Balloon-borne measurements of temperature, water vapor, ozone and aerosol backscatter at the southern slopes of the Himalayas during StratoClim 2016-2017

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Supplementary material

Sounding ID	Date	Time of launch	Radiosonde	Payload	Status / notes	Burst height
NT001	Aug 02, 2016	18:59 UT	iMet-1-RSB	ECC / CFH / COBALD	-	34.4 km
NT002	Aug 03, 2016	15:20 UT	iMet-1-RSB	ECC / CFH / COBALD	-	29.0 km
NT003	Aug 05, 2016	17:23 UT	RS41-SGP / RS92-SGP	ECC / CFH / COBALD	Early burst	18.6 km
NT004	Aug 06, 2016	17:57 UT	RS41-SGP / RS92-SGP	ECC / CFH / COBALD	-	34.0 km

NT005	Aug 08, 2016	16:30 UT	RS41-SGP / RS92-SGP	ECC / CFH / CO-BALD	-	30.2 km
NT006	Aug 11, 2016	05:04 UT	RS41-SGP / RS92-SGP	ECC / CFH	CFH electronics failure	32.8 km
NT007	Aug 11, 2016	18:57 UT	RS41-SGP / RS92-SGP	ECC / CFH / CO-BALD	ECC failure, CFH contaminated	32.5 km
NT008	Aug 12, 2016	04:57 UT	RS41-SGP / RS92-SGP	ECC / CFH	-	32.0 km
NT009	Aug 12, 2016	16:20 UT	RS41-SGP / RS92-SGP	ECC / CFH / CO-BALD	Early burst	19.8 km
NT010	Aug 15, 2016	04:53 UT	RS41-SGP / RS92-SGP	ECC / CFH	CFH contaminated	29.2 km
NT011	Aug 15, 2016	16:53 UT	RS41-SGP / RS92-SGP	ECC / CFH / CO-BALD	CFH contaminated	26.7 km
NT012	Aug 16, 2016	03:43 UT	RS41-SGP / RS92-SGP	ECC / CFH	-	31.0 km
NT013	Aug 16, 2016	18:27 UT	RS41-SGP / RS92-SGP	ECC / CFH / CO-BALD	Launch failure (early burst)	2.7 km
NT014	Aug 17, 2016	10:10 UT	RS41-SGP / RS92-SGP	ECC / CFH	-	33.0 km
NT015	Aug 17, 2016	15:30 UT	RS41-SGP / RS92-SGP	ECC / CFH / CO-BALD	-	32.7 km
NT016	Aug 18, 2016	06:28 UT	RS41-SGP / RS92-SGP	ECC / CFH	-	29.6 km
NT017	Aug 18, 2016	16:04 UT	RS41-SGP / RS92-SGP	ECC / CFH / CO-BALD	-	33.9 km
NT018	Aug 19, 2016	17:28 UT	RS41-SGP / RS92-SGP	ECC / CFH / CO-BALD	-	33.0 km

