

Supplement of Atmos. Chem. Phys., 18, 12817–12843, 2018
<https://doi.org/10.5194/acp-18-12817-2018-supplement>
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Supplement of

Black and brown carbon over central Amazonia: long-term aerosol measurements at the ATTO site

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Table S1. Aerosol sampling conditions and locations at the ATTO site.

Time period	Location	Inlet tube dimensions	Approx. flow rate (L min⁻¹)	Drying system	1 µm cyclone cut for BC (y/n)
Mar 2012 – Sep 2012	Mast *	60 m height 17 mm (0.685 ") inner diameter	13	Diffusion dryers	n
Sep 2012 – Dec 2013	Walk-up tower **	60 m height 17 mm (0.685 ") inner diameter	13	Diffusion dryers	n
Dec 2013 – May 2014	Mast *	60 m height 24 mm (0.935 ") inner diameter	18	Diffusion dryers	n
May 2014 – Jan 2015	Mast *	60 m height 24 mm (0.935 ") inner diameter	30	Diffusion dryers	y
Jan 2015 – present	Mast *	60 m height 24 mm (0.935 ") inner diameter	30	Automatic regenerating adsorption aerosol dryer	y

* S 02° 08.602'; W 59° 00.033', 130 m a.s.l.

** S 02° 08.647'; W 58° 59.992', 130 m a.s.l.

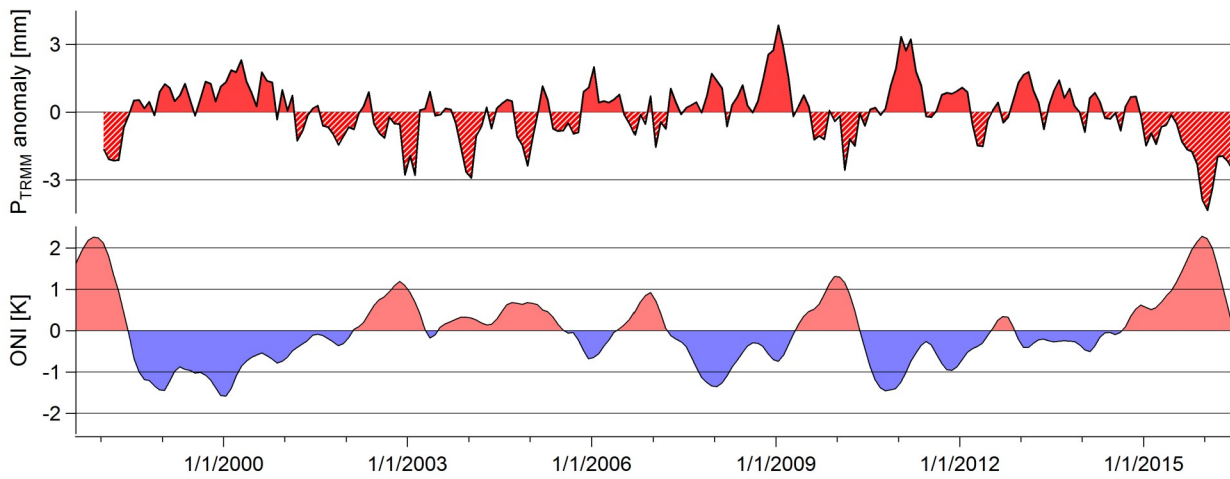


Figure S1. Precipitation anomalies calculated from the Tropical Rainfall Measurement Mission (TRMM) observations along the BT tracks in the ROI ATTO area (top) (see Fig. 1), and Oceanic Niño Index (ONI) (bottom) time series from 1998 to 2016.

