

Multi-disciplinary continuous monitoring of Kawah Ijen volcano, East Java, Indonesia

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Kawah Ijen volcano (East Java, Indonesia) has been equipped since June 2010 with 3 broadband seismometers, temporary and permanent short-period seismometers. While the volcano did not experience any magmatic eruption for more than a century, several type of unrests occurred during the last years. Apart from the seismometers, temperature and leveling divers have been immersed in the extremely acidic volcanic lake ($\text{pH} \approx 0$). While finding instruments capable of resisting in such extreme conditions has been particularly challenging, the coupling of lake monitoring techniques with seismic data improves the understanding and monitoring of the volcanic-hydrothermal system.

To detect small velocity changes, the approach developed by Brenguier et al. (2008) and Clarke et al. (2011) has been implemented to monitor Ijen volcano. Several artifacts that arise when using the later method (e.g.: stationary of the source position and amplitude, interference with volcanic tremor,...) will be investigated. We will present the results of this technique compared to other seismic parameters (e.g.: polarization and spectral attributes of the wavefield, seismo volcanic events spectral analysis) and temporal changes in lake temperature, color or levels. The benefits of monitoring Kawah Ijen magmatic/hydrothermal system using those techniques to identify precursors will finally be discussed.