EGU2020-13512
https://doi.org/10.5194/egusphere-egu2020-13512
EGU General Assembly 2020

Oxidation of black shale and its deterioration mechanism in Xujiaping rockslide, Southwestern China

Chunwei Sun[1,2], Marc-Henri Derron[1], Michel Jaboyedoff[1], and Sixiang Ling[2]
[1]Risk Analysis Group, Institute of Earth Sciences, University of Lausanne, Switzerland (chunwei.sun@unil.ch)
[2]Department of Geological Engineering, Southwest Jiaotong University, Chengdu, China

The water-rock chemical interaction of black shale interbedded with limestone along the bedding slip zone and its deterioration to the surrounding rock mass in Xujiaping rockslide is studied. As an important rock-forming mineral in black shale, pyrite is known for being easily oxidized to produce sulfuric acid in water, and sulfuric acid is a significant factor that leads to the dissolution of minerals. Significant number of erosion pits on the limestone were found and many geochemical phenomenon such as extremely low pH fissure water and the secondary mineral phases were investigated. Rock and water samples from this site were analyzed to determine mineralogy, chemical composition and hydrochemistry. The results indicate that many major elements and heavy elements are dissolved, such as Fe, Mn, Si, Zn, Ni, Al, S, Mg, Ca, Na, K, Co and Sr, because of the strong dissolution ability of acid water from black shale.The acid water migrates along the slip zone to exposed surface of cliff and fractures, where it evaporates to form the secondary mineral phases including melanterite, rozenite, szomolnokite, and gypsum etc. The water-rock chemical interaction in Xujiaping rockslide is a combination of dissolution, oxidation, dehydration, and neutralization reactions. Besides, the deterioration mechanism is expanded on two aspects: (1) rock-forming minerals, carbonate minerals especially are prone to be dissolved by sulfuric acid from oxidation of black shale in the slip zone; (2) the crystallization volume expansion of minerals precipitated, which leads to the further expansion and deformation of fractures.

How to cite: Sun, C., Derron, M.-H., Jaboyedoff, M., and Ling, S.: Oxidation of black shale and its deterioration mechanism in Xujiaping rockslide, Southwestern China, EGU General Assembly 2020, Online, 4–8 May 2020, EGU2020-13512, https://doi.org/10.5194/egusphere-egu2020-13512, 2020