















Supplementary Material for:

## The morphological response to the 13 May 2022 major explosive event at Stromboli volcano, Italy, characterised by high-resolution UAS surveys

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Schmid et al. (2025) should be cited if this material is used independently of the article.

Table S1: Processing parameters for the photogrammetric survey on 13 and 14 May 2022, respectively. With the high accuracy setting, full resolution images are used to achieve the image alignment. Generic preselection is a method where image pairs are identified from down sampled previews to aid image alignment. During optimization the camera calibration parameters are adjusted ( $f$  = focal length;  $c_x, c_y$  = optical axis interception with the sensor plane;  $k_1-k_4$  = radial distortion;  $p_1, p_2$  = tangential distortion).

Processing parameters	13-May-22	14 May 2022
Accuracy	High	High
Generic preselection	Yes	Yes
Reference preselection	Source	Source
Key point limit	40,000	40,000
Key point limit per Mpx	1000	1000
Tie point limit	4000	4000
Filter points by mask	Yes	Yes
Optimization parameters		Parameters
$f, c_x, c_y, k_1-k_4, p_1, p_2$	$f, c_x, c_y, k_1-k_4, p_1, p_2$	
Adaptive camera model fitting	No	No
Depth maps		
Quality	High	High
Filtering mode	Aggressive	Aggressive

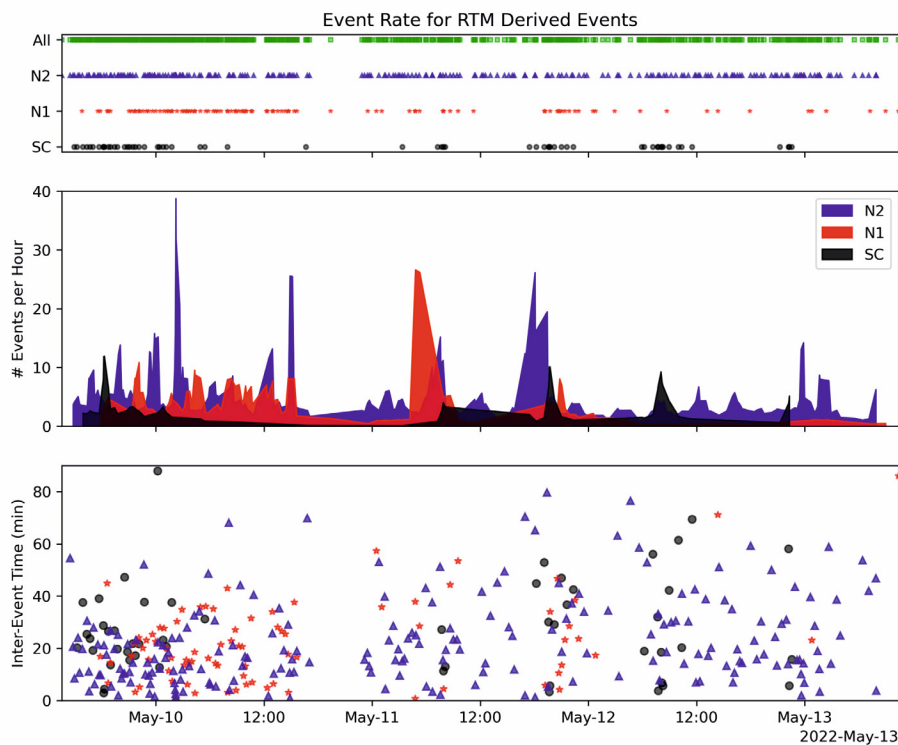


Figure S1: Reverse time migration (RTM) locations [Fee et al. 2021] of infrasound signals in the days leading up to the major explosive event on 13 May 2022. Events attributed to SC crater area all originated from vent S2 (Figure 1). Gaps in the data are caused by noisy data (e.g. because of strong wind), where the RTM method failed to localise events.