NT019	Aug 20, 2016	03:23 UT	RS41-SGP / RS92-SGP	ECC / CFH	-	33.4 km
NT020	Aug 20, 2016	07:19 UT	RS41-SGP / RS92-SGP	CFH	-	31.2 km
NT021	Aug 21, 2016	03:35 UT	RS41-SGP / RS92-SGP	ECC / CFH	-	32.3 km
NT022	Aug 21, 2016	07:12 UT	RS41-SGP / RS92-SGP	None	Early burst	18.6 km
NT023	Aug 21, 2016	15:51 UT	RS41-SGP / RS92-SGP	ECC / CFH / CO-BALD	-	33.0 km
NT024	Aug 22, 2016	04:21 UT	RS41-SGP / RS92-SGP	ECC	ECC battery failure	33.6 km
NT025	Aug 23, 2016	16:33 UT	RS41-SGP / RS92-SGP	ECC / CFH / CO-BALD	-	32.1 km
NT026	Aug 24, 2016	06:03 UT	RS41-SGP / RS92-SGP	ECC / CFH	-	29.6 km
NT027	Aug 26, 2016	18:18 UT	RS41-SGP / RS92-SGP	ECC / CFH / CO-BALD	-	33.0 km
NT028	Aug 28, 2016	16:11 UT	RS41-SGP / RS92-SGP	ECC / CFH / CO-BALD	-	33.9 km
NT029	Aug 30, 2016	15:44 UT	RS41-SGP / RS92-SGP	ECC / CFH / CO-BALD	CFH contaminated	31.3 km
NT030	Aug 31, 2016	05:58 UT	RS41-SGP / RS92-SGP	ECC / CFH	CFH contaminated	33.0 km
NT031	Nov 08, 2016	18:50 UT	RS41-SGP / RS92-SGP	ECC / CFH / CO-BALD	COBALD battery failure	32.7 km
NT032	Nov 10, 2016	06:56 UT	RS41-SGP / RS92-SGP	ECC / CFH	-	31.5 km

NT033	Nov 10, 2016	14:44 UT	RS41-SGP / RS92-SGP	ECC / CFH / CO-BALD	-	32.4 km
NT034	Nov 11, 2016	15:37 UT	RS41-SGP / RS92-SGP	ECC / CFH / CO-BALD	-	32.1 km
NT035	Nov 12, 2016	07:27 UT	RS41-SGP / RS92-SGP	ECC / CFH	CFH contaminated	30.1 km
DK001	Jul 30, 2017	18:27 UT	RS41-SGP / RS92-SGP	ECC / COBALD	-	34.8 km
DK002	Jul 31, 2017	18:40 UT	RS41-SGP / RS92-SGP	ECC / COBALD	-	25.5 km
DK003	Aug 2, 2017	18:48 UT	RS41-SGP / RS92-SGP	ECC	Early burst	18.0 km
DK004	Aug 3, 2017	19:36 UT	RS41-SGP / RS92-SGP	ECC / CFH / CO-BALD	-	32.8 km
DK005	Aug 4, 2017	18:18 UT	RS41-SGP / RS92-SGP	ECC / CFH	CFH contamin-ated, early burst	22.7 km
DK006	Aug 5, 2017	18:09 UT	RS41-SGP / RS92-SGP	ECC / CFH	ECC failure	35.0 km
DK007	Aug 6, 2017	04:22 UT	RS41-SGP / RS92-SGP	-	-	33.5 km
DK008	Aug 6, 2017	07:40 UT	RS41-SGP / RS92-SGP	-	-	34.8 km
DK009	Aug 6, 2017	18:44 UT	RS41-SGP / RS92-SGP	ECC / CFH	ECC failure CFH contaminated	27.8 km
DK010	Aug 7, 2017	16:45 UT	RS41-SGP / RS92-SGP	ECC / CFH	-	34.4 km
DK011	Aug 8, 2017	04:55 UT	RS41-SGP / RS92-SGP	-	-	26.9 km

DK012	Aug 8, 2017	06:49 UT	RS41-SGP / RS92-SGP	-	-	33.8 km
DK013	Aug 8, 2017	10:20 UT	RS41-SGP / RS92-SGP	ECC / CFH	-	32.4 km
DK014	Aug 9, 2017	03:51 UT	RS41-SGP / RS92-SGP	-	-	36.9 km
DK015	Aug 9, 2017	07:18 UT	RS41-SGP / RS92-SGP	-	-	35.3 km
DK016	Aug 9, 2017	16:49 UT	RS41-SGP / RS92-SGP	ECC / CFH	Early burst	19.0 km
DK017	Aug 10, 2017	03:13 UT	RS41-SGP / RS92-SGP	-	-	33.6 km
DK018	Aug 10, 2017	05:16 UT	RS41-SGP / RS92-SGP	-	-	35.9 km
DK019	Aug 10, 2017	07:33 UT	RS41-SGP / RS92-SGP	-	-	36.5 km
DK020	Aug 10, 2017	16:29 UT	RS41-SGP / RS92-SGP	ECC / CFH	Early burst	18.0 km
DK021	Aug 11, 2017	02:51 UT	RS41-SGP / RS92-SGP	-	-	35.6 km
DK022	Aug 11, 2017	05:30 UT	RS41-SGP / RS92-SGP	-	-	32.5 km
DK023	Aug 11, 2017	07:37 UT	RS41-SGP / RS92-SGP	-	-	33.2 km
DK024	Aug 11, 2017	11:51 UT	RS41-SGP / RS92-SGP	ECC / CFH	-	33.5 km

