

This supplement provides the datasets generated and presented as applications in **A cost-effective, open-source, high-resolution visible-wavelength camera network: design and applications for long-term monitoring and research in volcanology** – Simionato et al.

Datasets

Table S1. Overview of the application datasets presented in this supplement. For each case study, the table reports the acquisition mode, the raw data available in the repository (Simionato et al., 2026), and the main derived product generated from the image or video analysis.

Dataset	Acquisition mode	Raw data available in repository	Derived product
Mt. Etna (Italy)	Image timelapse	Representative images *	Activity record and lava flow front elevation
Geneva Jet d'eau (Switzerland)	Video	Videos + extracted images	Jet height time series
Stromboli (Italy)	Image timelapse	Images of ash emission events *	Plume height time series
Laboratory plume experiment	High-speed video	Videos + images	Plume height time series

* Full time series available upon request

5 Mt.Etna

Table S2. Periods of activity identified from the Mt. Etna camera network observations during February–March 2025. Only periods derived from our visual observations are reported here.

Activity type	Start time (UTC+1)	End time (UTC+1)
Strombolian activity	6 February 2025 19:00	7 February 2025 07:00
Lava flow	8 February 2025 18:00	2 March 2025 07:00
Strombolian activity	9 February 2025 01:00	9 February 2025 10:00
Strombolian activity	10 February 2025 23:00	11 February 2025 10:00
Strombolian activity	11 February 2025 18:00	12 February 2025 02:45
Ash emission	12 February 2025 02:45	12 February 2025 12:00
Strombolian activity	12 February 2025 22:00	13 February 2025 04:00
Ash emission	13 February 2025 04:00	13 February 2025 07:00
Strombolian activity	13 February 2025 18:00	14 February 2025 04:00
Ash emission	14 February 2025 04:00	14 February 2025 14:00
Strombolian activity	14 February 2025 22:00	15 February 2025 00:00
Ash emission	15 February 2025 00:00	15 February 2025 02:00
Strombolian activity	15 February 2025 21:00	16 February 2025 03:00
Ash emission	16 February 2025 03:00	17 February 2025 17:00
Strombolian activity	17 February 2025 17:00	18 February 2025 00:00
Strombolian activity	18 February 2025 06:00	18 February 2025 08:00
Strombolian activity	18 February 2025 22:00	19 February 2025 08:00
Strombolian activity	22 February 2025 07:00	22 February 2025 10:00
Strombolian activity	22 February 2025 17:00	24 February 2025 12:00
Strombolian activity	24 February 2025 19:00	25 February 2025 08:00
Strombolian activity	27 February 2025 21:00	28 February 2025 07:00

Strombolian activity includes low-intensity ash emissions and strong degassing

Table S3. Lava flow front positions manually picked from Mt. Etna camera images and corresponding lava flow front altitudes. Pixel coordinates refer to the manually selected front position in the image. Reported uncertainties include only the contribution related to ray tracing and pixel dimensions.

Observation time (UTC+1)	Pixel coordinates (x,y)	Lava flow front altitude (m a.s.l.)
8 February 2025 19:00	(1153, 1773)	3120.0 ± 0.8
9 February 2025 07:00	(1174, 1798)	2797.5 ± 0.7
9 February 2025 13:00	(1171, 1810)	2719.7 ± 0.7
10 February 2025 09:00	(1182, 1849)	2486.9 ± 0.7
11 February 2025 09:00	(1197, 1902)	2172.2 ± 0.6
12 February 2025 10:00	(1140, 1925)	2028.6 ± 0.6
13 February 2025 14:00	(1076, 1935)	1888.8 ± 0.5
14 February 2025 14:00	(1042, 1936)	1879.4 ± 0.5
15 February 2025 06:45	(1026, 1939)	1861.0 ± 0.5
16 February 2025 17:00	(1007, 1942)	1809.4 ± 0.5
17 February 2025 14:00	(992, 1943)	1803.5 ± 0.5
19 February 2025 18:30	(1000, 1937)	1886.8 ± 0.5
22 February 2025 06:15	(1194, 1812)	2718.8 ± 0.7
23 February 2025 11:00	(1202, 1850)	2485.6 ± 0.7
24 February 2025 06:00	(1215, 1856)	2452.9 ± 0.6
25 February 2025 06:00	(1244, 1888)	2244.6 ± 0.6
27 February 2025 12:00	(1223, 1810)	2748.3 ± 0.7
28 February 2025 12:00	(1264, 1829)	2638.7 ± 0.7
1 March 2025 12:00	(1293, 1850)	2500.8 ± 0.7

Geneva Jet d’Eau

Table S4. Five-minute Jet d’eau height time series derived from the Geneva Jet d’eau dataset. To reduce space, the time series is arranged in four side-by-side blocks. Each block reports time in seconds from the beginning of the analysed sequence and the plotted jet altitude for the PiCam 3 Std and the Canon Legria HF G50.

