Deformation microstructures of metamorphic mafic rocks close to the boundary to the Tanzawa plutonic complex

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The purpose of this study is to understand microstructural development of metamorphosed mafic rocks close to Tanzawa plutonic complex. Samples are collected from the southern region within 1 km from the boundary with Tanzawa plutonic complex. The mafic rocks consist mainly of amphibole and plagioclase with secondary minerals such as quartz and clinopyroxene. For microstructural analyses, we used well polished thin sections cutting perpendicular to the foliation and parallel to the lineation (i.e. XZ plane). Under a microscope, amphibole grains are well elongated. Plagioclase grains are polygonal and partly dynamically recrystallized.

Crystal-preferred orientations (CPOs) of both amphibole and plagioclase were measured. Amphibole CPOs commonly showed intense (100) [001] patterns. Plagioclase CPOs showed strong (001) [100] patterns in relativity monomineralic domains. In polymineralic domains where plagioclase and amphibole were coexisted, plagioclase CPOs showed remarkably weak (010)[001], (100)[001] patterns, or random patterns. Crystal orientations maps in amphibole dominant domains show that subgrains occur in amphibole grains. Some grain boundaries between amphibole grains are oriented perpendicular to the foliation. Cao *et al*. (2010 , JSG) showed that these grain boundaries were formed by dislocation wall resulting from dislocation creep. Therefore, we suggest that dislocation creep was dominant in deformation mechanism for amphibole. In polymineralic domains of amphibole and plagioclase, amphibole CPOs showed (100)[001] pattern, whereas plagioclase CPOs showed random patterns, where grain sizes are smaller than those with intense CPOs patterns in both amphibole and plagioclase. It suggests that grain-size sensitive creep may become dominant, as decreasing grain sizes of plagioclase due to the mixing with amphibole during deformation. As a consequence, the deformation mechanism could be switched from dislocation creep to grain-size sensitive creep during deformation in the metamorphic mafic rocks.

Keywords: dislocation creep, Tanzawa , CPO

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