

新潟-山形県境, 金丸小国地域の HFS 元素に富む優白質花崗岩 A leucogranite stock rich in high field strength elements, Kanamaru-Oguni area on the Niigata-Yamagata border, NE Japan

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A small stock of leucocratic Grt-two mica granite enriched in high field strength elements (HFSEs) has recently been found in the Kanamaru-Oguni district of the Asahi-Iide mountains in the Ashio Belt of the NE Japan arc. The granite has a high-K peraluminous composition, and is categorized as an A-type within-plate granitoid, according to several geochemical discriminants based on HFSEs. However, total Zr+Nb+Ce+Y contents are lower (166-192 ppm) and Rb/Ba ratios are higher (19-48) than those typical of A-type granitoids (Zr+Nb+Ce+Y >350, Rb/Ba <10). This suggests that this stock is in fact a highly fractionated granite, rather than an A-type intrusive. The stock solidified at shallow depth (about 3 - 6 km) from a silicic granitic magma, under moderately water-rich conditions. Geochemical modeling shows that the petrogenesis of the granite can be explained by partial melting of crustal rocks, leaving abundant plagioclase as a residual phase, with subsequent active fractional crystallization of plagioclase + alkali-feldspar. Many other small stocks composed of Grt-two mica granite occur in the Asahi and Iide mountains. The granitic activity ranges from Late Cretaceous (ca 90 Ma) to Paleogene in age. Although most of these stocks were derived from melting of various crustal rocks, some are highly differentiated, and have HFSE concentrations similar to the Kanamaru-Oguni stock studied here.

HFSE-rich granitoids also occur sporadically within the other Japanese geological units, but they are restricted in the southwestern Japan. The granitoids in the Inner and Outer Zones of SW Japan differ in composition. The HFSE-rich granitoids in the Inner Zone originated from middle to lower crustal materials, and were then strongly differentiated before emplacement. This is similar genesis to the granite in the Kanamaru-Oguni district. In contrast, the solitary HFSE-rich granitoid in the Outer Zone crops out at Cape Ashizuri. This occurrence is the only classic A-type intrusion in Japan, and is considered to have formed by a low degree of partial melting of the upper mantle or mafic lower crust. Although the HFSE-rich granitoids within the SW Japan arc may be similar geochemically to within-plate or ocean-ridge granites, they are in fact volcanic arc granites produced within the subduction zone by specific activities.

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