

Figure S1. Comparison of P3 flight data with WRF-CAM5 FireOn curtains on 15 August 2017.

(a) Latitude of the P3 over time. The longitude of the flight is 5° E for essentially the entire flight. For (b) N_a , (c) black carbon, and (d) organic carbon, scatter points represent P3 observations and the background shading is the WRF-CAM5 FireOn curtain (subset to the nearest P3 location and time) at all altitudes. The 1100-1300 UTC time period most relevant to the comparison, based on the HYSPLIT matches and P3 flight path (when the aircraft sampled around 2 km altitude), is demarcated by white dashed lines in (b-d). Black (unfilled) points represent missing P3 data.

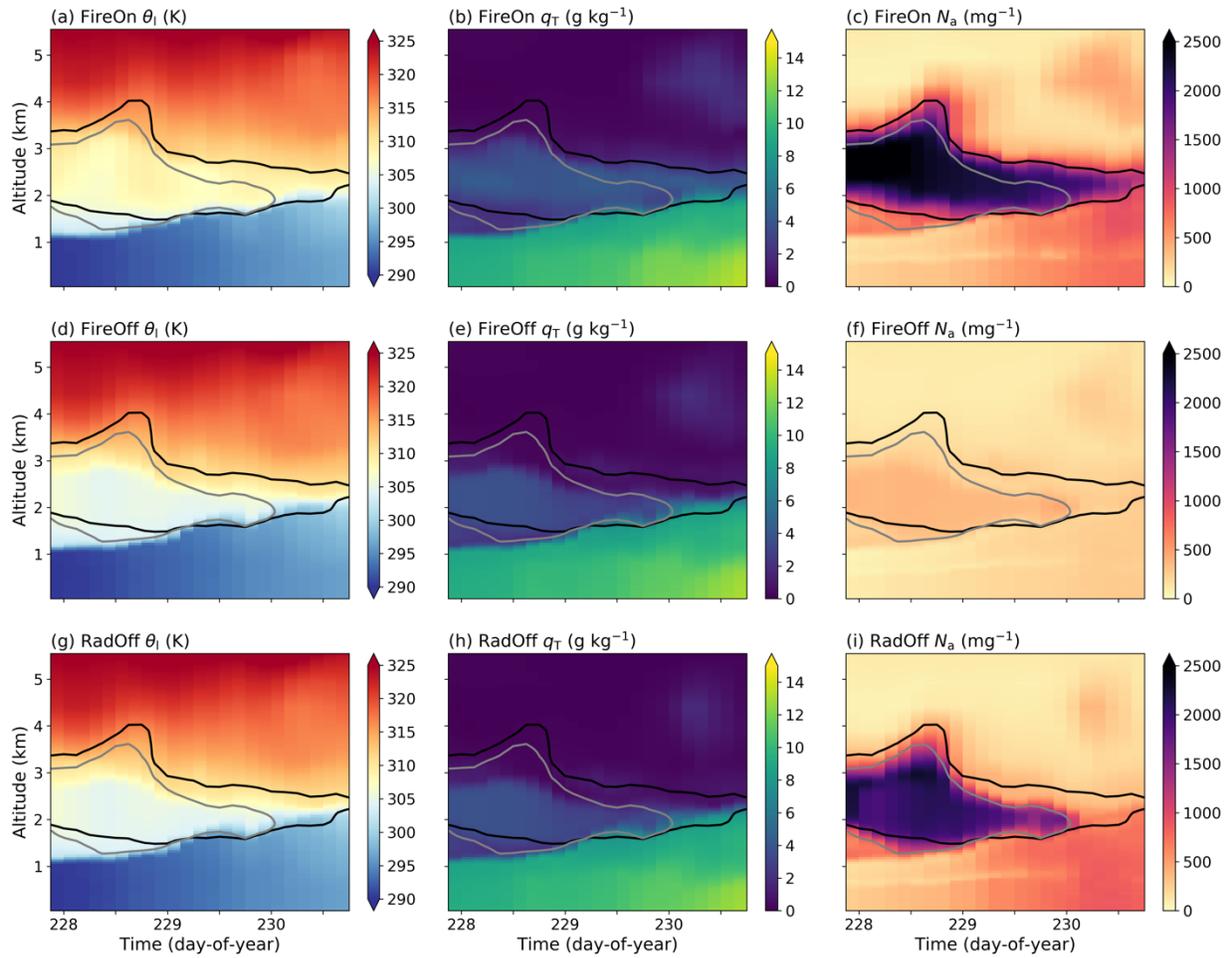


Figure S2. Lagrangian curtains of liquid water potential temperature, total water mixing ratio, and accumulation mode aerosol number concentration from 20:00 UTC on 15 August 2017 (doy 227) to 20:00 UTC on 18 August 2017 (doy 230). (a-c) show the FireOn case, (d-f) show the FireOff case, and (g-i) show the RadOff case. Black contours indicate FireOn N_a of 1000 mg^{-1} and grey contours indicate RadOff N_a of 1000 mg^{-1} .

