

## Characterization of the volcanism at the Southern Mariana Spreading Ridge inferred from chemical compositions and isotope ratio

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The present volcanism was found at the spreading ridges of the Southern Mariana Trough in 2000. Geochemical characteristics of the submarine volcanic rocks taken from the Southern Mariana Spreading Ridge has been studied to characterize the present volcanism, which was compared with those of the Southern Mariana Island Arc Submarine Volcanoes and the Northern Marian Spreading Ridge. Major, trace and rare earth elements of the bulk rocks were analyzed using XRF. H<sub>2</sub>O content, hydrogen isotope ratio, sulfur content and sulfur isotope ratio of these samples were determined for estimate the volatile characters concerning to the volcanism.

The volcanic rock of the Southern Mariana Spreading Ridge comprise basalt-andesite. At the northernmost and southern segment of the Northern Mariana Spreading Ridge, basaltic andesite basalt were recovered, respectively. The volcanic rocks of Southern Mariana Island Arc Seamounts are of basalt-basaltic andesite. All the studied rocks are plotted in the field of sub-alkali rocks.

The spider diagram of the incompatible elements from the Southern Mariana Spreading Ridge shows similar characteristics to that of typical back-arc basin basalt. The volcanic rocks from the Northern Mariana Spreading Ridge demonstrate the similar LIL composition to those of typical island arc basalt, while HFS show the nature of back-arc basalt. The rocks from the Southern Spreading Ridge exhibit the REE patterns characterized by HREE enrichment, whereas those from the Northern Spreading Ridge show LREE-depleted patterns. Such compositions of incompatible and REE elements suggest that the Southern Spreading Ridge volcanism is at the more evolved stage of backarc spreading than the northern spreading ridge.

The basalts from both the Northern and Southern Spreading Ridges represent high hydrogen isotopic ratios (-22 to -55per-mill, SMOW) than that of mantle water (-80per-mill, Kyser and O'Neil,1979), suggesting that seawater is contaminated into the source magmas in the Mariana backarc basin. Sulfur contents of the volcanic rocks are related to the sampling depth from the ocean surface, indicating that the sulfur contents vary with the degree of degassing. Isotopic ratios of sulfur also vary with the depth: shallower samples have higher sulfur isotope ratios than the deeper ones. However, the variation is not large(0 to 3per-mill,CDT), and the values are similar to that of a typical MORB. Thus, the effect of contamination of sea water to the magma of the Mariana Spreading Ridge is negligible. Since incompatible and REE patterns are also not affected by seawater, seawater contamination occurred in the source magmas. Probably, the amount of seawater is small to affect the other chemical compositions than hydrogen.