Erosion mechanism of the Gutingkeng formation intruded by active mud volcanoes in Taiwan

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Many mud volcanoes exist in Taiwan Island to compare with Japan Island. We investigate the relationship the rapid slaking property between the erosion mechanism of the Plio - Pleistocene Gutingkeng formation; siltstone, involving active volcanoes in Taiwan. To investigate by XRD, XRF, slaking test, etc., 5 samples get from surface to 40cm. For chemical analysis, Na, Ca, Cl, and SO_4 are increasing at 2cm depth from surface. These elements decrease to 10cm depth part. In deeper zone, these elements increase again. Water contents increase toward 40cm depth from surface to except 2cm depth zone by rain at sampling time. The saturation percentages of pore volume are increasing to 70vol%; 40cm from 17vol%; 5cm.

Easley slaking siltstone soaked in fresh water distributes the 2cm depth from surface used by wetted original sample. On the other hand, the 30cm depth siltstone is unslaking rock. The 2cm depth siltstone the saturation percentages of which decrease to 86vol% (-13vol%) by drying becomes hardly slaking rock. The fresh siltstone becomes easily slaking rock by decreasing to 72vol% (-15vol%). The slaking properties depend on degrees of drying and chemistry of the soaked solution. The slaking hardly occurs in high ion concentrated solution. Cl^- concentration of wetted original siltstone is more than 2000ppm. Active mud volcanoes springing brine water distribute in Plio - Pleistocene siltstone area. This siltstone also has brine porewater.

Erosion of the Gutingkeng formation occurs in drying zone between surface and 10cm. Slaking occurs to contact the rainwater in the low ion concentration part of this drying zone.

Sedimentary rocks including brine porewater are commonly the rapid slaking rock[1)]. It is possible to sedimentary rocks including brine porewater distributed in high uplift rate (5mm/y) area like Taiwan Island.

[1)] Nakata et al., (2006): The relationship between groundwater chemistry and rapid slaking properties of sedimentary rocks, Resource Geol, 56, 133-144.