Time (s)	Jet altitude (m)		Time (s)	Jet altitude (m)		Time (s)	Jet altitude (m)		Time (s)	Jet altitude (m)	
	PiCam	Canon		PiCam	Canon		PiCam	Canon		PiCam	Canon
0	0.00	0.00	75	122.10	120.12	150	117.30	117.45	225	121.21	119.05
1	4.85	6.61	76	121.38	118.69	151	119.07	116.21	226	119.60	118.52
2	26.29	15.91	77	121.38	118.34	152	121.21	117.98	227	119.60	117.63
3	56.30	42.95	78	119.43	117.81	153	122.99	119.23	228	121.74	117.63
4	81.85	70.12	79	121.56	119.41	154	122.99	121.55	229	121.74	117.10
5	101.95	92.11	80	123.17	121.01	155	122.99	121.55	230	117.48	116.04
6	115.02	108.00	81	123.71	121.37	156	120.85	120.12	231	116.42	114.45
7	122.28	118.16	82	123.71	122.09	157	120.85	118.16	232	114.49	112.00
8	126.06	121.19	83	122.63	121.55	158	123.35	119.05	233	117.66	115.68
9	127.51	125.89	84	122.63	119.94	159	124.07	122.09	234	117.66	116.57
10	126.60	125.34	85	122.63	119.94	160	124.25	122.09	235	119.07	116.57
11	127.33	125.34	86	119.78	118.34	161	124.25	122.09	236	121.03	119.41
12	127.33	124.98	87	122.81	119.41	162	121.92	120.84	237	121.03	119.41
13	127.87	125.89	88	124.43	120.48	163	123.35	121.01	238	121.03	116.74
14	127.87	125.89	89	125.33	122.81	164	124.43	121.37	239	123.35	118.52
15	126.24	125.34	90	127.14	124.98	165	124.79	122.99	240	123.71	121.91

Table S4. Five-minute Jet d'eau height time series derived from the Geneva Jet d'eau dataset (continued).

Time (s)	Jet altitude (m)		Time (s)	Jet altitude (m)		Time (s)	Jet altitude (m)		Time (s)	Jet altitude (m)	
	PiCam	Canon		PiCam	Canon		PiCam	Canon		PiCam	Canon
16	126.06	121.91	91	127.14	124.98	166	124.79	122.99	241	123.71	121.91
17	127.51	125.34	92	124.43	123.89	167	124.79	122.45	242	119.78	120.30
18	128.23	125.34	93	118.72	119.94	168	124.79	122.45	243	118.72	117.81
19	130.06	126.98	94	122.81	117.63	169	124.79	121.91	244	118.72	117.10
20	130.06	127.53	95	122.99	120.30	170	124.79	123.35	245	118.72	117.27
21	128.23	127.53	96	122.81	120.30	171	124.43	123.35	246	118.19	117.27
22	125.51	123.53	97	121.74	119.23	172	119.43	119.76	247	122.28	119.05
23	125.15	123.71	98	122.63	120.48	173	120.31	116.57	248	126.42	122.81
24	124.97	123.71	99	122.63	120.48	174	121.92	118.87	249	126.42	123.71
25	122.63	121.91	100	122.28	119.58	175	122.28	119.41	250	124.97	123.71
26	121.38	118.16	101	122.28	120.30	176	123.35	120.30	251	119.43	118.34
27	121.38	118.16	102	121.74	120.30	177	123.35	122.27	252	122.99	120.12
28	121.38	120.12	103	120.67	118.52	178	123.35	122.27	253	122.99	121.01
29	121.38	120.12	104	117.13	115.68	179	122.28	119.05	254	122.28	121.01
30	120.14	117.63	105	121.03	115.51	180	123.89	120.66	255	119.43	119.58
31	121.21	117.45	106	121.38	116.74	181	124.79	122.27	256	117.13	115.68
32	124.25	120.48	107	121.38	120.30	182	124.79	122.27	257	118.01	115.51
33	124.25	121.55	108	120.31	120.30	183	123.35	120.84	258	123.53	119.76
34	123.17	121.55	109	120.14	117.81	184	123.35	120.84	259	124.07	121.91
35	122.46	119.41	110	121.56	119.23	185	126.24	122.63	260	124.07	121.91
36	122.46	117.98	111	122.63	119.94	186	127.51	123.71	261	121.74	120.66
37	120.85	119.41	112	123.53	121.19	187	127.51	123.71	262	122.28	120.48
38	119.78	119.41	113	123.53	121.19	188	123.71	120.48	263	124.07	121.19
39	115.19	115.86	114	122.99	120.66	189	123.71	120.66	264	124.07	121.19
40	118.19	114.10	115	119.60	119.41	190	125.87	121.73	265	123.17	120.84
41	119.43	116.74	116	124.97	119.05	191	125.87	123.17	266	126.78	122.99
42	119.43	116.74	117	124.97	120.30	192	126.06	123.17	267	126.78	122.99
43	116.95	114.45	118	122.46	120.30	193	126.06	121.73	268	123.71	121.73
44	117.83	115.51	119	120.49	119.05	194	124.07	121.73	269	120.85	120.30
45	119.25	117.45	120	122.10	119.94	195	120.31	119.58	270	120.67	118.87
46	121.92	119.05	121	123.35	121.37	196	126.24	121.19	271	117.30	115.51
47	122.46	120.66	122	123.35	121.37	197	126.24	122.27	272	120.67	116.57
48	125.33	121.55	123	120.85	121.19	198	125.69	122.27	273	121.03	119.41
49	125.69	121.91	124	121.38	118.69	199	120.85	120.30	274	122.99	120.84
50	128.05	124.44	125	121.92	120.30	200	120.14	118.69	275	123.35	120.84
51	128.05	124.98	126	121.92	120.30	201	120.14	118.69	276	123.35	120.30
52	124.61	124.98	127	121.21	119.76	202	116.78	116.57	277	123.71	120.30
53	121.21	121.19	128	121.21	119.23	203	116.25	114.63	278	125.33	122.99
54	125.69	120.12	129	121.74	120.12	204	116.25	114.45	279	125.33	122.99
55	128.05	125.16	130	121.74	120.12	205	117.13	114.63	280	123.53	122.45
56	128.05	125.16	131	120.49	118.87	206	122.46	116.57	281	123.71	122.45
57	123.35	124.62	132	118.36	118.34	207	122.46	119.76	282	125.87	123.35
58	118.89	118.34	133	118.36	116.39	208	121.56	119.41	283	125.87	123.35
59	118.72	116.74	134	116.95	116.04	209	119.25	118.16	284	124.43	121.19
60	118.72	117.10	135	121.56	116.92	210	117.30	115.68	285	124.43	123.17
61	118.01	117.10	136	124.43	120.48	211	116.60	115.33	286	124.43	123.17
62	118.01	116.39	137	124.43	122.27	212	116.60	114.80	287	122.99	121.55
63	116.60	116.39	138	124.07	122.27	213	115.90	114.80	288	122.99	121.01
64	115.55	112.52	139	124.61	122.09	214	114.49	114.10	289	123.89	121.37

