Supplementary of

SAR Data and monitoring camera times series reveal transitions from aligned to distributed crater arrangement during the 2021 eruption of Cumbre Vieja, La Palma (Spain)

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Table S1. Descending data orbit 08 specifications. Here we can find the number of images, their acquisition date, and the corresponding day of the eruption.

CSK Descending 08, look angle 38.75,HH polarization, Time 18h55		
Index	Date of acquisition	Eruption day
1	25-Sep-21	7
2	29-Sep-21	11
3	1-Oct-21	13
4	2-Oct-21	14
5	3-Oct-21	15
6	11-Oct-21	23
7	15-Oct-21	27
8	27-Oct-21	39
9	31-Oct-21	43
10	2-Nov-21	45
11	3-Nov-21	46
12	4-Nov-21	47
13	12-Nov-21	55
14	28-Nov-21	71
15	5-Dec-21	78
16	6-Dec-21	79
17	14-Dec-21	87

Table S2. Ascending data orbit 06 specifications. Here we can find the number of images, their acquisition date, and their corresponding day of the eruption.

CSK Ascending H4- 06, look angle 35.55, HH polarization		
Index	Date of Acquisition	Eruption day
18	25-Sep-21	7
19	29-Sep-21	11
20	1-Oct-21	13
21	11-Oct-21	23
22	15-Oct-21	27
23	17-Oct-21	29
24	18-Oct-21	30
25	31-Oct-21	43
26	18-Nov-21	61
27	4-Dec-21	77
28	6-Dec-21	79

Table S3. Ascending data orbit 12 specifications. Here we can find the number of images, their acquisition date, and the corresponding day of the eruption.

CSK Ascending H4-12, look angle 44.4, HH polarization		
Index	Date of Acquisition	Eruption day
29	30-Sep-21	12
30	4-Oct-21	16
31	6-Oct-21	18
32	7-Oct-21	19
33	8-Oct-21	20
34	16-Oct-21	28
35	22-Oct-21	34
36	23-Oct-21	35
37	24-Oct-21	36
38	1-Nov-21	44
39	5-Nov-21	48
40	7-Nov-21	50
41	8-Nov-21	51
42	9-Nov-21	52
43	17-Nov-21	60
44	23-Nov-21	66
45	24-Nov-21	67
46	25-Nov-21	68
47	3-Dec-21	76
48	9-Dec-21	82

