

Volcanic rocks in the Komahashi-Daini Seamount, Northern Kyushu-Palau Ridge

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The Kyushu-Palau Ridge (KPR) was investigated until Japanese Geodynamics Project (GDP) in the 1970's. At the Komahashi-Daini Seamount in the northern KPR, tonalites were recovered, and Haraguchi et al. (2003) considered that this tonalite was produced by fractional crystallization of the basaltic magma during the arc volcanism. Basaltic to andesitic volcanic rocks were dredged from other seamounts in the northern KPR. Many volcanic rocks are clinopyroxene basalt, and these rocks show high incompatible elements (LILE, HFSE) content. These characteristics of composition are distinguished from the Komahashi-Daini Seamount, early arc volcanism and recent volcanism. And these rocks show 27 to 25 Ma by Ar-Ar geochron method (Ishizuka pers. comm.). Haraguchi and Ishii (2005) described that these characteristics was caused by the changing of the parent mantle into enriched composition, and assumed that this event was associated with back-arc spreading activity.

Volcanic rocks were recovered from the Komahashi-Daini Seamount accompanied with acidic plutonic rocks. And these volcanic rocks are important to associated with plutonic activity and rifting activity. In this study, I present igneous activity these volcanic rocks in the Komahashi-Daini Seamount by petrological and geochemical studies of these rocks.

Volcanic rocks in the Komahashi-Daini Seamount are divided into three types, recovered with plutonic rocks, recovered from eastern escarpment of northern peak, and recovered from western peak.

Volcanic rocks with plutonic rocks were recovered from central peak. These rocks show heavily hydrothermal alteration and completely replaced primary structures into secondary ones. Bulk composition of many volcanic rocks show 54-64 wt% of SiO₂, and similar compositions to acidic plutonic rocks. Especially, HFE elements show similar compositions and fractional trends. It is considered that magma genesis of these volcanic rocks is similar to that of plutonic activity.

Volcanic rocks from northern peak are olivine basalt and clinopyroxene basalt, same mineral assemblages as other basalt in the northern Kyushu-Palau Ridge. Bulk composition of volcanic rocks in the northern Kyushu-Palau Ridge show between two end-members, tholeiite at the Miyazaki Seamount and alkali series at the Nichinan Seamount. Volcanic rocks in the northern peak show 50 wt% of SiO₂, and incompatible element composition show intermediate between both end-member similar to many volcanic rocks in the northern Kyushu-Palau Ridge. Therefore, it is assumed that environment of magma genesis is similar to other volcanic rocks in the northern Kyushu-Palau Ridge, and produced by rifting activity associated with back-arc basin activity.

Volcanic rocks from western peak are clinopyroxene basalt same as northern peak. Bulk composition of these rocks show 48-53 wt% of SiO₂, and high alkaline and HFS elements. Especially, Y content is 35-85 ppm, higher than that of Nichinan Seamount basalt, and Zr/Y ratio of these rocks show remarkable lower than other volcanic rocks in the northern Kyushu-Palau Ridge and plutonic rocks in the Komahashi-Daini Seamount. On the other hand, LIL element content is similar to tholeiite end-member in the northern KPR. These characteristics indicate that the magma genesis, at least, parent material composition of western peak basalt was different from other igneous rocks in the northern Kyushu-Palau Ridge. And it is assumed that this activity was independent, not associated with plutonic rocks activity (38 Ma) and rifting activity (27-25 Ma).