



Supplement of

**Aerosols from anthropogenic and biogenic sources and their interactions
– modeling aerosol formation, optical properties, and impacts over the
central 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.

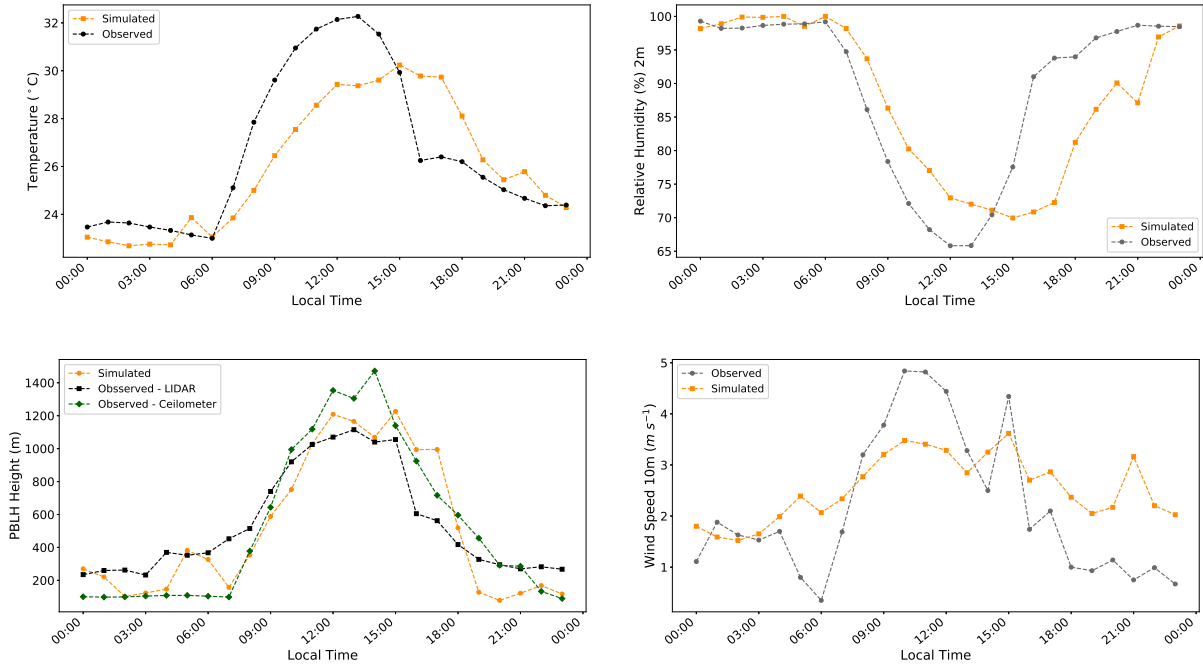


Figure S 1. Observed and WRF-Chem simulated of meteorological fields at the T3 site on March 13, 2014. 2 m air temperature (°C), 2 m specific humidity (%), PBL (m) and 10 m wind speed ($m s^{-1}$).

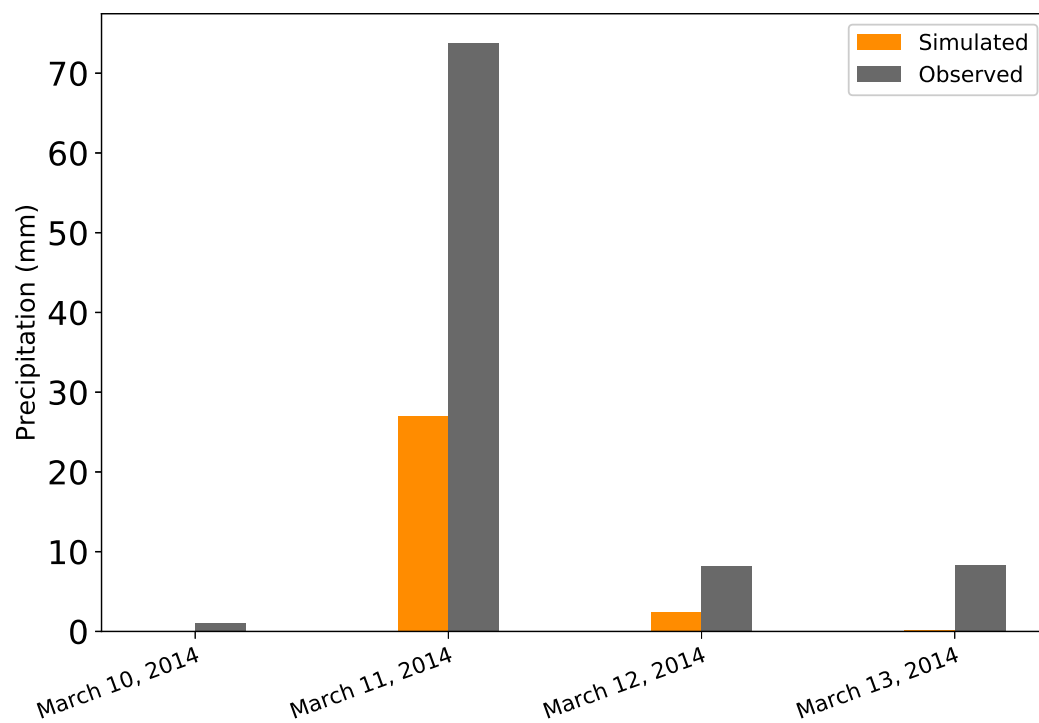


Figure S 2. Observed and WRF-Chem simulated accumulated daily precipitation at the T₃ site on March 13, 2014.

