

Rheology of garnet-clinopyroxenites within Higashi-akaishi mass in the Sanbagawa belt, central Shikoku

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Garnet-clinopyroxenites locally crop out in the Higashi-akaishi peridotite mass in the Cretaceous Sanbagawa metamorphic belt, central Shikoku. Garnet-clinopyroxenites contain 20-80% garnet, and these rocks occur within dunites as lenses, boudins or layers with thickness in the range from a few to around 50centimeters. Garnet-clinopyroxenites were plastically sheared, resulting in asymmetric boudins and rotation structures with a top-to-the-north sense of shear. Microstructural analyses were performed in optical microscope for clinopyroxene, whereas garnet microstructures were analysed by crystal-orientation maps made by the SEM-EBSD system. Both clinopyroxene and garnet grains show elongated shapes with some structures. Grain sizes in garnet are comparable with those in clinopyroxene (0.22-0.3 mm) regard less of ether modal compositions. These indicate that both minerals could be deformed under similar plasticity. Crystal preferred orientations (CPO) of both clinopyroxene and garnet were analyzed by the SEM-EBSD system. [001] in clinopyroxene is subparallel to the stretching lineation; both [100] and [010] directions form girdle patterns perpendicular to the lineation (L-type). Garnet CPOs show no preferred orientation. Fabric strength (J-index) of clinopyroxene becomes intenser as increasing modal composition of garnet.

The P-T condition of the garnet clinopyroxenites was estimated to be at 2.8 GPa /750-800 degrees by Mizukami and Wallis (2005). As a result, flow strength of garnet is similar to clinopyroxene, or weaker at this condition, as supported by flow laws of both minerals.