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Automatic Detection and Location method of Tremor signals: A case study from East Java, Indonesia.

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Mount Bromo is an andesitic stratovolcano in East Java, Indonesia, that entered into unrest between November 2015 and January 2016. The seismic activity was captured by the permanent seismic stations of the Indonesian seismological service (BMKG) and by a temporary (GIPP-provided) network deployed in the framework of the LusiLab Erc project. The goal of the temporary network deployed was to study the seismic signature of the newborn sediment-hosted geothermal system nicknamed LUSI. A preliminar inspection of the dataset showed that the activity of Bromo may have been recorded by stations of the temporary network. To investigate this further, we attempt an automatic detection and location of the impulsive and emergent signals recorded during Bromo's eruption. We use the Recursive STA/LTA on each component of the stations and apply a coincidence trigger to adjust the pickings aside with a first-arrival validation through a polarization analysis. A total of 32.787 events were detected, and some of these are consistent with variations in the eruptive activity observed at Mt. Bromo. The accepted locations (RMS ≤ 1; 3.965 events) revealed multiple superficial sources, concentrated between 0 and 5 Km depth, originating from Mt. Bromo and 4 other main volcanic structures located in the surrounding region. Other sources were localized at greater depth, between 10 to 50 Km, and are attributed mainly to interactions between the magmatic chambers of the volcanoes, and movements in pre-existing sutures zones (faults) from overpressure of magmatic activity. Chronologically, a peak preceding the main eruption was found, characterized by an increase in Volcano-Tectonic-type (VT) signals beneath Mt. Bromo. This is consistent with other cases observed at similar strombolian-type volcanoes prior to eruptions. After an assessment of the automatic processing procedure used, we suggest improvements for future works by: 1) applying an association method based on the same principle as the coincidence trigger used in the detection step, and 2) using the polarization analysis in a sliding window along the event signal to re-pick the first-arrivals.