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SMP046-P01

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Deformation experiment of Serpentine with preferred orientation

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We conducted constant strain rate experiment of antigorite serpentinite, in order to understand the effect of microstructural anisotropy on deformation behavior. The sample is naturally deformed foliated antigorite serpentinite which is characterized by preferential arrangement of (001) of antigorite parallel to the foliation. We prepared two types of oriented starting samples, whose foliations were set at 30 degree and 90 degree with respect to the axial stress. Experimental conditions were 500 C and 550 C at ca. 1 GPa confining pressure with 600 um/h displacement rate of piston. The experimental data indicate that the maximum and yield strengths of the 90 degree are ca. 40 % larger than those of 30 degree and that those of 500 C are 60 to 70 % larger than those of 550 C. The stress drop occurred at the final stage of all experiments. The microstructural observations with optical and scanning electron microscopes suggest that the yielding and stress drop in 30 degree experiments were due to kinking, and the deformation concentration on the axis of kink, respectively. On the contrary, those of 90 degree were due to plastic deformation of antigorite itself and extensional breakage of antigorite grains, respectively. All these behaviors are thought to be caused by two typical characters of foliated antigorite serpentinite; 1) easy to make open crack parallel to foliation if compression stress applies in the direction parallel to the foliation, and 2) weakness of (001) for extensional stress.

Keywords: Antigorite, Serpentine, Solid medium deformation experiment, SEM