

## Characteristics and origin of whole rock compositions of the volcanic rocks of small islands south off Hahajima, Bonin Islands.

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Hahajima Islands, southern part of Bonin archipelago, are known for the occurrence of high-Mg arc tholeiite. There are few geological and petrological studies on small islands south off Hahajima. We present the bulk chemistry characteristics and discuss the origin of the volcanic rocks occurring on the islands.

The volcanic rocks of the islands are mainly composed of basalt to basaltic andesite (SiO<sub>2</sub> 48~56 wt %) accompanied by andesite (58 wt %) to andestic dacite (63 wt %). MgO contents range from 2.9 wt % to 11.9 wt %. The composition of the volcanic rocks partially overlaps and partially plots on the extensions of the tholeiite and calc-alkaline rock series of Hahajima volcanic rocks. Samples having more than 8 wt% MgO are cumulates formed by accumulation of olivine phenocrysts.

Trace element compositions of the rocks of the islands have patterns characteristic of arc volcanic rocks. Zr contents range from 26 ppm to 112 ppm and Rb from 1.5 ppm to 13 ppm. La/Yb ratio varies from 0.8 to 3.6. Basalt samples of the islands can be divided into high- (2.1) and low-La/Yb (0.8~1.4) types.

We made model calculations of La/Yb in ~30% of degree of batch partial melting of primitive and residual mantles after various degrees (~20%) of melt subtraction from primitive mantle.

The model shows that high-La/Yb type can be produced by partial melting of primitive mantle under relatively dry and high pressure (D-F Type). Low-La/Yb type is classified into three primary magma types; 1) partial melts under a relatively wet condition of residual mantle, which has experienced 0.5% melt subtraction (W-L-D type), 2) partial melts under a relatively wet condition of residual mantle, which has experienced 1% melt subtraction (W-H-D type), 3) partial melts of highly depleted mantle with addition of LREE-enriched fluid (La-add type). D-F, W-H-D and a part of La-add types belong to the tholeiite series, while W-L-D and a part of La-add types belong to the calc-alkaline rock series. These source mantle materials are more fertile than those of the Quaternary volcanic front lavas of the Izu-Bonin arc. Furthermore, Th/Pb is higher in the rocks of the Hahajima islands than the present Izu-Bonin front lavas, suggesting lower chloride concentrations in the Hahajima-island fluid.

Stratigraphic positions of these magma types in the Hahajima islands indicate that tholeiite and calc-alkaline rock series were simultaneously active and derived from different source mantles.