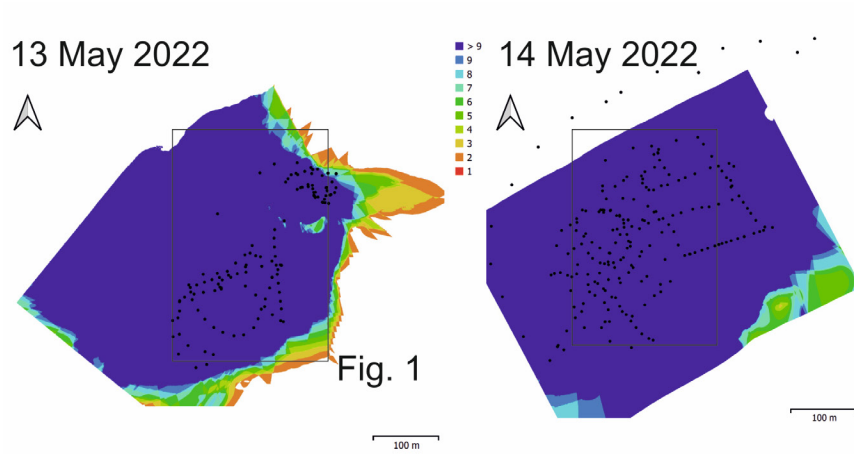


Figure S2: Flight paths for the acquisition of aerial images used in the structure from motion reconstruction for 13 and 14 May 2022. Colour indicates image overlap, i.e. on how many images the specific areas were captured.

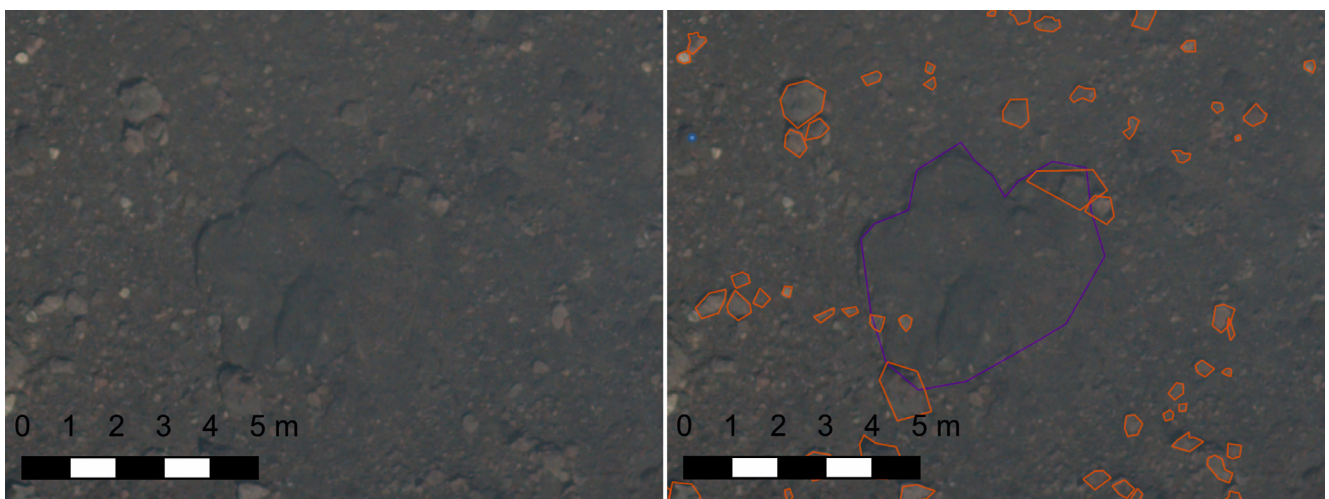


Figure S3: Example of manual classification of bombs (orange) and spatter (purple).

