

Supplement of

**Aerosols from anthropogenic and biogenic sources
and their interactions: modeling aerosol forma-
5 tion, optical properties and impacts over the cen-
tral Amazon Basin**

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Table S 1. Performance statistics for WRF-Chem simulation of meteorological and chemical variables.

T3 Site March 13, 2014								
Variable	r^a	MB	RMSE	S_{pielke}^d	MNBE ^b (%)	MNGE ^c (%)	SD_{obs}^e	SD_{sim}^f
Temperature (°C)	0.8	-0.5	0.41	0.6	-1.54	5.7	2.6	3.2
Humidity (%)	0.7	-1.6	1.8	0.52	-1.18	7.5	11.3	12.2
Wind Speed (m/s)	0.7	0.3	0.2	0.4	74.1	88.3	0.6	1.4
Precipitation (mm)	-0.18	-0.4	0.2	145			0.004	1.16
PBL LIDAR (m)	0.91	-36	39	0.6	-17	36	418	311
PBL Ceilometer (m)	0.93	-28	36.2	0.3	22	49	418	469
O ₃ (ppb)	0.89	8.5	2.4	0.2	254	289	17	12
CO (ppb)	0.56	19.7	10.7	3.5	16	25	53	13

- ^a Pearson's correlation coefficient.
^b Mean normalized bias error.
^c Mean normalized gross error.
^d Pielke skill.
^e Observed standard deviation.
^f Simulated standard deviation.

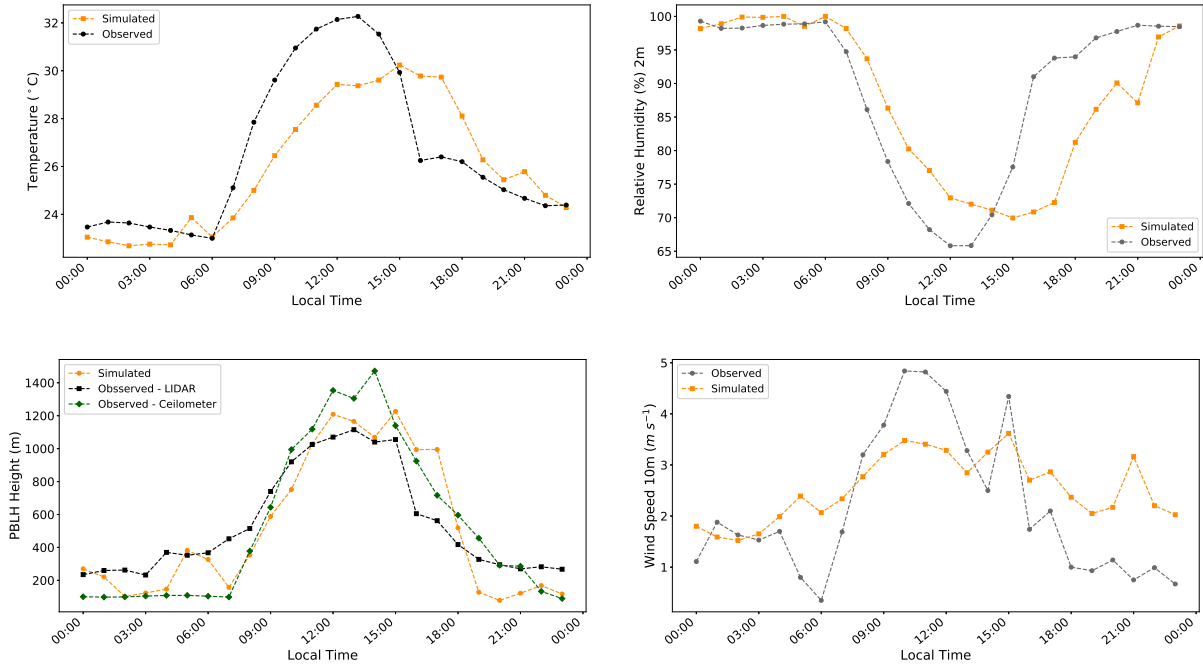


Figure S 1. Observed and WRF-Chem simulated of meteorological fields at the T3 site on March 13, 2014. 2 m air temperature (°C), 2 m specific humidity (%), PBL (m) and 10 m wind speed ($m s^{-1}$).

