Moment tensor solutions at Mt Etna Volcano, southern Italy

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In a volcano, seismic events can be related to multiple processes, such as brittle fracture, fluid flow, mass transport and volumetric changes. Therefore, seismic signal analysis and an adequate characterization of the seismic source is usually performed to monitor its activity and to provide a reliable understanding of its internal processes.

The earthquake source can be successfully studied through the seismic moment tensor computation, which also provides additional hints about non-double couple components of the acting forces. However, this kind of measurement in a volcanic environment is a difficult task due to the complexities of the structural model, to the wave propagation effects and to the presence of noise in the data.

On December 24, 2018 an intense seismic sequence preceded and accompanied the beginning of a flank eruption at Mt. Etna volcano (Italy). The relevant seismicity and the large ground deformation (Bonforte et al., 2019) are a clear evidence of the impressive dynamics that characterized the volcano during this last eruption which, despite the low volume of magma poured out, can be considered one of the most important ones of the last 30 years.

In this study, we analysed the Etnean seismicity and calculated the complete moment tensor of a selection of earthquakes recorded by the broad-band network of INGV-CT during the last eruption, with the aim of providing new insights into the eruption dynamics. In particular, we investigated the source mechanisms and the possible involvement of magmatic fluids.

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