

STUDYING LANDSUBSIDENCE USING GPS AND VLF-EM METHODS IN LUSI MUD VOLCANO

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ABSTRACT

Mud volcano that occurred in Porong Sidoarjo since May 29, 2006 until now (2014) has reached the age of 8 years old which has been showing bursts and interesting dynamics. The phenomenon known as "LUSI" mud volcano has covered more than 6.5 km area and has displaced more than 30,000 people. Mudflow phenomenon that still occurred until now results instability systems, such as cracks in the walls of houses, roads, crooked railroads that allow ground displacement and land subsidence.

In this thesis proposed land subsidence measurement with GPS method. In principle, the use of the GPS method is on the changing position from monitoring position that existed in the area. Monitoring is done by measuring the position of monitoring points using GPS geodetic at a different time. Different position of the same monitoring point at different measuring times indicates there is the movement of the ground. Because of that in this thesis was carried out the GPS measurement to determine the development of land subsidence in the area around Porong Sidoarjo. Besides GPS measurement, VLF-EM measurement is carried out to determine the subsurface structure. With the information from the VLF-EM data can be known subsurface structure development in Porong area and its correlation to the movement of the ground in the area around the lapindo mud.

From GPS measurements in April-March 2014 obtained a change of high level (subsidence and uplift) between -0.952 m to 0.367 m. High level change in the area of Porong in April-March 2014 obtained -0.028 m/month up to 0.010 m/month with a decreasing high towards to the north. While high level change in

May-April 2014 is between -0.996 m to 0.255 m. high level change in the Porong area in April 2014 obtained -0.026 m/month up to 0.059 m/month with a decreasing high towards to southwest. The results of 5 lines of VLF-EM obtained the value of 2D resistivity of subsurface that is varying. Resistivity values $< 30 \Omega\text{m}$ shows flooded area of the bubble, while resistivity value $> 30 \Omega\text{m}$ is a fractures and faults area.

Key word: LUSI mud volcano, *Land subsidence*, GPS, VLF-EM