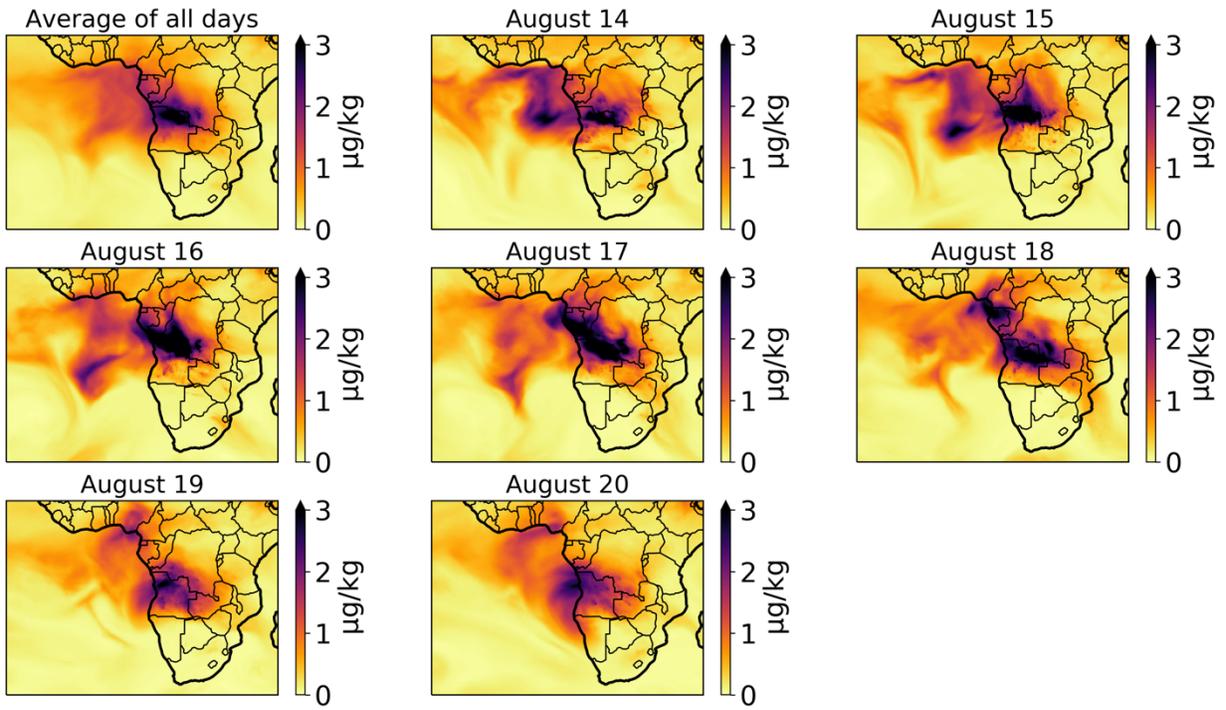


Figure S3. Smoke (black carbon mass concentration) evolution over time in WRF-CAM5 FireOn. Values are averaged between 2 and 5 km.

