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# Mineralogical quantitative analyses and petrological study of mantle xenoliths from Harrow Peaks (Northern Victoria Land, Antarctica)

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This contribution presents a mineralogical and petrological study of a new mantle xenoliths population NE of Harrow Peaks (HP, coord. 74 02.785S 164 47.466E q. 335m). Xenoliths are entrained in Cenozoic alkaline dykes and necks intruding consolidated tufaceous sediments. They are mainly amphibole-bearing spinel harzburgites and lherzolites similar to those found at Baker Rocks and Mt. Overlord [1]. The xenoliths range from protogranular to porphyroclastic and granoblastic in texture with a medium to coarse grain size. Metasomatic textures are widespread with amphibole and phlogopite as newly formed hydrous (metasomatic) minerals. Among the xenolith suites found in these territories the presence of phlogopite is peculiar [1]. Amphiboles occur both disseminated in the peridotite matrix (associated with clinopyroxenes and spinel), and in veins, whereas phlogopite is found only as tiny disseminated crystals.
Xenoliths were too small to allow whole-rock analyses, thus a new approach to determine the modal composition is proposed, that allows also a quantitative estimate of the percentage of the amorphous material. Quantitative analyses were performed by Rietveld method using a high resolution X-Ray powder diffraction data and Topas software©.
This approach requires the use of powder standards prepared by mixing, in the right proportions of the main peridotite phases (olivine, ortho- and clinopyroxene, spinel and amphibole) in order to check the reliability of the method. With this procedure the lower detectable limit of the crystalline material and amorphous content can be evaluated (< 1%). The HP samples were then studied by the same approach to identify their modal composition including total amorphous content.
The chemical composition of the silicate peridotite minerals and hydrous phases was determined by EMPA analysis. The peridotites show olivine and orthopyroxene with mg# [MgO/(MgO+FeOt) mol%] values in the range of 86.6-89.5 and 87.8-90.5 respectively. Orthopyroxene is mainly enstatite with, on average, CaO=0.56 wt% and $Al_2O_3$=2.85 wt% contents; whereas clinopyroxene (mg#=85.4-94.0) varies in $Al_2O_3$ contents up to 14.64 wt% in lherzolites. Phlogopites show high values of FeOt (5.80 wt%), $TiO_2$ (1.63 wt%), $K_2O$ (8.02 wt%) and MgO (21.9 wt%). Amphiboles range from pargasitic to kaersutitic compositions with mg# variable from 82.86 to 91.05, and, on average, FeOt=4.09 wt%, $Na_2O$=3.13 wt%, CaO=13.68 wt% and $Al_2O_3$=12.46 wt%. Comparing these amphiboles with those from mantle xenoliths of Mt. Melbourne and Mt. Overlord [1], they show high CaO, FeOt and $Na_2O$ contents. The major elements are similar in composition to those from worldwide intraplate geological setting [2], but the unusual coexistence with phlogopite testifies for a complex fluid/melt interaction with the peridotite matrix in this mantle domain.

[1] Coltorti et al., Lithos (2004) 75, 115-139; [2] Coltorti et al., Lithos (2007) 99, 68-84.