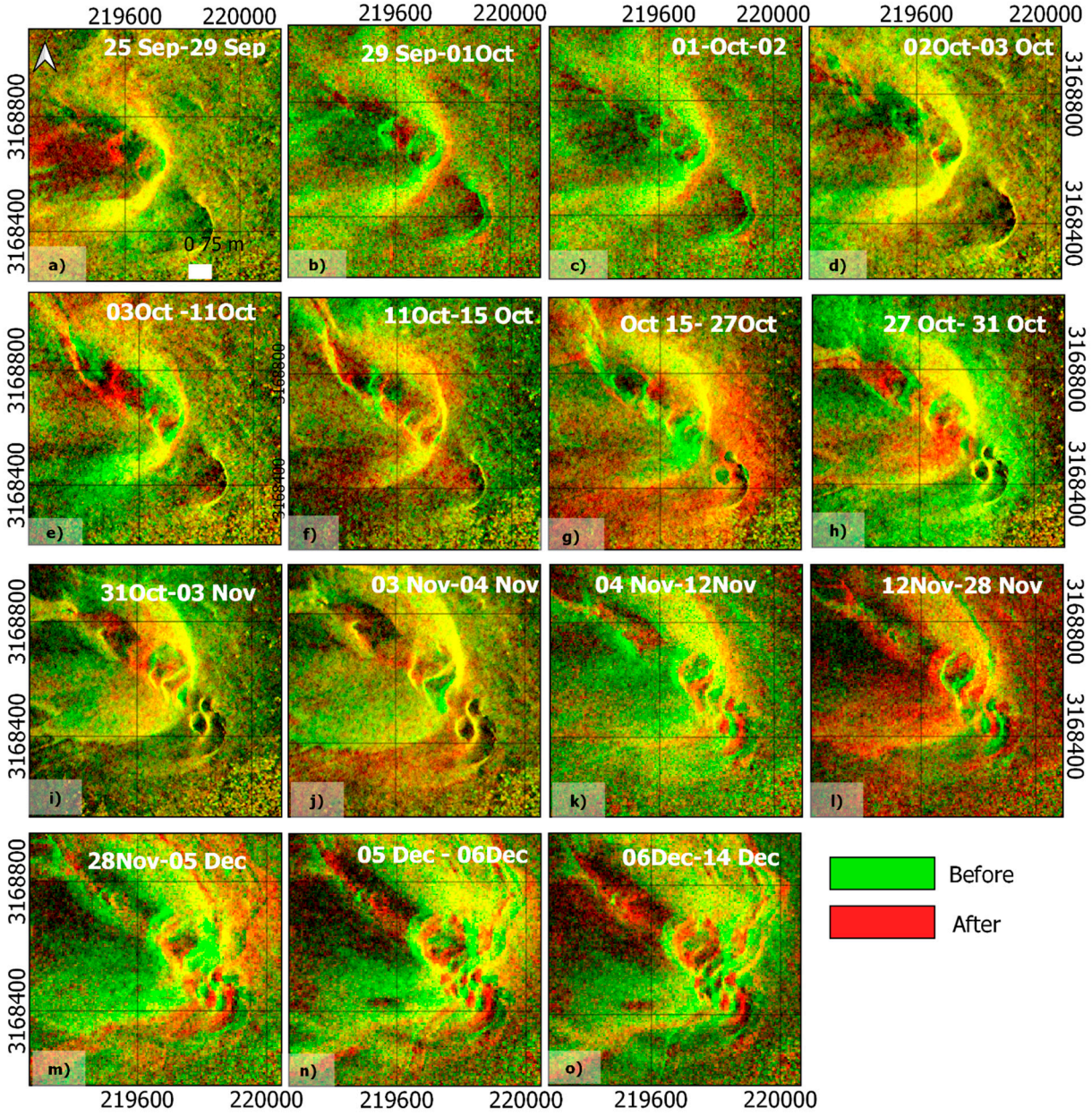

Figure S1. (**a**–**o**) Composite maps between pairs of SAR amplitude images from two consecutive dates. The green yellowish represents no change, while the red color represents the changes register in the cone surface

