Petrography and Ar isotopic information of nosean in the phonolite in East Eifel volcanic field, Germany: investigation of the source of excess ^{40}Ar

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Since the reports of the ^{40}Ar/^{39}Ar analyses and excess ^{40}Ar on Quaternary Eifel monogenetic volcano field in Germany from 1985 to 1990 by the group of Lippolt of the University of Heidelberg, hauyne and nosean in certain phonolites from the northwest of East Eifel volcanic field were known to contain significant amounts of excess ^{40}Ar and show apparent older ages. However, its petrographic meaning was not well known. The group of Sumino of the University of Tokyo has clarified the source for excess ^{40}Ar in plagioclase phenocrysts from the historic Unzen dacitic lava flows as the melt inclusions shown as zones in plagioclase by in-situ laser Ar isotope analysis.

In order to investigate the source of excess ^{40}Ar in hauyne/nosean from the phonolite in the East Eifel by in-situ Ar isotope analysis with UV pulse laser (wavelength 266 nm) and ^{40}Ar/^{39}Ar dating system at the University of Potsdam, we collected phonolites from the East Eifel and investigated their petrography, mineral composition and Ar isotopes. The rock collected from Olbrueck contains nosean, leucite and sanidine phenocrysts. Nosean contained fine inclusions with a size of less than 5 micrometer which are distributed linearly, but not as zones. For many nosean grains resorbtion occurred, although no inclusions or resorption are shown from the leucite and sanidine phenocrysts. The analysis by SEM-EDS showed that the resorbtion was caused by carbonates or carbonate melts. The chemistry at inclusions or in holes where the inclusions probably located showed higher Cl and S content, which could be derived from volcanic volatile elements. The in-situ Ar isotopic analyses were performed on the polished surface of small rock plates (less than 1cm size and less than 1mm thickness) with UV pulse laser by 100 or 200 micrometer beam size. Obtained results are: (1) carbonate in/around the nosean only show nearly the atmospheric Ar isotope ratios, (2) the in-situ analyses of nosean and leucites showed clearly higher ^{40}Ar/^{36}Ar ratios up to 460 (nosean) or 600 (leucite), (3) the correlation of the ^{40}Ar/^{36}Ar ratios with or without apparent involvement of linear distribution of inclusions in the spot areas was not clear. It was mostly difficult to analyze inclusion-free areas. (4) From the K-Ar isochron plots of the results considering potassium contents for nosean and leucites, nosean clearly shows the older age than leucite. This data set implies that the nosean surely has the apparent older ages than leucite as the previous reports by the group of Lippolt. Therefore presently the influences to the Ar isotope from the inclusions are not yet clear. As other rock plates were also irradiated by the fast neutron in the reactor at Petten, Netherlands, the discussion will continue with the results by in-situ ^{40}Ar/^{39}Ar analyses of those samples.