ENCLAVES OF PENINSULAR MALAYSIAN GRANITOIDS

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Abstract

Enclaves of Peninsular Malaysian granitoids may be categorised into the following types on the basis of detailed field, chemical and especially petrographic studies:

1. *Microgranular enclaves*
2. *Quartzo - feldspathic enclaves*
3. *Clinopyroxene - amphibole enriched enclaves*
4. *Surmicaceous enclaves*
5. *Aluminous enclaves and other obvious xenoliths*

Of the 5 enclave varieties identified, only the first 3 are common. Surmicaceous enclaves and obvious xenoliths tend to be rare.

The microgranular enclaves are examples of a class of enclaves which are now recognised worldwide. They are small, rounded and always finer grained and more mafic than their host granitoids. Their SiO_2 and K_2O contents never exceeds that of their host. The unique and spectacularly enclave-rich 'globular rock' from the southern Malay Peninsula demonstrates that microgranular enclaves represent quenched globules of basic magma within commingled granitoid magma. This important rock also reveals that the microgranular enclave-granitoid association represents a stage in the mixing of two magmas of contrasted composition, arrested before completion. Microgranular enclave or globule, formation is a vital stage in this magma-mixing process since it greatly increases the area of interface between the commingling magmas.

The globule magma is believed to be directly related to the magma of associated batholithic gabbro intrusions. Upon forming globules this magma is modified by hybridization with the commingling host granitoid magma resulting in magma-mixing. Hybridization occurs by interliquid diffusion, the engulfing of droplets of the host magma and the exchange of suspended phenocrysts. The recognition of microgranular enclaves as agents of magma-mixing provides an explanation for the well documented positive correlation between microgranular enclave abundance and basicity of host granitoid. After final quenching, further modification occurs by reaction between solidified enclave and still fluid host magma. The reaction process involves an early stage of 'reciprocal reaction' followed by the intergranular penetration of melt from the host into the enclave. This melt eventually crystallizes to poikilitic quartz and K-feldspar producing what is termed a 'reaction texture'. Thus the ultimate petrographic and chemical character of most microgranular enclaves is determined by solidified enclave-granitoid magma reaction superimposed on a previous globule magma-granitoid magma hybridization event. This work provides the first documentation of the operation of magma mixing processes within Peninsular Malaysia.

Quatzo-feldspathic and clinopyroxene-amphibole enriched enclaves are interpreted as country rock xenoliths which have suffered the same processes of reaction with the host magma, as have microgranular enclaves. The mica-rich surmicaceous enclaves are most likely restite.

It is suggested that megacrysts within all varieties of enclaves originate mainly by the mechanical introduction of phenocrysts from the host magma into fluid enclaves. This is possible for even xenolithic enclaves since enclave - host magma reaction is believed to result in the xenolithic enclaves acquiring a fluid condition.

Biotite and amphibole within all enclave types almost always posses lower Fe/Mg ratios than the same phases in the host granitoids. Trace elements typically show generally similar abundance levels in enclaves and corresponding hosts indicating equilibration.

Details of the investigation will be published subsequently.

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