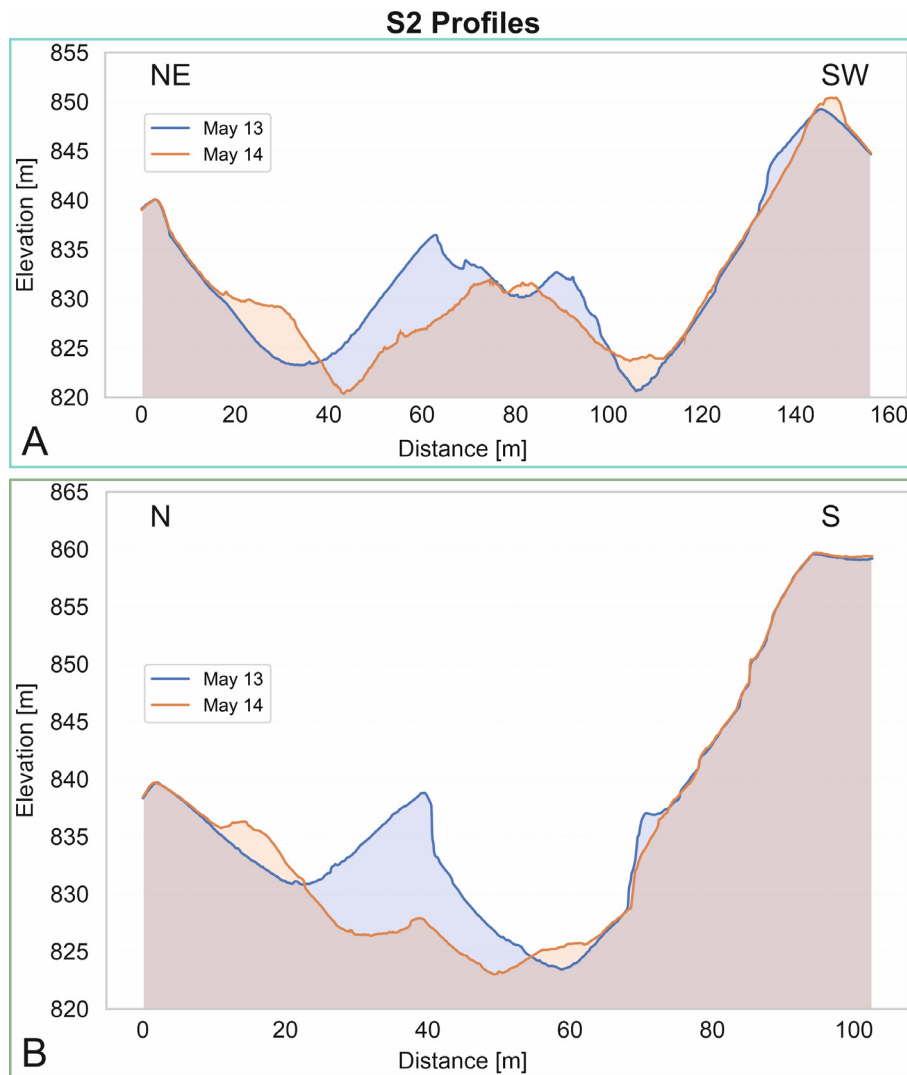


Figure S4: Cross-sections through the S2 crater area along Profile 2 from NE to SW [A] and along Profile 3 from N to S [B] highlighting the surface changes induced by the 13 May 2022 major explosive event at Stromboli volcano, Italy. The blue line represents the surface two hours prior the event. The orange line represents the surface 19 hours after the event (14 May 2022). Both [A] and [B] show slumping of pyroclastic material along the N side of the crater. [A] also shows a bomb that landed on the SW crater rim of S2. Location of the profiles can be seen in Figure 1. Note the difference scales for [A] and [B].

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## REFERENCES

Fee, D., L. Toney, K. Kim, R. W. Sanderson, A. M. Iezzi, R. S. Matoza, S. De Angelis, A. D. Jolly, J. J. Lyons, and M. M. Haney (2021). “Local Explosion Detection and Infrasound Localization by Reverse Time Migration Using 3-D Finite-Difference Wave Propagation”. In: *Frontiers in Earth Science* 9. DOI: [10.3389/feart.2021.620813](https://doi.org/10.3389/feart.2021.620813).