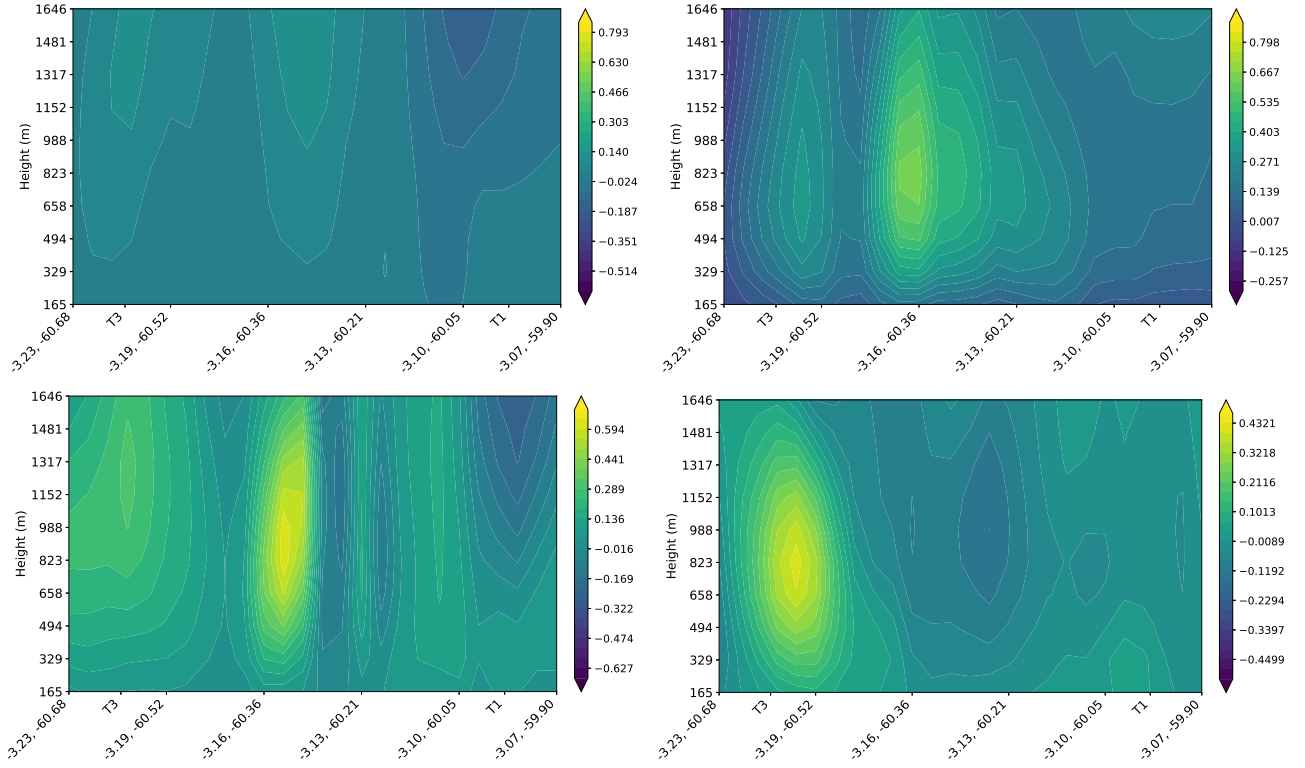


Figure S 3. Simulated vertical cross section of vertical wind speed on March 13, 2014 (19 to 22 LT) at T3.

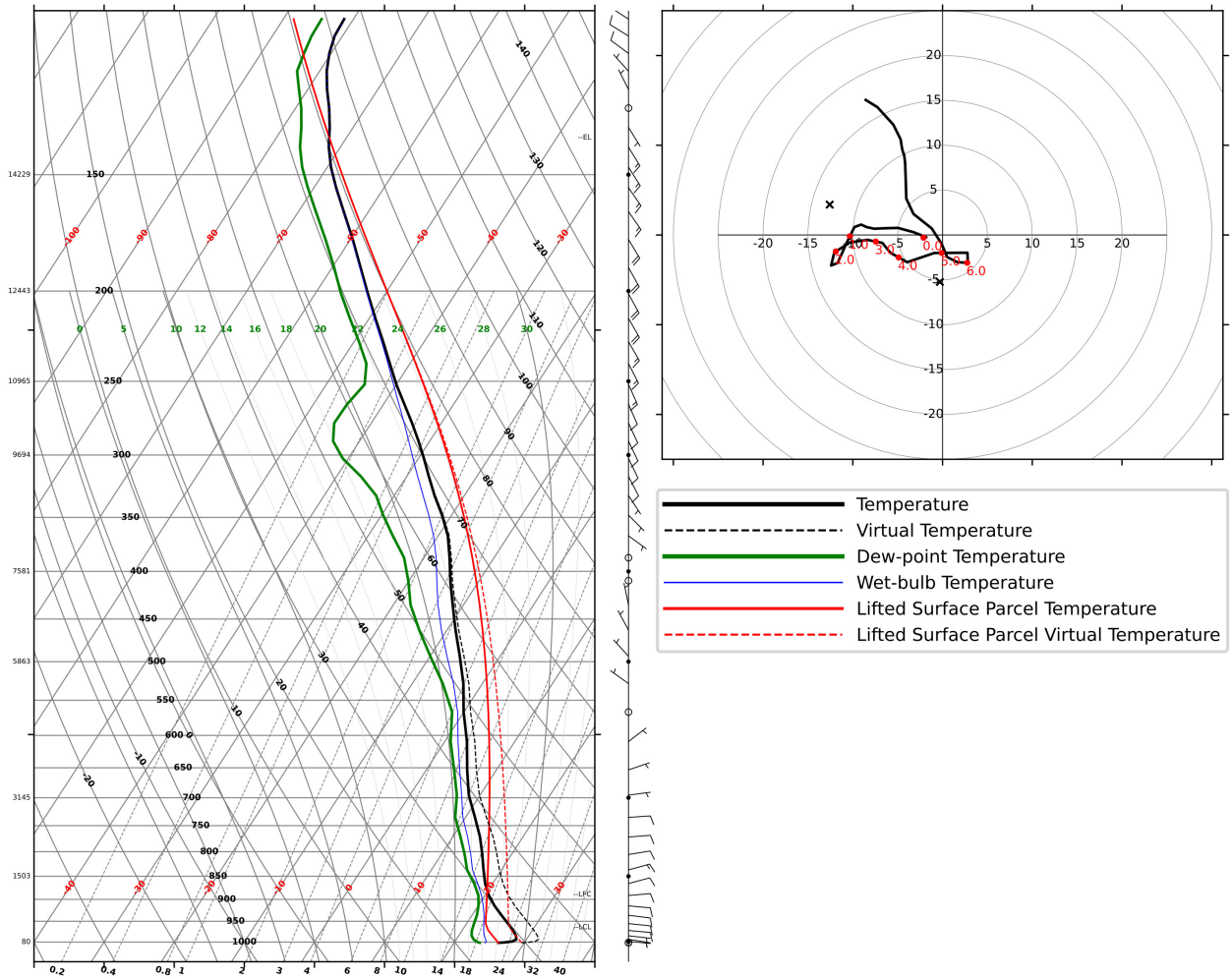


Figure S 4. Temperature, dew point, and wind profiles from simulations on March 13, 2014 (19:00 LT) at T3.