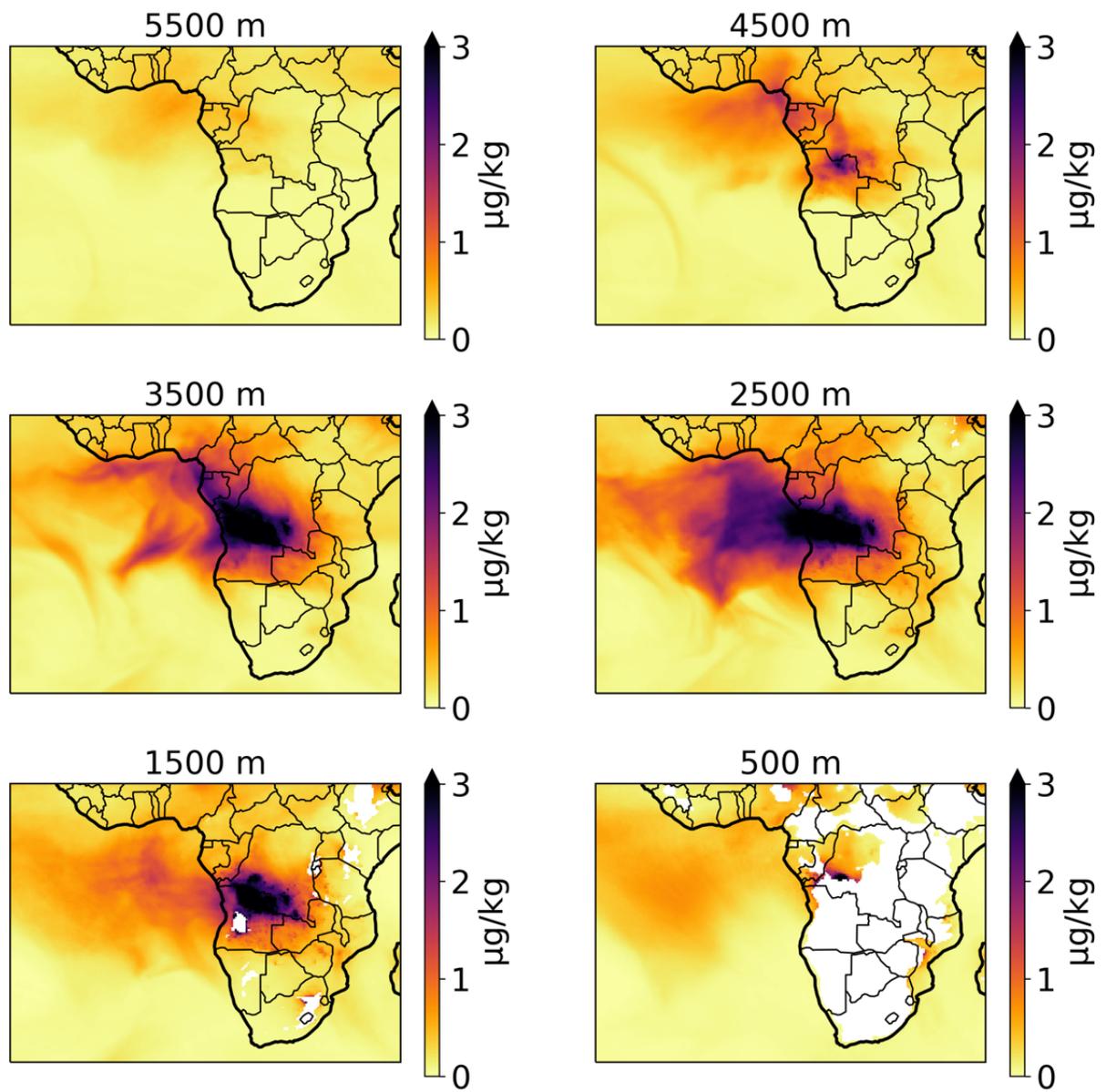


Figure S4. Smoke (black carbon mass concentration) vertical structure in WRF-CAM5 FireOn. Values are averaged over all simulated time periods.

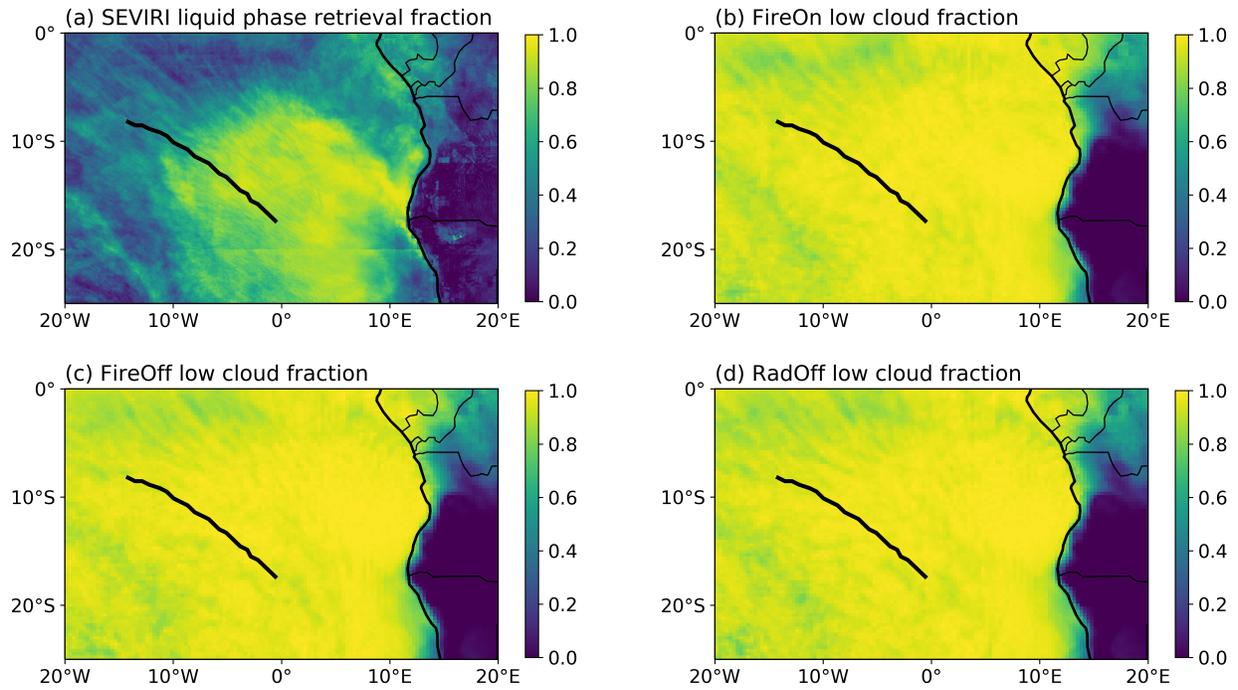


Figure S5. Low cloud fraction averaged over the full 14-20 August 2017 period for (a) SEVIRI (defined as the occurrence of successful liquid cloud phase) and the WRF-CAM5 (b) FireOn, (c) FireOff, and (d) RadOff cases. Location of the Lagrangian trajectory is indicated in black for reference.