Supplementary materials

Major elements were analysed using a JEOL JXA-8530F field emission Electron Microprobe Analyzer (EMPA) at the Photon Science Institute, University of Manchester (UK). Melt inclusions (MIs) in plagioclase phenocrysts and matrix glasses (gm) compositions were analysed using a 15 kV accelerating voltage, 10 nA beam current and beam size of 10 or 5 μm. Standard materials used for calibration were albite for Na; periclase for Mg; corundum for Al; fayalite for Fe; tephroite for Mn; apatite for P; sanidine for K; pyrite for S; halite for Cl; wollastonite for Ca and Si; and rutile for Ti. Sodium and potassium were measured first to minimize loss owing to volatilization.

According to Castruccio et al., [2016], we consider scoriae of the first layer (layer A) as produced by Eruption 1 and those from the other three layers (layers B, C and D) by Eruption 2. Sulfur concentrations in the MIs of Eruption 1 (scoriae of layer A) vary from 240 to 520 ppm (Supplementary Table 1), and S contents in the MIs of Eruption 2 (scoriae of layers B, C and D) ranges between 270 and 590 ppm. Low values of S are measured in the matrix glasses of the scoriae erupted from both eruptions, ranging between 30 and 150 ppm (these values are close to the detection limit of the electron microprobe, see Supplementary Table 1). The mean S content in the andesitic melt at pre-eruptive conditions is equal to 350 ppm for Eruption 1 and 400 ppm for Eruption 2, whereas, the residual andesitic-dacitic melt was practically devoid of S (<100 ppm).

