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Cloud droplet activation properties and scavenged fraction of black carbon in liquid-phase clouds at the high-alpine research station Jungfraujoch (3580 m a.s.l.)

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Table S1. List of all 24 cloud events sampled during the CLACE2016 field campaign and additional three cloud events of the CLACE2010 campaign included in this study. Green checkmarks are used to indicate proper instrument operation. All instruments that are not shown in this table operated correctly during the whole campaign. "min/max" refers to the minimum and maximum values of the corresponding calculated parameter during a cloud event. "Stable period ID" indicates the appellation used to refer to different stable cloud periods selected for detailed analyses. Two distinct stable periods were selected for some cloud events.

Month Year	Day	Duration full event [h]	CCNC	Inter. SP2	PCVI inlet	SS_{peak} [%] (min/max)	$T_{cloud\ base}$ [°C] (min/max)	Stable period ID	Main wind dir.
June 2010	16	11	✓	✓		0.22/0.40	Not calculated	16June10	SE
July 2010	22	22.5	✓	✓		0.12/0.21	Not calculated	22July10	SE
	28	10.5	✓	✓		0.34/1.37	Not calculated	28July10	NW
June 2016	16	18	✓			0.32/1.35	-4.1/.1.7		SE
	18-19	11	✓	✓		0.21/0.56	-6.9/-5.2	18-19 June	NW
	21	22		✓		/	-1.3/2.7		NW
	25	6	✓	✓		0.12/0.24	0.7/2.4	25June	SE
	26	2	✓	✓		0.40/0.44	0.8/3.4		SE
	26-27	9.5	✓	✓		0.26/0.46	-7.0/-1.6	26-27a &26-27b June	NW
	30a	1		✓		/	0.0/0.4		SE
	30b	1		✓		/	0.0/0.9		NW
July 2016	2	3		✓		/	-0.6/0.8		NW
	5	8	✓	✓		0.49/0.76	-2.0/1.3	5July	NW
	8-9	7	✓	✓		0.42/0.71	-2.9/1.5	8-9July	NW
	22	4	✓	✓	✓	0.29/0.44	0.2/3.5		SE
	23a	2	✓			0.25/0.35	0.7/1.7		SE
	23b	2	✓			0.18/0.28	0.2/1.5		SE
	23c	1	✓			0.10/0.18	1.6/5.2		SE
	23d	1	✓			0.18/0.26	-0.1/1.0		SE
	25	3.5	✓			0.20/0.31	1.8/2.8		NW
	27a	1	✓			0.32/0.38	-0.6/0.4		NW
	27b	3	✓			0.28/0.66	-1.5/-0.7		NW
	27c	1.5	✓			0.24/1.10	-1.7/-1.0		NW
	31-1	19	✓			0.28/0.80	-2.6/1.0		NW
August 2016	2	6	✓	✓		0.64/1.11	0.5/2.2	2a & 2b August	NW
	4	7	✓	✓	✓	0.19/0.45	-0.1/4.1	4August	SE
	5-6	27	✓	✓		0.54/0.73	-5.0/-1.1	5-6a & 5-6b August	NW

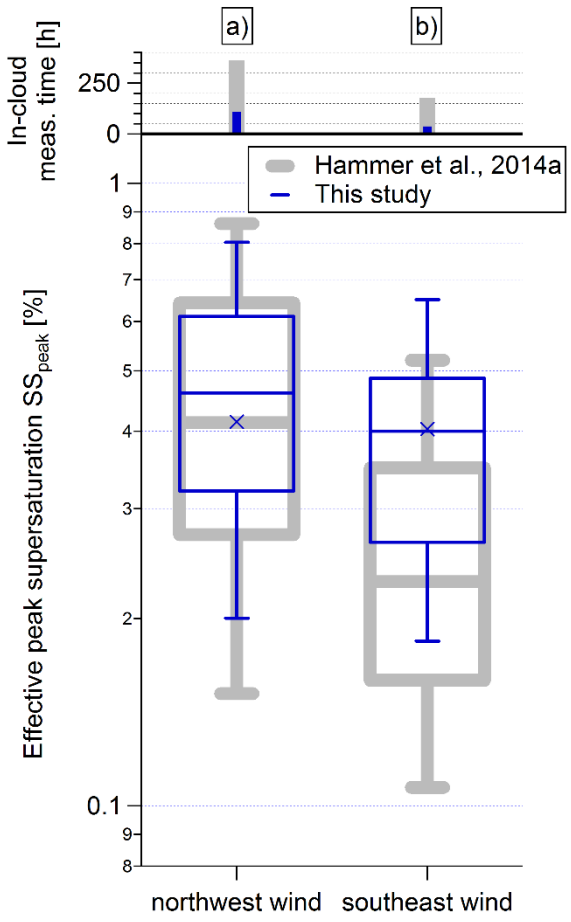

Figure S1. Boxplots representing the 10th, 25th, 50th (median), 75th, 90th percentiles and the geometric mean (cross) of SS_{peak} of all liquid cloud events sampled during the campaign together with the cumulated time of in-cloud measurements used to produce the boxplots. The data are split between northwestern (panel (a), 478 data points) and southeastern (panel (b), 129 points) wind conditions. Grey shadings indicate the statistics of 5 previous CLACE campaigns (2000, 2002, 2004, 2010, 2011) for northwest wind and 4 campaigns (same except for CLACE2000) for southeast wind.