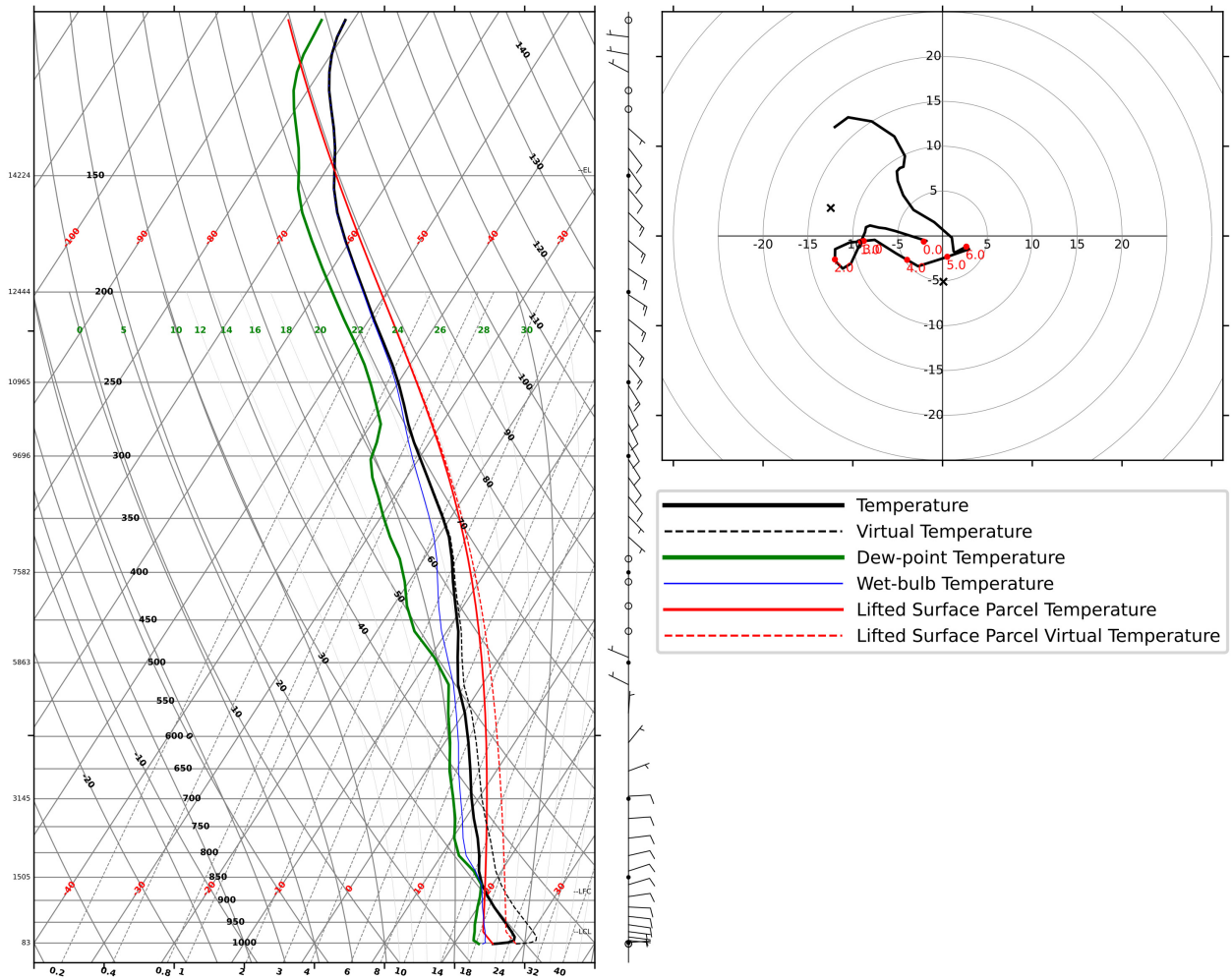


Figure S 5. Temperature, dew point, and wind profiles from simulations on March 13, 2014 (20:00 LT) at T₃.

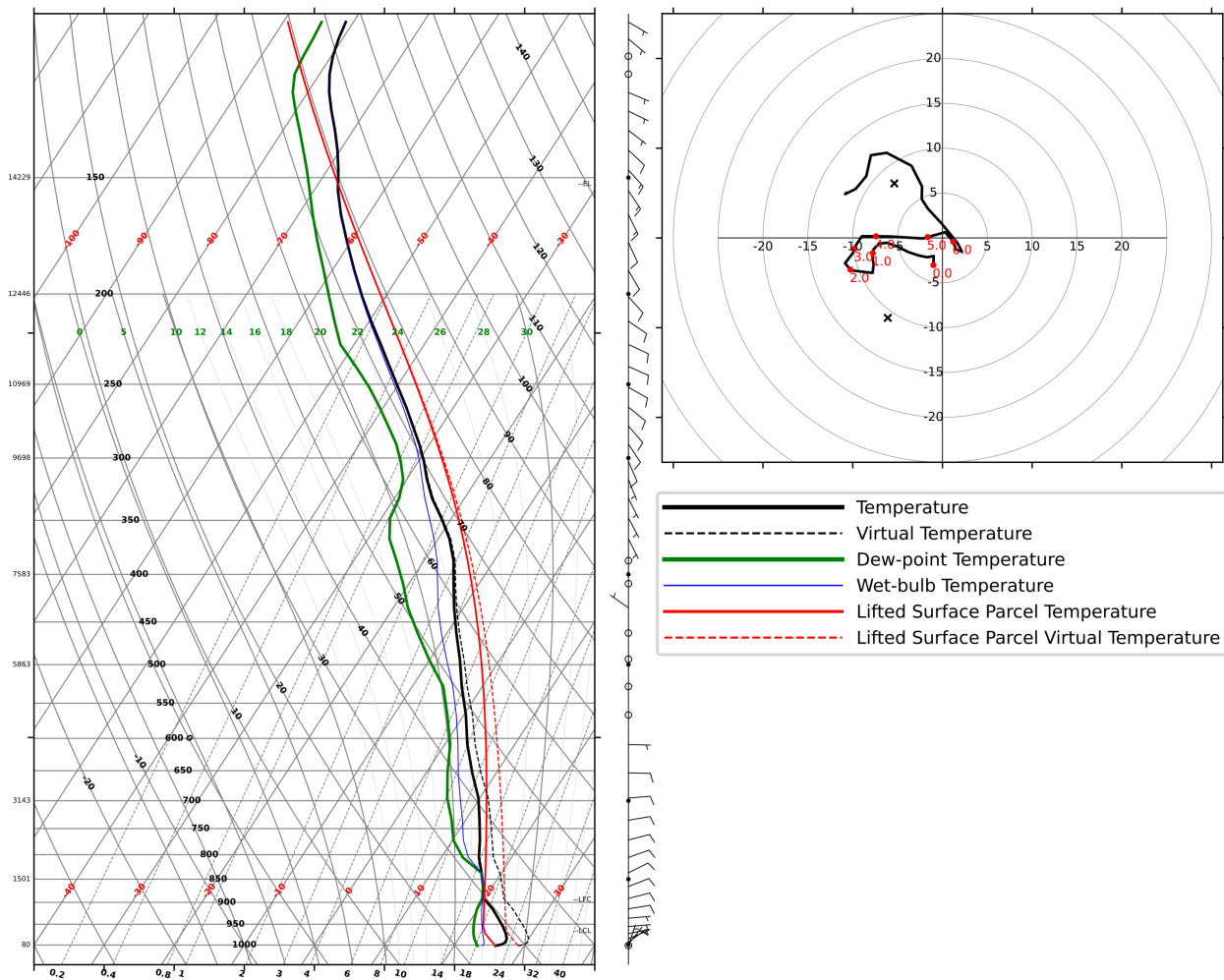


Figure S 6. Temperature, dew point, and wind profiles from simulations on March 13, 2014 (21:00 LT) at T3.

