



The LUSI Seismic Experiment: Deployment of a Seismic Network around LUSI, East Java, Indonesia

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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 Watukosek fault system and within weeks several villages were submerged by boiling mud. The most prominent eruption site was named Lusi. Lusi is located few kilometres to the NE of the Arjuno-Welirang volcanic complex. Lusi sits upon the Watukosek fault system. From this volcanic complex originates the Watukosek fault system that was reactivated by the M6.3 earthquake in 2006 and is still periodically reactivated by the frequent seismicity. To date Lusi is still active and erupting gas, water, mud and clasts. Gas and water data show that the Lusi plumbing system is connected with the neighbouring Arjuno-Welirang volcanic complex. This makes the Lusi eruption a "sedimentary hosted geothermal system".

To verify and characterise the occurrence of seismic activity and how this perturbs the connected Watukosek fault, the Arjuno-Welirang volcanic system and the ongoing Lusi eruption, we deployed 30 seismic stations (short-period and broadband) in this region of the East Java basin. The seismic stations are more densely distributed around LUSI and the Watukosek fault zone that stretches between Lusi and the Arjuno Welirang (AW) complex. Fewer stations are positioned around the volcanic arc.

Our study sheds light on the seismic activity along the Watukosek fault system and describes the waveforms associated to the geysering activity of Lusi. The initial network aims to locate small event that may not be captured by the Indonesian Agency for Meteorology, Climatology and Geophysics (BMKG) seismic network and it will be crucial to design the second phase of the seismic experiment that will consist of a local earthquake tomography of the Lusi-Arjuno Welirang region and temporal variations of v_p/v_s ratios. Such variations will then be ideally related to large-magnitude seismic events.

This project is an unprecedented monitoring of a multi component system including an Lusi active eruption, an unlocked strike slip fault, a neighbouring volcanic arc all affected by frequent seismicity. Our study will also provide a large dataset for a qualitative analysis of earthquake triggering studies, earthquake-volcano and earthquake-earthquake interactions. The seismic experiment suggested in this study enforces our knowledge about Lusi and will represent a step further towards the reconstruction of a society devastated by Lusi disaster.