Table S4. Five-minute Jet d’eau height time series derived from the Geneva Jet d’eau dataset (continued).

Time (s)	Jet altitude (m)		Time (s)	Jet altitude (m)		Time (s)	Jet altitude (m)		Time (s)	Jet altitude (m)	
	PiCam	Canon		PiCam	Canon		PiCam	Canon		PiCam	Canon
65	116.07	113.05	140	124.61	122.27	215	117.48	113.40	290	124.25	123.35
66	116.07	113.05	141	124.07	122.27	216	121.21	116.74	291	124.25	123.35
67	115.02	113.75	142	125.33	122.63	217	121.38	119.05	292	124.61	121.37
68	116.25	113.75	143	125.33	122.81	218	121.38	119.05	293	124.61	121.37
69	118.01	114.45	144	125.33	122.81	219	120.49	118.87	294	122.81	120.66
70	118.19	116.74	145	121.21	121.01	220	122.28	117.45	295	122.63	120.66
71	118.89	116.74	146	121.21	119.05	221	123.35	121.01	296	121.03	119.58
72	121.56	119.58	147	120.49	119.05	222	123.35	121.55	297	121.21	119.23
73	121.56	119.58	148	119.43	118.16	223	120.85	121.55	298	122.63	120.30
74	122.10	117.98	149	119.43	117.45	224	121.21	119.05	299	124.43	120.66

Table S5. First 4.5 s Jet d’eau relative height time series derived from the Geneva Jet d’eau dataset for the 50 fps acquisition. To reduce space, the series is arranged in five side-by-side blocks. Relative heights are computed by subtracting the initial height of the sequence.

Time (s)	Height (m)	Time (s)	Height (m)	Time (s)	Height (m)	Time (s)	Height (m)	Time (s)	Height (m)
0.00	0.00	0.98	7.01	1.92	28.95	2.86	53.77	3.80	75.98
0.06	0.16	1.00	7.47	1.94	29.58	2.88	54.42	3.82	76.49
0.08	0.31	1.02	7.63	1.96	29.90	2.90	54.91	3.84	76.82
0.10	0.47	1.04	8.10	1.98	30.37	2.92	55.56	3.86	77.16
0.12	0.47	1.06	8.57	2.00	30.85	2.94	55.89	3.88	77.67
0.14	0.47	1.08	8.88	2.02	31.48	2.96	56.21	3.90	78.18
0.16	0.78	1.10	9.35	2.04	31.96	2.98	56.87	3.92	78.52
0.18	0.78	1.12	9.81	2.06	32.43	3.00	57.20	3.94	78.86
0.20	0.78	1.14	10.13	2.08	33.07	3.02	57.85	3.96	79.54
0.22	0.93	1.16	10.59	2.10	33.70	3.04	58.51	3.98	79.88
0.24	0.93	1.18	11.06	2.12	34.02	3.06	58.83	4.00	80.22
0.26	1.09	1.20	11.53	2.14	34.65	3.08	59.49	4.02	80.57
0.28	1.24	1.22	12.00	2.16	35.29	3.10	59.82	4.04	80.91
0.30	1.24	1.24	12.31	2.18	35.76	3.12	60.48	4.06	81.25
0.32	1.24	1.26	12.78	2.20	36.24	3.14	60.80	4.08	81.93
0.34	1.40	1.28	13.25	2.22	36.88	3.16	61.30	4.10	82.28
0.36	1.40	1.30	13.72	2.24	37.52	3.18	61.79	4.12	82.62
0.38	1.40	1.32	14.19	2.26	37.83	3.20	62.45	4.14	82.96
0.40	1.56	1.34	14.50	2.28	38.47	3.22	62.78	4.16	83.31
0.42	1.56	1.36	15.44	2.30	39.11	3.24	63.44	4.18	83.99
0.44	1.56	1.38	15.75	2.32	39.43	3.26	63.77	4.20	84.34
0.46	1.71	1.40	15.91	2.34	40.07	3.28	64.27	4.22	84.34
0.48	1.71	1.42	16.53	2.36	40.55	3.30	64.77	4.24	85.03
0.50	1.71	1.44	17.00	2.38	41.03	3.32	65.26	4.26	85.37
0.52	1.87	1.46	17.32	2.40	41.67	3.34	65.76	4.28	85.37
0.54	2.02	1.48	18.10	2.42	42.15	3.36	66.43	4.30	86.06
0.56	1.87	1.50	18.57	2.44	42.95	3.38	66.76	4.32	86.41
0.58	2.02	1.52	19.04	2.46	43.27	3.40	67.09	4.34	86.75
0.60	2.18	1.54	19.51	2.48	43.91	3.42	67.76	4.36	87.10

Table S5. First 4.5 s Jet d’eau relative height time series derived from the Geneva Jet d’eau dataset for the 50 fps acquisition (continued).

