Supplement of

Influx of African biomass burning aerosol during the Amazonian dry season through layered transatlantic transport of black carbon-rich smoke

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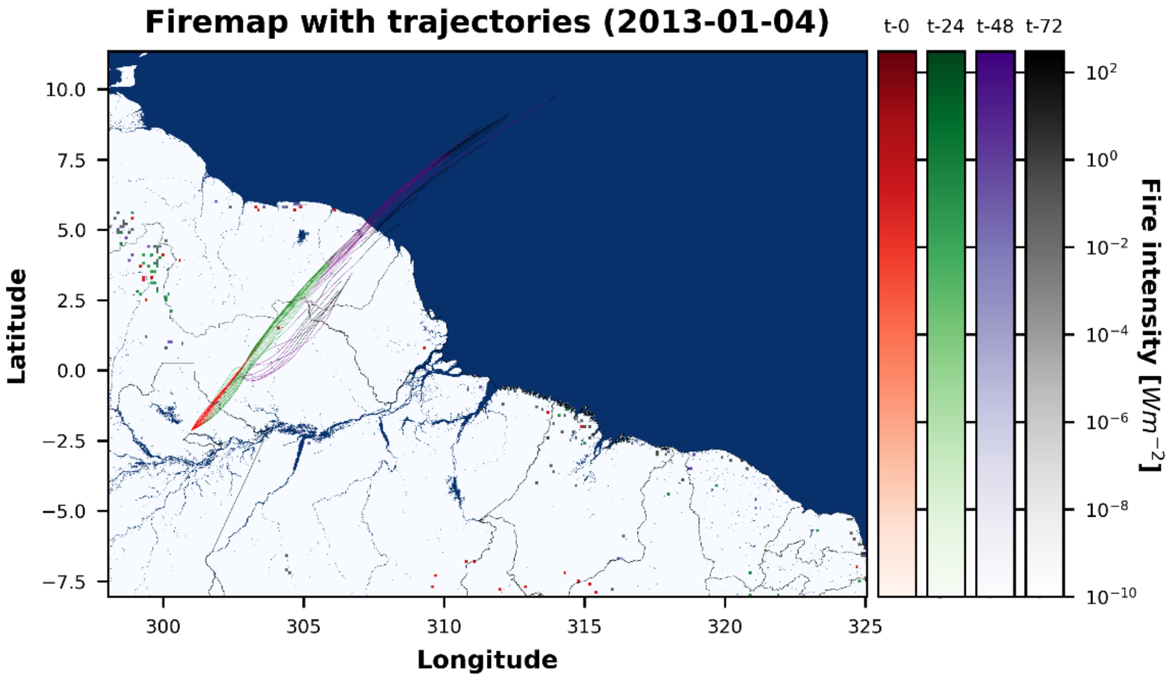

Figure S1. Ensemble of three-day HYSPLIT BTs, starting at every hour at the ATTO site (1000 m) on 04 January 2013 and corresponding daily fire intensity maps (W m^{-2}) from the Global Fire Assimilation System (GFAS).

Figure S2. View from the HALO cockpit, showing the active fire plumes (intersected at ~1 km above ground) during flight AC19 at 19:20 UTC on 30 September 2014. See also fire map in Fig. 1.

