

Partial melting and melt transfer in the Higo metamorphic terrane, central Kyushu, Japan.

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The Higo metamorphic terrane is located in the northern side of the Usuki-Yatsushiro tectonic line, and is distributed terrane with the geological structure of about 25km of east and west, and has about 7km of north-south width maximum. Throughout the Higo metamorphic terrane, metamorphic grade increases monotonically from north to south. Higo metamorphic belt is subdivided into five zones (A to E) by mineral assemblages in pelitic and psamitic rocks (Nagakawa et al., 1992). Recently, high-grade zones (D and E zone) in the Higo metamorphic terrane were re-mapped by Maki et al., (2004) and Miyazaki (2004). Some anatexitic features, such as pelitic migmatites, leucogranites and leucocratic veins, have been documented at highest grade, i.e. the amphibolite to granulite facies grade zones (Obata et al., 1994; Osanai et al., 1996; Kobayashi et al., 2005). It has been shown that the migmatites in the highest-grade zone represent refractory residues of partial melting (Kobayashi et al., 2005).

In this study, rare earth element (REE) abundances were determined for whole-rock trace-element using ICP-MS analysis for pelitic gneisses, migmatites, leucocratic veins and leucogranites from the Higo metamorphic terrane, SW Japan. Leucocratic veins and leucogranites have positive Eu, Pb and Y anomalies with flat HREE pattern. Pelitic gneiss from D zone shows weak negative Eu, Nb and Sr anomalies and flat and enriched HREE patterns. Migmatites (both metatexite and diatexite) from D zone are depleted in HREE. Diatexite from E zone is depleted in LREE and enriched in HREE relative to the host gneisses and other migmatites. Diatexite from E zone shows residual compositional features.

Model melts were calculated assuming a gneiss from D zone as a protolith and the diatexite from E zone as a residue. Furthermore, model melts was compared with the leucocratic veins and leucogranites data. The result of model melts (degree of partial melting, > 0.3) is similar to REE pattern of the leucocratic veins and leucogranites data. These results suggest that the degree of partial melting at the pelitic rocks in the high-grade zone in Higo metamorphic terrane may be exceeded 30 %. Melt transfer in the high-grade zone in Higo metamorphic terrane had dynamically occurred associated with partial melting process.

Keywords: Higo metamorphic terrane, migmatite, whole-rock analysis, trace-element, partial melting