

K-Ar, Ar-Ar, FT ages and degassing process of andesite magma

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The Setouchi volcanic belt in SW Japan is characterized by the occurrence of high-Mg andesites (HMAs) having unusually high Mg concentrations. The compositional similarity between such HMAs and the inferred bulk continental crust may suggest the genetic linkage between them. This study presents K-Ar, Ar-Ar and FT age data for andesites including HMAs and related andesites from the Setouchi volcanic belt, and the micro mineral formation process during magma mixing under degassed condition.

The samples were collected from Shodo-shima Island where all rock types in the Setouchi volcanic belt are collectively distributed. We applied various methods of dating such as K-Ar and FT dating for separated minerals (plagioclase, hornblende and zircon) and Ar-Ar and K-Ar dating for rather glassy groundmass of rocks. The samples were mostly erupted at the surface of the sea level, and we desalinated from the samples. To consider an effects from weathering and terrestrial mixing and from underwater diffusion of gases, we analyzed the micro mineral ages in K-Ar and FT dating for every minerals above and the matrix ages of the rocks in Ar-Ar and K-Ar dating. K-Ar ages were analysed with GVI-5400 noble mass spectrometer and Hitachi Z-5010 atomic absorption spectrometer in JAMSTEC. Ar-Ar ages were analysed with VG-3600 noble gas mass spectrometer in RIC, Tokyo University and neutron irradiation was cooperated with JMTR and Yamagata University and Tokyo University. FT ages were determined by Kyoto Fission Track Co.

Although some samples contain low temperature components possibly affected by terrestrial components, a total of 8 ages for the Setouchi rocks confirmed that the magmatism in this volcanic belt took place within a short period during 13-14 Ma. These ages are synchronous with the clockwise rotation event of the SW Japan arc sliver that was associated with the opening of the Japan Sea back-arc basin. However, Ar isotope ratios of 2 samples with a little older ages suggest crustal mixing with basement rock of granite.