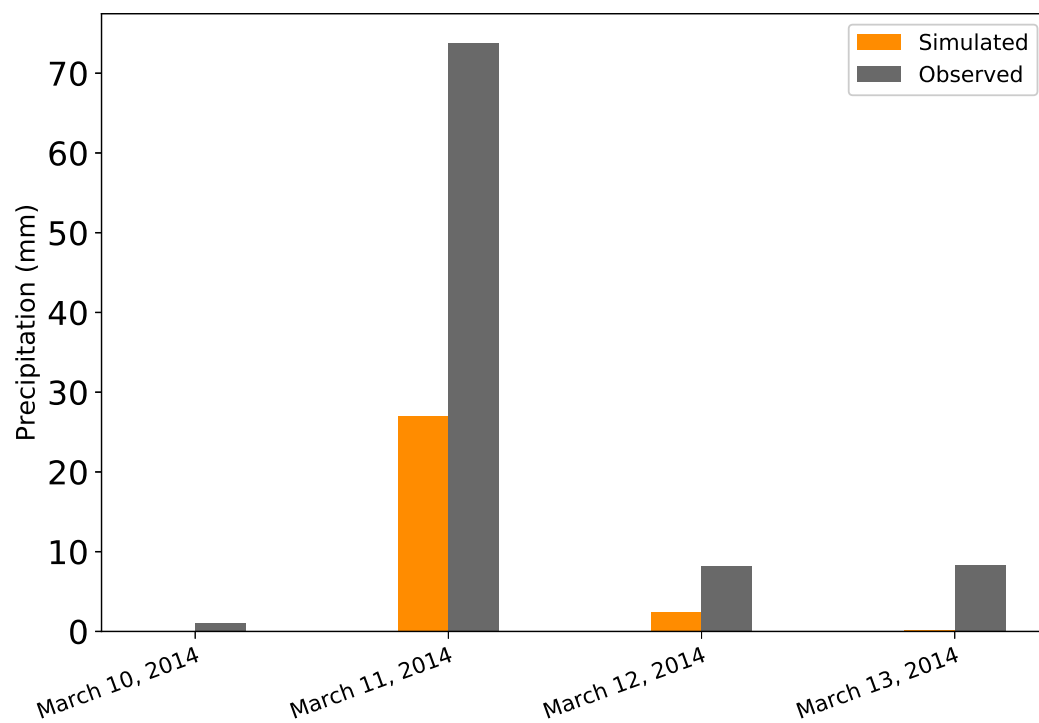


Figure S 2. Observed and WRF-Chem simulated accumulated daily precipitation at the T₃ site on March 13, 2014.

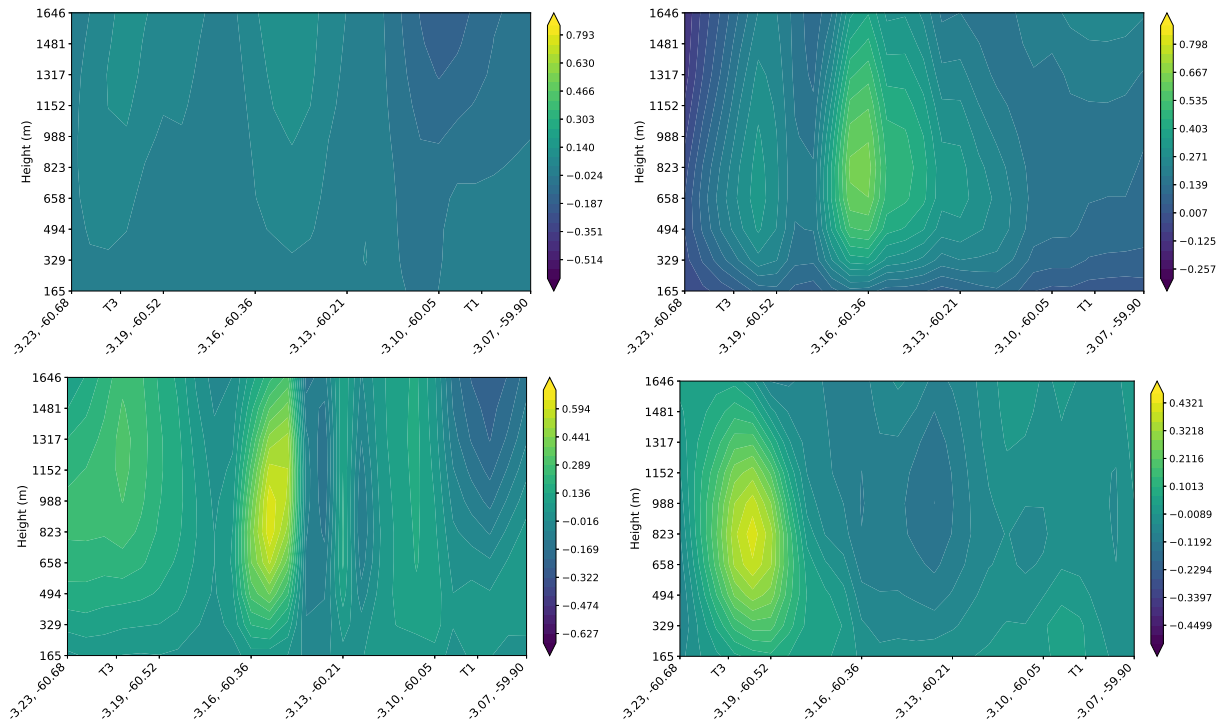


Figure S 3. Simulated vertical cross section of vertical wind speed on March 13, 2014 (19 to 22 LT).

