

Structural and micro-structural analyses in the metamorphic rocks of Sanbagawa belt, Jigoku and Oriu valleys, central shikoku.

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Abstract

The Sambagawa metamorphic belt is one of the best-documented subduction zone metamorphic complexes in the world. The metamorphic zones based on the appearance of key metamorphic minerals in metapelite. In order of increasing grade there are the chlorite, garnet, albite-biotite and oligoclase-biotite zones. Geographically our study area is situated in Besshiyama district in Central Shikoku and geologically it is a part of albite-biotite zone; which consists mainly of basic schist green and pelitic-quartz schist. The current study is focused on understanding the tectonic development responsible for deformation structures, which formed during the exhumation. And also to know the structural relationship between different outcrops in this area. Detail mapping has revealed the existence of complex structures in the area, either by faulting or folding system. In the study area, as many previous authors have been underline since a long time; that the main structure which dominates in the whole Sambagawa metamorphic belt is the bedding foliation or schistosity which has generally an EW trending. Later it has been deformed by subsequent events. Concerning the folding system. Except the intrafolial bedding, which was interpreted to be associated with the main schistosity during the major phase D1. In both of the valleys, folds of variable size and geometry exist. These folds show different features, which resulted from different mechanisms responsible for their formation. We distinguish two kinds of folds: upright folds and slightly inclined folds with a plunge up to 50 deg mostly towards SE. These folds are related to a second deformation phase, which deformed the pre-existing foliation with development of a crenulation cleavage in small-scale fold association. The second type of folds, showed curved hinges and generally non-symmetric shapes, which we interpreted to be related to shearing faulting zones with development of duplex fault systems concentrated in relatively narrow shear zones. These faults deform the S1 in sigmoidal shapes and revolved under ductile-brittle deformation conditions (Dozan River and Oriu shear zones). Finally in a lattermost stage the brittle deformation occurred in large scale. Different types of fault were detected. Using right dihedral method, extension trending NW-SE in the Jigoku and Dozan River area was constructed, while in the Oriu valley it trends NE-SW. These faults consist of left and right lateral strike-slip, normal, and reverse faults with development of breccia zones and cataclasis. The EPMA analyses in this research, showed that the anorthite content in plagioclase is low [An (%) is inferior or equal to 3.20], which indicates the plagioclases in both of the valleys are clearly albite not

oligoclase. Amphibole analysis reveals a retrograde zoning consisting of hornblende core and actinolite rim. However, some of the high content of [4] Al in the amphiboles analyzed, is close to those found in the oligoclase-biotite zone. The Oriu valley belongs to the oligoclase-biotite Hara et al (1990). This facts may suggest that rocks in the Oriu valley belong to the albite-biotite zone not oligoclase-biotite zone.