Geophysical Research Abstracts
Vol. 20, EGU2018-18070, 2018
EGU General Assembly 2018

Can we invert for shallow long-period volcanic sources with significant amount of shearing?

Ivan Lokmer (1), Louis De Barros (2), and Johannes Thun (3)

(1) University College Dublin, School of Earth Sciences, Dublin, Ireland (ivan.lokmer@ucd.ie), (2) Géoazur-Université Nice Sophia, 06560 Sophia Antipolis, France , (3) Geophysical Institute, Czech Academy of Sciences, Prague, Czech Republic

Most of the reported moment-tensor (MT) solutions for long- and very-long-period (LP and VLP, respectively) events on volcanoes suggest a tensile crack as the most likely source mechanism. However, numerous studies showed that LP wavefield is extremely sensitive to the joint heterogeneity-topography effect, which is very difficult (if not impossible) to model accurately. Thus, the mismodelling of the volcanic structure (additionally combined with the inclusion of single forces in many reported LP inversions) may lead to unreliable MT solutions. In addition, there is an inherent difficulty in reliably decomposing moment-tensor in a noisy environment, even if a unique geometry such as a shear-tensile crack is chosen. Regardless of the outlined difficulties, the tensile crack model is adopted as representative for volcanic LP sources and it is commonly used to support the existing LP source models. In this work we test our ability to invert for a shallow double-couple source (commonly neglected source component in LP inversions) in a heterogeneous volcanic environment. In order to resemble realistic scenarios, the tests are performed using a synthetic dataset calculated for a heterogeneous volcanic medium (with topography), while the inversions are performed using the Green's functions calculated in a homogeneous volcanic medium. Since some recent LP observations include the waveforms containing permanent static offsets (like in the near field of an earthquake), we investigate the best practices to include these offsets into LP inversions in order to improve the reliability of MT solutions. Our results are discussed in terms of implications they may have to the currently proposed LP source models.