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The CU mobile Solar Occultation Flux instrument: structure functions and emission rates of NH_3, NO_2 and C_2H_6

Natalie Kille et al.

Correspondence to: R. Volkamer (rainer.volkamer@colorado.edu)

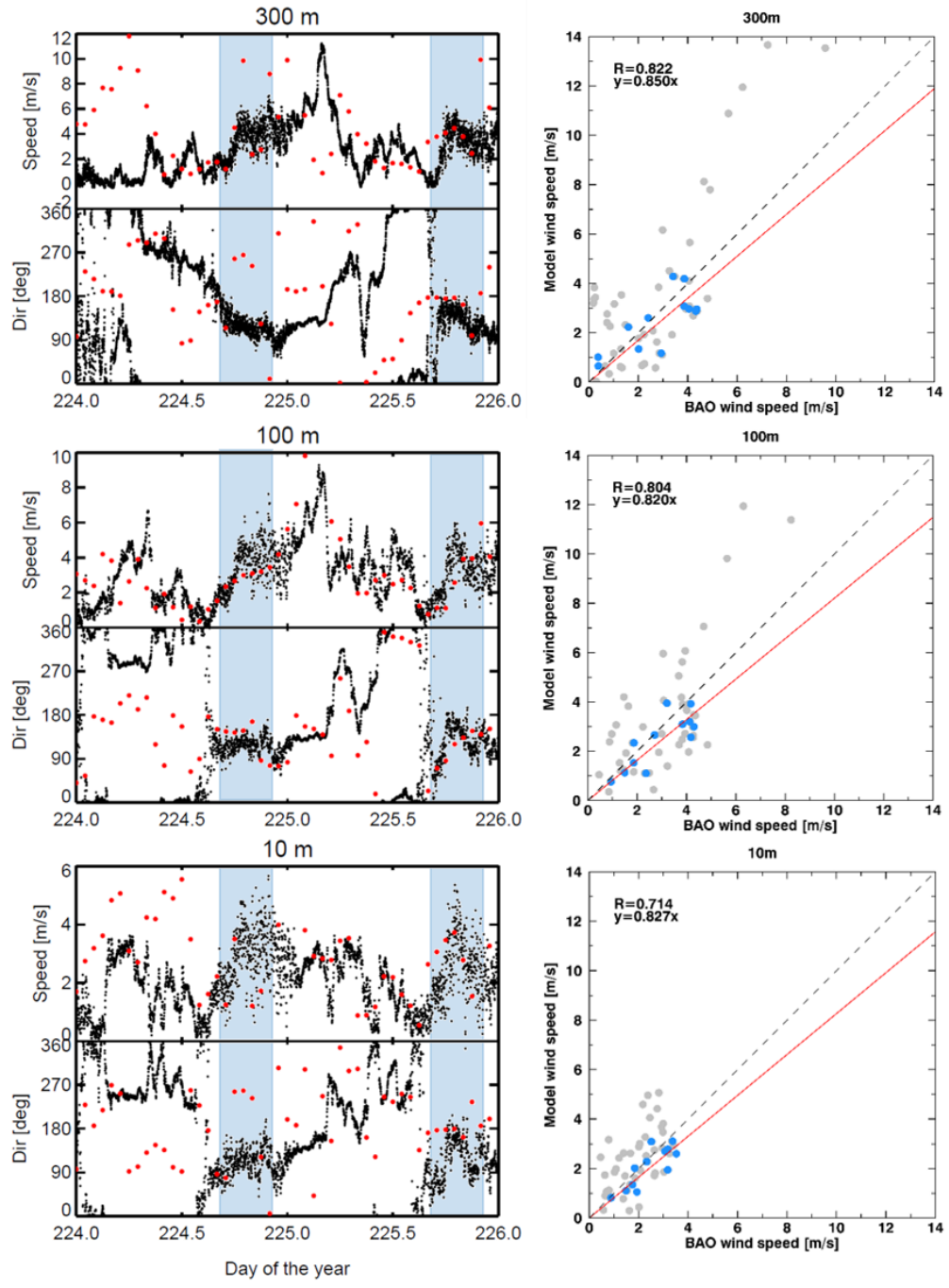

Figure S1: Comparison of wind speed and wind direction at 300 (top), 100 (middle), and 10 m (bottom). Left column: Black is BAO observed wind, red is modeled wind for 12 and 13 August 2014. The colored shading indicates the times of the RDs on both days (16–22 UTC). Right column: Blue indicates data from 16–22 UTC, gray is all data. The red line indicates the fit to blue data, the dashed line is the 1:1 line.

