5.3.P10

Crystallization conditions of magmatic garnets from gabbroid xenolths (Siberian Region, Russia)

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Experiments on garnets show that they are generated under high pressure conditions in calc–alkaline basaltic magmas. We have studied garnet-bearing mafic xenoliths from the Ordovician lamprophyre of Western Sangilen (Siberian Region, Russia). Texture features of gabbroid xenoliths reflect their magmatic origin and belonging to abyssal layered intrusion. They have gabbroic and gabbroophitic texture and show layering of alternating plagioclase-rich and pyroxene-rich layers. The xenoliths consist of clinopyroxene, orthopyroxene, plagioclase and garnet (not exceed 25 vol.%). Garnet appears in the xenoliths as idiomorphic grains with kelyphite rims and sometimes contains inclusions of plagioclase and clinopyroxene. The kelyphite has largerly preserved the major element composition of the original garnet. Kelyphitisation is commonly attributed to heating of the affected rock, either during transport in the host magma [1] or decompression [2]. Garnet is pyrop-almandine (Prp_{22}-$_{52}$, Alm_{35-60}, Grs_{15-20}) with no zonation. The ratio Mg/(Mg+Fe) of garnets increase with increasing the ratio Mg/(Mg+Fe) of coexisting pyroxenes.

For determination equilibration temperatures were used clinopyroxene-garnet [3], orthopyroxene-garnet pairs [4]. Equilibration pressures were estimated using orthopyroxene-garnet equilibria [4]. The temperature–pressure estimations indicate that equilibrium between garnet and pyroxenes is occurred near 990-1080°C and 1.15-1.3 GPa. Investigations of major and trace elements compositions and P,T-estimates of garnet-bearing xenoliths show their origin from calc–alkaline basaltic melt under high pressure and temperature near 1000°C.

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5.3.P11

The petrogenesis and thermal history of lower crustal xenoliths from the Karnei-Hitin volcano, northern Israel

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The Pliocene Karnei-Hitim volcano in northern Israel transported numerous and large size (10-30 cm) xenoliths of mafic granulite derived from the lower continental crust. The xenoliths are composed of mainly plagioclase (PLAG), clinopyroxene (CPX) and garnet (GT), and minor orthopyroxene (OPX), amphibole (AMP) and spinel. The rocks have granular or gneissic textures (showing CPX boudines within PLAG groundmass). Mineral thermobarometry yielded ~ 850 C and 6-8 kb, respectively, suggesting heating of the xenoliths source above the conductive steady state geotherm of the northern Arabian plate. SmNd isotope analyses yielded a late Proterozoic bulk rock isochron of ~700 Ma, which can be related to the production of the lower crust during the Pan African magmatism. However, $^{87}Sr/^{86}Sr$ isotope ratios of Plag-AMP pairs were reset and Rb was lost from the minerals probably due to the Cenozoic heating of the Arabian lithosphere that is also reflected by the elevated CPX-OPX temperatures. Initial εNd and $^{87}Sr/^{86}Sr$ ratios (+6 and 0.70312, respectively) and the patterns of major and trace element in the xenoliths (e.g. positive Eu anomalies) are consistent with their formation as cumulates from rising basaltic magmas.