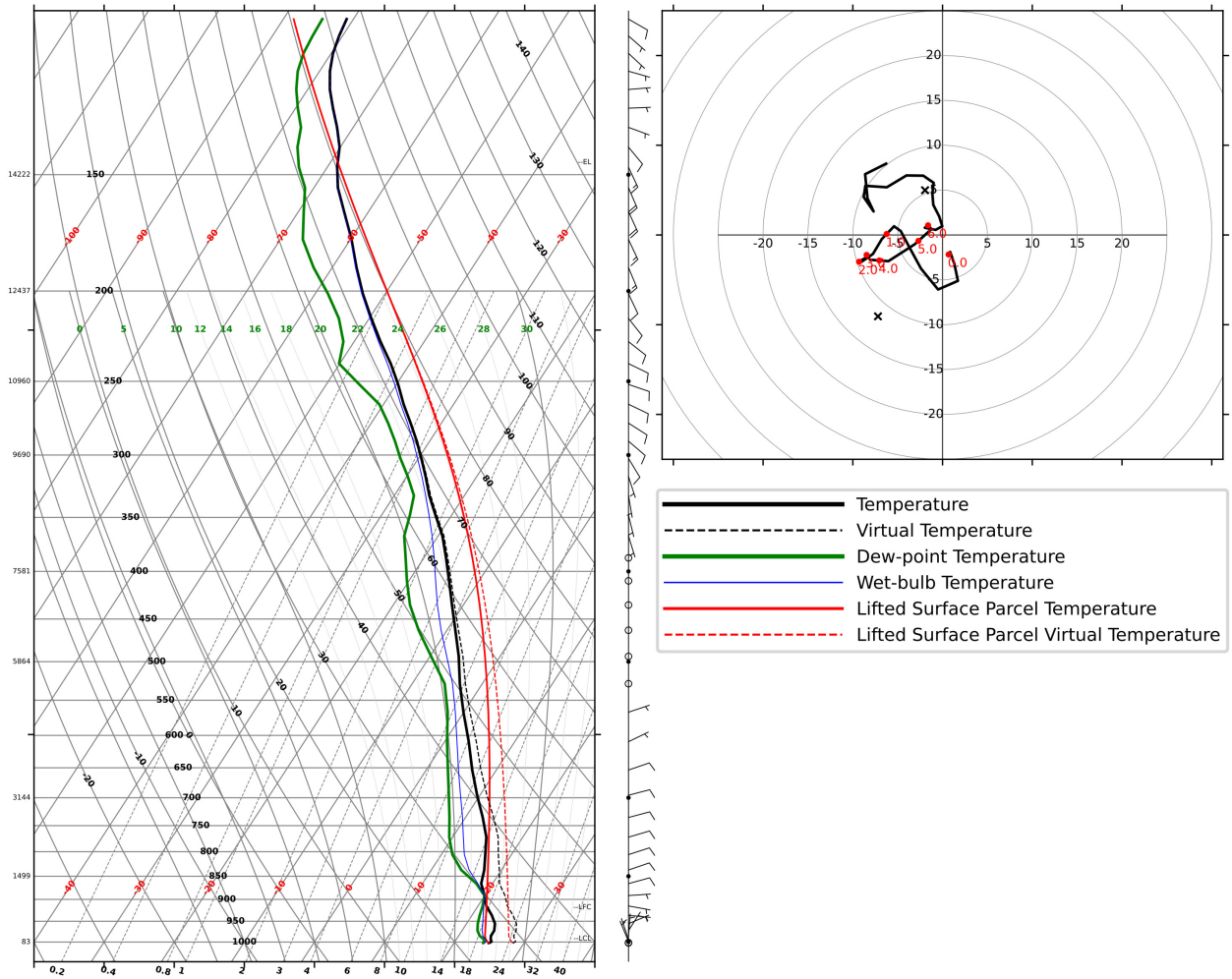


Figure S 7. Temperature, dew point, and wind profiles from simulations on March 13, 2014 (22:00 LT) at T₃.

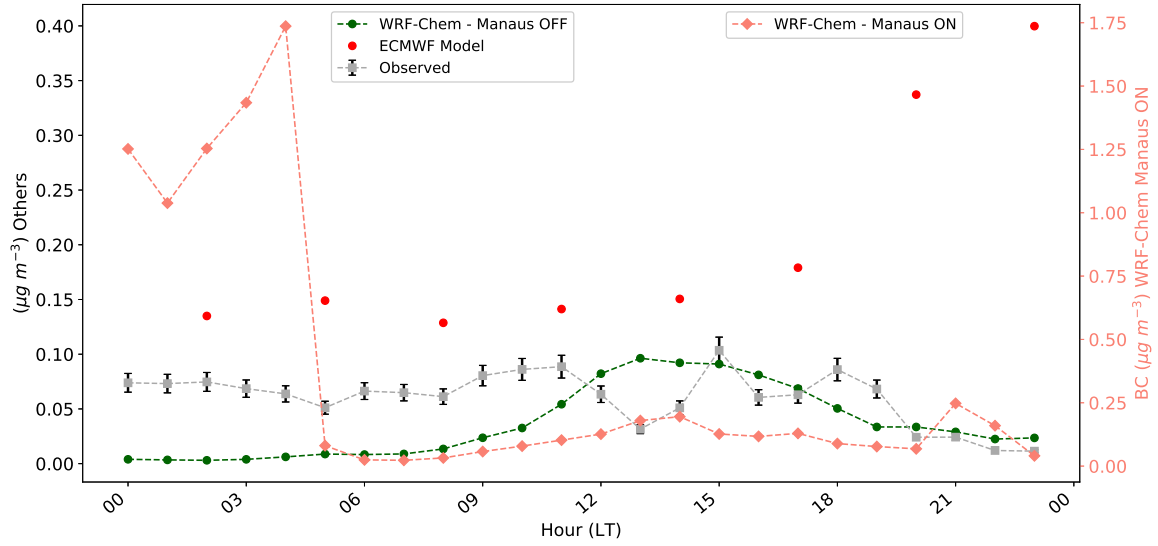


Figure S 8. Observed and WRF-Chem simulated surface concentrations of BC on March 13, 2014 at T3. An error bar is shown for each set of measurements. The green (Manaus OFF) and orange (Manaus ON) at T3 site show BC concentrations simulated for a height above ground of ca. 8 m. The global model values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

