Mineralogical characterization of serpentinite varieties in Sangun-Renge Belt exposed at Sasaguri, Fukuoka Prefecture, and their geological implications

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Serpentinite (serp) of Sangun-Renge Belt are widely exposed around the Narubuchi dam in Sasaguri area, Fukuoka Prefecture. The purpose of this study is to investigate the mineralogical characteristics of different types of serp in this region in order to understand the tectonic and metamorphic history of the Sangun-Renge Belt serp. Optical microscopy reveals the petrographic characteristics, EPMA is used to measure the composition of Cr-spinel, and Raman spectroscopy is utilized to distinguish serpentine polymorphs. The serp in the Sasaguri area primarily consists of serpentine group minerals, with minor amounts of magnetite, calcite, chlorite, talc, and Cr-spinel. Three types are identified on the basis of their dominant serpentine polymorph. Type 1: Lizardite serp, showing the hourglass textures with chrysotile veins. Type 2: Lizardite-Chrysotile serp, dominated by a mesh texture where the core and rim minerals are lizardite and chrysotile, and lizardite, respectively. And the antigorite (atg) veins are observed. Type 3: Atg serp, exposed to the north and south of the study area. Their microstructures are different. The serp in the north is composed of atg a few mm in grain size, showing undulose extinction and dynamic recrystallization, but no CPO. The serp in the south is composed of atg less than 200 μm in size, with atg veins. At the north, the mylonitized zones can be identified where the atg grain size is less than 100 μm, with (001) and [010] oriented parallel to foliation and lineation, respectively. The chemical composition of the Cr-spinel in the north serp indicates a forearc peridotite origin. The ferritchromite rim in the Cr-spinel suggests that the peridotite is re-equilibrated at greenschist to amphibolite temperatures (400-700˚C). A magnetite overgrowth around the ferritchromite rim indicates the serpentinization after ferritchromitization, which occurs at 250-400˚C. Based on the above results, the geological implications of the identified serpentine polymorphs and associated mineral assemblages for understanding the tectonic and metamorphic history of the Sangun-Renge Belt serp will be discussed in our presentation.

Keywords: Serpentinization, Antigorite, Serpentine polymorphs, Cr-spinel