

Preliminary report of the drilling core of the Kumano acidic rocks, Southwest Japan (2) Chemistry and the source rock

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A 580m all-core drilling was carried out in the seismic underground water project by the Geological Survey of Japan, AIST. It penetrated the Northern massif of the Miocene Kumano Acidic Rocks (KAR) in the southeastern Kii Peninsula, Southwest Japan. KAR are exposed in a large area of 20km x 60km. It is one of the largest Miocene igneous complexes in Japanese Islands. The recovery of the core was nearly 100%, and hardly weathered nor altered.

KAR is composed of rhyolite lava, crystal tuff and granite porphyry from bottom to top (Aramaki and Hada, 1965; MITI, 1979). The granite porphyry is a huge sill intruding the crystal tuff unit. The intrusion contact is clearly seen at 464.3m depth of the drill-core. These igneous rocks all rest on the Miocene forearc basin sediment (Kumano group) and the underlying Cretaceous to Paleogene accretionary complex (Shimanto supergroup).

The granite porphyry is nearly constant in major element composition, such as the SiO₂ content in the range of 70.2 - 73.0 wt.%. The trace elements, such as Y, Nb, Zr, Ni and Cr are not so variable either except the part near the intrusion boundary. The ⁸⁷Sr/⁸⁶Sr initial ratios (age corrected in 14Ma) have a considerable range of 0.7077 - 0.7081. It means the magma was not adequately homogenized within the magma body isotopically. It is essentially no use trying to get the whole rock isochron on this granitic body.

The igneous enclaves are mostly porphyritic tonalite with the SiO₂ content of 67.3 - 69.5 wt.%. The contents of Y, Nb and Zr are similar to the host granite porphyry. Other trace elements also largely overlap the range of the granite porphyry. The age corrected ⁸⁷Sr/⁸⁶Sr initial ratios of the porphyritic enclaves are 0.7071 - 0.7076, which is lower than the granite porphyry. On the other hand, the sedimentary rocks of the Shimanto accretionary complexes in the Kumano area have so high ⁸⁷Sr/⁸⁶Sr initial ratios as 0.7126 - 0.7130.

As the Kumano granite porphyry contains S-type characterizing minerals, as well as a number of metasedimentary xenoliths and xenocrysts, its magma is presumed to have been highly interacted with the Shimanto sedimentary rocks. However, their strontium isotope nature shows a remarkable contribution of some juvenile magma derived from deep crustal mafic materials. If the origin of those primary magma was the young oceanic lithosphere, the contribution of the primary magma and the sedimentary upper crustal materials could be nearly even.