

Study on fluid inclusions and noble gas isotopes in minerals of ultramafic xenolith in Cenozoic basalts, Eastern China

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To elucidate the characteristic of fluid inclusions and noble gases in mantle xenoliths from the Eastern China, we performed EPMA and noble gas isotope studies. Samples are from Wudalianchi (Heilongjiang province), Yitong (Jilin province), Dalongwan (Jilin province), Kuangdia (Liaoning province), Damaping (Hebei province), Yantai (Shandong province), Liuhe (Jiangsu province), Yinfenglin (Guangdong province), and Penglai (Hainan province).

The occurrence, type and composition of fluid inclusions, which developed in mineral of xenoliths (i.e. Ol, Cpx and Opx) are strongly dependent on localities. Two generations of fluid inclusions have been found in most of samples. One is CO₂-rich primary fluid inclusion and another is secondary melting inclusion. They affect abundance and composition of noble gas to some extent.

Results obtained by the two-pyroxene geothermometer indicate that the mantle xenoliths formed at a temperature ranging from 850 to 1150 °C.

For gases extracted by the heating method, noble gas isotopes were greatly affected by cosmogenic ray. Getting rid of cosmogenic ray and other effects, the data from the crushing method show that there are obvious differences among these samples depending on localities. The ³He/⁴He ratios range from 0.31Ra to 7.53 Ra (where Ra is the atmospheric helium isotope ratio). All of them are near to or lower than the MORB-like value (8Ra), which is similar to those reported as far about mantle xenoliths from continental area. It seems to have some correlation with various tectonic environments. Most of ⁴⁰Ar/³⁶Ar data obtained with the crushing method are less than 1000 with the highest of 4500, which are significantly lower compared to those found in MORB. The neon isotopic data show that most of them are indistinguishable from the atmospheric neon, but a few of them are obviously higher than it.