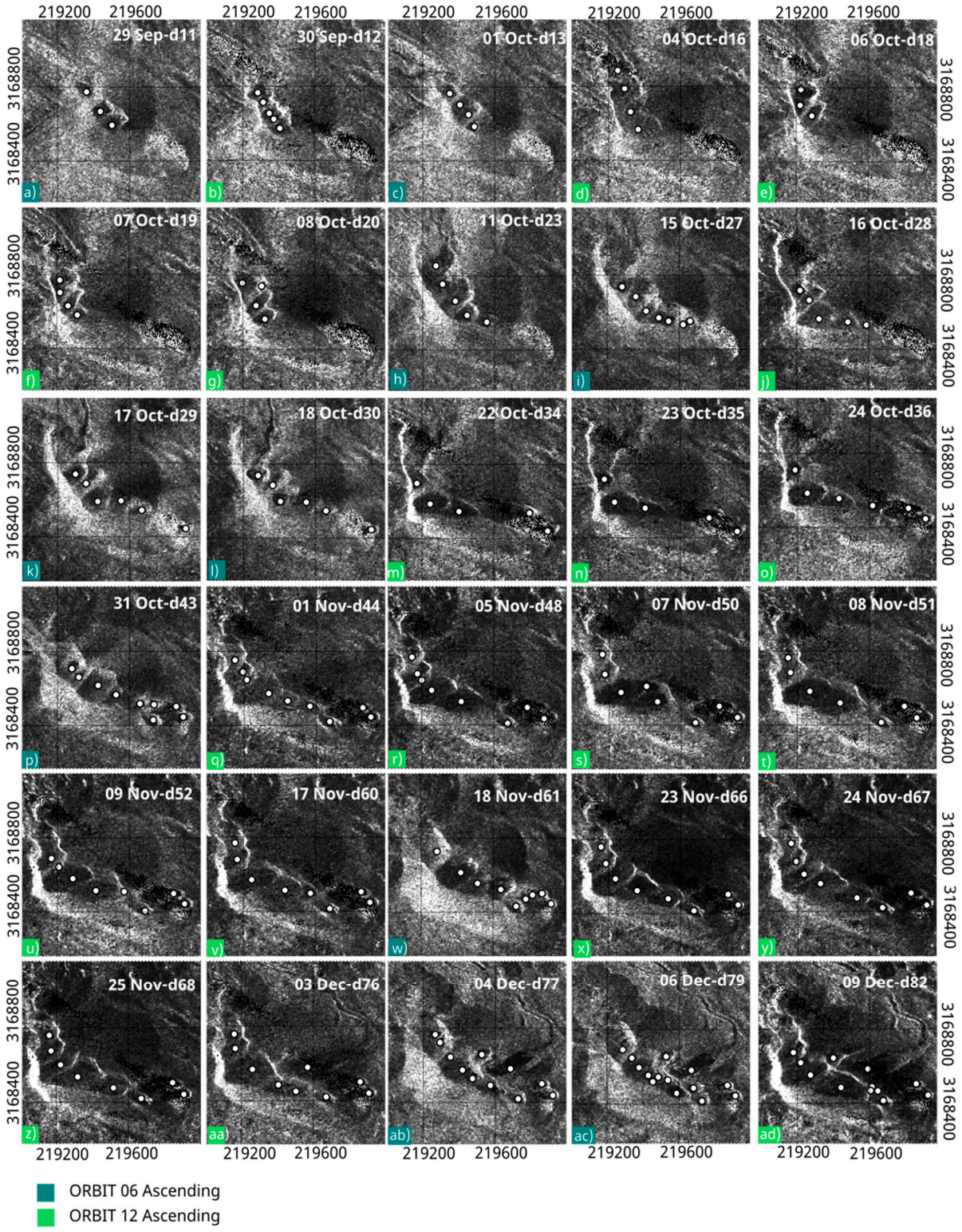

Figure S2. (**a**–**ad**) SAR amplitudes ascending images from September 29 to December 9, 2021. In the maps above, see the collection of two ascending orbits. On the dark green, we have the images of ascending orbit 6. In light green, we have the image of orbit 12. The white dots represent each of the identified craters in each of the images. Due to the two different tracks, it was not possible to track the exact date on which each crater emerged and thus this was not added in the ascending data.

Due to the higher geometric distortion of the ascending data and the combination of two orbits, the linearity of the craters is not as clear as in the descending data. This is because the ascending data LOS direction is orthogonal with respect to the crater row, which forms across the evolving cone, resulting in a rather curved crater row arrangement. Also, other geometric distortions prevail. For instance, in the ascending data (Figure S2-m), the SW flank looks brighter and tilted, especially in the more central

craters. Also, the SE craters show stronger distortion and are barely recognizable. The craters are close to each other but do not show an alignment; instead, they can be traced along a curve.