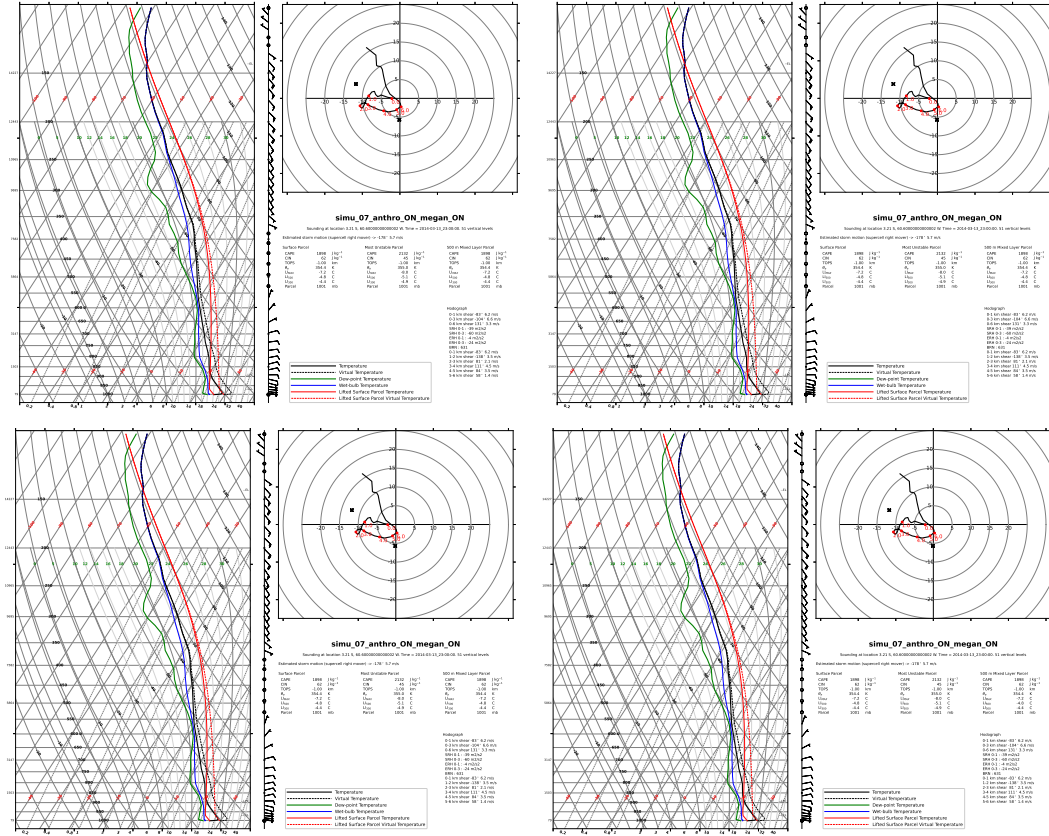


Figure S 4. Temperature, dew point, and wind profiles from simulations on March 13, 2014 (19 to 22 LT).

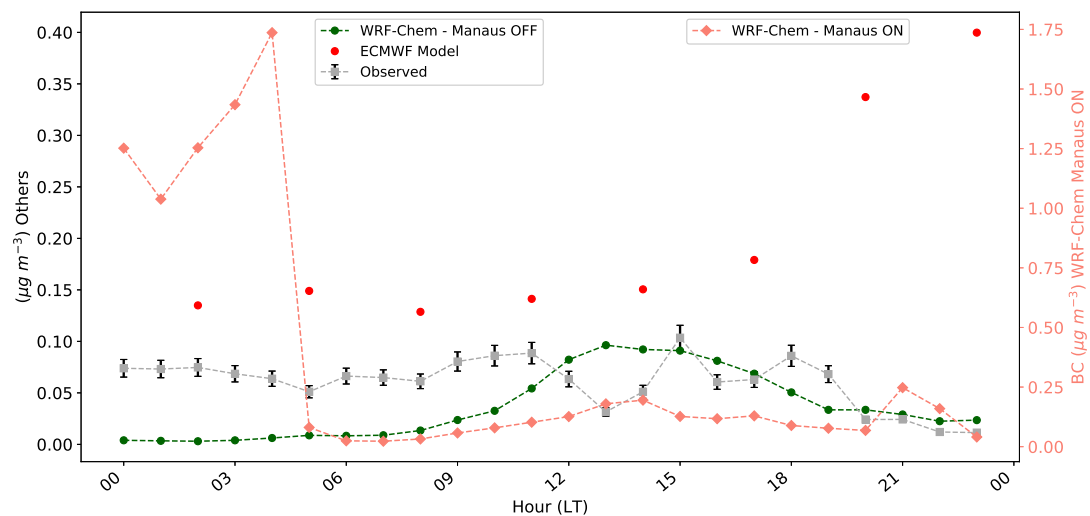


Figure S 5. Observed and WRF-Chem simulated surface concentrations of BC on March 13, 2014. An error bar is shown for each set of measurements. The green (Manaus OFF) and orange (Manaus ON) at T₃ site show BC concentrations simulated for a height above ground of ca. 8 m. The global model values are represented by red dots.

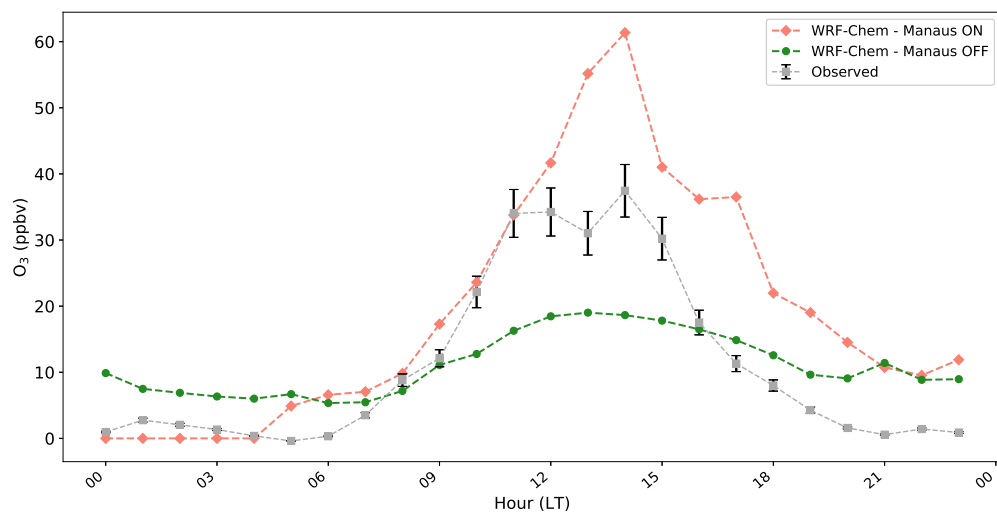


Figure S 6. Observed and WRF-Chem simulated surface O_3 mixing ratios (ppbv) on March 13, 2014. Error bars are shown for each set of measurements. The green (Manaus OFF) and orange (Manaus ON) lines show O_3 mixing ratios simulated for a distance above ground of ca. 8 m.