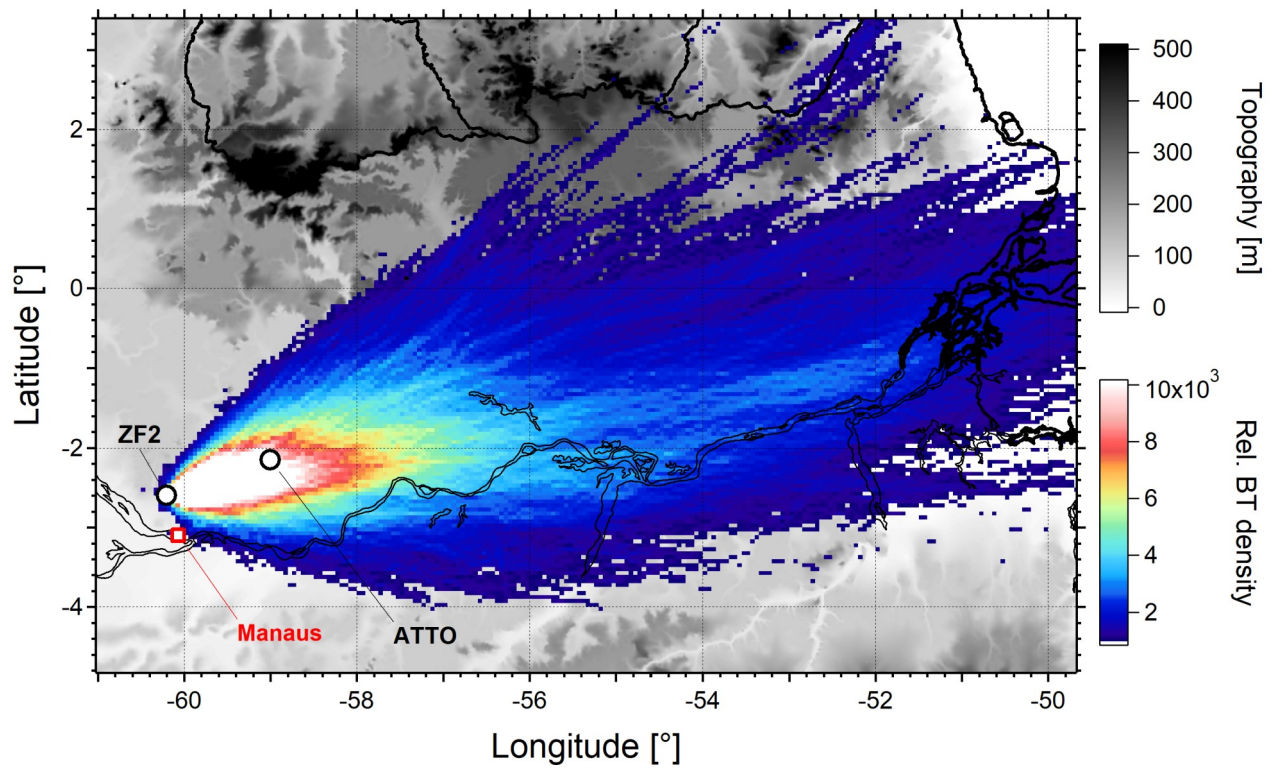


Figure S2. HYPSLIT backward trajectory footprint of the ZF2 site (01 Jan 2014 to 31 Dec 2015) calculated every hour with a starting height of 1000 m. Adapted from Pöhlker et al. (2017).

