

Investigating ambient noise recordings at lusi mud volcano (indonesia) seismic network

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The spectacular Lusi eruption started in northeast Java, Indonesia the 29 of May 2006 following a M6.3 earthquake striking the island. Initially, several gas and mud eruption sites appeared along the reactivated strike-slip Waturukosek fault system and within weeks several villages were submerged by boiling mud. The most prominent eruption site located few kilometres to the NE of the Arjuno-Welirang volcanic complex was named Lusi. To date Lusi is still active and erupting gas, water, mud and clasts as large as several centimeters in diameter. Gas and water data show that the Lusi plumbing system is connected to the neighboring Arjuno-Welirang volcanic complex. To verify and characterize the occurrence of seismic activity 31 seismic stations were deployed in the area. The seismic network was more densely distributed around Lusi and the Waturukosek fault zone.

In this study we applied the HVSR method, which is a common tool used for site effect investigations to assess fundamental frequency of sediments. It is based on the ratio of the horizontal to vertical components of ground motion and it generally exhibits a peak corresponding to the fundamental frequency of the site. Although experimental data peaks usually fit quite well the resonance frequency of the theoretical curves, they are less reliable as regards to their amplitude. Nevertheless, the HVSR curve contains valuable information about the underlying structure.

HVSR results highlight a fundamental frequency band between 0.4-2.0 Hz in the Lusi' surroundings. These peaks could be interpreted as related to the velocity contrast at depth between alternating shale and sand overlaying a velocity anomaly. However, our analysis also highlights the presence of a "depocenter" that could be interpreted as the subsidence caused by withdrawal of mud from depth.