

Geological studies on mud volcanoes in Hsiaokunshui area, southwest of Taiwan.

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Introduction:

Mud volcano is a mound composed of the erupted mud and breccia with accompanied by natural gas and oil that are originated from deep underground by abnormal pore water pressure. We carried out geological, topographic and geochemical investigation of mud volcanoes in the Shokonsui area, southwest of Taiwan.

Geology and geologic structure:

Tertiary and Quaternary sedimentary rocks called the Gutingkeng Formation are distributed in the study area (Huang et al., 2004). The lower Gutingkeng Formation, upper to middle Pliocene, consists of massive mudstone, alteration of sandstone and mudstone and intertidal sediments with a thickness of 1140 m. The upper Gutingkeng Formation, upper Pliocene to lower Pleistocene, consists of siltstone with a thickness of more than 715 m. Geologic structure is characterized by NE-SW trending anticline in the central part of the study area. The anticline axis is displaced by NNE-SSW trending fault.

Physical properties of sedimentary rocks:

Physical properties of mudstone were analyzed, obtaining magnetic susceptibility of less than 30×10^{-5} SI, density of 2.67 to 2.72 g/cm³ and porosity of 20 to 23 %. Clay mineral of mudstone is composed of mica minerals and chlorite without smectite.

Description of mud volcano:

13 mud volcanoes were found in the study area, dividing into two groups, i.e. north group and south group. The shape of mud volcano depends on the viscosity of erupted liquid. Highly viscous liquid builds a small mound and low viscous liquid forms a pool and a small depression. All the mud volcanoes are distributed in the area of 200m in diameter along the anticline axis.

Discussion and Conclusion:

As mud volcanoes are concentrated in a small area and are characterized by various geochemical properties of groundwater and morphological types, mud chamber with a diameter of about 200 m is assumed to be distributed under the mud volcanoes.

Maximum buried depth estimated by clay mineralogy of mudstone in Taiwan is deeper than that estimated by its porosity by referring to Aoyagi and Kazama (1980). This means that sedimentation proceeds under unconsolidated condition of sediments.