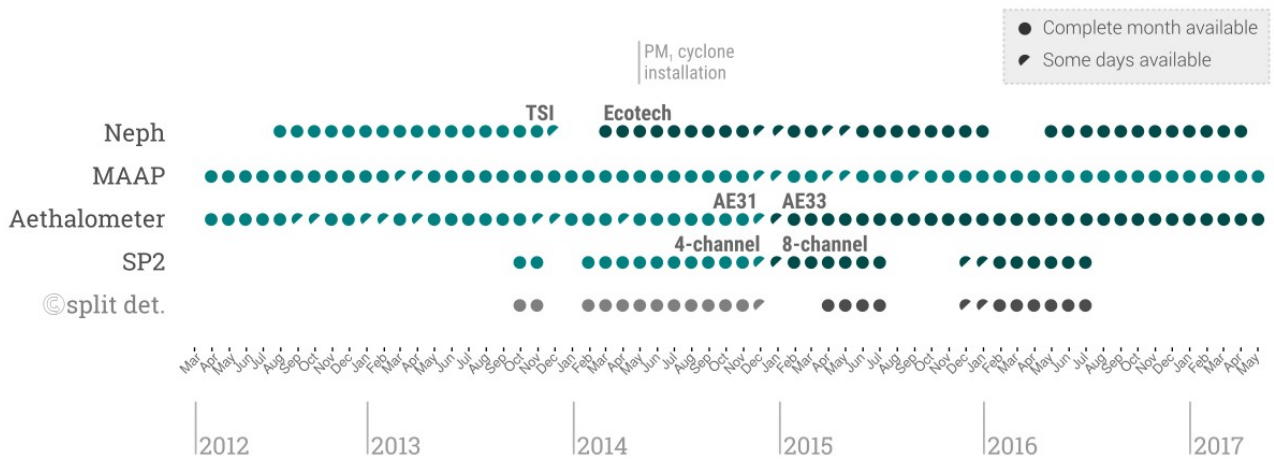


Figure S3. Nephelometer, MAAP, Aethalometer, and SP2 (+ split detector) measurement periods at the ATTO site.

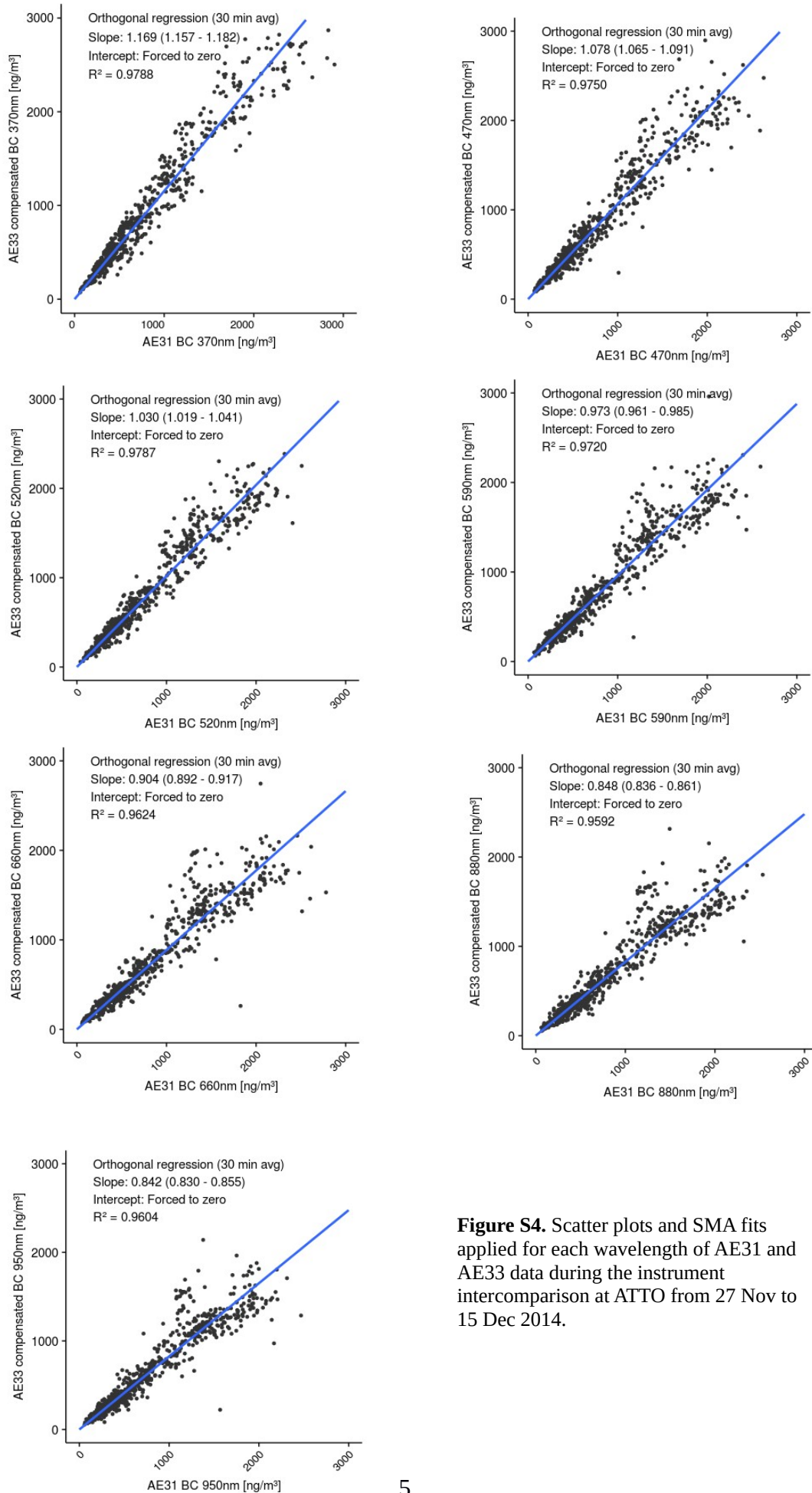


Figure S4. Scatter plots and SMA fits applied for each wavelength of AE31 and AE33 data during the instrument intercomparison at ATTO from 27 Nov to 15 Dec 2014.