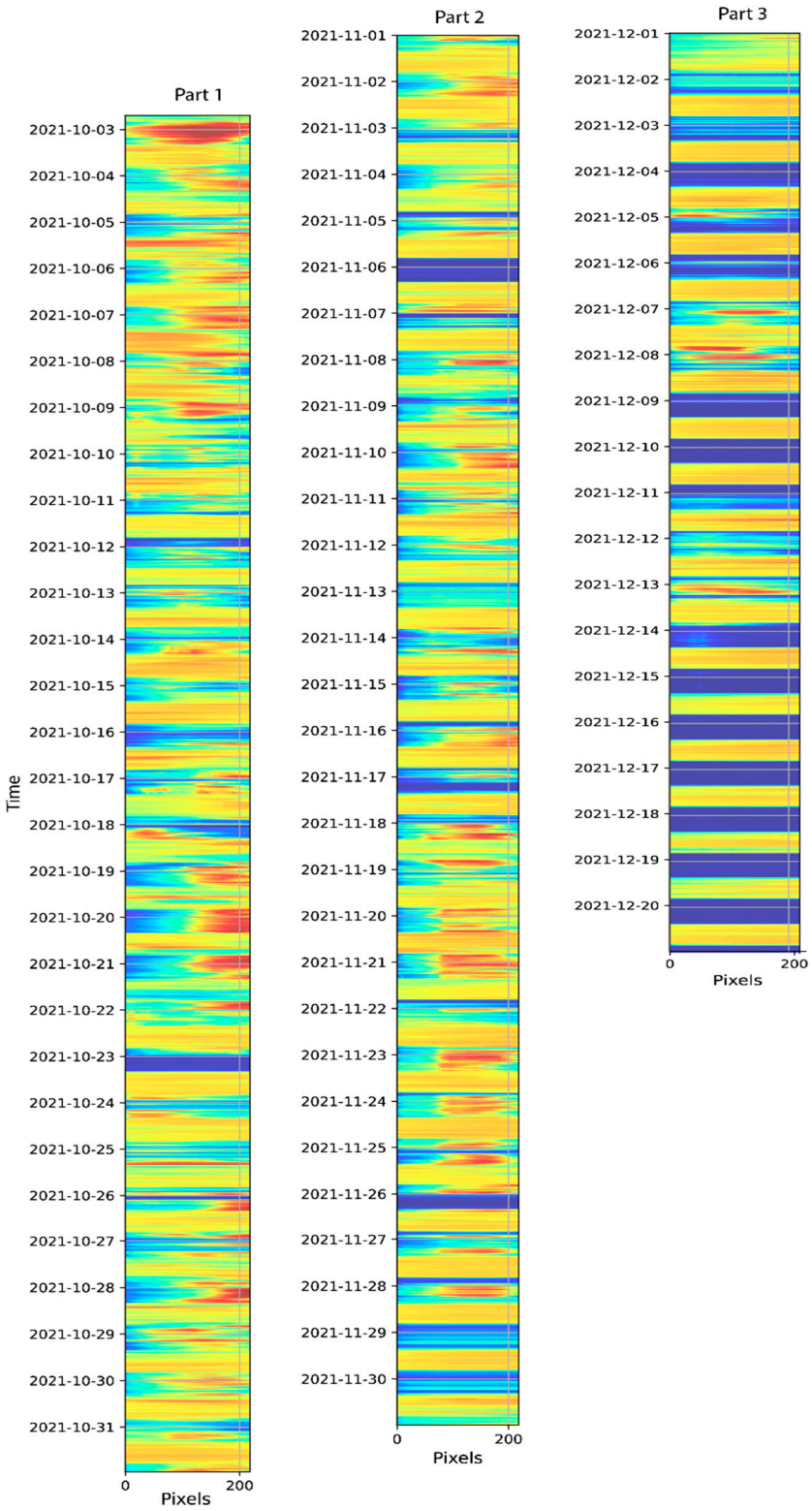

Figure S3. Kymograph Camera 1. Day and Night data. Part 1 corresponded to data from October 3rd, when the camera was installed, until the end of the month. Part 2 corresponds to November 2021. Part 3 corresponds to December until December 20th. The red color indicated the lava fountain activity. Most of the yellow periods correspond to cloudy periods during daylight.