Time (s)	Height (m)	Time (s)	Height (m)	Time (s)	Height (m)	Time (s)	Height (m)	Time (s)	Height (m)
0.62	2.02	1.56	19.98	2.50	44.23	3.44	68.09	4.38	87.44
0.64	2.18	1.58	20.45	2.52	44.88	3.46	68.42	4.40	87.79
0.66	2.18	1.60	20.92	2.54	45.52	3.48	69.09	4.42	88.14
0.68	2.49	1.62	21.55	2.56	46.16	3.50	69.42	4.44	88.49
0.70	2.80	1.64	22.02	2.58	46.48	3.52	70.09	4.46	88.83
0.72	2.96	1.66	22.65	2.60	47.13	3.54	70.43	4.48	89.18
0.74	3.11	1.68	22.81	2.62	47.45	3.56	70.76	4.50	89.53
0.76	3.58	1.70	23.44	2.64	48.10	3.58	71.10		
0.78	3.74	1.72	24.06	2.66	48.58	3.60	71.77		
0.80	3.89	1.74	24.22	2.68	49.07	3.62	72.10		
0.82	4.20	1.76	24.85	2.70	49.71	3.64	72.44		
0.84	4.51	1.78	25.17	2.72	50.36	3.66	73.11		
0.86	4.83	1.80	25.80	2.74	50.68	3.68	73.45		
0.88	5.60	1.82	26.43	2.76	51.33	3.70	73.95		
0.90	5.60	1.84	26.74	2.78	51.82	3.72	74.46		
0.92	5.76	1.86	27.37	2.80	52.31	3.74	74.80		
0.94	6.38	1.88	27.69	2.82	52.79	3.76	75.30		
0.96	6.70	1.90	28.32	2.84	53.28	3.78	75.64		

Table S6. First 4.5 s Jet d’eau relative height time series derived from the Geneva Jet d’eau dataset for the 120 fps acquisition. To reduce space, the series is arranged in five side-by-side blocks. Relative heights are computed by subtracting the initial height of the sequence.

Time (s)	Height (m)	Time (s)	Height (m)	Time (s)	Height (m)	Time (s)	Height (m)	Time (s)	Height (m)
0.000	0.00	0.917	6.71	1.833	26.95	2.750	51.27	3.667	74.63
0.008	0.28	0.925	6.71	1.842	27.23	2.758	51.56	3.675	74.63
0.017	0.56	0.933	6.71	1.850	27.51	2.767	51.56	3.683	75.24
0.025	0.84	0.942	6.71	1.858	27.51	2.775	51.56	3.692	75.24
0.033	0.84	0.950	6.71	1.867	28.08	2.783	52.14	3.700	75.24
0.042	0.56	0.958	6.99	1.875	28.08	2.792	52.73	3.708	75.84
0.050	0.84	0.967	6.99	1.883	28.36	2.800	52.73	3.717	75.84
0.058	1.12	0.975	7.27	1.892	28.64	2.808	52.73	3.725	76.45
0.067	1.12	0.983	7.27	1.900	28.93	2.817	53.31	3.733	76.45
0.075	1.12	0.992	7.83	1.908	28.93	2.825	53.31	3.742	76.45
0.083	1.12	1.000	7.83	1.917	29.49	2.833	53.31	3.750	76.45
0.092	1.12	1.008	7.83	1.925	29.49	2.842	53.31	3.758	77.05
0.100	1.12	1.017	7.83	1.933	29.78	2.850	53.89	3.767	77.05
0.108	1.12	1.025	8.11	1.942	30.06	2.858	54.47	3.775	77.66
0.117	1.40	1.033	8.39	1.950	30.34	2.867	54.47	3.783	77.66
0.125	1.40	1.042	8.67	1.958	30.34	2.875	54.77	3.792	78.27
0.133	1.40	1.050	8.67	1.967	30.63	2.883	55.06	3.800	78.27
0.142	1.40	1.058	8.95	1.975	30.91	2.892	55.35	3.808	78.27
0.150	1.40	1.067	8.95	1.983	31.20	2.900	55.64	3.817	78.27
0.158	1.40	1.075	8.95	1.992	31.20	2.908	55.64	3.825	78.88
0.167	1.40	1.083	9.51	2.000	31.48	2.917	55.64	3.833	78.88
0.175	1.68	1.092	9.51	2.008	31.76	2.925	56.23	3.842	78.88

Table S6. First 4.5 s Jet d'eau relative height time series derived from the Geneva Jet d'eau dataset for the 120 fps acquisition (continued).