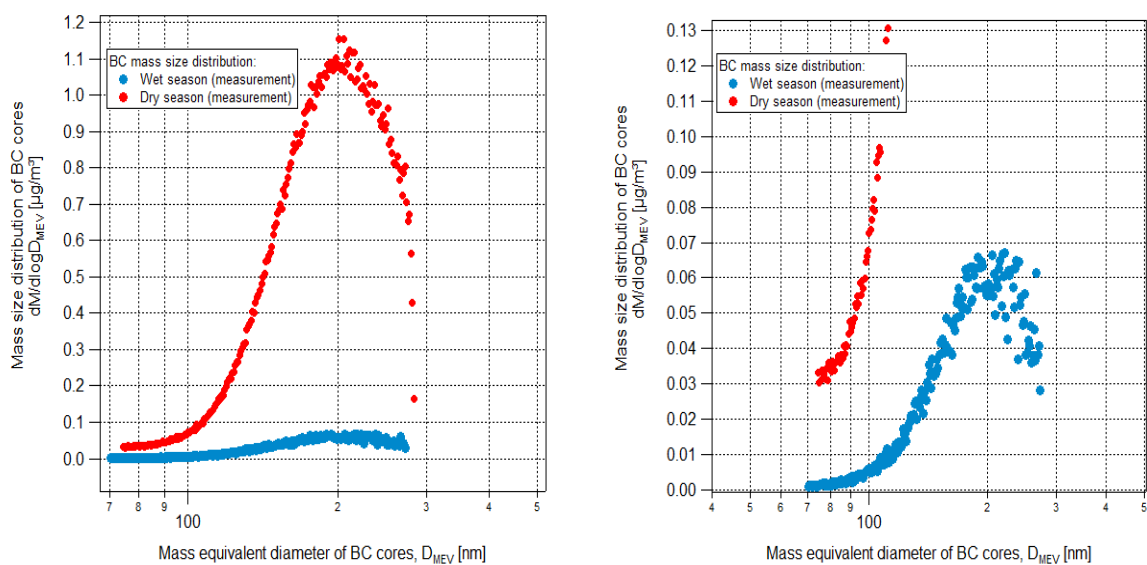


Figure S5. Refractory black carbon mass size distributions observed at the ATTO site on different characteristic days during the wet (blue dots) and the dry (red dots) season in 2014. The right panel shows a zoom into the wet season size distribution.

