Sources and physicochemical characteristics of black carbon aerosol in the southeastern Tibetan Plateau: internal mixing enhances light absorption

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Table S1. Concentrations of black carbon (BC) at Lulang compared with other high-altitude stations in the Tibetan Plateau and Himalayas.

Location	Latitude	Longitude	Altitude (m a.s.l.)	Observation period	Method[a]	rBC/BC[b] (μg m^{-3})	Reference
Lulang	29.46	94.44	3300	Sep.–Oct. 2015	SP2	0.31	This study
Muztagh Ata	38.28	75.023	4500	Sep. 2009	Aeth.	0.16	Zhu et al., 2016
Qilian Shan	39.5	96.51	4214	May 2009–Mar. 2011	Aeth.	0.05	Zhao et al., 2012
Qinghai Lake	36.98	99.88	3200	Nov. 2012	SP2	0.16	Wang et al., 2015a
Waliguan	36.28	100.9	3816	Oct.–Nov. 1997/Jan. 1998	Aeth.	0.27	Ma et al., 2003
Beiluhe	34.85	92.94	4600	Nov. 2012–Feb. 2013	Aeth.	0.2	Wang M. et al., 2016
Hanle valley	32.78	78.96	4250	Aug. 2009–Jul. 2010	Aeth.	0.08	Babu et al., 2011
Nam Co	30.77	90.99	4730	Sep.–Dec. 2012	TOR	0.09	Wan et al., 2015
Everest	28.36	86.95	4276	2014–2016	TOR	0.15	Li et al., 2017
NCO-P	27.95	86.82	5079	Post-monsoon, 2006/2007	MAAP	0.14	Marinoni et al., 2010
Tengchong	25.01	98.3	1960	Apr.–May 2004	Aeth.	0.42	Engling et al., 2010
Ranwu	29.32	96.96	4600	Nov. 2012–Feb. 2013	Aeth.	0.41	Wang M. et al., 2016
Godavari	27.59	85.31	1600	Jan.–Dec. 2006	TOT	1.0	Stone et al., 2010
Manora Peak	29.4	79.5	1950	Dec. 2004	Aeth.	1.36	Pant et al., 2006
Mukteshwar	29.47	79.65	218	Feb.–Mar. 2014	SP2	1.0	Raatikainen et al., 2017

[a]SP2, Aeth., TOR, MAAP, and TOT represent single particle soot photometer, aethalometer, thermal-optical reflectance method, multi-angle absorption photometer, thermal-optical transmittance method, respectively.
[b]The term rBC is used exclusively in reference to SP2 measurements while BC more generally refers to measurements made with other techniques.

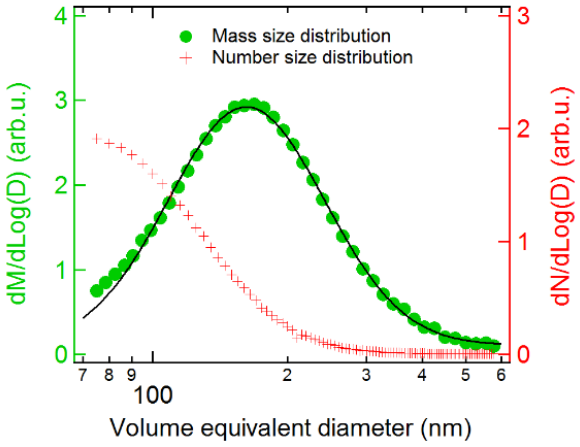

Figure S1. Mass and number size distributions of rBC for the campaign. The black line is the mono-modal lognormal fit to the data. In the vertical labels "M", "N", and "D" denote rBC mass, number, and void-free equivalent diameters (assuming 1.8 g cm^{-3} density), respectively, and "arb.u." stands for arbitrary units.

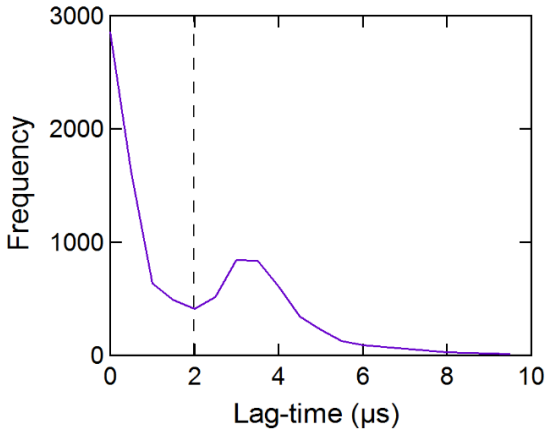

Figure S2. Frequency distribution of the incandescence lag-times for ~10000 arbitrary-selected ambient rBC particles. The vertical dashed line shows a lag-time of 2 μs, which can be used to distinguish thickly-coated rBC particles from uncoated or thinly-coated rBC.