Supplementary Table 1

Sample	SiO_2	TiO_2	Al_2O_3	FeO	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	Cl	S	Total	S-error (2s)
DF10A														
DF10A_MI_1	60.72	1.50	15.50	8.14	0.28	2.88	4.16	3.07	1.14	0.29	0.20	0.052	97.92	0.007
DF10A_MI_2	60.67	1.13	15.94	8.63	0.21	2.52	4.27	3.65	1.08	0.19	0.19	0.028	98.50	0.006
DF10A_MI_3	60.94	1.55	15.86	9.03	0.25	2.67	3.84	2.93	1.18	0.34	0.19	0.025	98.79	0.007
DF10A_MI_4	62.27	1.39	15.25	8.26	0.21	2.30	3.94	3.27	1.43	0.37	0.20	0.028	98.91	0.015
DF10A_MI_5	57.73	1.14	15.06	8.48	0.17	3.08	5.25	4.57	1.16	0.14	0.18	0.045	97.00	0.008
DF10A_MI_6	57.96	1.17	15.90	8.61	0.17	3.02	5.23	4.09	1.12	0.14	0.19	0.047	97.65	0.011
DF10A_MI_7	60.70	1.06	15.15	6.87	0.14	2.38	4.59	4.39	1.31	0.19	0.17	0.036	96.99	0.004
DF10A_MI_8	60.62	1.07	15.85	6.95	0.15	2.35	4.54	4.02	1.26	0.16	0.17	0.036	97.18	0.005
DF10A_MI_9	57.76	1.18	15.76	8.64	0.17	3.00	5.22	4.37	1.11	0.10	0.19	0.024	97.53	0.009
DF10A_MI_10	58.00	1.25	15.49	8.42	0.19	2.90	5.31	4.16	1.13	0.21	0.19	0.031	97.29	0.009
DF10A_gm_1	63.21	1.16	16.04	6.89	0.16	1.05	4.40	4.53	1.40	0.48	0.23	0.010	99.56	0.007
DF10A_gm_2	63.15	1.15	16.29	6.77	0.16	1.36	4.38	4.22	1.32	0.35	0.22	0.009	99.37	0.007
DF10B														
DF10B_MI_1	60.15	1.20	15.93	8.69	0.20	2.63	5.02	3.04	1.23	0.27	0.30	0.028	98.68	0.010
DF10B_MI_2	59.90	1.11	17.50	7.00	0.13	2.17	4.91	3.40	1.21	0.27	0.29	0.040	97.93	0.011
DF10B_MI_3	59.11	1.10	16.24	8.75	0.18	2.72	5.50	3.11	1.19	0.28	0.30	0.049	98.52	0.010
DF10B_MI_4	61.85	1.14	16.94	7.24	0.17	2.37	4.62	3.01	1.25	0.25	0.18	0.032	99.05	0.008
DF10B_MI_5	59.26	1.11	16.23	8.15	0.17	2.60	5.27	3.64	1.36	0.30	0.31	0.045	98.45	0.010
DF10B_MI_6	59.62	0.98	17.34	6.59	0.14	2.13	6.11	4.60	1.37	0.23	0.22	0.034	99.36	0.010
DF10B_MI_7	62.77	0.59	17.42	5.74	0.10	2.16	4.44	3.92	1.25	0.23	0.21	0.029	98.86	0.010
DF10B_MI_8	61.50	0.65	17.29	5.86	0.10	2.26	4.48	4.26	1.28	0.21	0.21	0.028	98.14	0.010
DF10B_MI_9	61.71	0.58	16.51	5.96	0.11	2.51	4.39	4.08	1.26	0.20	0.22	0.027	97.56	0.010
DF10B_MI_10	59.61	1.04	17.11	6.96	0.16	2.12	5.31	4.24	1.14	0.24	0.27	0.037	98.24	0.010
DF10B_gm_1	62.14	1.15	15.31	7.06	0.20	2.41	4.69	4.14	1.38	0.20	0.25	0.013	98.95	0.007
DF10B_gm_2	62.22	1.12	15.96	6.92	0.18	2.26	4.42	4.08	1.35	0.15	0.25	0.012	98.93	0.007
DF10C														
DF10C_MI_1	60.93	0.91	16.91	6.73	0.14	1.92	4.69	3.79	1.39	0.23	0.25	0.041	97.94	0.010
DF10C_MI_2	60.02	1.06	17.58	6.88	0.14	2.19	4.79	3.14	1.23	0.35	0.24	0.037	97.66	0.010
DF10C_MI_3	60.99	0.94	16.39	6.86	0.16	1.98	4.71	3.79	1.30	0.32	0.31	0.031	97.78	0.010
DF10C_gm_1	62.66	0.95	17.21	5.84	0.13	1.74	4.65	4.09	1.28	0.28	0.19	0.006	99.03	0.006
DF10C_gm_2	62.30	1.01	16.71	6.52	0.15	1.84	5.05	4.12	1.20	0.21	0.21	0.005	99.34	0.005
DF10C_gm_3	61.01	1.00	17.05	6.70	0.16	2.21	5.32	4.02	1.37	0.26	0.26	0.015	99.37	0.005
DF10C_gm_4	62.24	1.02	17.08	6.31	0.14	1.97	4.86	4.13	1.30	0.23	0.20	0.008	99.49	0.006
DF10C_gm_5	62.11	0.99	16.49	6.47	0.14	1.91	5.22	4.15	1.21	0.19	0.19	0.003	99.08	0.005
DF10D														
DF10D_MI_1	60.64	1.19	15.34	8.58	0.20	2.67	4.61	3.57	1.24	0.32	0.30	0.051	98.71	0.010
DF10D_MI_2	62.42	1.37	15.05	8.07	0.20	2.71	3.77	3.35	1.38	0.31	0.34	0.045	99.02	0.009
DF10D_MI_3	60.31	1.12	16.90	7.62	0.15	2.49	4.79	3.56	1.30	0.29	0.28	0.050	98.86	0.009
DF10D_MI_4	60.08	1.17	16.34	8.09	0.17	2.72	4.83	3.28	1.30	0.29	0.33	0.049	98.65	0.012
DF10D_MI_5	60.33	1.31	15.07	9.63	0.21	2.98	4.50	3.16	1.27	0.32	0.36	0.059	99.20	0.009
DF10D_MI_6	60.8	1.30	15.14	9.07	0.21	2.80	4.79	3.30	1.20	0.27	0.34	0.049	99.27	0.010
DF10D_MI_7	59.74	1.06	17.45	7.05	0.15	2.15	5.25	3.71	1.28	0.24	0.26	0.044	98.38	0.009
DF10D_MI_8	61.76	1.33	15.61	8.05	0.21	2.86	4.39	3.04	1.25	0.34	0.31	0.044	99.19	0.009
DF10D_MI_9	61.97	1.40	14.27	8.11	0.22	2.88	4.35	3.24	1.28	0.35	0.32	0.034	98.43	0.009
DF10D_MI_10	62.28	1.33	14.77	8.45	0.19	2.66	4.00	3.46	1.32	0.32	0.25	0.059	99.09	0.014
DF10D_MI_11	59.79	1.01	17.02	6.80	0.17	2.08	5.37	3.55	1.19	0.26	0.27	0.031	97.53	0.009
DF10D_MI_12	61.8	1.36	15.09	8.37	0.16	2.82	4.02	3.33	1.26	0.29	0.28	0.057	98.84	0.013
DF10D_gm_1	64.65	1.37	15.76	6.66	0.12	1.09	3.32	3.97	1.76	0.42	0.33	0.012	99.46	0.008
DF10D_gm_2	62.74	1.07	17.14	5.85	0.13	1.14	4.88	4.16	1.35	0.27	0.23	0.010	98.98	0.008
DF10D_gm_3	63.06	1.06	16.90	5.59	0.12	1.02	4.74	4.10	1.51	0.37	0.25	0.007	98.72	0.007

note: MI = Melt inclusion. gm = Matrix glass. The nomenclature reported from Romero et al., [2016] is used for tephra fall layers (A, B, C and D).