Geophysical Research Abstracts
Vol. 14, EGU2012-10468, 2012
EGU General Assembly 2012

Investigating the Source Characteristics of a Family of Long Period Events Recorded on Piton de la Fournaise, La Réunion, Using Moment Tensor Inversion

M. Zecevic (1), L. DeBarros (1), C.J. Bean (1), G.S. O'Brien (2), and F. Brenguier (3)

(1) Seismology and Computational Rock Physics Laboratory, School of Geological Sciences, University College Dublin, Dublin 4, Ireland, (2) Tullow Oil Ltd, Dublin 18, Ireland, (3) Piton de la Fournaise Volcano Observatory, IPGP, Paris, France

Volcano seismicity can be used to obtain an insight into a volcano's internal dynamics. Long Period (LP) events are of particular interest as the mechanisms of these events are still not well understood. LP events typically have peaked spectra ranging in frequencies between 0.5 to 5 Hz, and often precede or accompany volcanic eruptions.

Piton de la Fournaise, La Réunion, is one of the most active volcanoes in the world, however LP events on Piton de la Fournaise are rare. A seismic network of 21 broadband seismometers, funded through the UnderVolc project, has been operational on the volcano since November 2009. Since deployment the volcano has erupted five times, yet only 15 LP events were recorded in this period. Three of these eruptions were preceded by LP events, and several LP events were recorded during an intrusive phase.

The LP events have dominant frequencies ranging between 2 and 4 Hz and, as typical for LP events, the P- and S-wave phases are difficult to differentiate at stations close to the summit. A family of similar LP events exists within these events. In this work we will attempt to address two important questions: (i) why does such an active volcano have so few LP events, and (ii) what can we learn about the eruption process from these particular events? The source location of the family of LP events was determined using a double-difference method; the events are located within the summit crater at a very shallow depth (<500m below the surface). In this study 3D full-waveform simulations were carried out to determine the source mechanism which can best be described as a horizontal crack, the orientation of which was corroborated using constrained moment tensor inversion. We will also investigate the relationship between LP occurrence and eruptive characteristics (size of the eruption, deformation of the edifice, etc.).