Geophysical Research Abstracts
Vol. 13, EGU2011-8083, 2011
EGU General Assembly 2011

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

Corentin Caudron (1,2), Devy Syahbana (1,2), Thierry Camelbeeck (1), and Alain Bernard (2)
(1) Royal Observatory of Belgium, Uccle, Belgium, (2) Université Libre de Bruxelles, Brussels, Belgium

Kawah Ijen volcano (East Java, Indonesia) is equipped with three broadband seismometers since June 2010. Different temperature and leveling divers have also been immerged in the crater lake, the largest acidic lake in the world (pH∼0). While finding instruments capable of resisting in such extreme conditions was particularly challenging, these provide data every hour. The crater lake acts as a calorimeter integrating the heat emitted by the magmatic intrusion. The coupling of lake monitoring techniques with seismic data could thus improve the understanding and monitoring of the volcanic-hydrothermal system.

Kawah Ijen seismic activity portrays a wide variety of events. These events have been daily compared with Real time Seismic Amplitude Monitoring (RSAM) technique in different spectral bands ranging from 0.001 to 40 Hz. We are currently working on the implementation of the approach developed by Brenguier et al. (2007) to detect small velocity changes using ambient seismic noise. Since October 2010, an anemometer and a pluviometer have also been installed to better assess environmental and volcanic interactions. For example, during the rainy season several Indonesian volcanoes experience an increase in seismic activity leading authorities to raise the alert status. This is likely explained by a meteoric water recharge of the hydrothermal system. The latter enhances the movements of fluids triggering tremor and/or low frequency events which are not related to an increase in magmatic activity.

Three low cost iButton temperature sensors have been installed with different acid equipment in the crater lake. A winsitu level/temperature diver with a better resolution and precision was placed nearby. This allowed a comparison both instrument performances. Since meteorological equipments have been installed, the calculation of the thermal flux of the lake can be achieved improving the interpretation of temperature fluctuations. In the perspective of efficiently monitoring the temperature, we noticed that temperature is not affected by wind at depths greater than 80 cm, which is different for neutral lakes (Rinjani, Kelud, Indonesia) where temperature divers need to be fixed at high depth (20 m) to limit wind influence.
Several fieldworks have also been conducted during the last years. H/V measurements have been acquired around the volcano to better understand site effects and help refine velocity model. CO2 measurements and echo sounding campaigns allowed a better understanding of crater lake dynamic and degassing.

More instruments will be installed in the future to provide a sufficient amount of background data for the monitoring and a better constrain volcanic processes.