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Volcano-tectonics analysis of the active faults affecting eastern slope of the Mt. Etna: the case study of “Ripe della Naca” fault system

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The eastern part of the Etna volcanic complex is affected by the presence of several active fault systems (Monaco, 1997; Monaco et al., 2010), which generate tectonic instability, strictly connected to the regional stress fields, acting on a larger scale (Ellis & King, 1991; Lo Giudice & Rasà, 1992; Gvirtzman & Nur, 1999; Doglioni et al., 2001). In this work, we focus on the secondary the Ripe della Naca fault system (RNF), located on the North-eastern sector of Mount Etna, oriented about NE-SW. Although this sector is characterized by weak seismic activity (Hirn et al., 1997), it has been affected by a historical eruptive event, dated 1928. While studies related to the eruptive event have already been carried out (Branca et al., 2017), to date there are no works that focus directly on the Ripe della Naca fault system.

By analysing structural-geology, tectonic, and rock-physics data, as well as geodetic and seismic information, this work aims to verify the volcano-tectonic behaviour of the RNF. The crustal, geological cross section allowed us to compute the tensional state on the fault plain at three different depths (1 km, 2 km, 3.2 km) (Griffith, 1990; Labuz & Zang, 2012). The Geodynamics & GeoMatic Laboratory Working Group provided ground velocity field and displacement monitored by discrete geodetic network (UNICT-Net), quantifying the aseismic deformation along the RNF system during the 2018 December unrest period.

This information provides new knowledge to understanding the volcano tectonics processes. This all with a view of being able to make reliable forecasts as to the likely course of events or scenarios during unrest periods of Etna volcano.

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