Hornblende-rich xenoliths from Sabtang island, Batanes: Insights to the subarc conditions beneath the Luzon arc

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Mantle and lower crust derived xenoliths entrained in calc-alkaline magmas provide a unique insight to the sub-arc composition and processes. The unique calc-alkaline signature of arc magmas for example are attributed to hornblende-rich lithologies hypothesized to comprise thickened arc crusts [1]. Such lithologies however are seldom observed in the Earth's surface because of the limited stability of amphibole [2]. In this study, we report new petrographic and mineral chemistry data on hornblende-rich mafic, and ultramafic xenoliths from the Sabtang island, Batanes which forms part of the Babuyan segment of the Luzon Arc. The xenoliths range from hornblende pyroxenites, hornblende gabbros, hornblendites and peridotites.

In the mafic xenoliths, secondary hornblende mantle or occur within the large pyroxenes which display cumulate texture. Mosaic texture in the hornblende gabbro xenoliths indicates subsolidus recrystallization. Plagioclase microcrystals fill the interstices or cut the clinopyroxenite xenoliths forming microscopic veins. In the peridotites, recrystallization of coarse olivine grains to finer grains is associated with the growth of secondary orthopyroxene which either surround the fine olivine crystals or occur as radial aggregates.

Mineral chemistry analysis of the dunite xenolith revealed olivine Fo content ranging from 81 to 90 with the fine grained olivine being slightly more Fe-rich (Fo=81-87) compared to the coarse olivine grains (Fo=88-90). The Cr# of the chromian spinel in the dunite sample ranges from 0.64-0.71. The hornblende and clinopyroxene have major oxides comparable to exposed lower crustal sections. The Mg# of the secondary hornblende from the mafic xenoliths range from 0.60-0.82 with a narrow range of Al_2O_3 (=8.98–14.77 wt %) and low TiO_2 content (<2 wt%).

[1] Greene et al., (2006) *J Petrol* **47**, 1051-1093. [2] Davidson et al., (2007) *Geology* **35**, 787-790.