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九州黒瀬川帯における蛇紋石鉱物の化学組成と微細組織
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Chemical composition and microtexture of serpentine minerals from Kurosegawa belt, Kyushu, Japan

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The serpentine minerals are 1:1 type phyllosilicates and have ideal chemical composition Mg₃Si₂O₅(OH)₄. They are classified into three species, fibrous chrysotile (ctl), platy lizardite (lz) and antigorite (atg). In addition, other fibrous serpentine has been reported (e. g. Baronnet and Devouard, 2005; Mugnaioli et al., 2007), which is shaped like a multi-angular column and called polygonal serpentine (PS). It needs detailed checks to quantify serpentine minerals using X-ray powder diffraction (XRD) since their diffraction patterns resemble each other.

More than two hundreds specimens were collected from outcrops in central Kyushu where ultramafic rocks and serpentinites are distributed intermittently along with the Usuki-Yatsushiro tectonic line. This region is the westernmost part of the Kurosegawa tectonic belt which forms a part of accretionary prism in southwest Japan. The distribution of serpentinites in this region has been researched (e. g., Saito et al, 2005), but the serpentine species included in them is not clear. The specimens were analyzed by XRD, SEM-EDS and TEM.

In this region foliated serpentinites are common. Antigorite-rich serpentinites are found locally. Some serpentinites include a lot of polygonal serpentine in their yellow or light green flaky parts. According to the TEM observation, most of chrysotile has approximately 50 nm in diameter, on the other hand, most of polygonal serpentine has approximately 200-300 nm in diameter. Some chrysotile fibers have fan-shaped sectors partially; therefore they seem to be intermediates chrysotile and polygonal serpentine. They should be imperfect chrysotile or polygonal serpentine. Chemical compositions of lz-ctl serpentines show wide variations in FeO and Al₂O₃ contents (Fig. 1), PSs show low FeO contents and variable Al₂O₃ contents and atg serpentines have constant FeO content (2-3 wt %) and lower Al₂O₃ contents.

Keywords: chrysotile, lizardite, polygonal serpentine, antigorite, Kurosegawa belt.

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Fig.1. BSE image of Fe-rich lizardite-chrysotile mesh texture.
Di: diopside.
lz-ctl: lizardite-chrysotile.