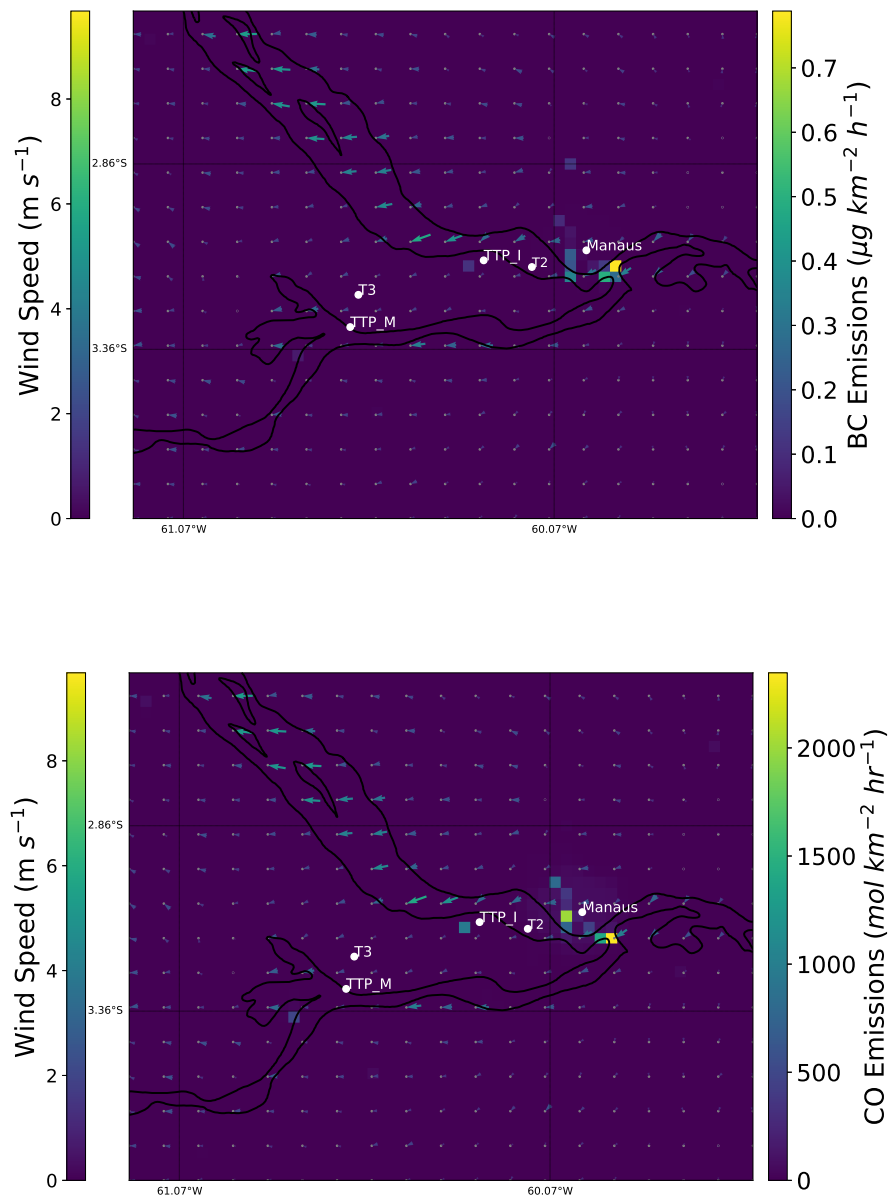


Figure S 7. Simulated spatial distribution of CO and BC emissions with wind vectors at 8 m above ground at 00 LT on March 13, 2014. TTP1 and TTPM are diesel TPPs.