DK025	Aug 12, 2017	05:44 UT	RS41-SGP / RS92-SGP	-	Telemetry issues, sounding terminated manually	Unknown
DK026	Aug 12, 2017	08:18 UT	RS41-SGP / RS92-SGP	-	-	26.8 km
DK027	Aug 12, 2017	11:36 UT	RS41-SGP / RS92-SGP	CFH	CFH contaminated	31.8 km
DK028	Aug 12, 2017	16:53 UT	RS41-SGP	CFH	Early burst, CFH contaminated	22.3 km

Table S1. List of all balloon soundings performed, including sounding identifier (ID), date and time of launch, radiosondes and payload used, status / notes (instrumental malfunctionings), and burst altitude. The sounding ID is composed of the station abbreviation (NT for Nainital, India; DK for Dhulikhel, Nepal) and sounding chronological number. Exact coordinates (latitude, longitude) of the sounding stations were, in NT: 29.3554°N, 79.4619°E; in DK: 27.6193°N, 85.5386°E.

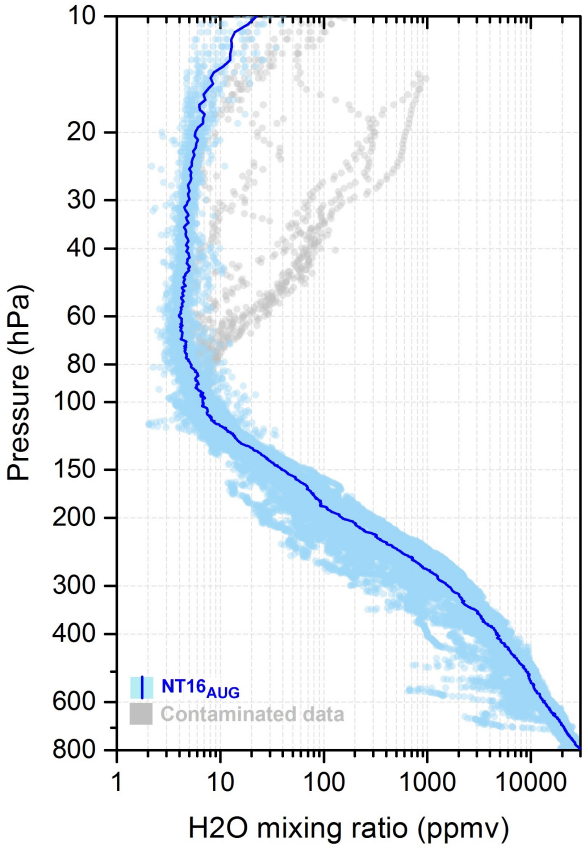

Figure S1. All measurements of H_2O mixing ratio by CFH of the $NT16_{AUG}$ campaign. Blue dots: data points used for the analysis. Grey dots: measurements showing CFH contamination (as described in Section 2). Blue solid line: mean profile of the data points used for the analysis. Contaminated measurements are detected using a threshold of 10 ppmv in the stratosphere, and the onset of contamination is inferred as the lowest altitude where the measurement deviates significantly from the mean profile. Increased H_2O mixing ratio in all measurements above 20 hPa is likely due to outgassing from the balloon skin and the payload train (discussed in Section 3.3).

