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Processes culminating in the 2015 phreatic explosion at Lascar volcano, Chile, evidenced by multiparametric data

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Supplementary table and figures

Table S1: Time series of plume center SO_2 SCDs of the October 30th, 2015 eruption along with corresponding SO_2-fluxes and plume transport conditions at approximately 5 km distance from crater, where the volcanic plume intercepts the field of view of the scanning DOAS. Exact UTC times of plume center intercept are indicated. The horizontal red line marks the time of eruption onset and bright yellow to orange cell fills provide amplitude information for each data column. Plume transport directions were determined by means of triangulation using the location of the center of SO_2 mass in combination with the plume heights retrieved from visual imagery (see Figure S3b). Plume heights 5 km downwind of the crater were assumed to be about 100 m higher than those measured directly above source, since the plume was observed to continue rising slightly when being drifted downwind of the crater. Heights are given with respect to elevation of the crater rim. Wind speeds at plume height were obtained from GDAS1 atmospheric soundings provided by NOAA.

Time (hh:mm:ss)	SO_2 SCD (ppmm)	SO_2 SCD (molecules cm^{-2})	SO_2-flux (kg sec^{-1})	Plume Direction (deg)	Plume Height (m.a. Crater Rim)	Wind Speed at Plume Height (m sec^{-1})
11:50:50	249	6.23E+17	4.11	76.9	200	10.2
12:03:05	203	5.08E+17	9.75	40.5	200	7.8
12:16:32	646	1.62E+18	13.54	87.1	1000	8.64
12:27:52	766	1.92E+18	55.14	62.8	1800	11.57
12:37:57	610	1.53E+18	54.44	72.9	2200	12.4
12:48:01	656	1.64E+18	49.28	38.3	1500	11
12:57:33	425	1.06E+18	40.33	33.3	1300	10.53
13:06:56	462	1.16E+18	44.38	31.3	1500	10.53
13:16:36	435	1.09E+18	25.19	8.9	600	9.9
13:25:07	440	1.10E+18	19.19	10.8	500	9.9
13:33:56	520	1.30E+18	16.96	12.5	400	9.9
13:42:51	382	9.55E+17	13.31	9	400	9.6
13:51:54	199	4.98E+17	8.15	8.6	300	7.8
14:00:13	126	3.15E+17	6.7	5.6	300	7.8
14:08:28	134	3.35E+17	3.61	5.6	300	7.8
14:16:44	66	1.64E+17	3.18	3.7	200	7.8

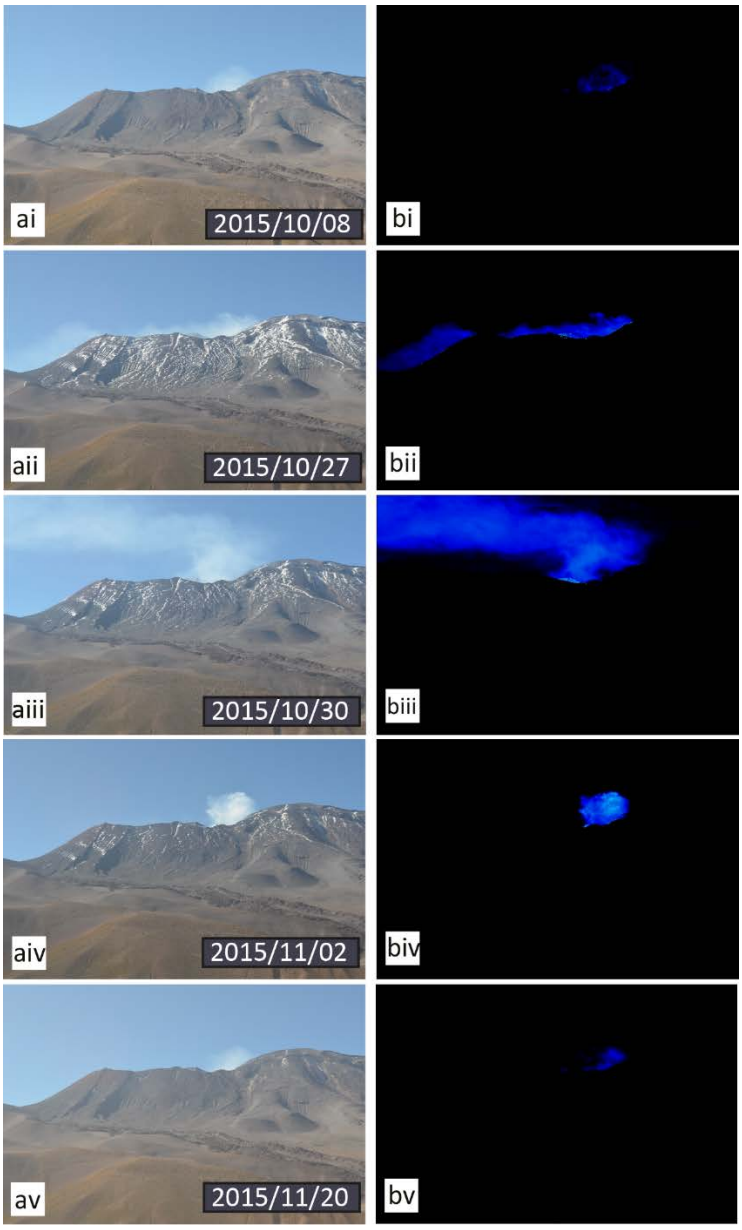

Figure S1: Example of images from camera C2 (see Figure 1 for location) used for brightness analysis for the period 1st October to 30th November. Column (a) shows raw images and column (b) shows the same images after application of the mask filter. Image (aiii) shows the volcanic plume condition just after the VT cluster and 12 minutes before the eruption. All these images were made at 9:12 local time (12:12 UTC).