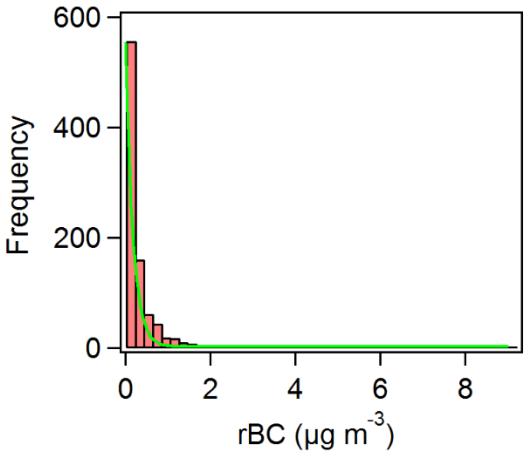

Figure S3. Frequency distribution of rBC mass concentrations during the campaign.

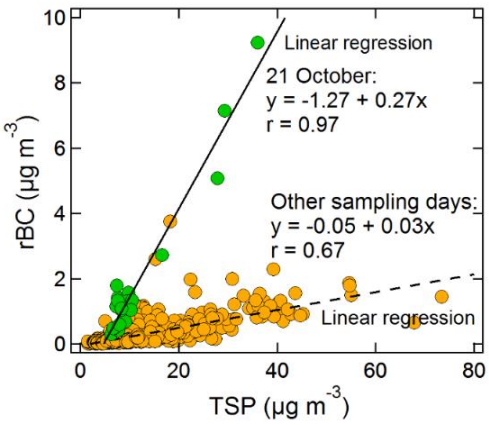

Figure S4. Correlation between the mass concentrations of rBC and TSP on 21 October and other sampling days.