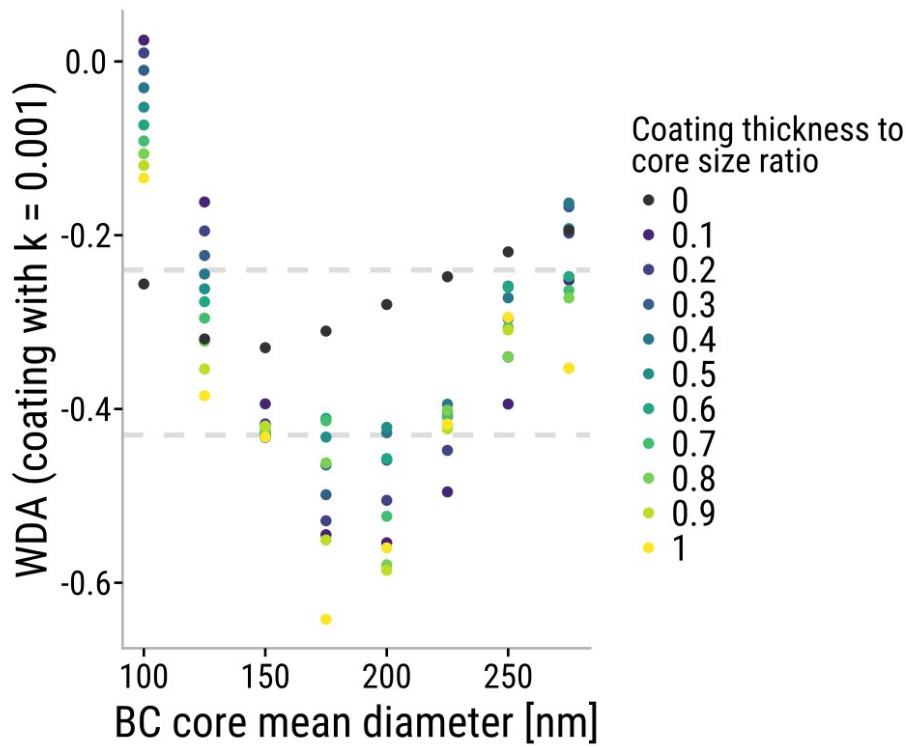


Figure S6. Results of Mie model calculations for pure BC, using a log-normal size distribution with mean = BC geometric mean diameter (GMD), and a standard deviation of 1.45, and internally mixed BC using the core-shell model for monodisperse BC cores with a coating's refractive index of $1.55 - 0.001i$. The horizontal dashed lines show the boundaries of the inter-quartile range.

Table S2. Relative overestimation of the BrC contribution to light absorption at 370 nm obtained from Mie model calculations by considering different BC core size ranges and refractive indices of the coating material. The parameters used in this study are shown in bold letters.

BC core size range [nm]	Refractive index of the coating material	Relative overestimation of BrC contribution to σ_{370} (%)
100 – 275	1.55 - 0i	0
100 – 275	1.55 - 0.001i	0
100 – 275	1.55 - 0.1i	33
100 – 275	1.55 - 0.2i	46
80 – 275	1.55 - 0i	18
80 – 275	1.55 - 0.001i	18
80 – 275	1.55 - 0.1i	44
80 – 275	1.55 - 0.2i	56

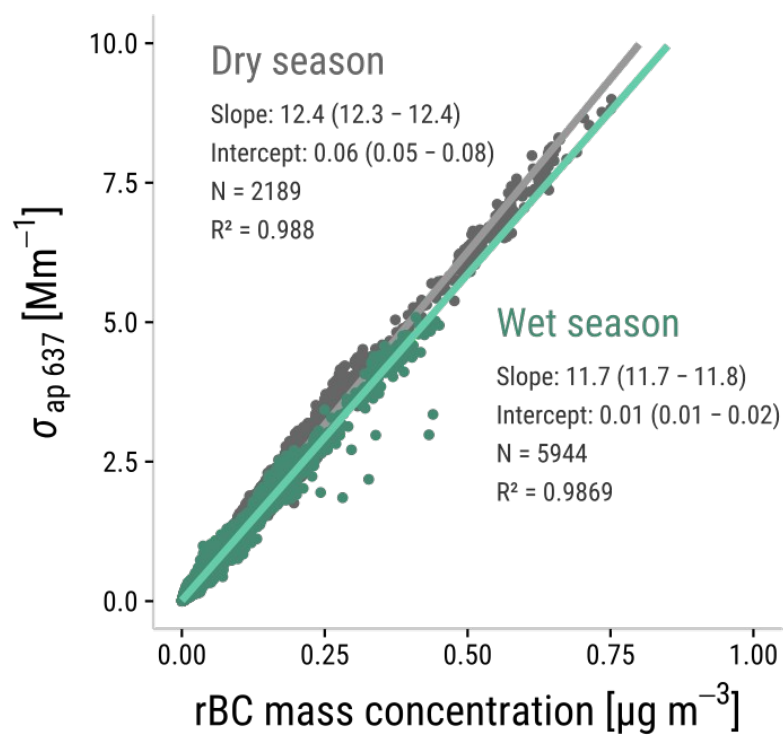


Figure S7. Light absorption coefficient at 637 nm ($\sigma_{\text{ap } 637}$) vs. rBC mass concentration (30-min averaged data) corresponding to the wet and the dry seasons, in green and gray, respectively. The slopes of the SMA fits correspond to the BC mass absorption cross-section at 637 nm ($\alpha_{\text{abs } 637}$), inter-quartile ranges are indicated in brackets.