

高Mg安山岩と超マフィック火山岩の共存について

On the coexistence of high-Mg andesites and ultramafic volcanic rocks

*三部 賢治¹、川本 竜彦²、小野 重明³*Kenji Mibe¹, Tatsuhiko Kawamoto², Shigeaki Ono³

1. 東京大学地震研究所、2. 京都大学大学院理学研究科附属地球熱学研究施設、3. 独立行政法人海洋研究開発機構

1. Earthquake Research Institute, University of Tokyo, 2. Institute for Geothermal Sciences, Graduate School of Science, Kyoto University, 3. Japan Agency for Marine-Earth Science and Technology

In order to understand the origin of magmas in the hydrous upper mantle, we have been investigating the phase relation and compositions of phases in the system peridotite-H₂O. Using X-ray radiography technique together with Kawai-type multi-anvil high-pressure apparatus (SPEED-1500, SPring-8, Japan), the second critical endpoint in the peridotite-H₂O system was determined to be at around 3.8 GPa and 1000 °C (corresponding to a depth of ~ 110 km) [1]. It is possible that two fluid phases (i.e., aqueous fluid and hydrous silicate melt) coexist up to 3.8 GPa. Above 3.8 GPa, however, hydrous silicate melt and aqueous fluid in upper mantle becomes indistinguishable from each other and the melting temperature of hydrous mantle peridotite can no longer be defined beyond this critical condition. Using the quenched recovered samples obtained by Mibe et al. [1], chemical compositions of aqueous fluid, silicate melt, and supercritical fluid magma in the vicinity of second critical endpoint were determined by the electron microprobe analyzer. In the run at 3.6 GPa, the composition of aqueous fluid was high-Mg andesitic, whereas the composition of hydrous silicate melt was komatiitic. Our experimental results indicate that high-Mg andesitic magma and komatiitic magma can be generated at the same time as the liquid-fluid immiscibility near the second critical endpoint in the peridotite-H₂O system. Some natural examples on the coexistence of high-Mg andesites and ultramafic volcanic rocks from various tectonic settings and locations around the world will also be presented.

[1] Mibe, K., M. Kanzaki, T. Kawamoto, K. N. Matsukage, Y. Fei, and S. Ono (2007), Second critical endpoint in the peridotite-H₂O system, *J. Geophys. Res.*, 112, B03201, doi:10.1029/2005JB004125.

キーワード：高温高圧

Keywords: high pressure and high temperature