

Rapid Weathering and Salt Water Migration Processes near a Slope Surface in Plio-Pleistocene Mudstone Areas in Taiwan

HIGUCHI, Kohei^{1*} ; CHIGIRA, Masahiro² ; LEE, Der-her³ ; WU, Jian-hong³

¹Grad. Sch. of Front. Sci., Univ. Tokyo, ²DPRI, Kyoto Univ., ³Dept. of CE, Natl. Cheng Kung Univ.

Badlands consisting of barren slope surfaces, sharp ridges, and v-shaped gullies are widely formed in Plio-Pleistocene mudstone in southwest Taiwan due to rapid weathering and erosion near the slope surface. The mudstone, which formed in the syn-collisional Plio-Pleistocene foreland sequence, has high density with a void ratio as low as 0.2 and has pore water chemistry similar to the seawater. In this area under the humid, subtropical climate with distinct dry and rainy seasons, since the mudstone slope surfaces are eroded as high as 9 cm/y in average in the rainy season, paved roads such as national express way are frequently damaged by slope failure hazards. To understand the mechanism of rapid erosion, we monitored water content and salinity near the slope surface and found that salt water migrates from the depth to the surface during the dry season, and salt precipitated on crack surfaces. After the dry season, rainfalls in the early rainy season dilutes the salinity, and closes desiccation cracks, consequently slowing the downward migration of water near the slope surface. The wetting of dry rocks and dilution of pore water near the slope surfaces deteriorates the rock and disperses rock-forming grains. The deteriorated surfaces are eroded during subsequent rain in the late rainy season. After the erosion, migration of salt water from the depths to the surfaces occurs again during the subsequent dry season.

Keywords: Plio-Pleistocene Mudstone, Rapid Weathering, Badlands, Monitoring, Salt Water Migration