

Development of an ultramylonite zone within the mafic rocks in the Moho Transition Zone, Oman Ophiolite

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The purpose of this study is to reveal the process of structural development of a ductile shear zone across the crust-mantle boundary in Oman ophiolite. The ductile shear zone has been developed within the mafic rocks in the Moho Transition Zone, Fizh massif. Ultramylonites are widely distributed, whereas mylonite does not occur in the shear zone. Weakly and moderately deformed rocks observed in the outside of the ductile shear zone have igneous equigranular textures and partly contain domains of dynamically recrystallized fine grains consisting of plagioclase and minor amphibole. The mean grain sizes of fine-grained plagioclase matrix within ultramylonites are 5-6 microns which are nearly steady state. Plagioclase crystal-preferred orientations (CPO) show (010) [100] pattern and (001) [100] pattern in the weakly and moderately deformed rocks, respectively, and random in the ultramylonites. The change of the CPO patterns suggests a transition from dislocation creep to grain-size-sensitive creep. The modal composition of amphibole is higher in each ultramylonite than those in weakly and moderately deformed rocks. Combined with the whole rock chemical compositions, it is suggested that the shear zone has been infiltrated by water, by which element mobilization could occur. As the grain sizes of plagioclase decreased along with the amphibole formation, intense strain localization in the shear zone could take place accommodated with strain softening.

Keywords: ultramylonite, gabbro, mafic rock, shear zone