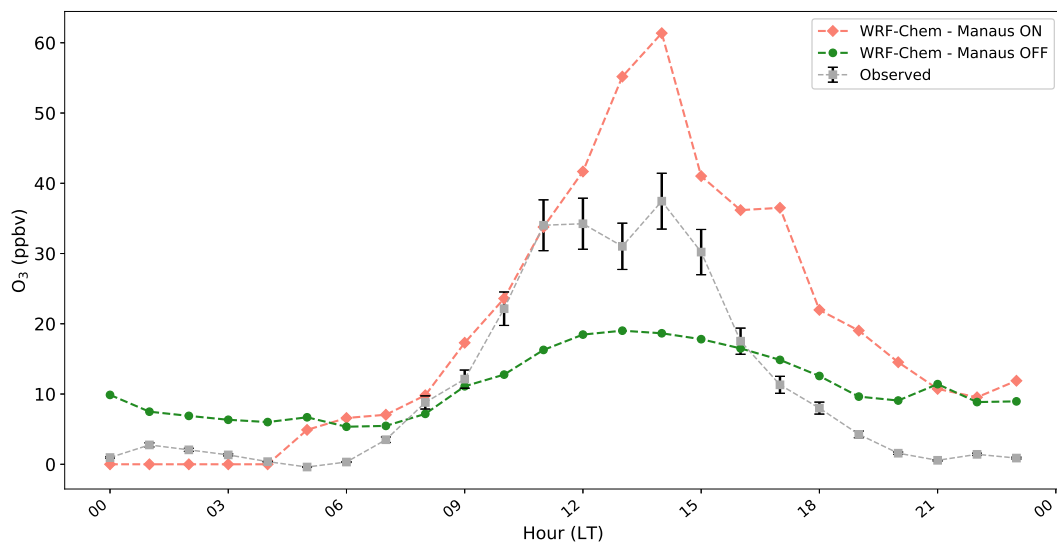


Figure S 9. Observed and WRF-Chem simulated surface O_3 mixing ratios (ppbv) on March 13, 2014 at T3. Error bars are shown for each set of measurements. The green (Manaus OFF) and orange (Manaus ON) lines show O_3 mixing ratios simulated for a distance above ground of ca. 8 m.

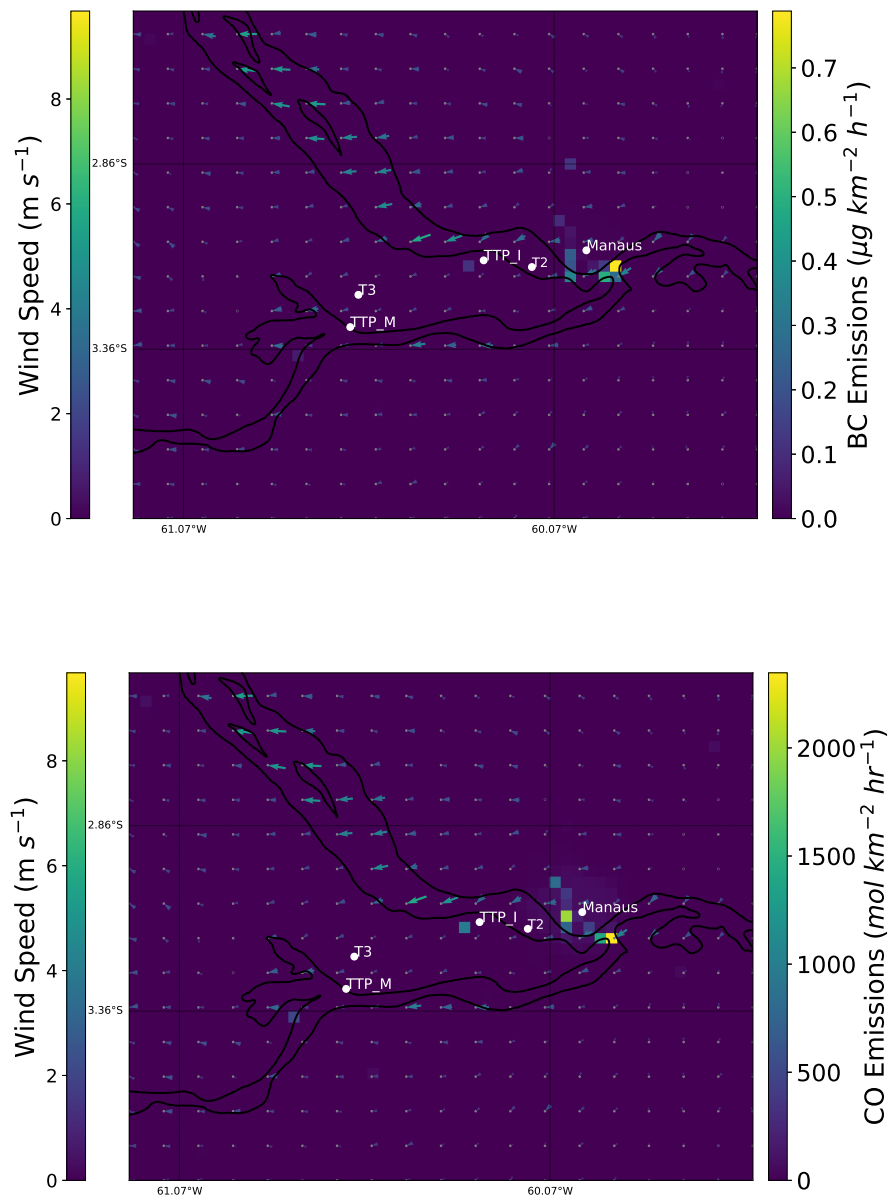


Figure S 10. Simulated spatial distribution of CO and BC emissions with wind vectors at 8 m above ground at 00 LT on March 13, 2014. TTP1 and TTPM are diesel TPPs.

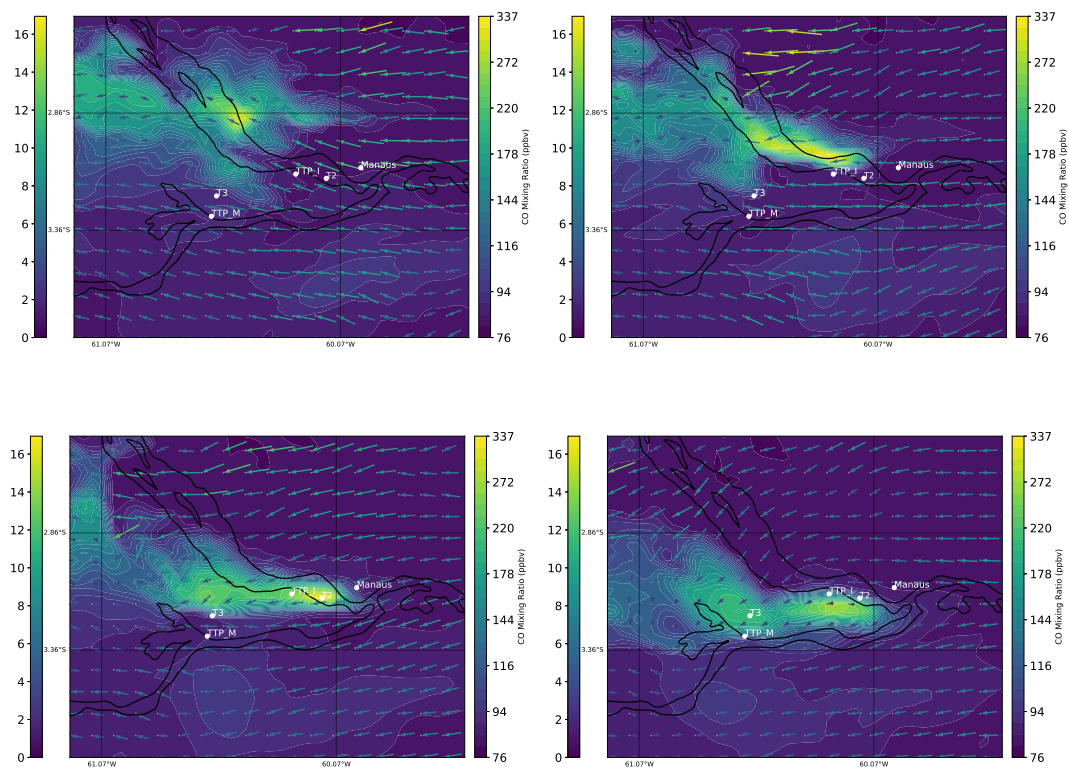


Figure S 11. Simulated CO mixing ratios and wind vectors at ca. 500 m above ground on March 13, 2014 (19 to 22 LT). TTP1 and TTPM are diesel TPPs.