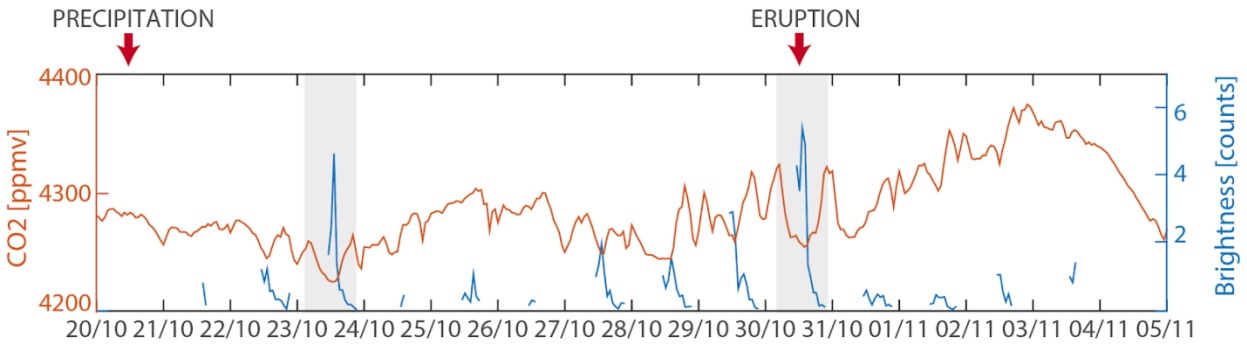

Figure S2: CO_2 mixing ratio versus hourly variations of fumarole brightness. The gray stripes show two pronounced peaks of brightness. The first one occurs three days after the precipitation (*P3, see Figure 2*) and the second one during the eruption, showing clear anticorrelation between the parameters.

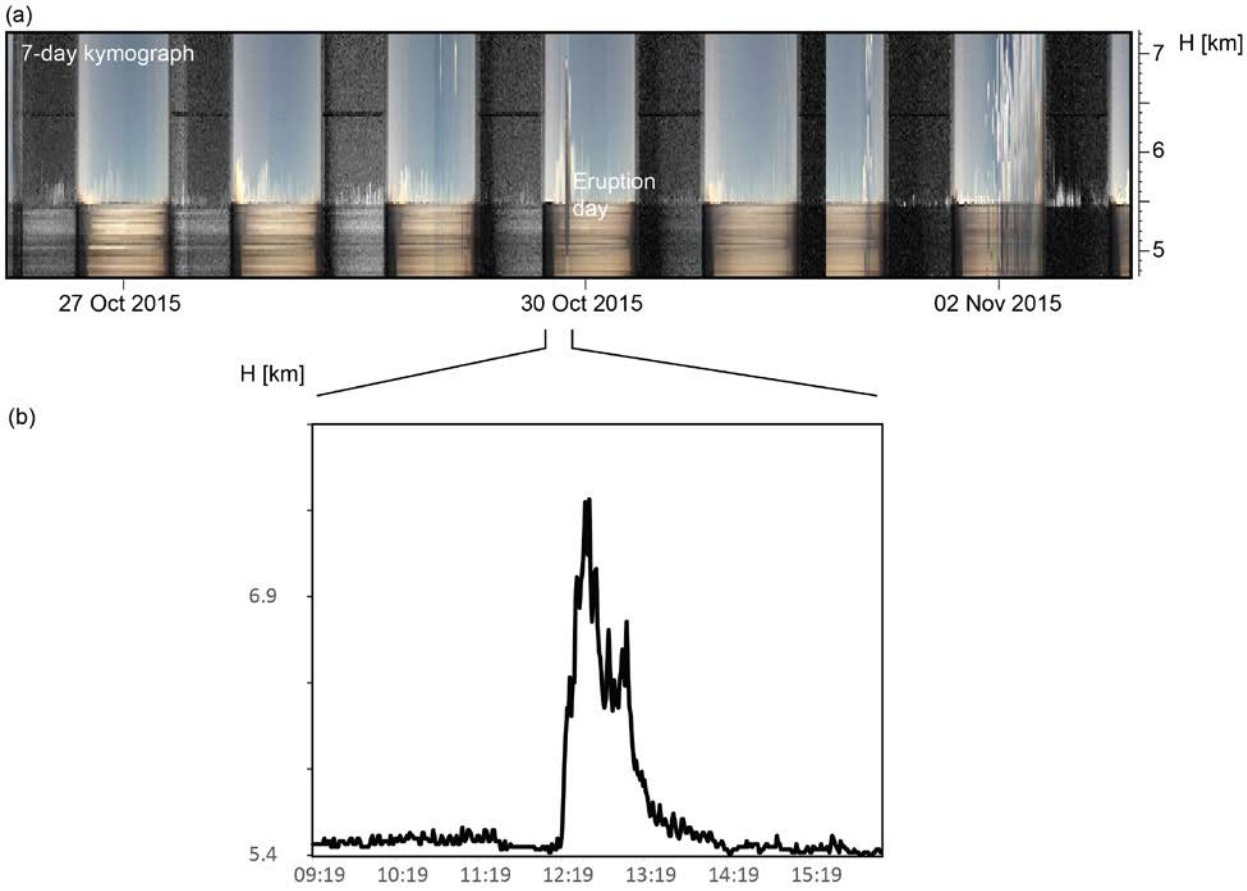

Figure S3: (a) One week kymograph showing the short eruption pulse. (b) Height variation of the eruption derived from the highest eruption point identified in the camera images along the vertical profile K-K' (see vertical line in Figure 5b).