Geophysical Research Abstracts
Vol. 20, EGU2018-10765, 2018
EGU General Assembly 2018

Resolution test for moment tensor inversions of very-long-period seismo-volcanic signals

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The study of very long period (VLP) seismic signals became possible with the widespread use of broadband instruments. With periods ranging from several seconds to several minutes, VLP signals close the gap between geodesy and short period seismology. On the example of a VLP signal recorded on 23 March 2012 at Soufriére Hills volcano, Montserrat, by instruments with different natural periods, we show the processing steps required to obtain displacement information out of velocity seismogram in this frequency range through restitution and forward modelling. When ground displacements can not be retrieved through restitution process due to inability to restitute band-pass limited seismograms we show how with modelling ground displacements and accounting for the seismometer response, we can compare the synthetic and observed waveforms in the velocity domain and determine the best model. This unique dataset gave us the opportunity to see the small changes in ground displacement and to use them in forward modelling to reveal much more details of the source process. These displacements are used as displacement seismograms in moment tensor inversion (MTI). Numerical tests using synthetic waveforms are performed to examine the possibility of resolving different source mechanisms (isotropic, double-couple, CLVD) at different depths using MTI for the seismic network configuration at Soufriére Hills volcano.