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Mt. Etna feeding system: a new 3D image constrained by earthquakes distribution and 3D modelling analysis in a customizable GIS.

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Imaging the interior of a volcano is crucial step to model its dynamics and develop an efficient eruption forecasting strategy.
High-resolution seismic image models of the interior of the volcanoes, usually based on tomographic methods, make possible to image the shape and locate possible lava ascending paths, shallow magma chambers and areas of flank collapse.
Here, we model the lava ascending path and feeding systems of Mt. Etna (Sicily, Italy) using the Marching Cubes algorithm (MC), usually applied to medical visualization and 3D modelling, combined with 16 years of earthquake localization data.
The analysis in the framework of a novel volcano-oriented GIS environment (VolGIS) offers the possibility to develop numerical tridimensional model improving the interpretation thanks to both the high visualization resolution and the known exact geolocalization.
The results show a high-resolution 3D model of the feeding system of Mt. Etna,
interpreted as a ductile realm surrounded by a fragile one.
In particular, the model: (1) highlights the plumbing system in a depth span between 1 km and 6 km b.s.l., increasing the detail of structures previous imaged by deep seismic tomography; (2) suggest new evidence behind the eastern flank instability; and (3) it is compatible with published models of the conduit structure.
We infer that the Marching Cubes algorithm, applied to those volcanoes with high seismicity, may improve considerably the ability of the user to obtain a preliminary imaging of the main feeding system reducing time cost and helping interpretation on common seismic tomography.