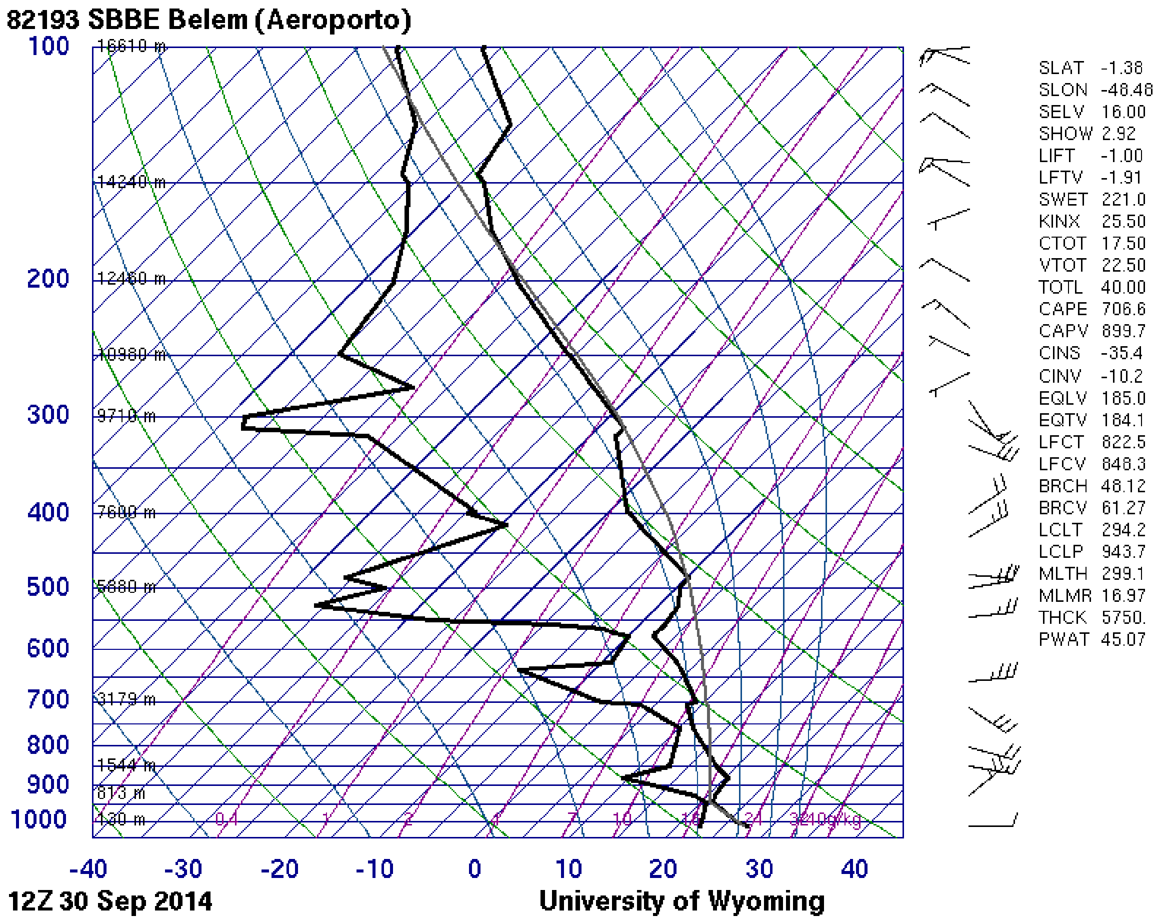

Figure S3. Radiosonde soundings at Belem Airport (see Fig 1.) on 30 September 2014 at 12:00 UTC, provided Wyoming University (http://weather.uwyo.edu/upperair/sounding.html, last access on 06 August 2019).