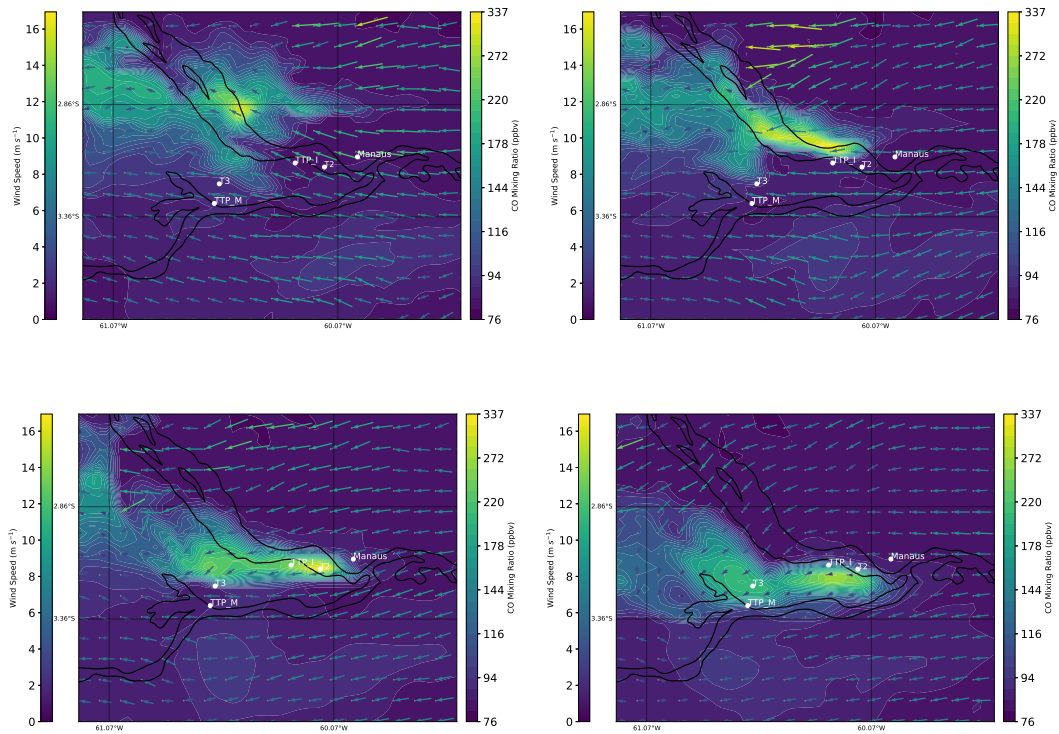


Figure S 8. Simulated CO mixing ratios and wind vectors at ca. 500 m above ground on March 13, 2014 (19 to 22 LT). TTP1 and TTPM are diesel TPPs.

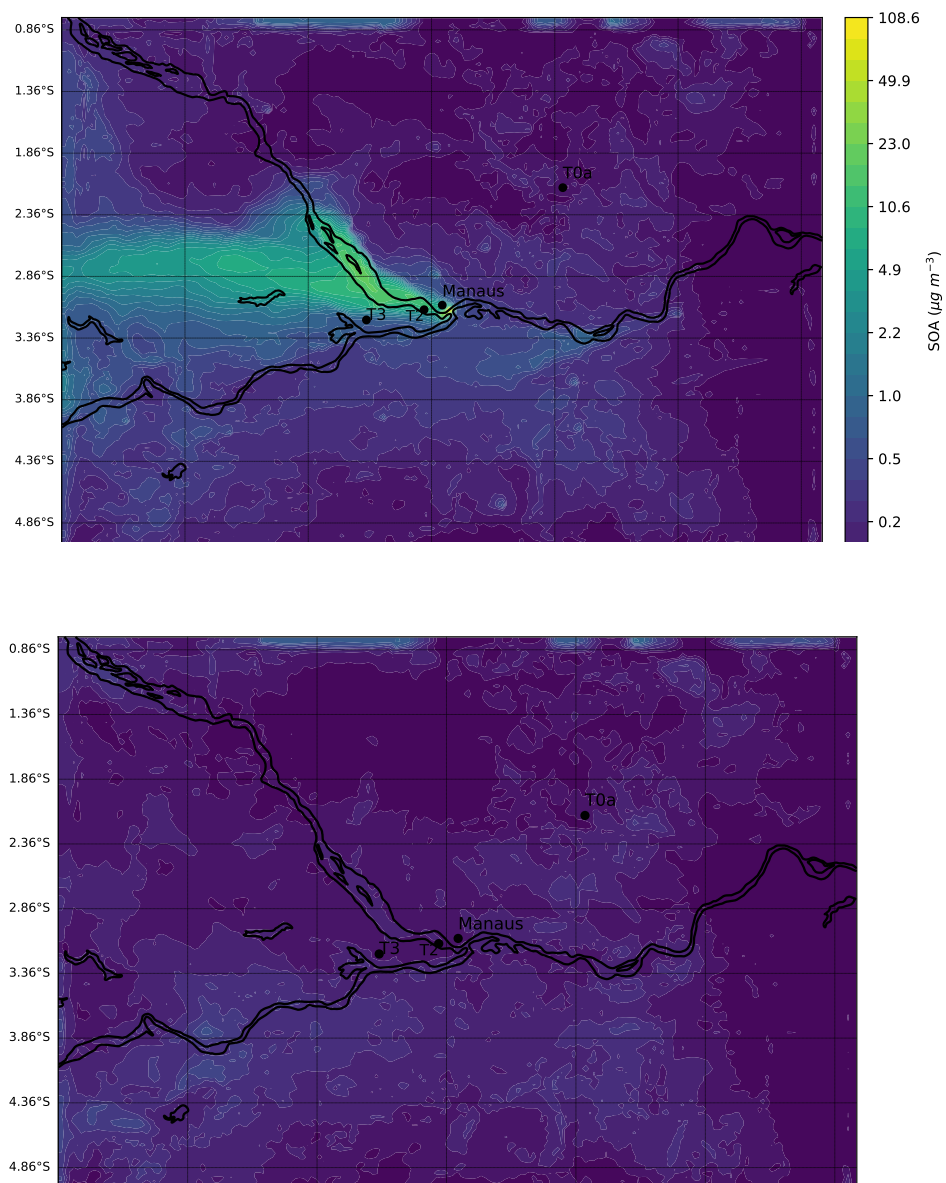


Figure S 9. Simulated SOA at ca. 8 m above ground on March 13, 2014 in the presence and absence of Manaus emissions.