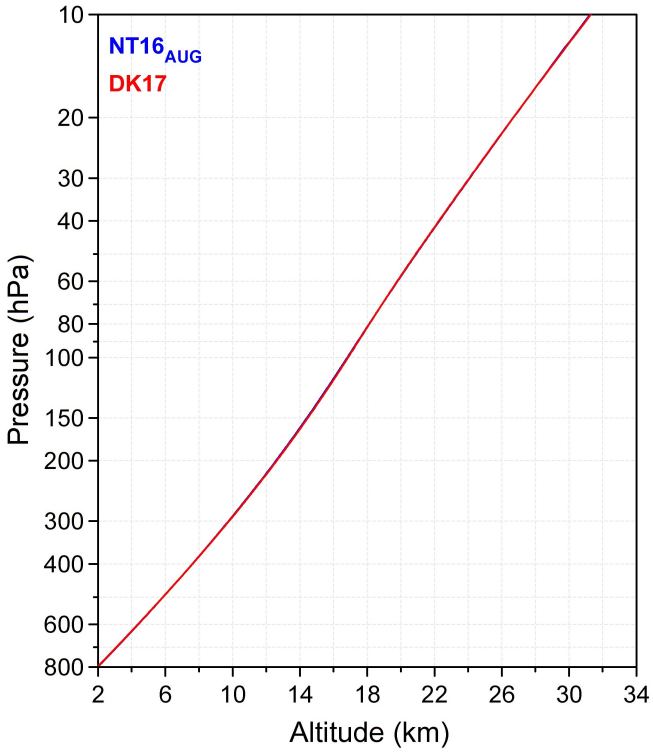

Figure S2. Mean profiles of altitude as a function of pressure from RS41-SGP measurements of the $NT16_{AUG}$ (blue) and DK17 (red) campaigns.