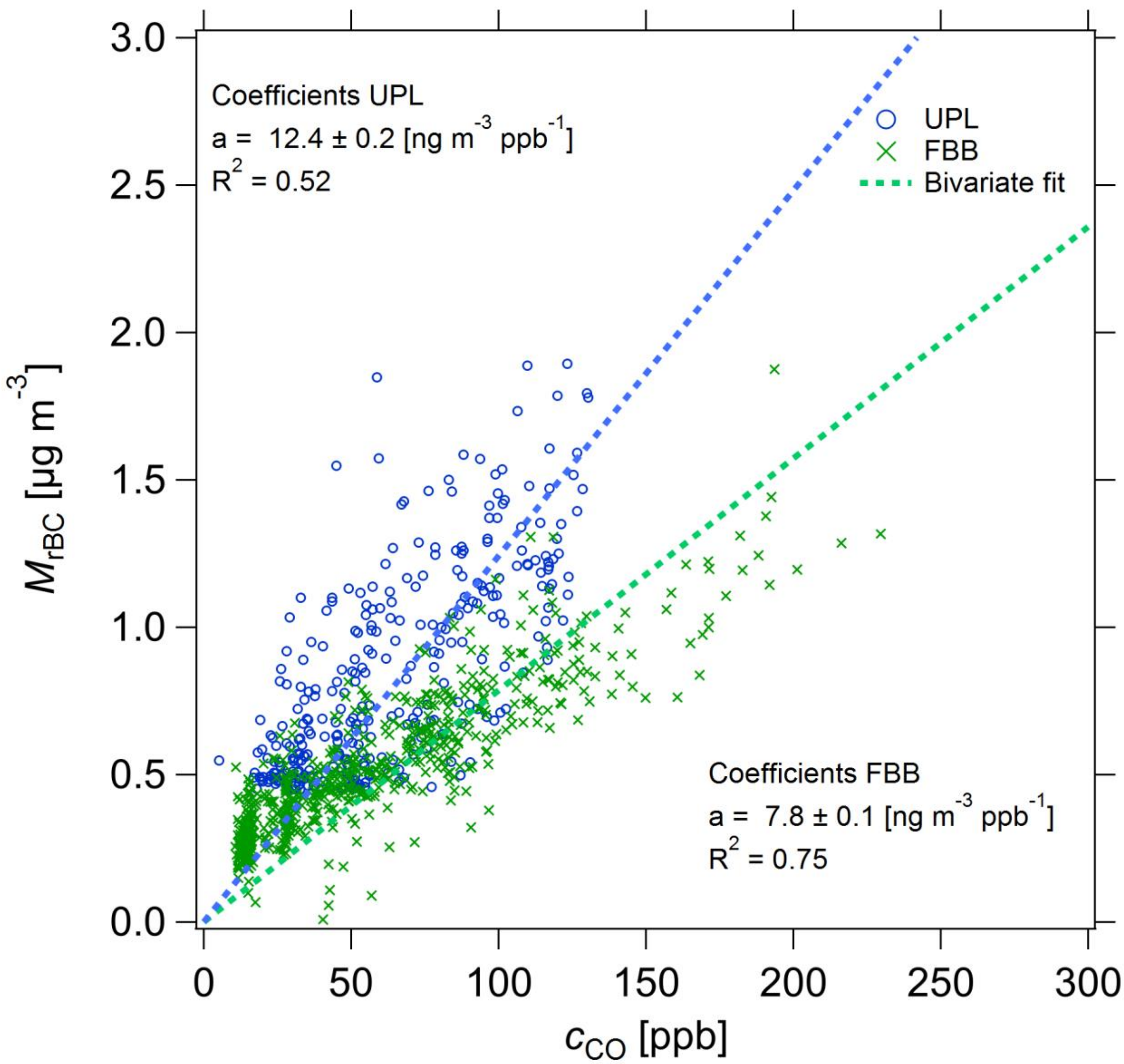

Figure S4. Correlation between Δc_{CO} and ΔrBC mass concentration within the upper pollution layer (UPL) and fresh biomass burning emissions (FBB). A bivariate regression fit was applied to the data set in order to obtain the BC enhancement ration, EnR_{BC}.

