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Cover | *In copertina* Catania after the 1669 euption (Anonymous, ca 1687)

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A feasibility study on the near real-time calculation of the complete seismic moment of the Etna seismicity: application to the earthquakes occurred during the December 2018 eruption

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In a volcanic area, seismicity is characterized by different types of seismic signals, due to the complex interaction between tectonic stress and volcanic dynamics. Referring to the Etna volcano, seismicity mainly consists in earthquakes associated with the fracturing processes of the rocks and seismic signals mainly caused by fluid dynamics (i.e tremor, LP and VLP events).
Complete Seismic Moment Tensor computation allows to a complete definition of the seismic source through the inversion of the waveforms recorded by the seismic stations. It permits to calculate not only the seismic source Double Couple component (DC), which allows identifying the nodal planes of the focal mechanism but also the non - DC components. Among the latter, the Compensated Linear Vector Dipole (CLVD) component can be indicative of the generation of lenticular cracks and fluids dynamics, while the volumetric component (ISO) is an indicator of the volume variations due to explosions or implosions.
INGV routinely computes real-time automatic seismic moment tensor solutions in Italy for Ml greater or equal to 3.5 earthquakes. In this case, the implemented algorithm (TDMT, Dreger et al., 2003), widely employed in many observatories around the world, it is applied mainly to study the DC component of the moment tensor, and the ISO component is constrained to zero. However, for seismicity in a volcanic environment, retrieving the non-DC component is important since it can provide useful insights into the understanding of the source origin and to evaluate the role of magma in the generation of earthquakes. Therefore, it would be interesting to compute the full moment tensor and to tune the algorithm for this special area.
To achieve our goal, we applied the TDMT algorithm to 10 earthquakes with Ml greater or equal to 3.5 occurred in the Etna volcano area during the December 2018 eruptive episode. To calculate the moment tensor, we used different velocity models and station configurations to account for the peculiarity of Etna volcano seismicity and we tested the robustness of the retrieved non-DC components. Finally, the obtained focal mechanisms have been compared with independent estimates of fault plane solutions computed by the first polarities analysis.

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