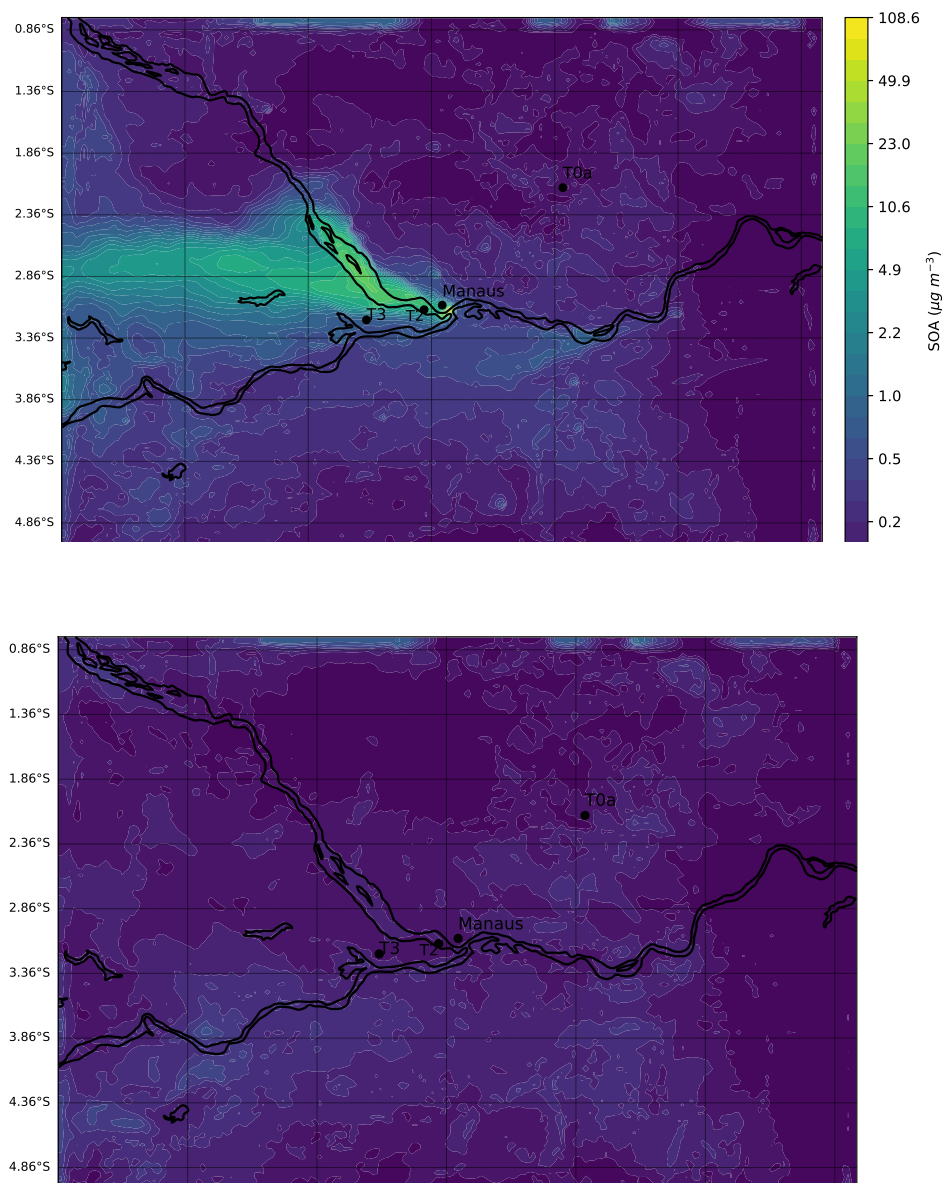


Figure S 12. Simulated SOA at ca. 8 m above ground on March 13, 2014 in the presence and absence of Manaus emissions.

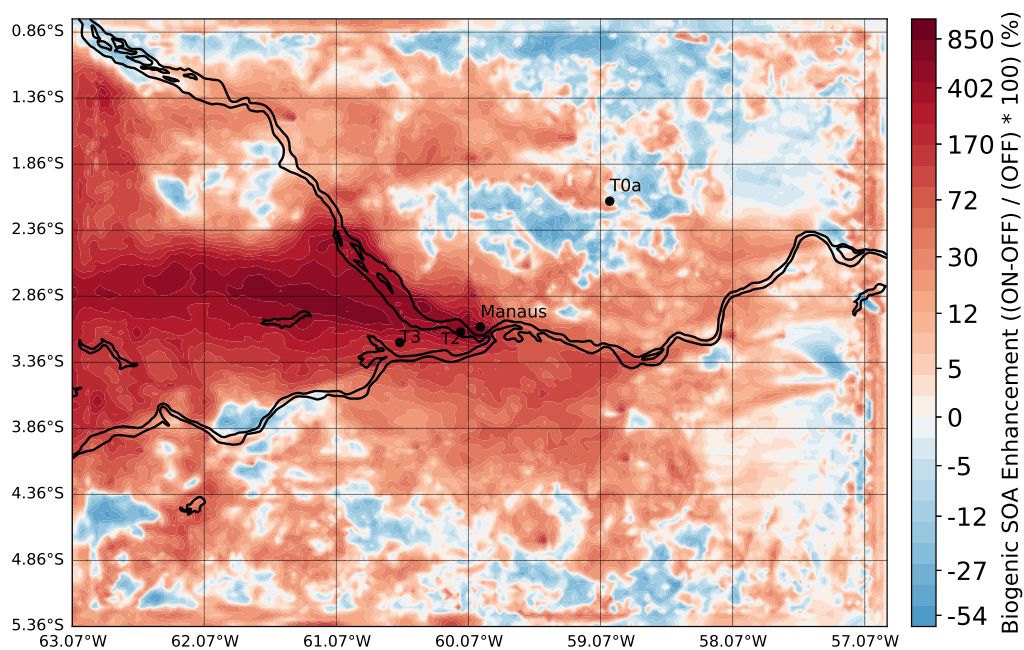


Figure S 13. Biogeni SOA enhancement (%) calculated from the two WRF-Chem simulations with anthropogenic emissions turned on and off i.e. $((\text{ON}-\text{OFF})/\text{OFF}) \times 100$. WRF-Chem predictions are at ca. 8 m altitude, averaged over 0 to 23 LT on March 13, 2014.