Time (s)	Height (m)	Time (s)	Height (m)	Time (s)	Height (m)	Time (s)	Height (m)	Time (s)	Height (m)
0.183	1.68	1.100	9.79	2.017	32.05	2.933	56.23	3.850	78.88
0.192	1.68	1.108	9.79	2.025	32.33	2.942	56.23	3.858	79.48
0.200	1.68	1.117	10.07	2.033	32.62	2.950	56.81	3.867	79.48
0.208	1.68	1.125	10.07	2.042	32.62	2.958	56.81	3.875	79.48
0.217	1.68	1.133	10.07	2.050	32.90	2.967	57.40	3.883	80.09
0.225	1.68	1.142	10.35	2.058	33.18	2.975	57.40	3.892	80.09
0.233	1.68	1.150	10.63	2.067	33.47	2.983	57.40	3.900	80.09
0.242	1.96	1.158	10.63	2.075	33.75	2.992	57.98	3.908	80.09
0.250	1.96	1.167	11.19	2.083	34.04	3.000	57.98	3.917	80.70
0.258	1.96	1.175	11.19	2.092	34.04	3.008	58.57	3.925	80.70
0.267	1.96	1.183	11.19	2.100	34.32	3.017	58.57	3.933	80.70
0.275	1.96	1.192	11.47	2.108	34.61	3.025	58.57	3.942	81.32
0.283	1.96	1.200	11.75	2.117	34.89	3.033	58.57	3.950	81.32
0.292	1.96	1.208	12.03	2.125	35.18	3.042	59.16	3.958	81.93
0.300	1.96	1.217	12.03	2.133	35.18	3.050	59.16	3.967	81.93
0.308	1.96	1.225	12.31	2.142	35.46	3.058	59.75	3.975	81.93
0.317	2.24	1.233	12.31	2.150	35.75	3.067	59.75	3.983	81.93
0.325	2.24	1.242	12.59	2.158	36.03	3.075	59.75	3.992	82.54
0.333	2.24	1.250	12.87	2.167	35.18	3.083	59.75	4.000	82.54
0.342	2.24	1.258	12.87	2.175	35.46	3.092	60.63	4.008	82.54
0.350	2.24	1.267	13.15	2.183	35.46	3.100	60.92	4.017	83.15
0.358	2.24	1.275	13.15	2.192	35.75	3.108	60.92	4.025	83.15
0.367	2.24	1.283	13.43	2.200	36.03	3.117	61.22	4.033	83.15
0.375	2.24	1.292	13.71	2.208	36.32	3.125	61.51	4.042	83.15
0.383	2.24	1.300	13.71	2.217	36.60	3.133	61.51	4.050	83.77
0.392	2.24	1.308	14.28	2.225	36.60	3.142	61.81	4.058	83.77
0.400	2.24	1.317	14.28	2.233	37.17	3.150	62.10	4.067	83.77
0.408	2.52	1.325	14.56	2.242	37.17	3.158	62.10	4.075	83.77
0.417	2.52	1.333	14.56	2.250	37.17	3.167	62.10	4.083	84.38
0.425	2.80	1.342	14.84	2.258	37.74	3.175	62.69	4.092	84.38
0.433	2.80	1.350	15.12	2.267	38.03	3.183	63.28	4.100	85.00
0.442	2.80	1.358	15.40	2.275	38.03	3.192	63.28	4.108	85.00
0.450	2.80	1.367	15.40	2.283	38.60	3.200	63.28	4.117	85.00
0.458	2.52	1.375	15.68	2.292	38.60	3.208	63.28	4.125	85.00
0.467	2.80	1.383	15.96	2.300	38.89	3.217	63.88	4.133	85.62
0.475	2.80	1.392	16.24	2.308	38.89	3.225	63.88	4.142	85.62
0.483	2.80	1.400	16.24	2.317	39.46	3.233	63.88	4.150	85.62
0.492	3.08	1.408	16.52	2.325	39.46	3.242	64.47	4.158	86.23
0.500	3.08	1.417	16.52	2.333	39.74	3.250	64.47	4.167	86.23
0.508	3.08	1.425	16.80	2.342	40.03	3.258	65.06	4.175	86.23
0.517	3.08	1.433	17.08	2.350	40.32	3.267	65.06	4.183	86.23
0.525	3.08	1.442	17.36	2.358	40.32	3.275	65.06	4.192	86.85
0.533	2.80	1.450	17.36	2.367	40.60	3.283	65.65	4.200	86.85
0.542	2.80	1.458	17.64	2.375	41.18	3.292	65.65	4.208	86.85
0.550	2.80	1.467	17.93	2.383	41.46	3.300	65.65	4.217	87.47
0.558	2.80	1.475	18.21	2.392	41.46	3.308	65.65	4.225	87.47
0.567	2.80	1.483	18.21	2.400	41.75	3.317	66.25	4.233	87.47
0.575	2.80	1.492	18.49	2.408	41.75	3.325	66.25	4.242	87.47
0.583	3.08	1.500	18.77	2.417	41.75	3.333	66.84	4.250	88.09
0.592	2.80	1.508	18.77	2.425	42.32	3.342	66.84	4.258	88.09

Table S6. First 4.5 s Jet d'eau relative height time series derived from the Geneva Jet d'eau dataset for the 120 fps acquisition (continued).

