Geophysical Research Abstracts
Vol. 17, EGU2015-13292, 2015
EGU General Assembly 2015
© Author(s) 2015. CC Attribution 3.0 License.

Analysis of seismic signals related to rockfalls in the Dolomieu crater, Piton de la Fournaise, La Réunion

Virginie Durand (1), Anne Mangeney (1), Pauline Lebouteiller (1), Clément Hibert (2), Ovpf Team (1,3)
(1) IPGP, Paris, France, (2) Lamont-Doherty Earth Observatory, US, (3) OVPF, La Réunion

The seismic and photogrammetric networks of the volcano of the Piton de la Fournaise (La Réunion Island), maintained by the OVPF, are well appropriate for the study of seismic signals generated by rockfalls. In this work, we focus on the signals generated by rockfalls occurring in the Dolomieu crater. The aim of this study is to understand the link between rockfall and volcanic activity. One key question is as to whether the number and characteristics of rockfalls can provide a precursor to the occurrence of an eruption. Another scope of this work is to determine if there is a link between the rockfall activity and the precipitations, changes of temperature and seismic activity. For this, we analyze the rockfall activity preceding the June 2014 eruption. To detect the events, we use a method based on the Kurtosis function that picks the beginning of the signals. Then we localize the events using the arrival time of the waves and a propagation model computed with the Fast Marching Method. Finally, we calculate the seismic energy generated by these rockfalls. Thus, we obtain a catalog of events that we can exploit to determine the characteristics and the temporal evolution of the rockfall activity in the Dolomieu crater. A power law is observed between the seismic energy and the duration of rockfalls, making possible to calculate the rockfall volume from the ratio between seismic and potential energy. From previous studies on the Piton de la Fournaise volcano, we can infer that rockfall activity in the crater is correlated with eruptions: the rockfall activity seems to begin before the eruption time. We compare the spatio-temporal changes of the rockfall characteristics to the volcanic, seismic, and rain activity. We show in particular that the rockfall size seems to be different if the intrusion of magma reaches the surface or not, providing potential precursors to the occurrence of an eruption.