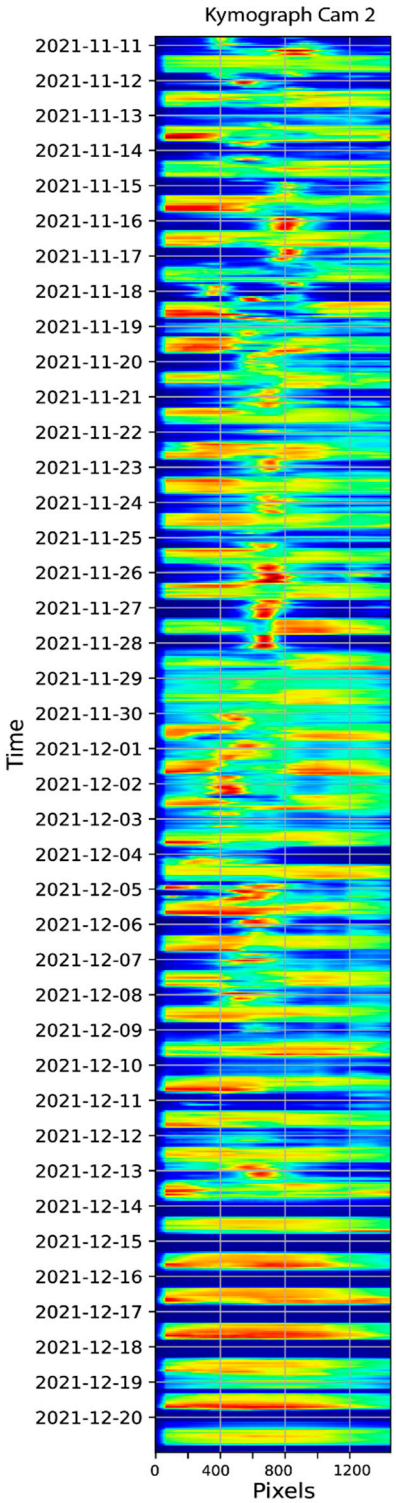

Figure S4. Kymograph Camera 2. Day and Night data. The red color shows lava fountain activity; however, we see gaps that correspond to the images taken during daylight that were affected by clouds, ash clouds, and steam.

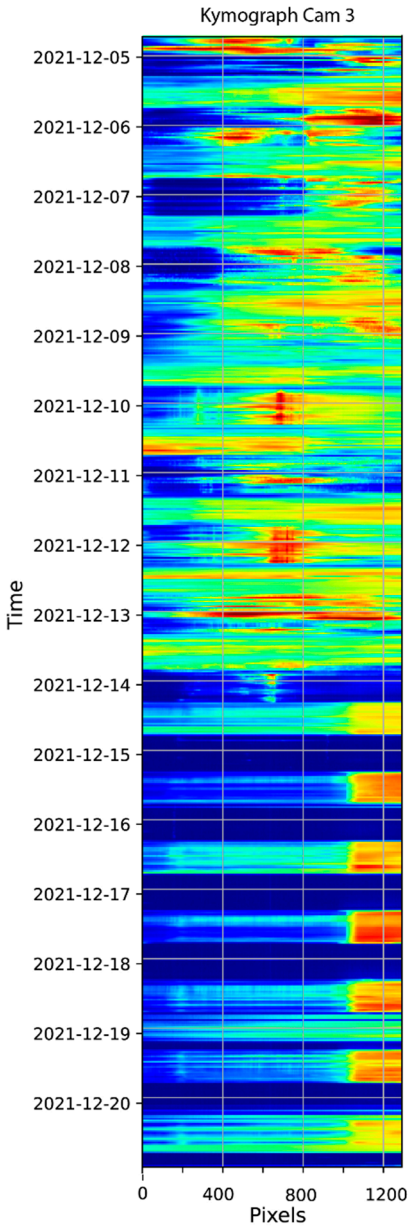

Figure S5. Kymograph Camera 3. Day and Night data. The red color shows lava fountain activity; however, we see gaps that correspond to the images taken during daylight that were affected by clouds, ash clouds, and steam.