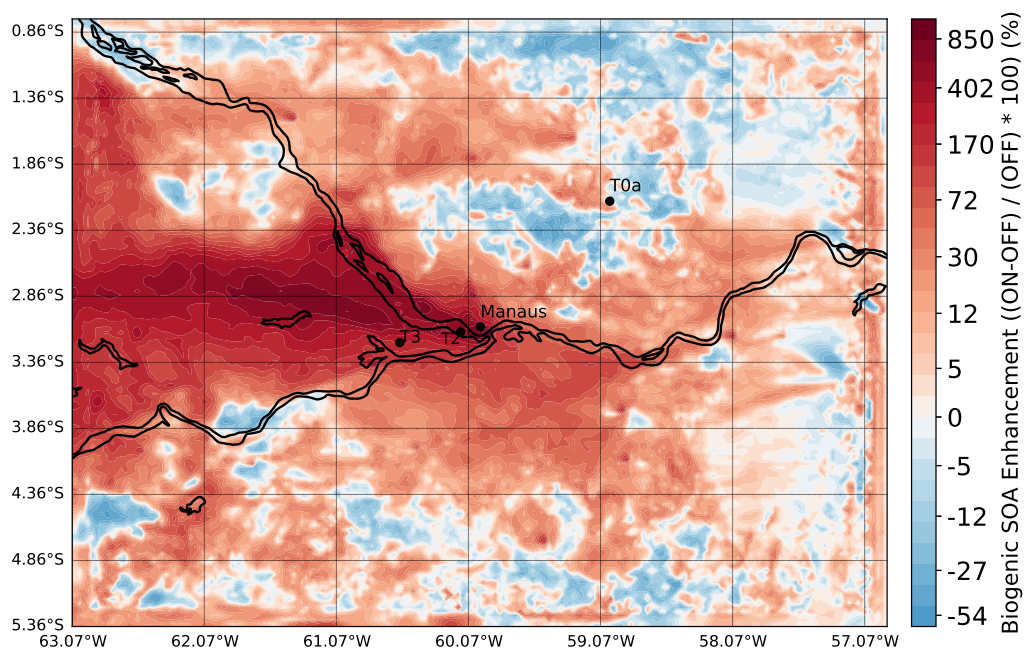


Figure S 10. Biogeni SOA enhancement (%) calculated from the two WRF-Chem simulations with anthropogenic emissions turned on and off i.e. $((\text{ON}-\text{OFF})/\text{OFF}) \times 100$. WRF-Chem predictions are at ca. 8 m altitude, averaged over 0 to 23 LT on March 13, 2014.

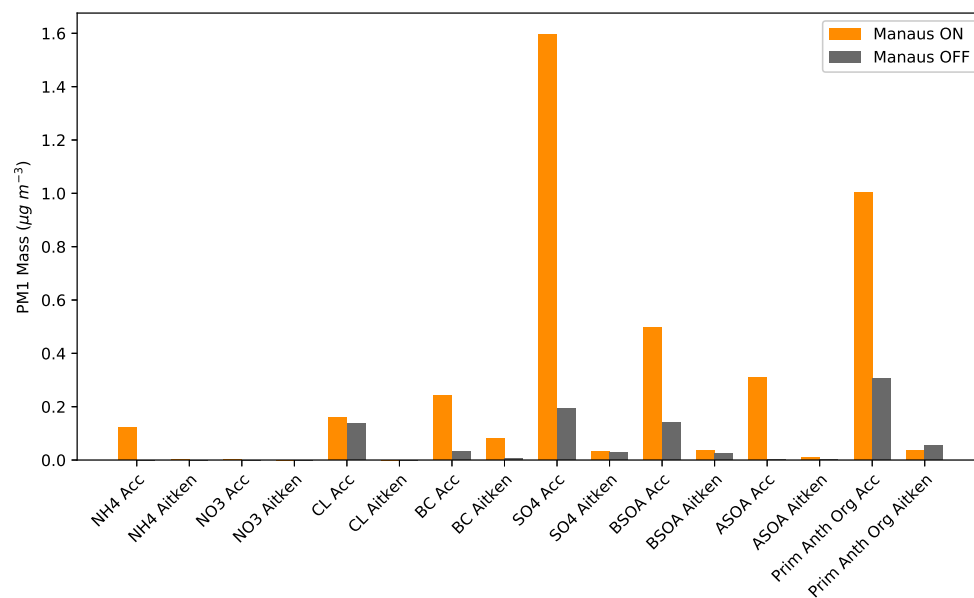


Figure S 11. Fraction of the simulated PM1 mass in the presence and absence of Manaus emissions on March 13, 2014.