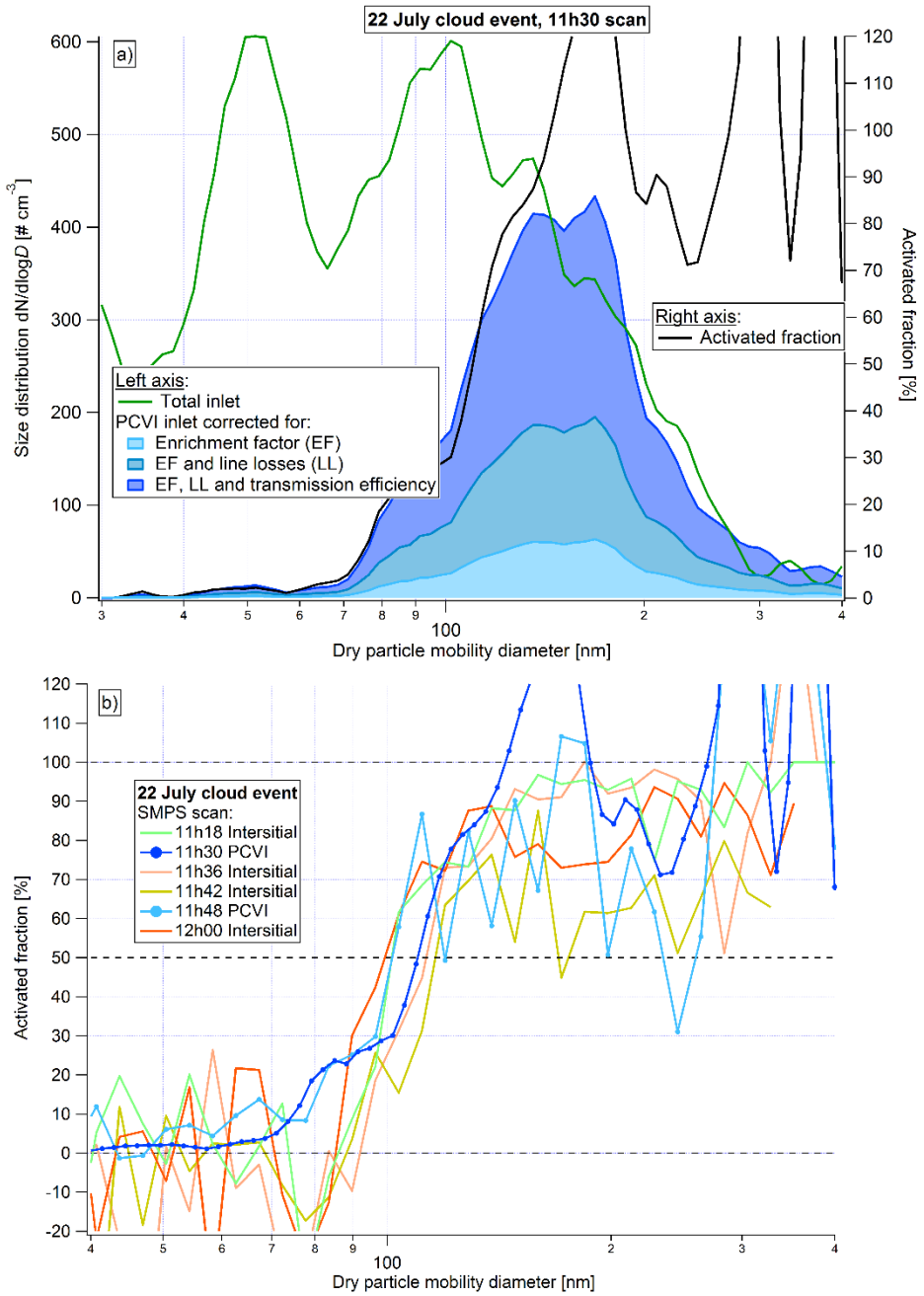

Figure S2. Cloud droplet residual particle measurements using the PCVI inlet for the example of the 22 July cloud event. (a) Particle number size distributions measured behind the total and PCVI inlets and corresponding activated fraction (Eq. 2). The corrections applied to the PCVI data are illustrated with the blue shadings. (b) Comparison between PCVI-derived and interstitial-derived activated particle fractions.