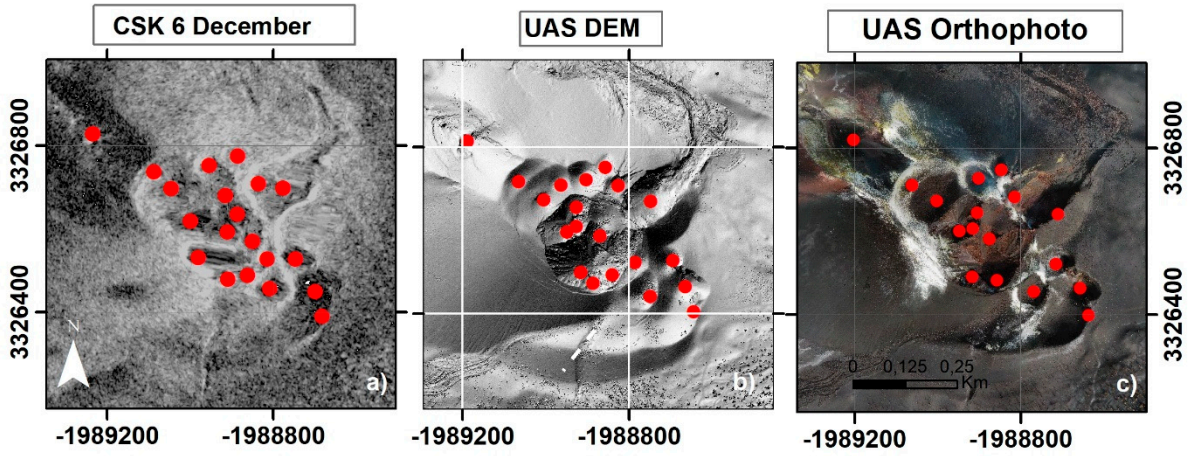

Figure S6. Comparison of craters between SAR and a shaded relief map from drone data and UAS orthophoto. (**a**) CSK SAR amplitude image in descending orbit from 6 December, 2021. (**b**) Shade relief representation of a DEM acquired in UAS survey in January 15, 2021. (**c**) UAS orthophoto acquired on January 15, 2021. The red dots represent the geometric centers of the craters found in each dataset.

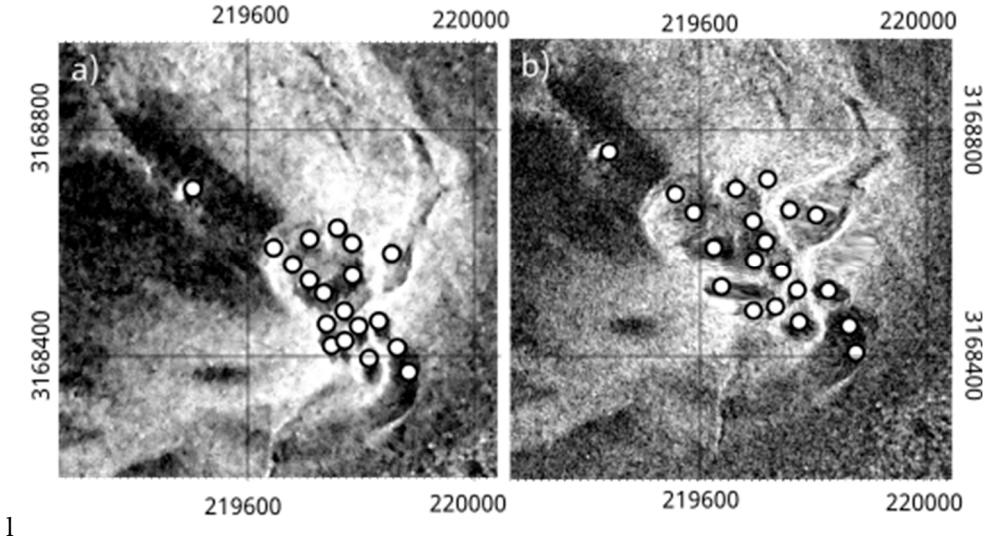

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Figure S7. Comparison between 6 December SAR images corrected with two different DEMs. (**a**) SAR image terrain corrected with DEM 2009 (Pre-Eruption). (**b**) SAR image terrain corrected with UAS DEM of 15 January 2022 (Post Eruption). The use of post-eruptive DEM has reduced the foreshortening and shadowing effect.