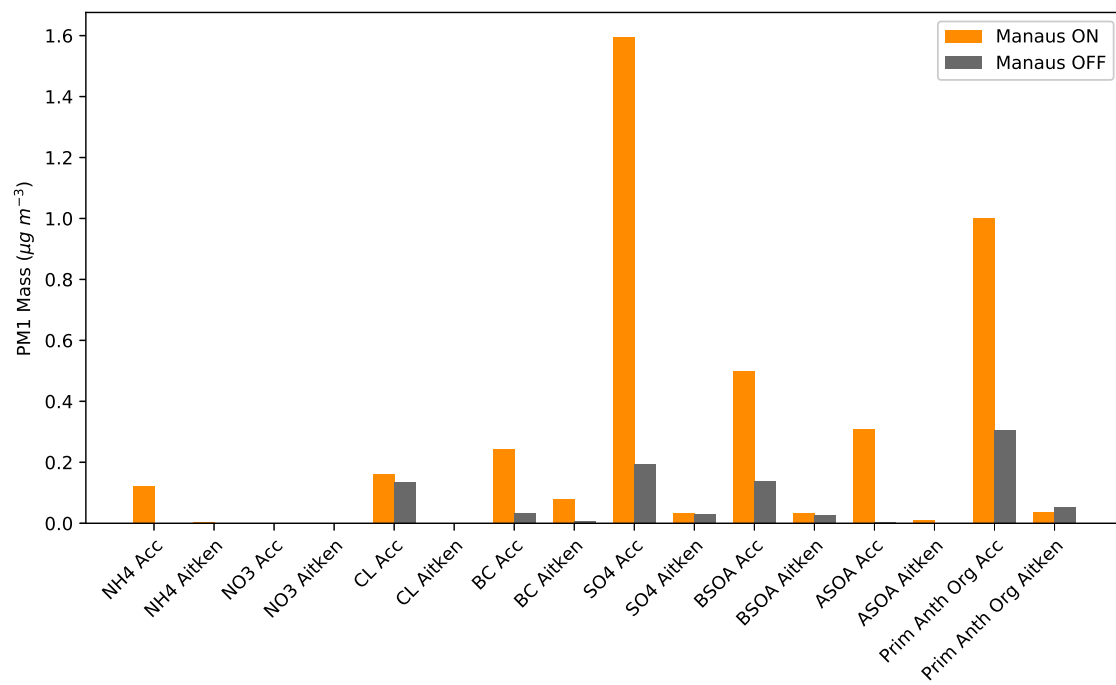


Figure S 14. Fraction of the simulated PM1 mass in the presence and absence of Manaus emissions on March 13, 2014 at T₃.

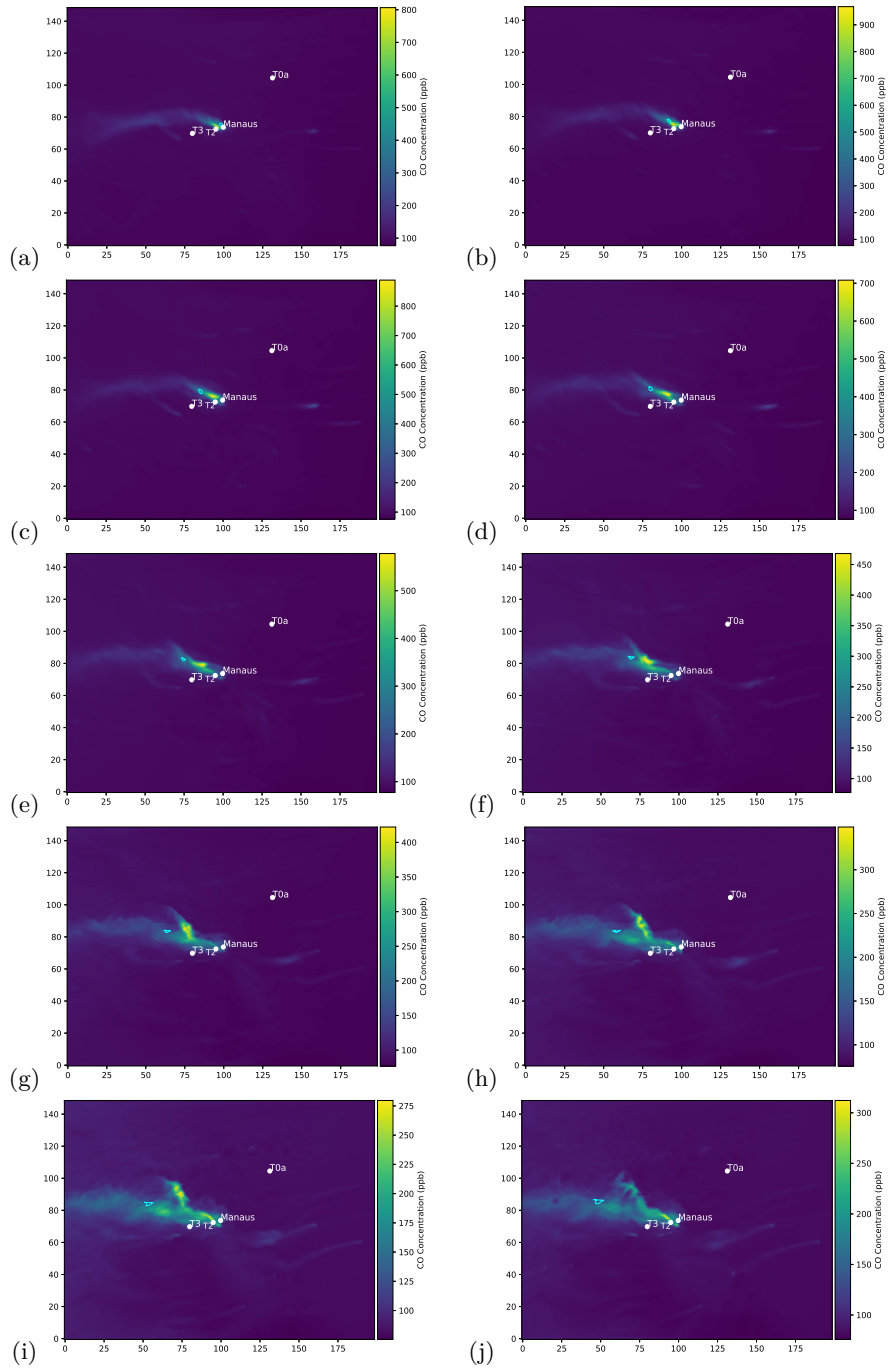


Figure S 15. Demonstration of HYSPLIT plume tracking algorithm for (a) 6 LT, (b) 7 LT, (c) 8 LT, (d) 9 LT, (e) 10 LT, (f) 11 LT, (g) 12 LT, (h) 13 LT, (i) 14 LT, (j) 15 LT on March 13, 2014. The CO mixing ratio (ppbv) at ca. 200 m provides a background for the HYSPLIT regions shown by cyan lines.