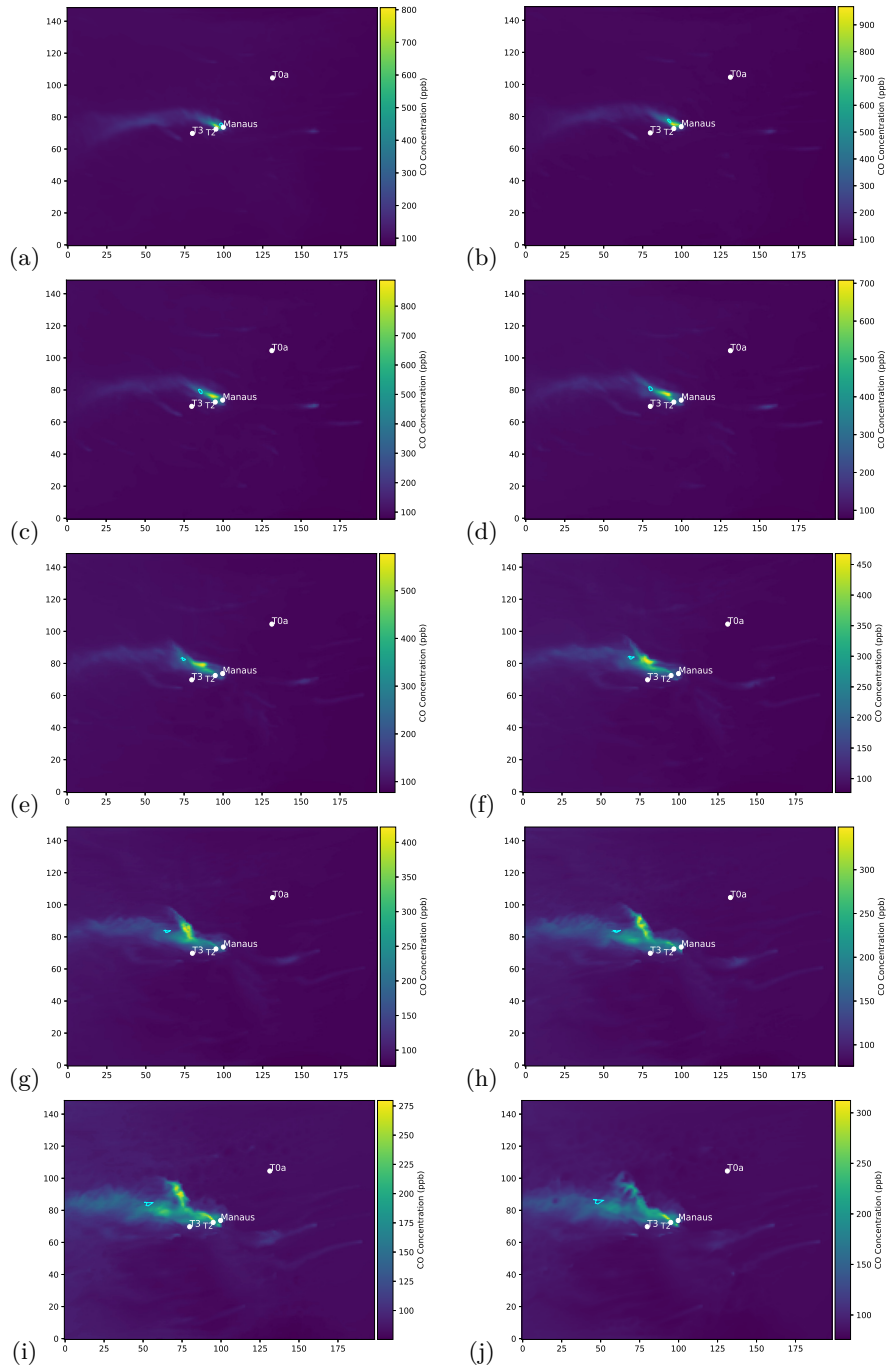


Figure S 12. Demonstration of HYSPLIT plume tracking algorithm for (a) 6 LT, (b) 7 LT, (c) 8 LT, (d) 9 LT, (e) 10 LT, (f) 11 LT, (g) 12 LT, (h) 13 LT, (i) 14 LT, (j) 15 LT on March 13, 2014. The CO mixing ratio (ppbv) at ca. 200 m provides a background for the HYSPLIT regions shown by cyan lines.

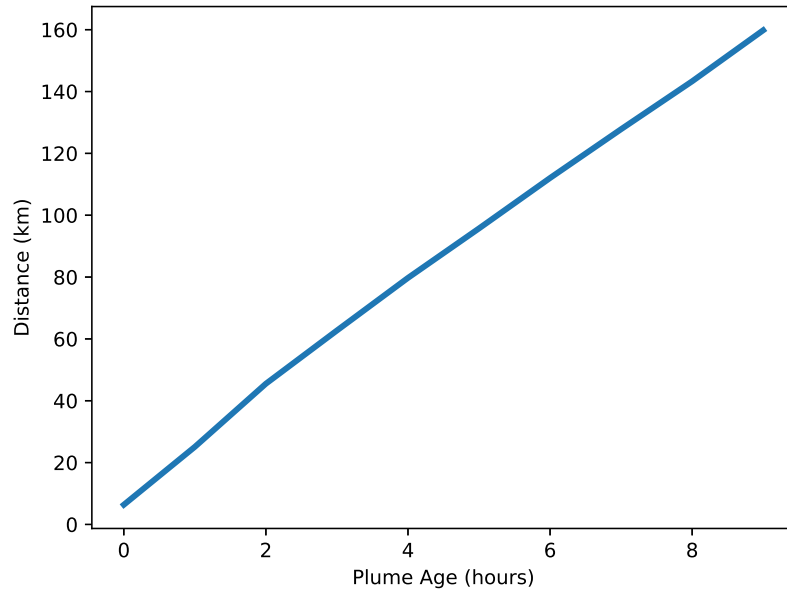


Figure S 13. Simulated plume center distance from Manaus on March 13, 2014 (6h to 15h LT.)

