Felsic member of the Setouchi volcanic rocks in Kii peninsula and Sanuki plain

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Igneous rocks in the near trench region of the Middle Miocene Southwest Japan arc are usually divided into two; Setouchi volcanic rocks to the north of MTL, and Acid rocks in the Outer Zone of Southwest Japan to the south of MTL. Most of the studies on the Setouchi volcanic rocks were concentrated on the mantle derived rocks; high-Mg andesite and olivine tholeiite. Studies on the felsic volcanic rocks were scarce, although they are one of the dominant component of the Setouchi volcanic rocks. In this study, we will report whole rock major and trace element compositions of the felsic volcanic rocks in Kii peninsula and Sanuki plain, and discuss their origin.

Representative distributions of the Setouchi volcanic rocks of the Kii peninsula are Muro pyroclastic deposit on the border of Nara and Mie Prefectures and Nijyo Group on the border of Nara and Osaka Prefectures. The former have the whole rock compositions close to those of S-type granitic rocks of Acid rocks in the Outer Zone of Southwest Japan. It was presumed that the source of the deposit is some body of Acid rocks in the Outer Zone of Southwest Japan (Iwano et al., 2000; Shinjoe et al., 2001). In the Nijyo Group, the lowest Donzurubo Formation comprise rhyolite, the upper Jogashiro Formation contains dacite. Most of rhyolite in the Donzurubo Formation bears garnet phenocryst, and are peraluminous. They are distinguished from S-type granitic rocks of Acid rocks in the Outer Zone of Southwest Japan by the fact richer in Sr, poorer in K and Rb, depleted in HREE. Dacite in Jogashiro Formation is rich in Mg, Ni and Cr (FeO*/MgO=0.86, Cr=255 ppm, Ni=96 ppm). High-Mg andesite enclave is reported (Akaishi, 1995). The dacite magma may be evolved from high-Mg andesite magma.

Around the Sanuki plain, felsic volcanic rocks usually occupy the lowest horizon of the large volcanic bodies, such as Goshikidai and Shodo-shima. There also distribute small isolated hillocks composed of lava or volcanoclastics of rhyolite in the south of the Sanuki plain. Most of dacite/rhyolite of the Sanuki region are peraluminous with garnet phenocryst, but some of them contains hornblende. Most of them are poor in Y and HREE.

As stated above, most of dacite/rhyolite in Nijyo and Sanuki region are poor in Y and HREE. The degree of depletion is rather wide (YbN=0.5-7)

Dacite/rhyolite highly depleted in HREE (e.g. found in Uchinomi Formation in Shodo-shima and Donzurubo Formation in Nijyo Group) have high Sr content and no or small Eu negative anomaly. These geochemical characteristics suggest that the magma was formed with melting residue with garnet and scarce plagioclase. This is consistent with the model of Shimoda and Tatsumi (1999) that the rhyolite magma of the Uchinomi Formation was formed by partial melting of the sediments on the subducting slab.

Dacite/rhyolite moderately depleted in HREE have negative Eu anomaly, and they should fractionated plagioclase as the melting residue or during the fractional crystallization. Range of the SiO2 content of the dacite/rhyolite highly depleted in HREE do not differ from those of moderately depleted rocks. Hence fractionation of plagioclase from the former magma cannot produce the latter, and fractionation of garnet from the latter cannot produce the former. The depth of magma production may be different for these rock types.