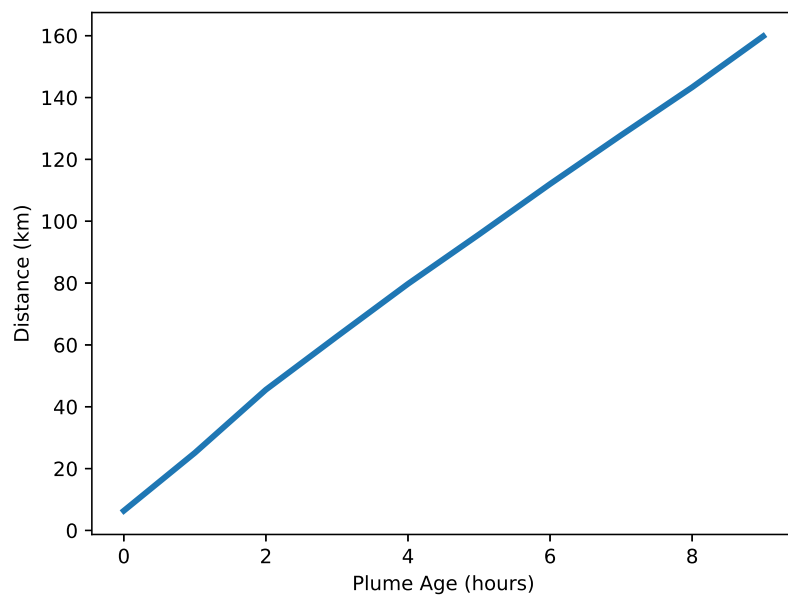


Figure S 16. Simulated plume center distance from Manaus on March 13, 2014 (6h to 15h LT.)

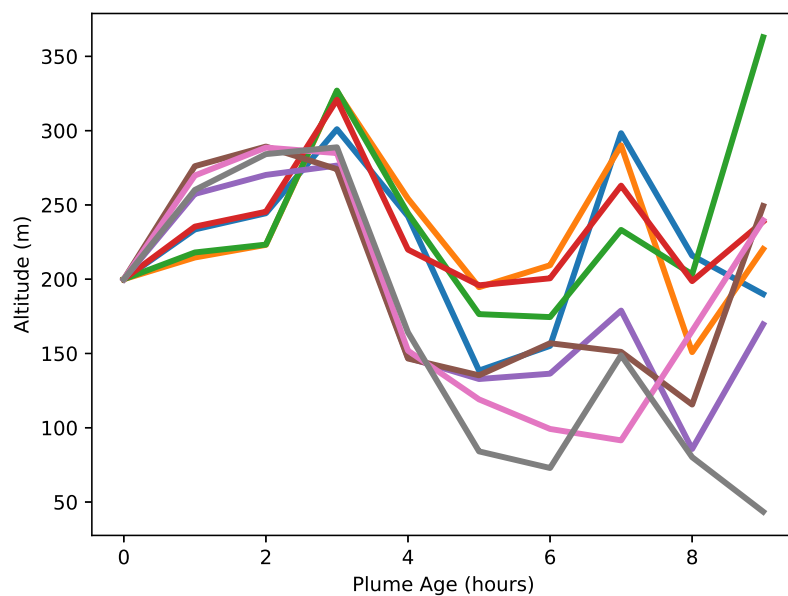


Figure S 17. Simulated altitude trajectories of HYSPLIT points on March 13, 2014 (6h to 15h LT.).

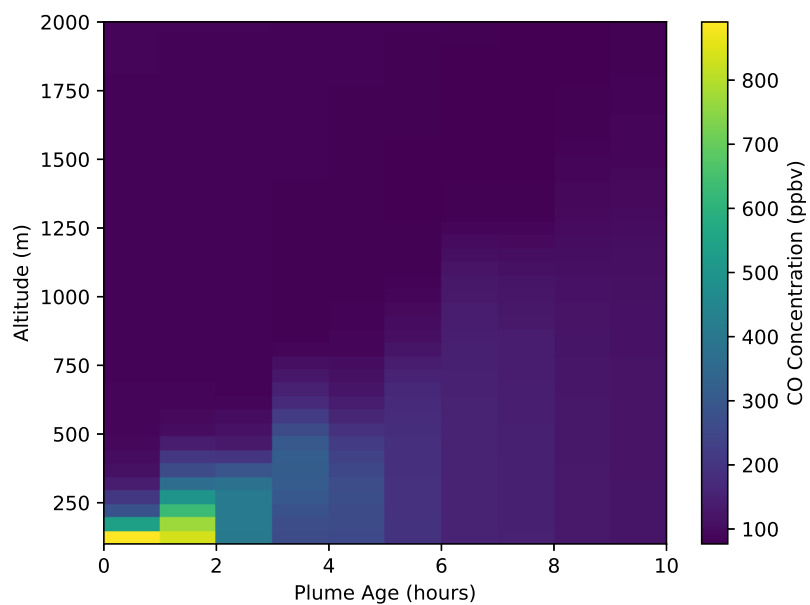


Figure S 18. Simulated CO vertical cross section at plume center determined by HYSPLIT on March 13, 2014 (6h to 15h LT).

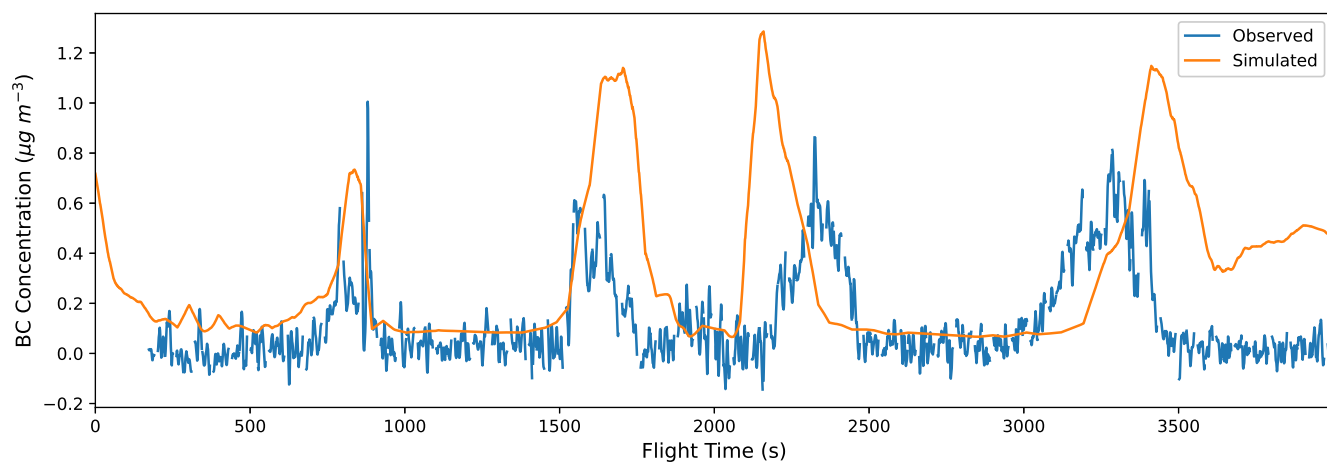


Figure S 19. Simulated and observed BC plotted along aircraft flight transects at ~ 500 m altitude on March 13, 2014.