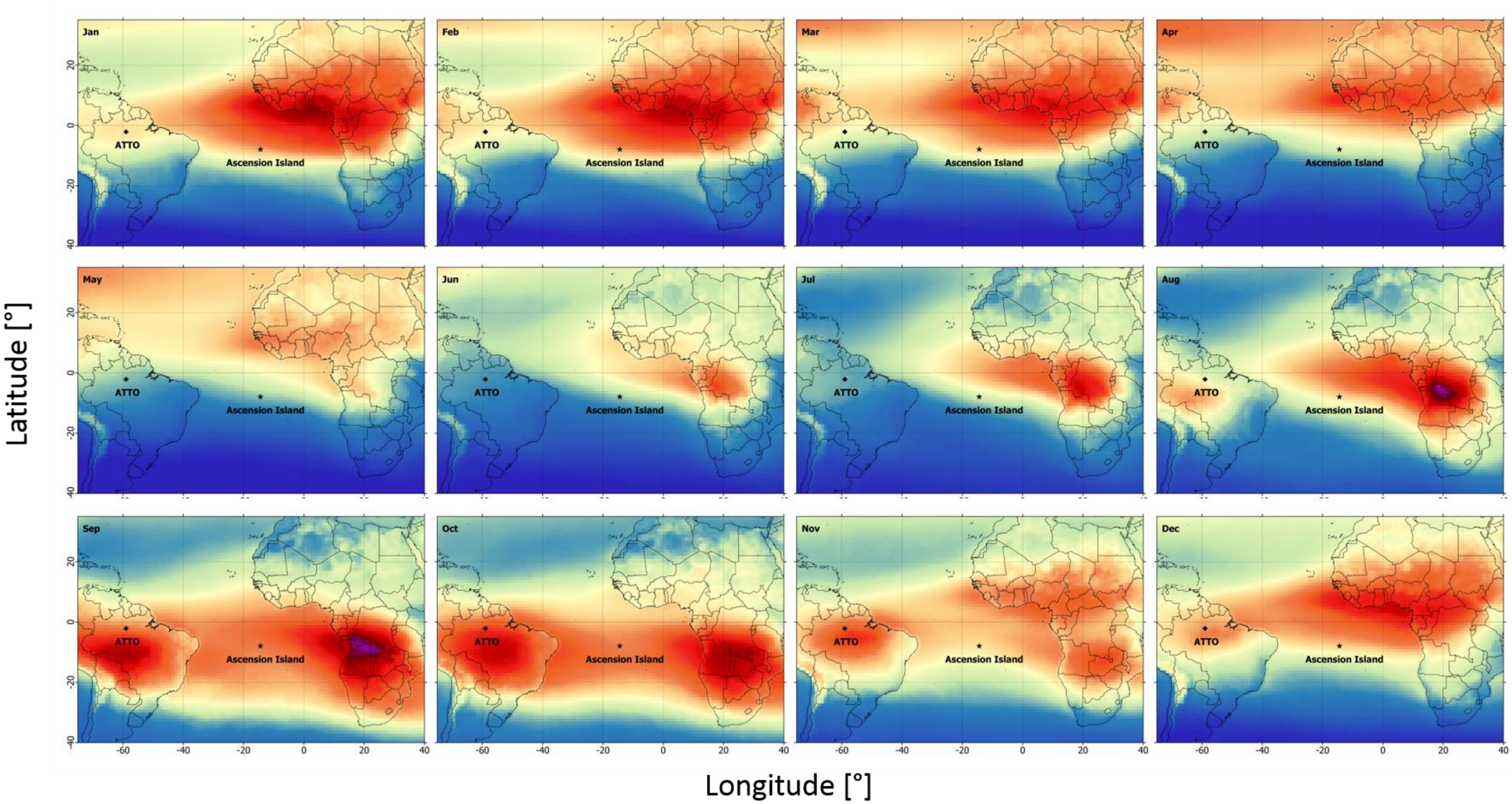

Figure S5. Monthly distribution of AIRS-derived carbon monoxide (400 to 600 hPa) over the Southern Hemisphere, relevant to the Amazonian atmospheric conditions. The map shows averages over multiple years (2005-2018).

