

Seismic records of rockfalls associated with volcanic activity (Soufrière Hills volcano, Montserrat)

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It is now widely acknowledged that seismic signals associated with rockfalls can provide important information on the characteristics of the source (volume, duration, location). Recent studies using data from the Piton de la Fournaise volcano evidenced a scaling law between seismic energy and signal duration for granular flows (Hibert *et al.*, 2011, doi:10.1029/2011JF002038). Complementary analytical analysis and numerical simulations allowed to find a similar scaling law between the difference of potential energy of an event and the duration of its propagation phase. This link between the energy dissipated as seismic waves and the loss of potential energy for a given granular flow was used to estimate the volumes of granular flows using seismic records.

Our work used seismic data from the Soufrière Hills Volcano at Montserrat in order to test the developed signal processing for the Piton de la Fournaise seismic records. The outputs were used to investigate whether similar scaling laws can be observed for granular flows at Montserrat. Despite differences of settings when considering the topographical context or the properties of constituting rocks (the Piton de la Fournaise is a shield volcano, whereas the Soufrière is an andesitic volcano), a similar scaling law between seismic energy and potential energy was found for granular flows. This late result suggests that such studies could be relevant at a more general level. Similar approaches could be used to constitute databases of rockfall characteristics (volume, location, occurrence time) in order to study the relationship between rockfall activity and processes related to volcanic activity. In particular, data were used to study if the monitoring of rockfall activity could be used as a precursor to volcanic eruption, or as precursor to larger destabilization of the volcano flanks.