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Noble gas isotope ratios of CO_2 fluid inclusions in mantle-derived xenoliths by spot measurement -direct constraints on the origin of noble gas heterogeneity in subcontinental lithospheric mantle beneath back arc region

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Isotope ratios of noble gases extracted from minerals or rocks are effective to investigate the origin of fluids within the samples. Longgang volcanos in northeastern China are expected to involve the influence of subducted slab-related component to subcontinental mantle beneath back-arc region of eastern Asia. We extracted noble gases by crushing 1-2 g olivine grains of five mantle xenoliths collected from the volcanos. The $^3He/^4He$ ranges from 6.45 Ra to 0.14 Ra where Ra is atmospheric $^3He/^4He$. A possible cause of the significant variation of the $^3He/^4He$ is variable mixing ratio of CO_2 fluid inclusions and melt ones in minerals, which exhibit different $^3He/^4He$. This is because the samples showing relatively high $^3He/^4He$ include abundant CO_2 fluid inclusions. To evaluate the assumption, we preferentially extracted noble gases from CO_2 fluid inclusions using laser ablation method. For the extraction, we made holes with 100-200 micrometer in diameter on polished olivine surfaces using an ultraviolet laser (UP-213, New Wave Research, Inc.). The $^3He/^4He$ of the CO_2fluid inclusions are higher than those obtained by crushing method. It implies that noble gas isotope ratios of the samples depend on the distribution of inclusions. In addition, there is a possibility that melt inclusions in minerals are the host of relatively low $^3He/^4He$ derived from subducted slab-related component.