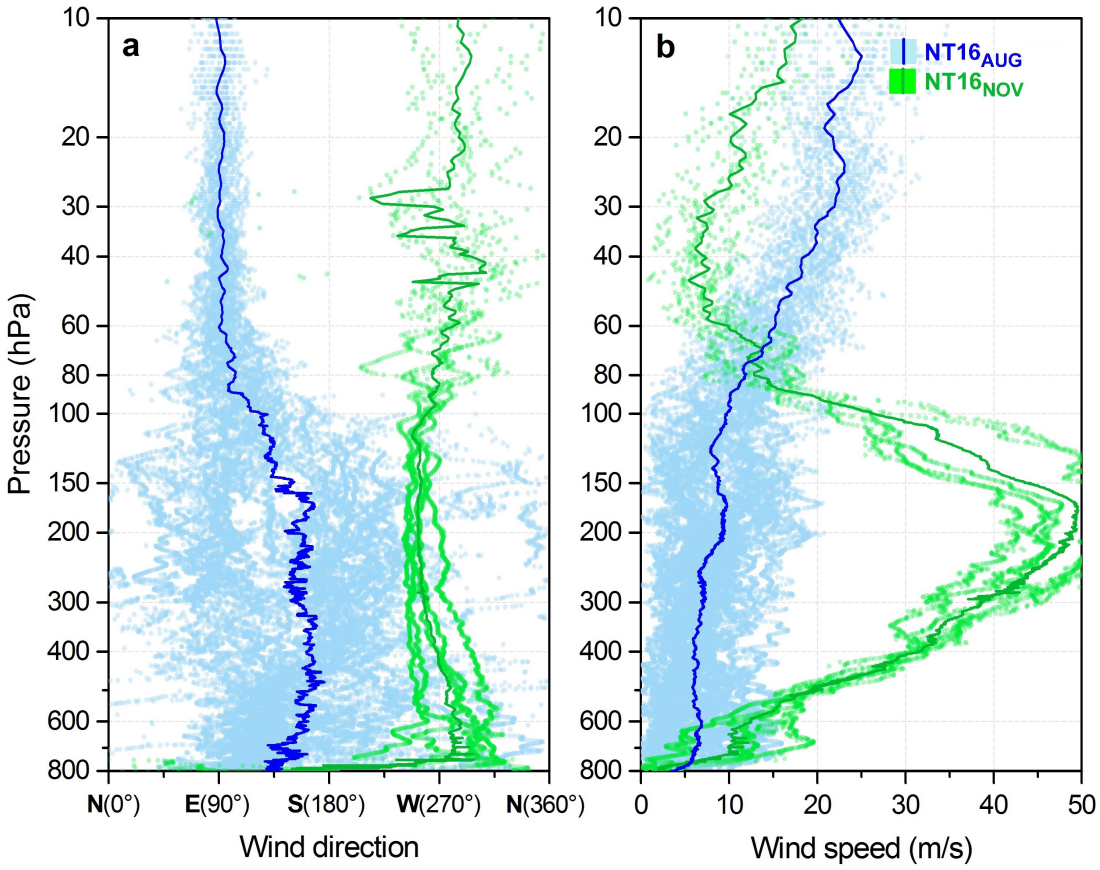

Figure S3. All measurements (dots) and mean profiles (solid lines) of wind direction (Panel a) and wind speed (b) as a function of pressure, measured by RS41-SGP during the $NT16_{AUG}$ (blue) and $NT16_{NOV}$ (green) campaigns.

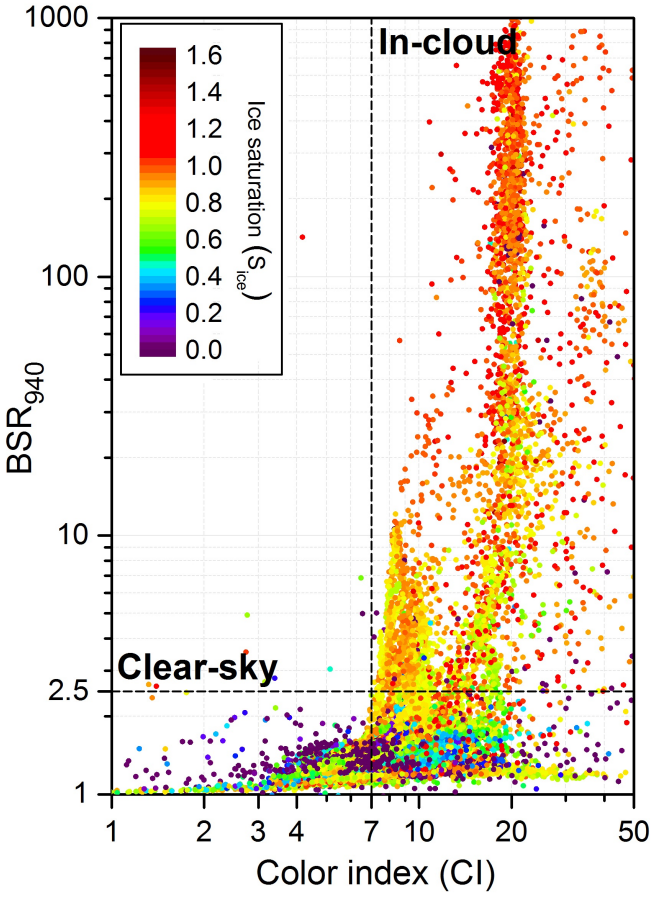

Figure S4. All measurements of the NT16$_{AUG}$ campaign (dots), shown as a scatter plot of BSR at 940 nm (BSR$_{940}$) as a function of color index (CI), color-coded with ice saturation (S$_{ice}$). Dashed lines show the BSR$_{940}$ = 2.5 and CI = 7 isolines, which are the optical thresholds used for cloud-filtering (discussed in Section 6.2).