

Study on the formation process of composite MMEs (mafic magmatic enclaves) in Taejongdae, Busan Korea.

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Mafic Magmatic Enclave (MME) is a common feature in granitic rocks. However, the layered MMEs developed in the outcrop of Cretaceous granite in Taejongdae National Geopark, Busan show various patterns and interesting phenomena providing useful information on the formation of MMEs. We define here the layered MME as MME composed of several contrasting rock shells. Characteristics and origin of MMEs have been studied in several ways; descriptively, geochemically and through isotope studies due to their importance in the evolution of igneous rocks. This study aims to understand the formation mechanism of the composite MMEs, including the reasons for the diversity of the MME rock types. To achieve those tasks, the relationship between the MMEs and the host granite, and difference between the layers were investigated based on petrological, XRF and EPMA analyses. The important results include the followings: the MMEs can be categorized into two main types; Simple-type composed of a single rock type, and Layered-type composed of different surrounded rock shells. Most of the Simple-type have relatively angular shapes and small sizes, and their contacts with the host granite are commonly sharp but some show small dioritic mixing rims. The forming rocks of the simple MMEs are variable from mafic porphyritic, mafic fine to medium grains and felsic coarse-grained dioritic rocks. The layered MMEs have almost circular to elliptical shapes, and show gradual change in composition from mafic and porphyritic texture in the center to fine in the outer shells (like a chilled margin) and again surrounded by a dioritic layer. The dioritic layer shows another chilled margin with the host granite, indicating double cooling mechanism. Some MMEs are injected by granitic materials through cracks. The injection of the granitic materials into the layered MMEs may indicate fracturing during the cooling process. They may indicate two different phases of mingling and one phase of mixing event. The zonation within the plagioclase may be a good indicator of ascending from a deep level of high temperature to a shallow level of low temperature. The relatively, small size and angular sharp contact with the host granite of the simple MMEs may indicate breaking of the layered MMEs before the crystallization of the host granite. To confirm these interpretations, further petrological and geochemical analyses are necessary.