Geochemical Processes between Acid Magma and Clastic Sedimentary Rocks

Yoshinobu Kawano[1]; Masahiko Yamamoto[2]

[1] Fac. Cul. Edu., Saga Univ.; [2] Earth and Envir. Sci., Fac. Sci., Kagoshima Univ.

Sedimentary rocks are probably separated to fluids and restites by partial melting in granitic magma. The fluids can not be mixed with the magma, because of they have large amount of gas phase. Then, they will be appeared as felsic or aplitic dykes. The restites will be changed to sedimentary enclave, sedimentary hornfels enclave and migmatitic enclave, and conclusively to xenocryst, dark clot and biotite thin vein. On the other hand, the granitic magma also changes its chemical composition.

Most of Miocene granitic plutons in the Outer Zone of Southwest Japan are composed of heterogeneous granodioritic rocks, they may be originated by chemical reactions between sedimentary rocks and granitic magma (Yamamoto & Kawano, 2004). We measure geochemical compositions for enclaves, felsic dyke and heterogeneous granodiorites from the Osumi pluton, Kagoshima Prefecture to discuss their chemical reaction processes.

The enclaves consist of dominantly biotite and cummingtonite with orthopyroxene, spinel, garnet and/or ilmenite, while felsic dyke and heterogeneous granodiorites are composed of plagioclase, quartz, K-feldspar and biotite with cummingtonite, ilmenite, apatite and zircon.

SiO2 contents of enclaves, felsic dyke and heterogeneous granodiorites are 40wt%, 65~68 wt% and 64~67wt%, respectively. Those of felsic dyke and heterogeneous granodiorites overlap each other, and other chemical components of them also show same features. However, the enclaves are richer in TiO2, Al2O3, Fe2O3, MgO, K2O, Cr, Nb, Ni, V, Zn, Zr than felsic dyke and heterogeneous granodiorites.

From these geochemical features, it seems that sedimentary rocks are taken up by granitic magma, and separated to felsic fluids and restites by partial melting. Add that the felsic fluids are squeezed out and the restites are shrank to sedimentary enclave.