# Origin of the Garnet pyroxenite xenoliths from Malaita, Solomon Islands

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Garnet pyroxenite xenoliths from Malaitan alnoite which intruded in Ontong Java Plateau basement were classified into two types by their equilibrium conditions: shallow type (<1100C, <30kbar) and deep-seated type (>1300C, >30kbar). Shallow type formed as cumulate which made by single fractionation process affected by aluminous pyroxene plane as a thermal divide. On the other hand, deep-seated type originated as reaction products between Si-rich magma and peridotite in the bottom of lithosphere. These rocks may appear to provide the direct evidence that Ontong Java Plateau basalt produced by upwelling of recycled oceanic crust bearing mantle plume as proposed in other LIPs.

Ontong Java Plateau which is the largest of the world's LIPs is partly exposed in Malaita, Solomon Islands. The basement formed at 122 Ma and 90 Ma were intruded by the 34 Ma alnoite (phlogopite-melilite-olivine-pyroxene), which contains varied mantle-derived xenoliths. We examined garnet-bearing pyroxenites which have no olivine or less amount than ultramafic nodules (<5 modal % in garnet pyroxenite nodules, >50 modal % in ultramafic nodules) and classified into two types by their equilibrium conditions: shallow type (<1100C, <30kbar) and deep-seated type (>1300C, >30kbar). Compositions of pyroxenes differ distinctly between both types; subcalcic diopside and bronzite in deep-seated type in contrast to diopside and enstatite in shallow type.

Mineral assemblages of shallow type are spinel griquaite (Grt+Cpx+Sp) and garnet websterite (Grt+Cpx+Opx). The textures of these rock types are dominated by unmixing caused by partial reequilibration; both garnet and orthopyroxene have exsolved from clinopyroxene, while spinel has been surrounded by garnet, showing that were experienced significant cooling after crystallizing from melt. The trend defined by modal composition and primary mineral chemistry might have resulted from single fractionation process affected by aluminous pyroxene plane as a thermal divide. Estimated REE patterns of coexisting melt by using mineral/melt partition coefficients support that fractionated melt had LREE-enriched profile like those of alkaline-series magma.

Rock types included in deep-seated type are garnet clinopyroxenite (Grt+Cpx), garnet orthopyroxenite (Grt+Opx) and garnet websterite (Grt+Cpx+Opx). The chemical compositions of their constituent minerals are relatively homogeneous and resemble those of megacryst suites from Malaitan alnoite except for slightly high pyrope content of garnet. Although the origin of megacryst suites from Malaitan alnoite is still controversial, one specimen of garnet clinopyroxenite contains interstitial quartz aggregate with significant Ca-Eskola solid solutions in clinopyroxene (average 7%). Olivine occurs as small inclusion in coarse-grained bronzite and might have reacted with Si-rich melt. Some coarse-grained garnet retains unusually Cr-rich core (up to 3.4 wt.%). These observations suggest the deep-seated type garnet pyroxenite and some megacrysts formed as reaction products between Si-rich magma and peridotite in the bottom of lithosphere. These rocks may appear to provide the direct evidence that Ontong Java Plateau basalt produced by upwelling of recycled oceanic crust bearing mantle plume as proposed in other LIPs.