K025-P007 Time: May 28 17:00-18:30

Melting process of metapelites: an example from the metapelitic xenoliths of the Ishikiriba andesite, Nijo Group

Takamoto Okudaira[1]

[1] Dept. Geosci., Osaka City Univ.

http://www.sci.osaka-cu.ac.jp/geos/geo2/okudaira.html

Process of the granite generation is a central topic in the earth science. Crustal melting is one of the most important process for granite generation in some geological settings, especially in island arcs. Pelitic/metapelitic rocks are the most important crustal constituents, and then melting process of the pelitic/metapelitic rocks is a major process in the island arcs. Details of the process has been indicated by high-temperature experiments as well as petrological study for the granulite-facies metamorphic rocks and xenoliths in intermediate to mafic volcanic rocks. In the natural samples, because acidic melt generated by partial melting of the xenoliths cannot mixed with intermediate-mafic melt of the volcanic magma, the melting process observed in the xenoliths can be treated as closed system phenomena.

We study the metapelitic xenoliths in the Ishikiriba andesite of the Donzurubo Formation, Nijo Group. Tagiri et al. (1975) reported briefly the mineral assemblages of the xenoliths and their leading metamorphic reactions. In this study, we described firstly mineral assemblages and mineral chemistry, to clarify the melting phenomena occurred in the metapelitic xenoliths.

In the metapelitic xenoliths, the mineral assemblages can be identified as follows:

1) plagioclase + biotite + staurolite + cordierite + andalusite/sillimanite

2-a) plagioclase + biotite + hercynite + cordierite + andalusite/sillimanite

2-b) plagioclase + biotite + corundum + andalusite/sillimanite

3) plagioclase + biotite + garnet + hercynite + sillimnaite.

These assemblages indicates the following prograde reactions:

staurolite = cordierite + hercynite + andalusite/sillimanite + H_2O

cordierite + hercynite = sillimanite + garnet.

Furthermore, the xenoliths contain interstitial silicate glass and spherulitic siderite. The spherulitic siderite coexists with the silicate glass which shows high SiO_2 (~80 wt%) and K_2O (~4-5 wt%) contents.

The metapelitic xenoliths do not contain quartz and K-feldspar, although the xenoliths may be derived from the Ryoke metamorphic belt as a basement. The metapelites of the Ryoke metamorphic belt contain quartz and K-feldspar grains as major constituent mineral. This suggests that the phases in the xenoliths excluding the silicate glass and siderite represent restite mineral assemblage. Because the xenoliths do not contain graphite, the formation of siderite was not resulted from CO_2 influx but increase in fugacity of CO_2 due to decomposition of the graphite grains.