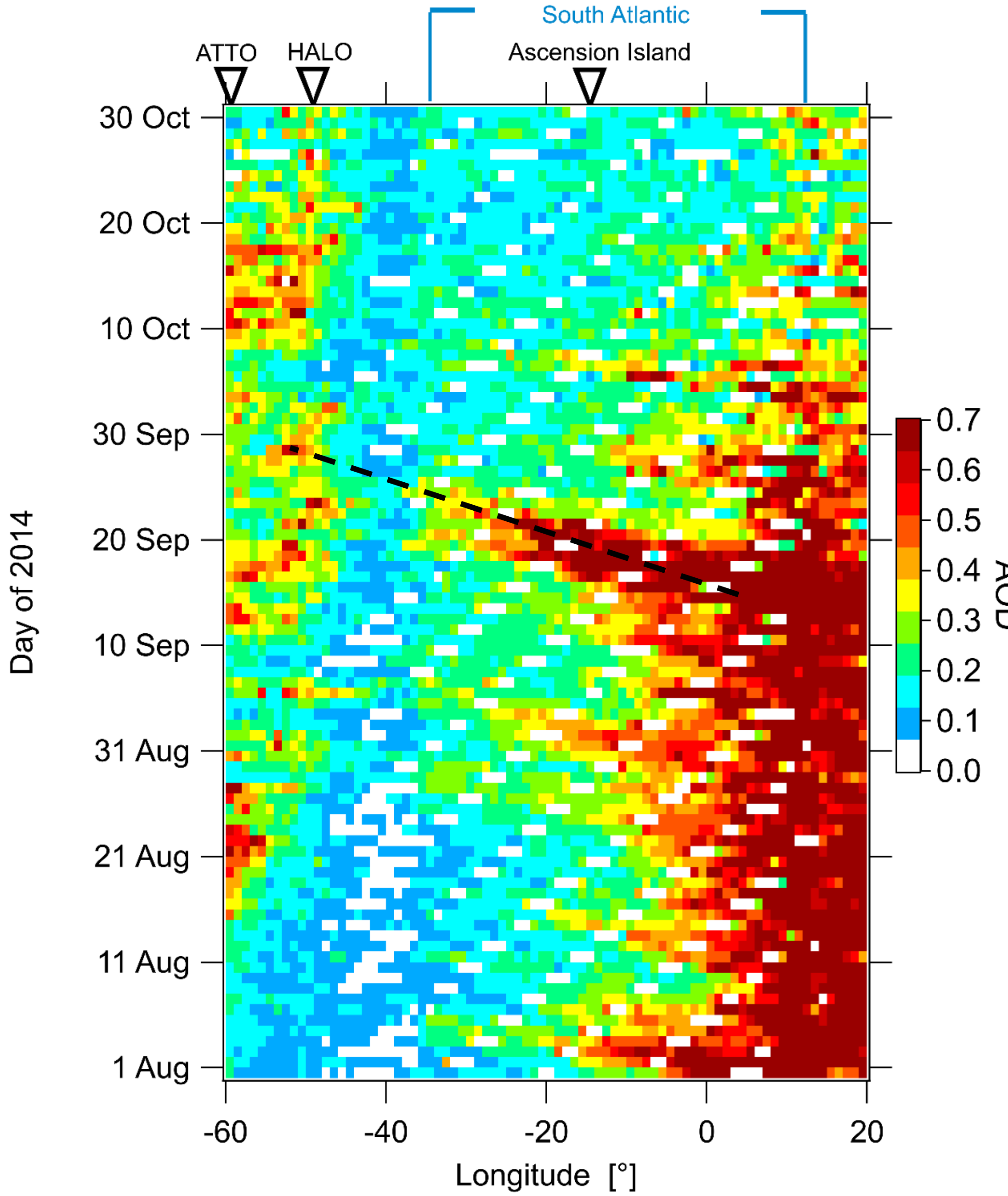

Figure S6. Hovmöller plot of the daily MODIS AOD (550 nm) distributed over the South Atlantic region (60 ºW to 20 ºE) from August to October 2014, averaged over the latitudinal band of 10º S to 5º N, corresponding to the region of interest (ROI) highlighted in Fig. 5a. Several events of transatlantic transport of aerosol from Africa towards South America can be easily identified, with the strongest plume starting approximately on 15 September 2014. A dashed line for this particular event is also shown in the picture, which arrives at a time close to our observations during AC19 on 30 September 2014. Westwards of 35 ºW, the AOD levels are increasingly influenced by the South American continent, which masks the AOD signals of the transported African pollution as it approaches the South American continent.

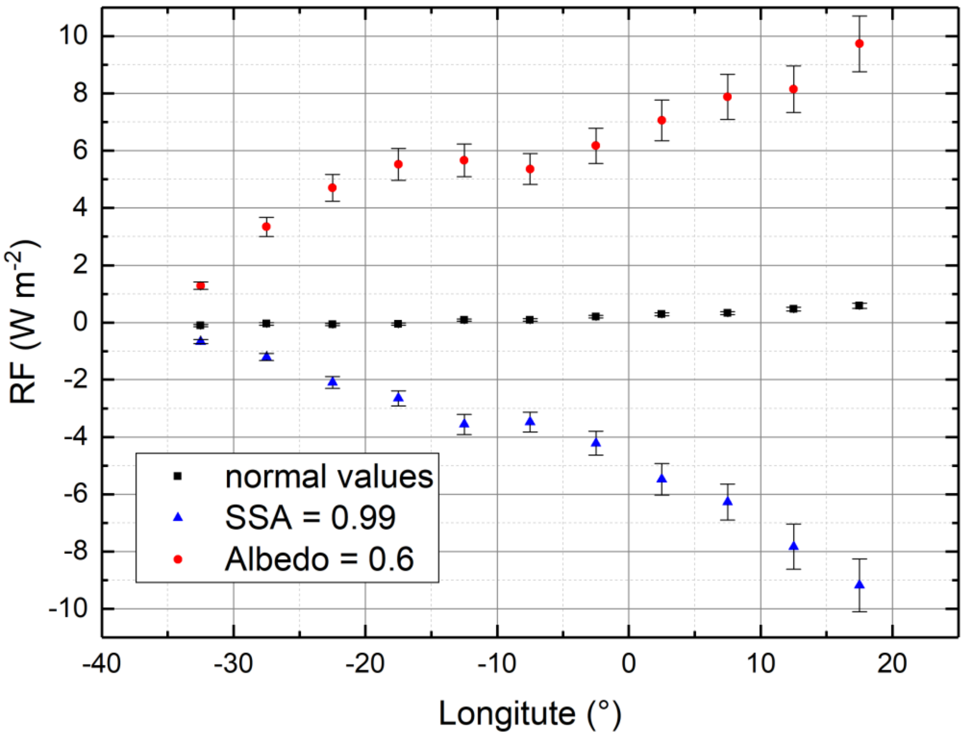

Figure S7. Sensitivity tests showing the DRF-TOA changes due to different assumptions in the aerosol and surface properties, comparing with the original DRF-TOA estimation. The simulations show that if the aerosol layer is mostly scattering (SSA = 0.99), a general cooling (back-scattering by the layer) is observed. On the other hand, if the absorbing ocean is replaced by a higher surface albedo (0.6), a warming effect by the layer is observed due to the downward radiation that is scattered back and forth between the aerosol layer and the surface.