High-Mg diorite in western Chugoku district: Reagional extension of Cretaceous high-Mg andesite magma

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Southwest Japan during the Cretaceous was located in the active continental margin along the eastern part of Asian Continent. There are voluminous felsic igneous activities from 105 Ma to 90 Ma. Mafic magmas derived from mantle are assumed as a heat source for the fusion of crust to produce the felsic magmas. The Shimokubara garanite (105 Ma) and Susuma-Nagao granodiorite are exposed in the eastern part of Yamaguchi Prefecture. They geologically occur as the coeval intrusive rocks. The Susuma-Nagao granodiorite is accompanied by dioritic rocks. On the other hand, the Shimokubara granite shows leucocratic and contains porphyritic K-feldspar; thereby both suites show petrographically different character. Therefore, we address the petrological investigation of the Shimokubara granite and Susuma-Nagao granodiorite, and discuss the genetic relationships between granite and diorite to granodiorite magmas.

The Shimokubara granite is characterized by euhedral K-feldspar up to 4 cm. The constituent minerals are Quartz, K-feldspar, Plagioclase and biotite. The Susuma-Nagao granodiorite is medium grained with granodiorite-diorite in compositions. The constituent minerals are plagioclase, hornblende, biotite, quartz with small amounts of K-feldspar.

SiO_2 contents of the Shimokubara granite and Susuma-Nagao granodiorite range from 66-78wt.% and 54-65 wt.%. The Shimokubara granite and Susuma-Nagao granodiorite show the peraluminous and meta-aluminous compositions, respectively, and make a linear trend in the Harker diagrams.

The geological and petrological features of Shimokubara granite and Susuma-Nagao granodiorite are as follows:

(1) Boundary between them is generally unclear and locally including and cutting each other.

(2) Samples collected from such boundary have mixing and mingling texture, e.g., acicular apatite, dusty zoned plagioclase, and quartz ocellar.

(3) Linier trends are shown in the some variation diagrams.

These features suggest that the Shimokubara granite and Susuma-Nagao granodiorite are the coeval intrusive rocks and locally mixed with each other. It means that the Susuma-Nagao granodiorite intruded in this region at the time of 105 Ma, and was chemically modified by the felsic melt from the Shimokubara granite in some places.

The most primitive compositions of the Susuma-Nagao granodiorite have 54 wt.% SiO_2 with up to 6 wt.% MgO. The sample is situated far from the Shimokubara granite and shows free from mixing textures. These geochemical features correlated with those of High-Mg andesite (HMA). In addition, the granodiorite has low- Sr/Y ratio similar to the Sanukitick HMA.

According to the above description, the Susuma-Nagao granodiorite magma would be derived from metasomatized mantle, and penetrate in the crust at 105 Ma. Such mafic magma is caused by the crustal fusion as a heat source and producing felsic melts. Both mafic and felsic magmas are locally mixed with each other.

Keywords: Yamaguchi Prefecture, granodiorite, San-yo belt

