Geophysical Research Abstracts
Vol. 18, EGU2016-6543-1, 2016
EGU General Assembly 2016

Role of graphite layers in gravitational deformation of pelitic schist

Shintaro Yamasaki
Kitami Institute of Technology, Japan (yamasaki@mail.kitami-it.ac.jp)

We examined microscopic textures in drillcore samples obtained from landslide masses of pelitic schist, a rock type that is known to be susceptible to deep-seated gravitational slope deformation. We performed simple shear tests on artificial rock samples both with and without graphite layers placed between pre-cut shear surfaces under normal stresses up to 800 kPa (equivalent to 32 m depth of burial) and on similar samples with graphite sheets embedded along the uncut shear plane under normal stresses up to 200 kPa (equivalent to 8 m depth). Pelitic schist commonly contains black layers of millimeters to centimeters thickness that are typically weaker than neighboring whitish layers. Ductile gravitational shearing commonly occurs along the black layers and is accompanied by brittle fracture in the whitish layers. The color of the black layers reflects the presence of microscopic grains of graphite, a known solid lubricant. The coefficients of friction for samples with graphite layers embedded in the artificial rock samples (0.30) were much lower than those without graphite layers on the pre-cut surface (0.85). The shear strength of the artificial rocks with embedded layers of graphite decreased abruptly with increasing areal extent of the graphite layer along the shear surface, from which it can be inferred that the continuity of a graphite layer in natural pelitic schist has a considerable effect on shear resistance. A coefficient of friction of 0.30 is equal to a friction angle of 16.7°, suggesting that such a gentle dip of schistosity of pelitic schist could initiate microscopic slip along the black layers. If the schistosity is downslope, slip would be more likely to occur.