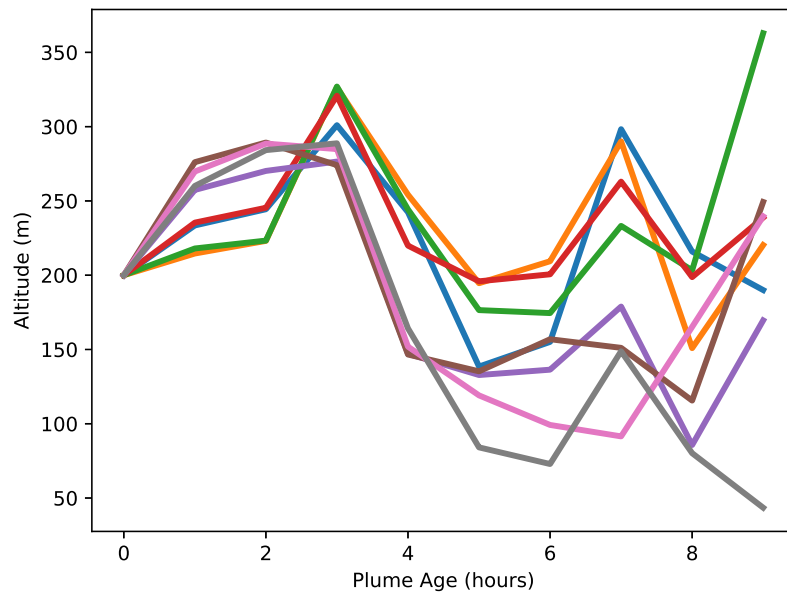


Figure S 14. Simulated altitude trajectories of HYSPLIT points on March 13, 2014 (6h to 15h LT).

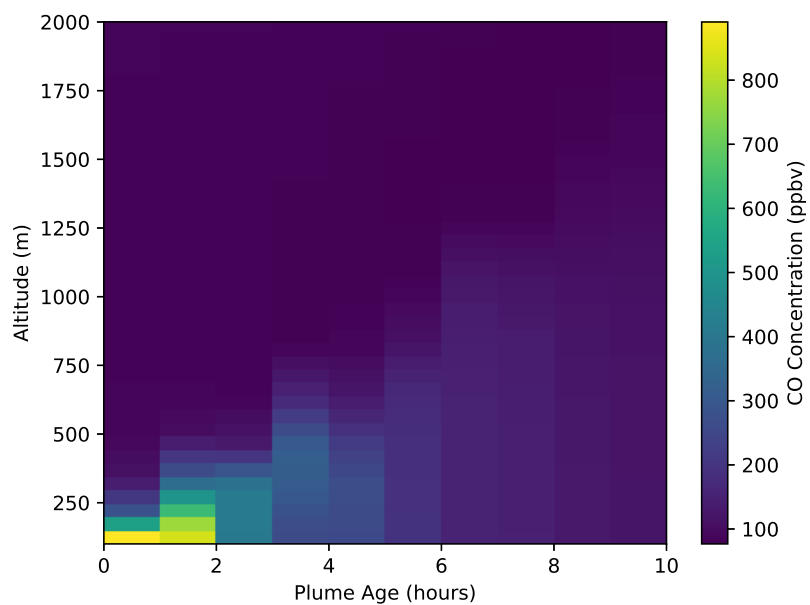


Figure S 15. Simulated CO vertical cross section at plume center determined by HYSPLIT on March 13, 2014 (6h to 15h LT).

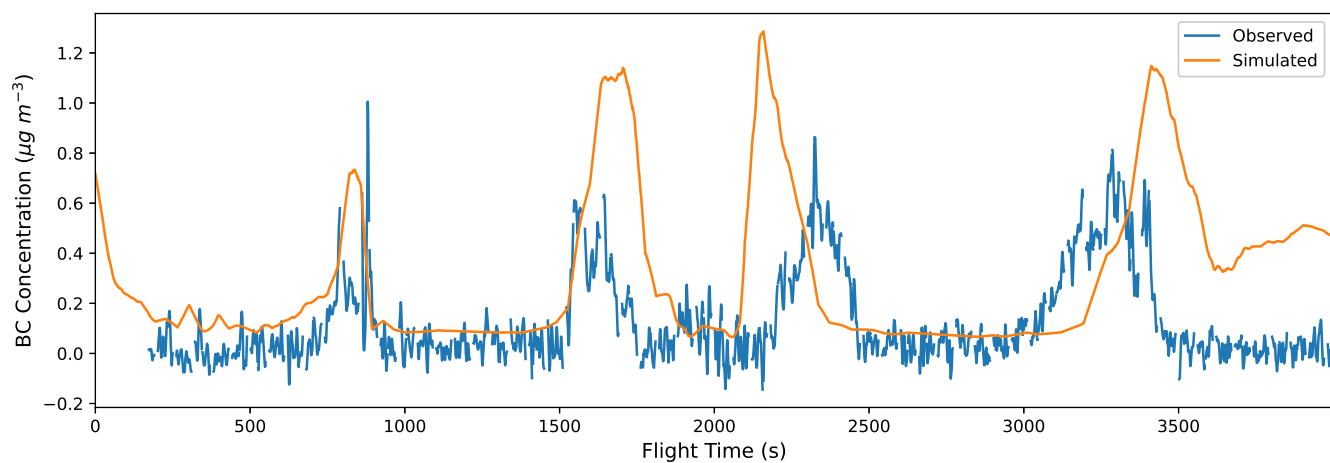


Figure S 16. Simulated and observed BC plotted along aircraft flight transects at ~ 500 m altitude on March 13, 2014.