Time (s)	Height (m)	Time (s)	Height (m)	Time (s)	Height (m)	Time (s)	Height (m)	Time (s)	Height (m)
0.600	3.08	1.517	19.05	2.433	42.61	3.350	67.44	4.267	88.09
0.608	2.80	1.525	19.33	2.442	42.90	3.358	67.44	4.275	88.71
0.617	2.80	1.533	19.33	2.450	43.47	3.367	67.44	4.283	88.71
0.625	3.08	1.542	19.61	2.458	43.47	3.375	67.44	4.292	88.71
0.633	3.08	1.550	19.89	2.467	43.76	3.383	68.03	4.300	89.33
0.642	2.80	1.558	20.18	2.475	43.76	3.392	68.03	4.308	89.33
0.650	2.80	1.567	20.46	2.483	44.34	3.400	68.03	4.317	89.33
0.658	2.80	1.575	20.74	2.492	44.34	3.408	68.63	4.325	89.33
0.667	2.80	1.583	20.74	2.500	44.34	3.417	68.93	4.333	89.33
0.675	3.08	1.592	21.02	2.508	44.34	3.425	69.23	4.342	89.33
0.683	3.35	1.600	21.30	2.517	44.91	3.433	69.83	4.350	89.96
0.692	3.63	1.608	21.30	2.525	45.49	3.442	69.83	4.358	89.96
0.700	3.63	1.617	21.58	2.533	45.49	3.450	69.83	4.367	89.96
0.708	3.63	1.625	21.58	2.542	45.49	3.458	70.13	4.375	90.58
0.717	3.91	1.633	21.87	2.550	46.06	3.467	70.13	4.383	90.58
0.725	3.91	1.642	22.15	2.558	46.06	3.475	70.43	4.392	91.20
0.733	3.91	1.650	22.43	2.567	46.06	3.483	70.43	4.400	91.20
0.742	3.91	1.658	22.71	2.575	46.64	3.492	70.43	4.408	91.20
0.750	3.91	1.667	22.99	2.583	46.93	3.500	70.72	4.417	91.20
0.758	3.91	1.675	23.28	2.592	46.93	3.508	71.02	4.425	91.20
0.767	4.19	1.683	23.28	2.600	47.22	3.517	71.62	4.433	91.83
0.775	4.19	1.692	23.56	2.608	47.51	3.525	71.62	4.442	91.83
0.783	4.47	1.700	23.84	2.617	47.80	3.533	71.62	4.450	91.83
0.792	4.47	1.708	23.84	2.625	48.09	3.542	71.62	4.458	91.83
0.800	4.75	1.717	24.12	2.633	48.09	3.550	72.22	4.467	92.46
0.808	4.47	1.725	24.40	2.642	48.37	3.558	72.22	4.475	92.46
0.817	4.75	1.733	24.69	2.650	48.66	3.567	72.22	4.483	92.46
0.825	4.75	1.742	24.69	2.658	48.66	3.575	72.83	4.492	93.08
0.833	4.75	1.750	24.97	2.667	48.95	3.583	72.83	4.500	93.08
0.842	5.03	1.758	24.97	2.675	49.24	3.592	73.43		
0.850	5.03	1.767	25.53	2.683	49.53	3.600	73.43		
0.858	5.03	1.775	25.53	2.692	50.11	3.608	73.43		
0.867	5.59	1.783	25.82	2.700	50.11	3.617	74.03		
0.875	5.59	1.792	25.82	2.708	50.40	3.625	74.03		
0.883	5.59	1.800	26.10	2.717	50.40	3.633	74.03		
0.892	6.43	1.808	26.38	2.725	50.69	3.642	74.03		
0.900	6.43	1.817	26.66	2.733	50.69	3.650	74.63		
0.908	6.71	1.825	26.66	2.742	50.98	3.658	74.63		

Table S7. Ash plume events visually identified from images at Stromboli, during 20–26 September 2025.

Observation date	Start time (UTC+2)	Observation date	Start time (UTC+2)	Observation date	Start time (UTC+2)
20 September 2025	16:54	23 September 2025	13:43	24 September 2025	14:26
	16:59		13:50		14:39
	17:02		14:13		14:43
	17:06		14:48		14:52
21 September 2025	15:19	24 September 2025	14:49	26 September 2025	14:56
	15:41		15:05		15:01
	15:47		15:18		15:11
	16:22		15:23		15:21
	16:33		15:39		15:40
	16:37		16:00		15:47
	17:02		16:25		15:56
	17:08		09:35		16:01
	17:15		09:46		16:07
	17:15		09:59		16:14
22 September 2025	14:39		10:04		16:19
	16:35		10:45		16:34
	16:51		10:59		16:43
	16:53		11:04		11:11
	16:56		11:08		11:21
23 September 2025	16:58		11:40		11:28
	10:27		11:57		11:36
	10:34		12:01		11:37
	10:38		12:13		11:43
	10:56		12:21		11:50
	11:07		12:23		11:53
	11:16		12:51		12:02
	11:22		12:58		12:14
	11:34 (i)		13:16		12:20
	11:44 (ii)		13:26		12:32
	11:57 (iii)		13:31		12:49
	12:15 (iv)		13:36		12:58
	12:20 (v)		13:44		13:07
	12:33 (vi)		13:52		13:14
	12:42 (vii)		14:02		13:21
	12:57 (viii)		14:11		
	13:10		14:21		
	13:35				

Table S8. Plume height time series for Stromboli event (i) on 23 September 2025 at 11:34 (UTC+2).

