

# Petrologic and chemical characteristics of Tonaru epidote-amphibolite and the related lithologies in the Besshi region of the Sanbagawa metamorphic belt

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Subduction zones are unique areas where various-types of material from the earth's surface encounter mafic and ultramafic lithologies of the lower crust and mantle wedge. Thus, it can be inferred that physical and chemical interactions between these materials have occurred during the formation of protoliths and subduction along the interface between subducted slabs and crust-mantle beneath arc-trench systems. In the Besshi region of central Shikoku, there are extensive occurrences of various types of metamorphic rocks originating from different protoliths.

Field relationships between the metagabbro dominated body (Tonaru epidote-amphibolite body) and the surrounding pelitic and basic schists have been systematically investigated along the Kokuryo River in the Tonaru area of the Besshi region. Petrologic characteristics and variations in whole-rock compositions of the Tonaru body were documented as a case study on the interactions and compositional modifications found at the interface between compositionally different materials during subduction zone metamorphism.

Most parts of the Tonaru body have petrographic and chemical features similar to other epidote-amphibolites and eclogites in the Besshi region, which are predominantly metagabbro. However, the epidote-amphibolites collected from the southern margin of the Tonaru body have intermediate whole-rock compositions between basic igneous and pelitic rocks, suggesting that protoliths of the Tonaru epidote-amphibolites exhibit gabbroic lithology, as well as a mixture of basic and pelitic lithologies. Pelitic rocks, several meters in width, are intercalated with metagabbroic rocks of the Tonaru body along its northern border, and mixture zones were developed between these lithologies. The pelitic rocks contain composite zoned garnet with paragonite inclusions, and have probably recrystallized under eclogite facies conditions along with the Tonaru body. This evidence suggests that mechanical mixing of gabbroic and pelitic lithologies developed before or during eclogite facies subduction zone metamorphism.

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