Precise K/Ar geochronology of rhyolitic rocks in Hohi volcanic zone, central Kyushu island.

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There are many rhyolitic lavas in Hohi Volcanic Zone (HVZ), middle Kyushu. They erupted at close time span and close area. This means that there may be some common causes for such eruptions. Therefore it is important to know their precise radiometric ages in order to elucidate geological features characterized by such type of eruption. In addition, each lava plateau has no contact to other lava plateaus in many cases. Precise radiometric ages need also to determine the volcano- stratigraphy of rhyolitic bodies, which are probable source of regional ash layers in Japanese Quaternary systems. Because radiometric ages in previous studies have large errors, it was impossible to achieve the latter purpose especially. We can determine K/Ar ages with very small errors at present.

The other significance of this study is that lavas in general can be used for crosscheck among the plural dating methods because the formation age of lavas can be dated accurately by K/Ar method. In particular, rhyolitic lavas are important sources of age standard zircon and apatite for FT and U-Th/He methods. Especially, age standards ranging in age are needed in developing U-Th/He method though available international age standards originally developed for FT calibration are older than 16Ma (Hurford, 1990). Therefore, we need to develop younger age standards for U-Th/He method. Rhyolitic activity in HVZ is younger than at least 2Ma. Therefore precise age determination of rhyolite in HVZ may give us the new young age standard. The objects of dating are Yamakogawa rhyolite, Haneyama rhyolite and Togamidake dacite. The age of Yamakogawa rhyolite is the most important, because it is unknown clearly, whether older or younger than the Yabakei pyroclastic flow deposit, the source of Pink tuff in Osaka group and O7 tuff in Kazusa group. In addition, Yamakogawa rhyolite is dissected by Tsuetate river and Yamakogawa river from upper layer to lower layer outcrops, and consists of three or more welded/non-welded layers. However, all boundaries between layers do not have outcrop. We measured samples from each layer to make clear this uncertain eruption history.

All samples are fresh lavas or strong welded tuffs. Samples were 250-500 micrometer diameter groundmass prepared by rock crushing, sieving, magnetic separating and hand picking.

As a result, ages of Yamakogawa rhyolite are 1.17 +/- 0.02Ma from two samples of upper unit, 1.21 +/- 0.02Ma from middle unit and 1.21 +/- 0.02Ma and 1.22 +/- 0.02Ma from lower unit. It is elucidated that Yamakogawa rhyolite is slightly older than the Yabakei pyroclastic flow deposit and that Yamakogawa rhyolite, erupted more than once, formed at close time span. We succeeded to date Haneyama rhyolite precisely, too. The ages are 0.672 +/- 0.013, 0.692 +/- 0.013 and 0.706 +/- 0.009Ma. These results and previous data suggest that the activity of Haneyama rhyolite is concentrated at about 0.7Ma. The age of Togamidake dacite, 2.83 +/- 0.05Ma, is a preliminary age and we may need re-dating reliably.

In general, the errors of ages decrease less than one tenth from previous ages. It confirmed that re-dating by K/Ar method is effective to compare rock units that cannot be determined top and bottom by field observation.

Reference

Hurford, A. J. (1990) Standardization of fission track dating calibration: Recommendation by the Fission Track Working Group of the I.U.G.S. Subcommission on Geochronology. Chemical Geology (Isotope Geoscience Section), 80, 171-178.