Time (UTC+2)	Height (m a.s.l.)	Time (UTC+2)	Height (m a.s.l.)	Time (UTC+2)	Height (m a.s.l.)
11:34:08	760.0 ± 40.0	11:34:32	1045.0 ± 21.4	11:34:56	1240.6 ± 25.9
11:34:11	835.7 ± 16.7	11:34:35	1071.7 ± 22.0	11:34:59	1261.7 ± 26.4
11:34:14	882.7 ± 17.7	11:34:38	1104.3 ± 22.8	11:35:02	1283.7 ± 26.9
11:34:17	911.3 ± 18.4	11:34:41	1130.9 ± 23.4	11:35:05	1302.5 ± 27.3
11:34:20	941.8 ± 19.1	11:34:44	1150.0 ± 23.8	11:35:08	1320.8 ± 27.7
11:34:23	966.7 ± 19.6	11:34:47	1172.9 ± 24.3	11:35:11	1332.4 ± 28.0
11:34:26	996.0 ± 20.3	11:34:50	1192.6 ± 24.8	11:35:14	1342.3 ± 28.2
11:34:29	1018.3 ± 20.8	11:34:53	1219.3 ± 25.4		

Table S9. Plume height time series for Stromboli event (ii) on 23 September 2025 at 11:44 (UTC+2).

Time (UTC+2)	Height (m a.s.l.)	Time (UTC+2)	Height (m a.s.l.)	Time (UTC+2)	Height (m a.s.l.)
11:44:08	760.0 ± 40.0	11:44:38	1064.0 ± 21.9	11:45:08	1227.4 ± 25.6
11:44:11	844.7 ± 16.9	11:44:41	1087.9 ± 22.4	11:45:11	1239.3 ± 25.8
11:44:14	870.8 ± 17.5	11:44:44	1107.1 ± 22.8	11:45:14	1250.7 ± 26.1
11:44:17	901.5 ± 18.2	11:44:47	1128.3 ± 23.3	11:45:17	1261.4 ± 26.3
11:44:20	922.7 ± 18.7	11:44:50	1147.0 ± 23.7	11:45:20	1273.2 ± 26.6
11:44:23	943.3 ± 19.1	11:44:53	1164.2 ± 24.1	11:45:23	1280.0 ± 26.8
11:44:26	960.5 ± 19.5	11:44:56	1178.2 ± 24.5	11:45:26	1290.1 ± 27.0
11:44:29	988.5 ± 20.1	11:44:59	1192.5 ± 24.8	11:45:29	1295.2 ± 27.1
11:44:32	1012.9 ± 20.7	11:45:02	1204.2 ± 25.0	11:45:32	1303.6 ± 27.3
11:44:35	1040.3 ± 21.3	11:45:05	1216.1 ± 25.3	11:45:35	1306.1 ± 27.4

Table S10. Plume height time series for Stromboli event (iii) on 23 September 2025 at 11:57 (UTC+2).

Time (UTC+2)	Height (m a.s.l.)	Time (UTC+2)	Height (m a.s.l.)	Time (UTC+2)	Height (m a.s.l.)
11:57:41	760.0 ± 40.0	11:58:11	1148.1 ± 23.8	11:58:41	1382.7 ± 29.1
11:57:44	886.0 ± 17.8	11:58:14	1173.8 ± 24.3	11:58:44	1403.7 ± 29.6
11:57:47	904.1 ± 18.2	11:58:17	1193.9 ± 24.8	11:58:47	1421.8 ± 30.0
11:57:50	933.5 ± 18.9	11:58:20	1220.4 ± 25.4	11:58:50	1441.2 ± 30.4
11:57:53	965.9 ± 19.6	11:58:23	1243.7 ± 25.9	11:58:53	1459.1 ± 30.8
11:57:56	1005.8 ± 20.5	11:58:26	1267.5 ± 26.5	11:58:56	1479.2 ± 31.3
11:57:59	1035.9 ± 21.2	11:58:29	1291.0 ± 27.0	11:58:59	1495.5 ± 31.7
11:58:02	1062.6 ± 21.8	11:58:32	1316.7 ± 27.6	11:59:02	1504.7 ± 31.9
11:58:05	1089.0 ± 22.4	11:58:35	1340.6 ± 28.1	11:59:05	1513.4 ± 32.1
11:58:08	1117.7 ± 23.1	11:58:38	1365.3 ± 28.7		

Table S11. Plume height time series for Stromboli event (iv) on 23 September 2025 at 12:15 (UTC+2).

Time (UTC+2)	Height (m a.s.l.)	Time (UTC+2)	Height (m a.s.l.)	Time (UTC+2)	Height (m a.s.l.)
12:15:32	760.0 ± 40.0	12:15:44	895.8 ± 18.0	12:15:56	993.4 ± 20.3
12:15:35	843.8 ± 16.9	12:15:47	921.9 ± 18.6	12:15:59	1017.6 ± 20.8
12:15:38	862.0 ± 17.3	12:15:50	945.6 ± 19.2	12:16:02	1043.2 ± 21.4
12:15:41	875.0 ± 17.6	12:15:53	967.7 ± 19.7	12:16:05	1060.2 ± 21.8

Table S12. Plume height time series for Stromboli event (v) on 23 September 2025 at 12:20 (UTC+2).