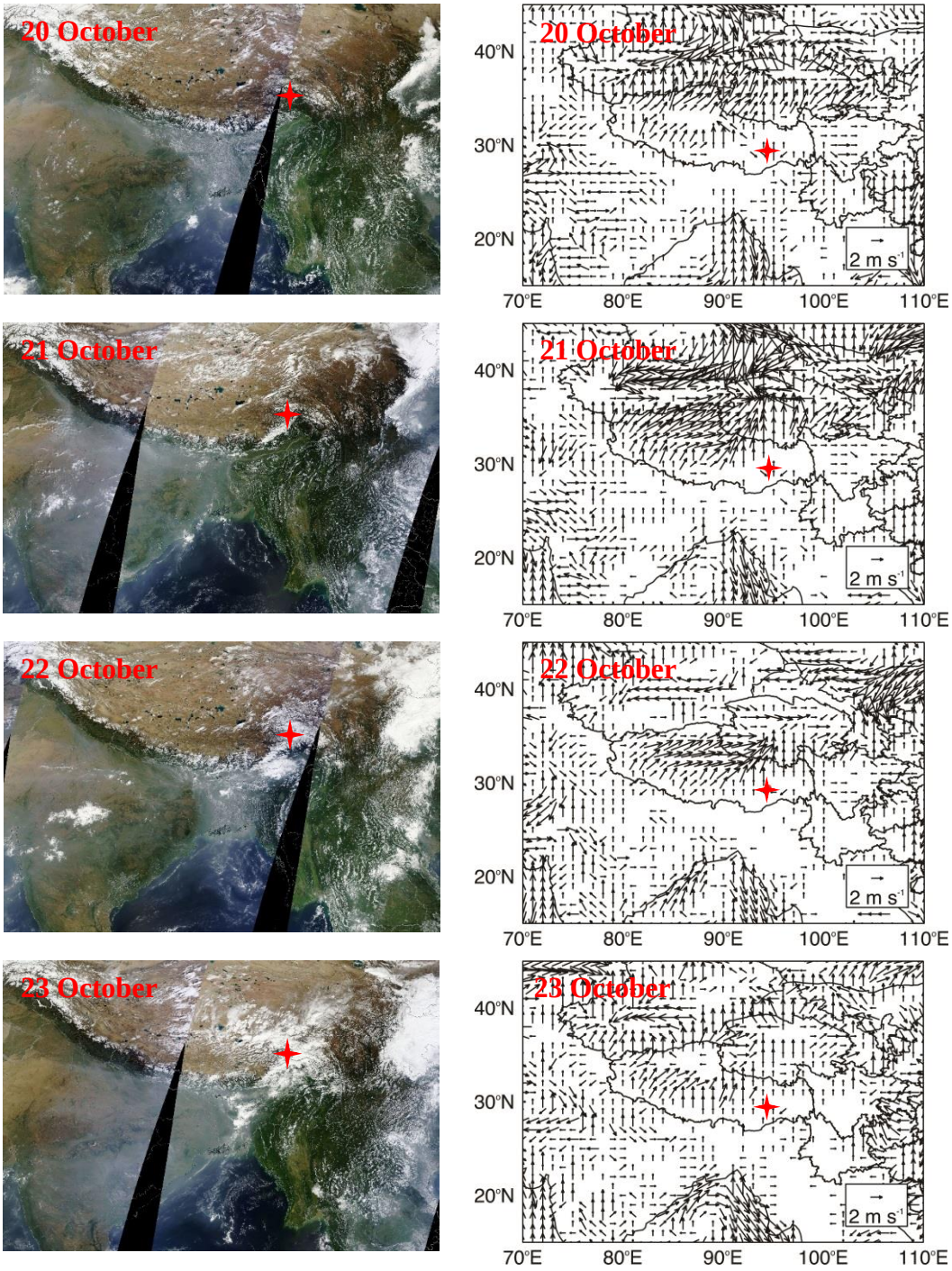

Figure S5. (left panels) Terra MODIS true color images of haze clouds and (right panels) horizontal wind distributions 200 m above the ground at 08:00 local time (LT) during 20–23 October 2015. The Terra satellite passed over this region at ~10:30 LT. The red cross shows the Lulang site.

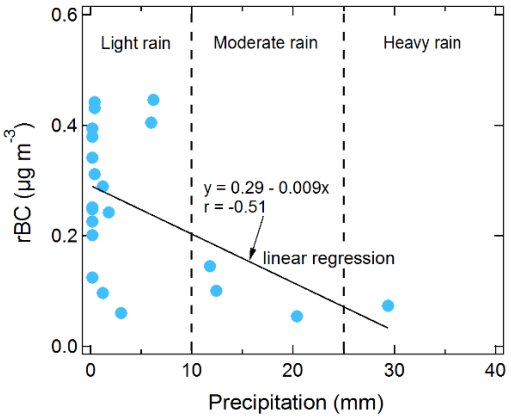

Figure S6. Daily averaged rBC mass concentrations versus precipitation.

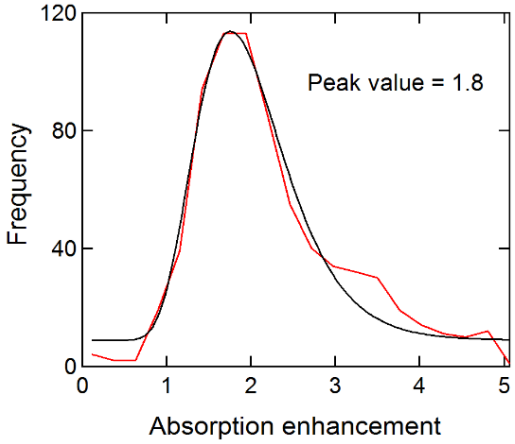

Figure S7. Frequency distribution of absorption enhancement. The black line is the mono-modal lognormal fit to the data

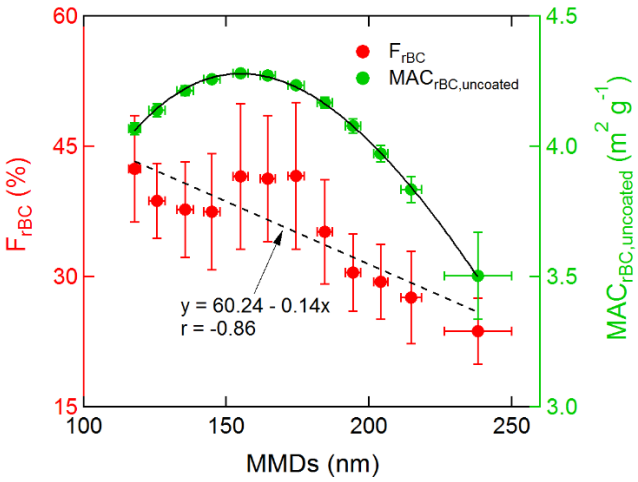

Figure S8. Mass median diameters (MMDs) versus number fraction of thickly-coated rBC (F_{rBC}) and mass absorption cross section of uncoated rBC ($MAC_{rBC,uncoated}$).