

Effects of talc content on frictional properties of quartz gouge

Risako Shirahige¹, Inori Tataru¹, *Ken-ichi Hirauchi¹, Takato Takemura²

1. Department of Geosciences, Faculty of Science, Shizuoka University, 2. Department of Earth and Environmental Sciences, College of Humanities and Sciences, Nihon University

Phyllosilicates have low coefficients of friction and an effect of weakening fault strength. To understand effects of talc content on frictional strength and sliding stability, we conducted frictional sliding experiments on dry gouge mixtures of quartz and talc at room humidity, room temperature, a normal stress of 10 MPa and sliding velocities of 0.66–2 $\mu\text{m/s}$, using a single direct-shear apparatus. The coefficient of friction for the mixture ranged from 0.18 to 0.69 and fell between pure quartz and talc values. The overall trend was a decrease in the coefficient of friction with increasing talc content. The velocity dependence of friction, $(a-b)$, ranged from -0.0018 to 0.0039 and increased with increasing talc content. The $(a-b)$ values are highest in the mixture with a talc content of 80 wt.%. For the mixture with talc contents below 10 wt.%, the $(a-b)$ values become negative, with the occurrence of slow to fast stick-slip behavior.

Keywords: friction, stick slip, fault weakening, phyllosilicate