Time (UTC+2)	Height (m a.s.l.)	Time (UTC+2)	Height (m a.s.l.)	Time (UTC+2)	Height (m a.s.l.)
12:20:04	760.0 ± 40.0	12:20:22	1009.9 ± 20.6	12:20:40	1198.3 ± 24.9
12:20:07	836.7 ± 16.7	12:20:25	1035.4 ± 21.2	12:20:43	1233.4 ± 25.7
12:20:10	879.5 ± 17.7	12:20:28	1070.0 ± 22.0	12:20:46	1252.3 ± 26.1
12:20:13	934.2 ± 18.9	12:20:31	1105.7 ± 22.8	12:20:49	1278.6 ± 26.7
12:20:16	961.6 ± 19.5	12:20:34	1137.5 ± 23.5		
12:20:19	984.8 ± 20.1	12:20:37	1163.4 ± 24.1		

Table S13. Plume height time series for Stromboli event (vi) on 23 September 2025 at 12:33 (UTC+2).

Time (UTC+2)	Height (m a.s.l.)	Time (UTC+2)	Height (m a.s.l.)	Time (UTC+2)	Height (m a.s.l.)
12:33:17	760.0 ± 40.0	12:33:32	952.8 ± 19.3	12:33:47	1031.9 ± 21.1
12:33:20	836.9 ± 16.7	12:33:35	974.0 ± 19.8	12:33:50	1043.9 ± 21.4
12:33:23	866.1 ± 17.4	12:33:38	991.9 ± 20.2	12:33:53	1049.8 ± 21.5
12:33:26	893.8 ± 18.0	12:33:41	1009.5 ± 20.6		
12:33:29	923.2 ± 18.7	12:33:44	1019.6 ± 20.8		

Table S14. Plume height time series for Stromboli event (vii) on 23 September 2025 at 12:42 (UTC+2).

Time (UTC+2)	Height (m a.s.l.)	Time (UTC+2)	Height (m a.s.l.)	Time (UTC+2)	Height (m a.s.l.)
12:42:42	760.0 ± 40.0	12:43:00	1008.1 ± 20.6	12:43:18	1126.9 ± 23.3
12:42:45	853.7 ± 17.1	12:43:03	1031.7 ± 21.1	12:43:21	1141.7 ± 23.6
12:42:48	888.2 ± 17.9	12:43:06	1051.4 ± 21.6	12:43:24	1155.3 ± 23.9
12:42:51	927.0 ± 18.7	12:43:09	1068.5 ± 22.0	12:43:27	1163.5 ± 24.1
12:42:54	952.2 ± 19.3	12:43:12	1092.3 ± 22.5	12:43:30	1163.5 ± 24.1
12:42:57	979.0 ± 19.9	12:43:15	1113.4 ± 23.0		

Table S15. Plume height time series for Stromboli event (viii) on 23 September 2025 at 12:57 (UTC+2).

Time (UTC+2)	Height (m a.s.l.)	Time (UTC+2)	Height (m a.s.l.)	Time (UTC+2)	Height (m a.s.l.)
12:57:42	760.0 ± 40.0	12:58:00	973.9 ± 19.8	12:58:18	1096.8 ± 22.6
12:57:45	846.5 ± 16.9	12:58:03	997.4 ± 20.3	12:58:21	1116.0 ± 23.0
12:57:48	871.3 ± 17.5	12:58:06	1022.7 ± 20.9	12:58:24	1126.6 ± 23.3
12:57:51	900.2 ± 18.1	12:58:09	1046.6 ± 21.5	12:58:27	1138.5 ± 23.5
12:57:54	923.3 ± 18.7	12:58:12	1059.3 ± 21.8		
12:57:57	948.7 ± 19.2	12:58:15	1078.1 ± 22.2		

Laboratory experiment

Table S16. Plume height and velocity time series derived from the laboratory plume experiment dataset.

Time (s)	Length (cm)	Velocity (cm s^{-1})	Time (s)	Length (cm)	Velocity (cm s^{-1})
0.000	0.00	–	0.267	6.17	3.3
0.008	0.66	74.0	0.275	6.21	4.4
0.017	1.23	100.6	0.283	6.24	5.5
0.025	2.34	79.6	0.292	6.30	4.1
0.033	2.56	60.8	0.300	6.31	2.5
0.042	3.35	60.8	0.308	6.34	2.5
0.050	3.57	35.4	0.317	6.35	5.0
0.058	3.94	30.9	0.325	6.42	7.5
0.067	4.09	26.5	0.333	6.48	6.9
0.075	4.38	24.3	0.342	6.54	5.2
0.083	4.49	17.7	0.350	6.57	3.9
0.092	4.68	25.4	0.358	6.60	3.3
0.100	4.92	19.9	0.367	6.62	3.9
0.108	5.01	15.5	0.375	6.67	3.9
0.117	5.17	19.9	0.383	6.69	3.3
0.125	5.34	8.8	0.392	6.72	3.3
0.133	5.32	2.2	0.400	6.74	3.9
0.142	5.38	9.9	0.408	6.79	4.4
0.150	5.49	4.4	0.417	6.81	3.3
0.158	5.45	-1.1	0.425	6.84	4.4
0.167	5.47	6.6	0.433	6.89	5.5
0.175	5.56	11.0	0.442	6.93	5.0
0.183	5.65	9.9	0.450	6.97	2.8
0.192	5.73	9.9	0.458	6.98	3.9
0.200	5.82	8.8	0.467	7.03	5.0
0.208	5.87	6.6	0.475	7.06	4.4
0.217	5.93	4.4	0.483	7.11	2.2
0.225	5.95	6.6	0.492	7.10	2.8
0.233	6.04	6.6	0.500	7.15	2.8
0.242	6.06	5.5	0.508	7.15	1.7
0.250	6.13	5.5	0.517	7.18	4.4
0.258	6.15	2.2			