

Where is the S-type granitic magma formed? A case study of Miocene Kumano Acidic Rock in SW Japan and its metamorphic xenoliths

Takashi Nakajima[1]; Nobuo Geshi[2]; Teruki Oikawa[3]

[1] GSJ; [2] GSJ, AIST; [3] AIST, GSJ

Middle Miocene granitic rocks are exposed sporadically in the Outer zone of Southwest Japan. Some of them are known to have S-type-like characters. Kumano Acidic Rock, 50km x 15km in size, located in eastern Kii peninsula is one of those S-type-like granitic rocks. The main lithological unit is Kumano Granite porphyry. The constituent minerals are quartz, plagioclase, K-feldspar, biotite, and often orthopyroxene and garnet. Hornblende is not common.

The Kumano Granite porphyry has abundant metamorphic xenoliths. They are pelitic and psammitic gneisses derived presumably from Shimanto Supergroup. The metamorphic minerals are biotite, K-feldspar, plagioclase, garnet and cordierite, suggesting amphibolite facies condition. Some xenoliths have possible partial melting textures, such as glass-derived dendrite and possible melt pockets at grain boundary junctions.

There are some xenocrysts of andalusite. Now they are mostly pseudomorphs and changed into sillimanite, hercynite, corundum and plagioclase. Corundum is intergrown with hercynite and never touches sillimanite. Plagioclase of An more than 40% surrounds corundum like halo. No quartz inside the pseudomorph.

The decomposition of andalusite and growth of sillimanite is a prograde metamorphic process. Xenocrysts of metamorphic mineral are restite which survived the assimilation by the granitic magma. Some garnets show reverse zoning on Mn, suggesting metamorphic garnets. Those facts indicate a large amount of metasediments were involved in the granitic magma, giving the S-type-like characters.

As the Kumano Granite porphyry is nearly homogeneous in geochemistry, mineralogy and isotopes in the entire body of 50km x 15km, it is conceived that the granitic magma of the Kumano Granite porphyry had assimilated the metasedimentary rocks for wide areas at deep in the crust. The similar gneiss xenoliths have been documented from other middle Miocene granitic bodies, such as Uwajima and Kashiwajima in Shikoku Islands. In the middle Miocene Shimanto accretionary prism, mechanical and chemical mixing of lower crustal magma and highly metamorphosed Shimanto accretionary complex was widely and extensively going on, which could have given the S-type-like character to the granitic magma