

Metamorphism and partial melting of the lower crust under the oceanic island-arc setting for the Yakuno ophiolite

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Gabbro-migmatite - granites association was discovered in the Asago igneous complex of the upper Paleozoic Yakuno ophiolite in the Asago-cho area, Hyogo Prefecture, Southwest Japan. The Asago complex shows a horizontal pile of three distinct nappe sheets: the Lower, Middle and Upper sheets. The gabbro-migmatite was found in the lowest horizon of the Middle sheet. Much of granitic rocks intrude into the ophiolitic basic complex of Middle sheet. The granitic rocks are classified into tonalite, trondhjemite, quartz-diorite, granite, granodiorite, and quartz monzodiorite. They are geochemically characterized as plagiogranite or volcanic arc granite thought to have been constituent rocks of lower crust of oceanic island-arc. Its importance is emphasized in the context of the generation of intermediate to acidic magma at the lower crust of immature oceanic island-arc by its partial melting.

Metamorphic Ca-amphiboles are generally occurred in the gabbroic and granitic rocks. Ti contents of those amphiboles are increase from upper to lower most horizon along the ophiolitic succession.

P-T condition of the metamorphism was determined by the formulation of Al-Ti geothermobarometer (Ernst & Liu, 1998), aluminum-in-hornblende barometry (Schmidt, 1992. Anderson & Smith, 1995) and amphibole-plagioclase thermometry (Holland & Blundy, 1994). The lower part of the Middle sheet shows the temperature of 850 to 900 centigrade, and pressure of 5.5 to 6.0 kba as its the metamorphic condition. Such the condition covers the solidus curve of amphibolite in the P-T field (Johannes & Wolke, 1994). These result shows that the Middle sheet have experienced an relatively complicated geohistory, in which the metamorphic basic complex of oceanic crust origin have been intruded by granitic rocks produced by partial melting of itself.