

## Petrological characteristics of the submarine volcanic rocks of the Southern Mariana Spreading Ridge

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It is known that the presently active backarc spreading ridge is adjacent to the active arc volcanic zone, in the Southern Mariana Trough. The active spreading from 11 to 14 degree North ridge has echelon arrangement in NNE direction. This geographical feature of the spreading ridge, which lacks axial valley and has low relief of the footwall, is similar to the topography of fast spreading East Pacific Rise.

To define the characteristics of the volcanisms of Southern Mariana Spreading Ridge, the volcanic rocks from this area and adjacent Mariana Island Arc submarine volcanoes were studied with the volcanic rocks from the Northern and the Central Mariana Trough to compare the chemical characteristics of the Southern Mariana Trough rocks. Major and trace elements of the bulk rocks were analyzed by XRF. H<sub>2</sub>O content and hydrogen isotope ratio of the quenched glass rim were determined to consider the effect of on the igneous activity of the Southern Mariana Spreading Ridge.

The Southern Mariana Spreading Ridge volcanic rocks contain 52.8-64.1wt% SiO<sub>2</sub>, 1.2-4.3wt% MgO and 3.5-5.4wt% Na<sub>2</sub>O, indicating basalt-andesite composition. The volcanic rocks of Southern Mariana Island Arc Seamounts compose 51.0-54.2wt% SiO<sub>2</sub>, 4.2-6.5wt% MgO and 1.9-3.0wt% Na<sub>2</sub>O, showing basalt-basaltic andesite composition. The volcanic rocks of the Northern and the Central Mariana Trough are basalts comprising 49.5-51.0wt% SiO<sub>2</sub>, 6.3-8.6wt% MgO and 2.9-3.6wt% Na<sub>2</sub>O. All of the studied rocks are sub-alkali rocks.

Rocks of the Southern Mariana Spreading Ridge, LIL (large-ion lithophile) elements (Sr,K,Rb,Ba) enrich more than those of N-MORB, and concentrations of HFS (high field-strength) elements (Nb,P,Zr,Ti,Y) are close to those of N-MORB. Such a compositional character represents typical volcanic rocks of basin setting. However Sr and Ti contents are less than those of typical backarc basin basalts [Sr:(sample/N-MORB) is nearly 1, Ti:(sample/N-MORB) is less 1]. Southern Mariana Island Arc Volcanic rocks are enriched in LIL elements but HFS elements showing usual volcanic arc rock character. Rb content however is less than that of usual arc volcanic rocks [Rb:(sample/N-MORB)=2-6].

H<sub>2</sub>O content and hydrogen isotope ratios (δD, SMOW) of the quenched glass rim on the Southern Mariana Spreading Ridge rocks range within 1.2-2.0wt% and from -36.3 to -45.0 per mill, respectively. Those of the Southern Mariana Island Arc volcanoes are 0.8-2.0wt% and from -45.0 to -55.0 per mill, and those of the Northern and the Central Mariana Trough are 0.6-1.6wt% and from -32.9 to -46.4 per mill, respectively. The hydrogen isotope ratios of the studied back arc basin volcanic rocks are heavier than those of the Mariana forarc magma, about -60 per mill (Sakai et al.1990), suggesting that direct contribution of seawater into the source magma of the Mariana backarc basin.