Coefficients of the manually fitted Hill equations (Fig. 8):

$$f(x) = \text{base} + (\text{max} - \text{base}) / \left(1 + \left[\frac{\text{x}_{\text{half}}}{\text{x}}\right]^{\text{rate}}\right)$$

For both BC and the total aerosol:
base: 0
max: 100

For BC:
rate: 1.95
xhalf: 1.55

For the total aerosol:
rate: 1.8
xhalf: 0.167

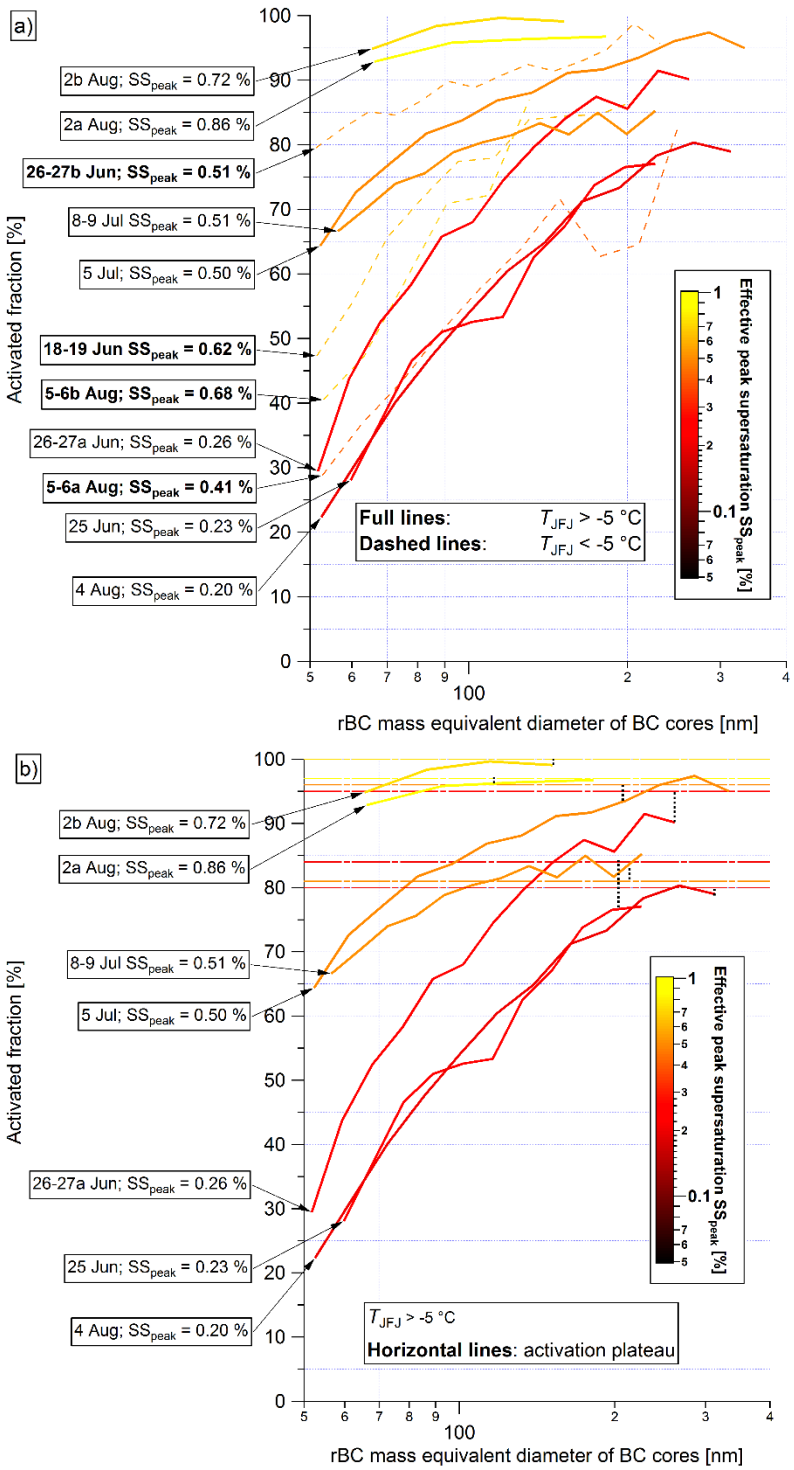

Figure S3. Variants to Fig. 9a, including CLACE 2016 cloud events only, averaged over complete stable period. (a) Four stable cloud periods with T_{JFJ} below -5 °C, which are likely to be mixed-phase clouds and therefore expected to have lowered activated fraction across all diameters due to cloud droplet evaporation (Cozic et al., 2007; Verheggen et al., 2007), are shown as dashed lines in addition to the original figure. (b) Horizontal coloured lines represent the activation plateau of all particles deduced from the SMPS data for the corresponding cloud periods with temperature above -5 °C (see Figure 7).