Mantle Xenoliths from Northern Victoria Land, Antarctica: evidence for heterogeneous lithospheric metasomatism

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Alkaline basic magmas of the McMurdo Volcanic Group (MMVG, Northern Victoria Land, Antarctica) carry abundant mantle xenoliths, which allow to highlight the petrological features of Antarctic lithospheric mantle. Samples from Greene Point are anhydrous, mainly protogranular, coarse-grained harzburgites and lherzolites, with ol and opx crystals up to 0.8 cm in size, whereas xenoliths from Baker Rocks, a locality about 100 Km south from Greene Point, are characterized by abundant amphibole both disseminated and in vein. Superimposed metasomatic textures with glass enclosing crystal boundaries and/or forming patches between opx and spinel, are found in many xenoliths of both localities. Primary phases in anhydrous and hydrous populations are comparable in composition. Analogously secondary ol tends to be lower in MgO and Ni, and higher in CaO contents, while secondary sp is cr#-richer and mg#-poorer.

Several differences can be observed in the metasomatic parageneses of the two localities. With respect to primary assemblage Greene Point xenoliths present: i) secondary cpx with higher SiO_2 and lower Al_2O_3 contents and no variation in TiO_2 contents [1], ii) secondary sp with higher TiO_2 contents (up to 8 wt% in idiomorphic crystals in the glassy patches) and iii) glasses have high-silica (57.9-67.8wt%) and alkali contents (12.9-16.1wt%), but relatively low TiO_2 values (0.21-2.90wt%).

With respect to primary assemblage Baker Rocks xenoliths present: i) secondary cpx with higher Al_2O_3 and lower SiO_2 contents and strong TiO_2 enrichment (up to 4wt%) [2], ii) no variation TiO_2 contents in secondary sp, and iii) glass having low silica (45.9-58.9wt%) and alkali (3.94-9.59wt%) contents but very high TiO_2 (1.96-6.74wt%) abundances.

The distinct geochemical features of secondary paragenesis (including glasses and amphibole) could be explained by reaction with two metasomatic agents which differs mainly for the TiO_2 contents.

References

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