

EGU2020-11260

<https://doi.org/10.5194/egusphere-egu2020-11260>

EGU General Assembly 2020

© Author(s) 2020. This work is distributed under the Creative Commons Attribution 4.0 License.



## The 2019 eruptive phase of Stromboli volcano through multiparametric geophysical observations.

**Massimo Orazi**<sup>1</sup>, Flora Giudicepietro<sup>1</sup>, Carmen López<sup>2</sup>, Giovanni Macedonio<sup>1</sup>, Salvatore Alparone<sup>3</sup>, Francesca Bianco<sup>1</sup>, Sonia Calvari<sup>3</sup>, Walter De Cesare<sup>1</sup>, Dario Delle Donne<sup>1</sup>, Bellina Di Lieto<sup>1</sup>, Antonietta Esposito<sup>1</sup>, Rosario Peluso<sup>1</sup>, Eugenio Privitera<sup>3</sup>, Pierdomenico Romano<sup>1</sup>, Giovanni Scarpato<sup>1</sup>, and Anna Tramelli<sup>1</sup>

<sup>1</sup>Istituto Nazionale di Geofisica e Vulcanologia, Osservatorio Vesuviano, Napoli, Italy

<sup>2</sup>Observatorio Geofísico Central, Instituto Geográfico Nacional (IGN), Madrid, Spain

<sup>3</sup>Istituto Nazionale di Geofisica e Vulcanologia, Osservatorio Etneo, Catania, Italy

In summer 2019, two paroxysmal explosions occurred in Stromboli. The first one occurred on July 3, when the Strombolian ordinary eruptive activity did not show a significant intensification. The explosion formed an eruptive column more than 3 km high. A pyroclastic flow ran down the “Sciara del Fuoco” slope causing a victim and some injuries. Moreover, the pyroclastic flow spread over the sea surface for about one kilometer. On August 28, a second paroxysmal explosion occurred, similar to the previous one. Also in this case the eruption formed an eruptive column of more than 3 km and a pyroclastic flow that expanded along the “Sciara del Fuoco” slope and traveled about 1 km on the sea surface. In the period between the two paroxysms, effusive activity occurred from the summit crater area. The eruptive phase of summer 2019, which began with the paroxysm of 3 July, was not preceded by significant changes in the routinely monitored parameters, such as the hourly frequency (daily average) of the VLP events (typical of Stromboli) and the amplitude of the seismic signal (RSAM). For this reason, we have analyzed the seismic and dilatometric data, which were recorded by the INGV geophysical network in the period November 2018 - September 2019, focusing our attention on other parameters that can give indications on the activity state of the volcano. In particular, we analyzed the data of the broadband seismic stations, equipped with the Guralp CMG40T sensors, and the data of one Sacks-Evertson borehole strainmeter. We defined the “VLP size”, which takes into account the waveform of the VLP events, in terms of both amplitude and duration. We also applied time varying Fractal Dimension (FD) analysis to the seismograms of a seismic station close to the crater area and we analyzed the polarization of the same signal. We carried out the polarization analysis both without applying a filter and by filtering the seismic signal in the typical frequency bands of the Stromboli volcanic tremor (1-3 Hz) and of the VLPs (0.5-0.05 Hz). We found that the “VLP size”, the FD and the polarization parameters showed significant changes about one month before the paroxysm of July 3. In the short term, we applied an appropriately tuned STA/LTA algorithm to the data of the borehole strainmeter, which is installed on the island at about 2km from the craters, and we obtained an automatic detection of the paroxysmal events 10 and 7.5 minutes before the explosion of July 3 and August 28, respectively.

