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Constrained inversion of seismo-volcanic events

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The inversion of seismo-volcanic events is performed to retrieve the source geometry and to determine volumetric budgets of the source. Such observations have shown to be an important tool for the seismological monitoring of volcanoes.
We developed a novel technique for the non-linear constrained inversion of low frequency seismo-volcanic events. Unconstrained linear inversion methods work well when a dense network of broadband seismometers is available. We propose a new constrained inversion technique, which has shown to be efficient also in a reduced network configuration and a low signal-noise ratio.
The waveform inversion is performed in the frequency domain, constraining the source mechanism during the event to vary only in its magnitude. The eigenvectors orientation and the eigenvalue ratio are kept constant. This significantly reduces the number of parameters to invert, making the procedure more stable. The method has been tested over a synthetic dataset, reproducing realistic very-long-period (VLP) signals Stromboli volcano.
We have applied the method to a VLP dataset recorded on Stromboli volcano and to low-frequency earthquakes recorded on Mt.Vesuvius.