

Earthquake, the major trigger of Mud Volcanism at Sidoarjo, East Java

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The geological setting at mud volcano site is similar with Osaka Basin, Japan. The Osaka Basin is composed with Plio-Pleistocene sediments named Osaka Group. It consists mainly of fluvial deposits intercalated with several marine clays. In this sediment, the authors examine some groundwater movements at the big earthquake named the Hyogoken Nanbu Jishin. More than 200 m depth of this basin, the authors have confirmed several liquefaction phenomenon horizons. Such kind of phenomenon can be observed at so called Pucangan formation situated at Mojokerto area.

The effects of the earthquake to ground water is very sensibility. Even at Japanese Island, the Groundwater table fluctuation caused by the Ache Earthquake has been caught. Groundwater table in the compression field of Earthquake was rising up more than 30 cm and groundwater table in the tension field was fall down. The altitude level in some area of the basin subsided after the earthquake. The authors estimated that this subsidence which may be caused by the liquefaction in the deep horizon of Osaka Group.

Around 1000 m under ground of the Osaka Basin, the hot sprig water stored in the lower horizon of Osaka Group and more than 150 wells had been dug for the utilization of spa and so on. The hot sprig water has circulated from surrounding mountain area passing through the deep granitic rocks witch is now still keeping heat and few percents of crack. The regional groundwater flow system of hot spring area of central Japan indicated such as condition.

The authors estimate a simple regional flow system of hot spring water surrounding area of Sidoarjo. According to the flow system, the erupted hot water from Sidoarjo mud volcano come from southern volcanic region and passing through under the deep place of volcanic body. The heating sources may be situated not only living volcanic vent but also some old magma reservoir such as the Miocene granitic rocks.