

## Supplementary Material

### I. SM1

List of the websites hosting the three video footages discussed in the text (all accessed 13 August, 2023).

Magri, E. (via Storyful; 16 March, 2017). Explosion at Mount Etna Injures Ten [Video]. YouTube.  
<https://www.youtube.com/watch?v=nOCzy0zhano>

Martin, A. (17 March, 2017). Mount Etna Eruption March 16th 2017 Escape Run [Video]. YouTube.  
<https://www.youtube.com/watch?v=IF3CxOmnKhs>

Morelle, R. (16 March, 2017). Mount Etna: BBC crew caught up in volcano blast. BBC News [Video].  
<https://www.bbc.com/news/world-europe-39293086>

### II. SM2

UAS video footage of the lava flow and the deposit of the explosion

### III. Figure Captions

**Figure S1.** (a-e) Burns on the clothes of some of the people affected by the incandescent fallout. (f) Lahar/muddy ash deposits which formed during or few minutes after the explosive sequence, suggesting the formation and thus the availability of a large amount of water due to snow melting by the lava flow. In the background, the NSEC is erupting an ash plume. (g) Clast welded with glasses. f-g: photos by FC.

**Figure S2.** Relative abundance of different lithologies of clasts in different samples (Supplementary Table S1). (a) Poorly vesicular bomb, characterized by sub-rounded shape, grey-to-brownish color and scarce vesicularity. (b) Scoriaceous, vesicular bomb, characterized by more irregular aspect, similar color palette and more pronounced superficial micro- to macro-vesicularity. than type a) (c) Glassy bombs, characterized by dark, shiny aspect (glassy to the touch), highly irregular shapes and consistent macro-vesicularity.

**Figure S3.** Shape parameters for the samples PH4, PH6 and PH9 relative to the grain-size class  $\phi = -1$  (a) and  $\phi = 1$  (b). ALT: Altered clasts. GLY: Glassy clasts. FLU: Fluidal clasts. BLK: Blocky clasts. VES: Vesicular clasts.

**Figure S4.** Density distribution on the different lithologies recognized in the coarse material.

**Figure S5.** Top. Pre- and post-eruption satellite images of the area invaded by the lava flow. White squares: starting and end points of the topographic transects; white star: location of the main explosion vent. Bottom. Transects of the pre-eruption topography across the area overran by the lava flow, showing the elevation changes from the points A to A' (blue) and B to B' (red). Transects were computed on a Digital Surface Model at 1-meter spatial resolution, built from a Pleiades triplet acquired at Mt Etna on 24 December 2015.

**Table S1.** List of samples with date of sampling, typology, coordinates, mass load per square meter (where available), and performed analyses.

<sup>1</sup>Samples PH2 and PH3 were collected from the same sampling site. They include the coarse and fine portions of the total deposit, respectively.

<sup>2</sup>Samples PH6 and PH7 were collected from the same sampling site. They include the coarse and fine portions of the total deposit, respectively.

<sup>3</sup>Sample PH8 sample includes selected and altered clasts collected around the previous 6 sampling sites

