORRE, M.², GIACOMONI, P. P.¹, FACCINI, B.¹,
NTAFLOS, T.³ AND GREGOIRE, M.⁴

¹Dipartimento di Fisica e Scienze della Terra, Università di Ferrara, Italy. plrbrc@unife.it

²Institute Of Earth Sciences Jaume Almera, Barcelona, Spain.

³Dept. of Lithospheric Research University of Vienna.

⁴GET CNRS-IRD-Université Paul Sabatier, Toulouse.

A petrological study of two mantle xenolith suites from Northern Victoria Land (NVL) have been carried out in order to characterize a large portion of the lithospheric mantle beneath the West Antarctic Rift System from Mt. Melbourne (74°21'S 164°42'E) to Handler Ridge (HR) (72°31' 167°18'E). Samples are anhydrous lherzolites, although few harzburgites and wehrlites are also found. GP peridotites vary from protogranular to porphyroclastic in texture, while in HR medium to coarse or fine-grained equigranular texture prevails. Based on mineral major and trace element petrological modeling, this mantle domain may represent a residuum after ~10 to 20% of partial melting. Overprinting on this event at GP there are evidence for the percolation of a tholeiitic and an alkaline melts, most probably affecting the mantle domain in different times. The first event increases the Al₂O₃ content in opx and cpx and modifies the REE content in cpx, leaving a garnet signature. The good matching with trace element content in cpx phenocryst from Ferrar and Karoo tholeiites allow to ascribe this refertilization event to Jurassic time. The second event is associated with the alkaline Cenozoic magmatism related to the WARS opening and is responsible for the presence of rare LREE-enriched, secondary cpx and high alkalis glassy patches. The mg# values (mg# ol = 87.5-91.0) and the high variable cpx HREE contents ($Y_N = 1.76-11.45$) of the HR reflect a fertile to moderate residual mantle segment. The presence of SiO₂-rich glass and rare, trace element-enriched secondary cpx suggest that HR population was also affected by melt interaction, most probably of alkaline affinity. Both HR and GP peridotites are thermal constrained at 950-980 °C, with redox conditions close to the QFM buffer, and the tendency for GP population towards more reduction conditions (~ -1.04 log units below QFM). Compared with hydrated mantle xenoliths from nearby localities, GP and HR xenolith suites present higher T and comparable oxidized conditions.