

Petrogenesis of high-Mg diorites on Kyushu Island, southwest Japan arc: evidence from clinopyroxene and whole rock compositions

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High-Mg diorites that have similar whole rock composition to high-Mg andesites (HMAs) should not be simply interpreted as rocks solidified from the HMA magmas, because the high-Mg diorites may be mafic cumulate derived from a different magma from the HMAs.

The HMAs contain unique clinopyroxenes with higher Mg# and Si than those of other sub-alkaline series igneous rocks. The Mg# and Si are controlled by the source magma composition rather than its crystallized conditions such as pressure and temperature. The chemical composition of clinopyroxenes would present important information for the investigation of the source of high-Mg diorites.

We considered the source of Early Cretaceous high-Mg diorites on Kyushu Island, southwest Japan arc, based on their clinopyroxene and whole rock compositions. The clinopyroxenes have similar chemical characteristics to those in HMAs compared with those in other sub-alkaline rocks. Moreover, the whole rock compositions are equivalent to the sanukitic HMA and do not show features of mafic cumulate. These evidences indicate that the high-Mg diorites have been solidified from sanukitic HMA magmas. It is generally believed that the sanukitic HMA magmas involve in their genesis the subduction of a young and/or hot oceanic slab. Therefore, igneous activities of the high-Mg diorites suggest that Kyushu has been placed to the tectonic setting of young and/or hot slab subduction in the Early Cretaceous.