

# **Petrologic monitoring of Etna: a tool to infer the eruptive behaviour of the volcano**

**ROSA ANNA CORSARO**

Istituto Nazionale di Geofisica e Vulcanologia

Presenting Author: [rosanna.corsaro@ingv.it](mailto:rosanna.corsaro@ingv.it)

Etna, one of the most active volcanoes in the world, produces various types of activity, including both flank and summit eruptions from the four summit craters, named Voragine (VOR), Bocca Nuova (BN), North-East (NEC) and South-East (SEC). The eruptive activity is monitored by the Istituto Nazionale di Geofisica e Vulcanologia, Osservatorio Etneo (INGV-OE) that provides scientific support to the operational decisions of the National Civil Protection Department (DPC), and deals with the interpretation of the monitoring data from the instrumental networks, field surveys and laboratory analyses. In particular, the petrological monitoring, together with gas geochemistry, is the only activity that provides direct information of the magma's properties.

It's initially described the organization of the syn-eruptive and extended (Di Re et al., 2021) petrologic monitoring carried out at INGV-OE.

Subsequently, the role of petrologic monitoring is discussed with two test-eruptions. The first concerns the flank activity of the volcano, and in particular the eruption of July 2001, when a complex system of eruptive fissures cut the flanks of the volcano down to 2100 m a.s.l., very close to inhabited zones. The second focuses on the summit activity of the South-East crater from December 2020 to April 2021; it produced a sequence of 21 lava fountains and associated ash plumes, which heavily impacted on the health and activities of the local population. In 2001, petrologic data immediately pointed out that, unusually for Etna, magmas with different petro-chemical features were contemporaneously erupted from distinct vents (Corsaro et al., 2007). In 2020-21, for the first time at Etna, all the lava fountains have been sampled allowing to track the variation of magma composition with an unprecedented detail (Corsaro and Miraglia, 2022).

Finally, petrologic monitoring carried out during a volcanic crisis at Etna, integrated with the results of geophysical networks and gas geochemistry, is a crucial tool: i) to check the volcano's behaviour during the eruption and to communicate potentially dangerous variations in eruptive features, ii) to acquire preliminary insights into the structure of the plumbing system and the pre-eruptive processes governing the eruptive activity.