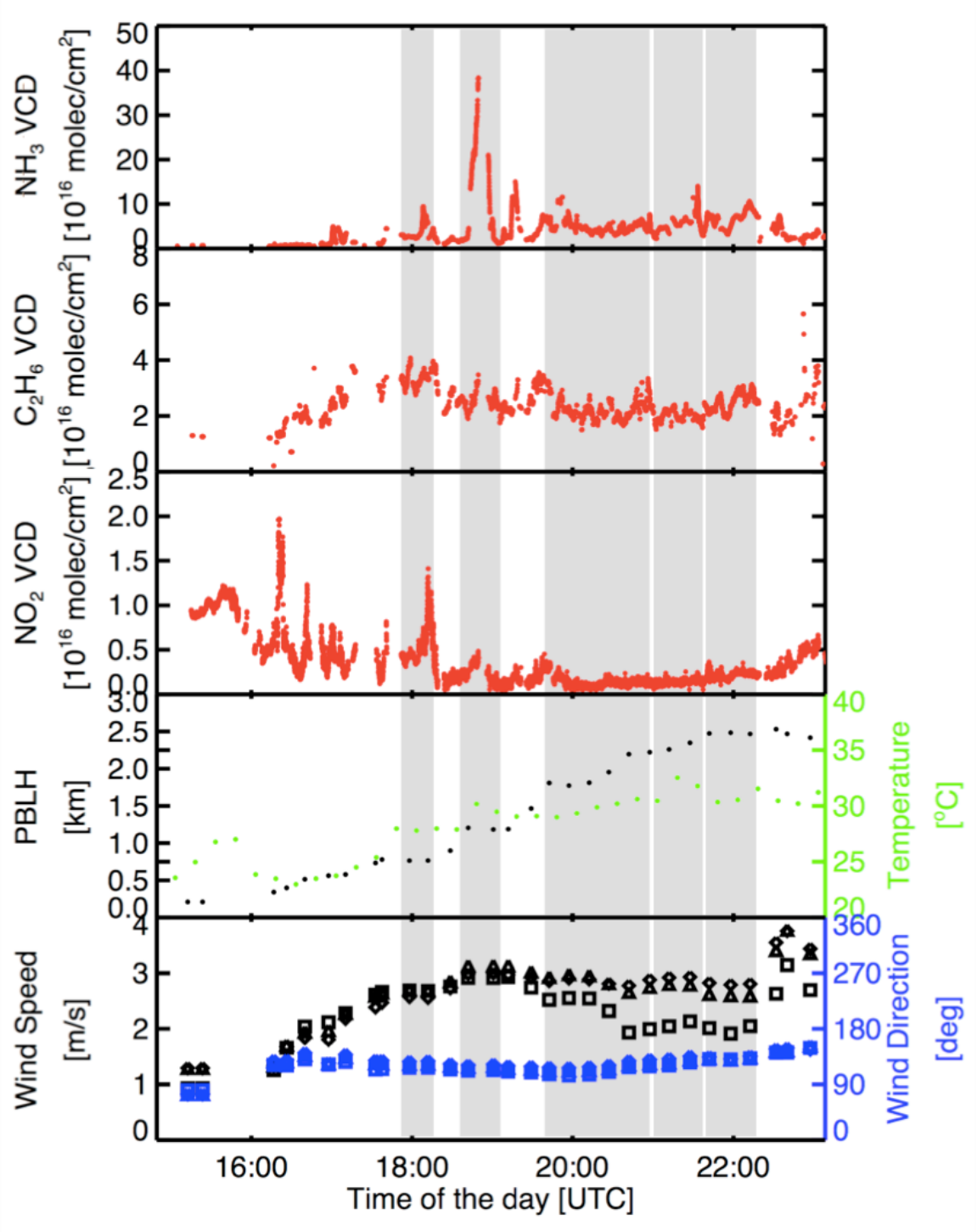

Figure S2: Timeseries of the VCDs measured for A) NH_3, B) C_2H_6, C) NO_2, during RD10. D) PBLH and temperature, E) model wind; (diamonds) model wind averaged over approximately 10 – 50 m above ground level, (triangles) over half PBLH, (squares) over the full PBLH. Shaded areas indicate times at each site.

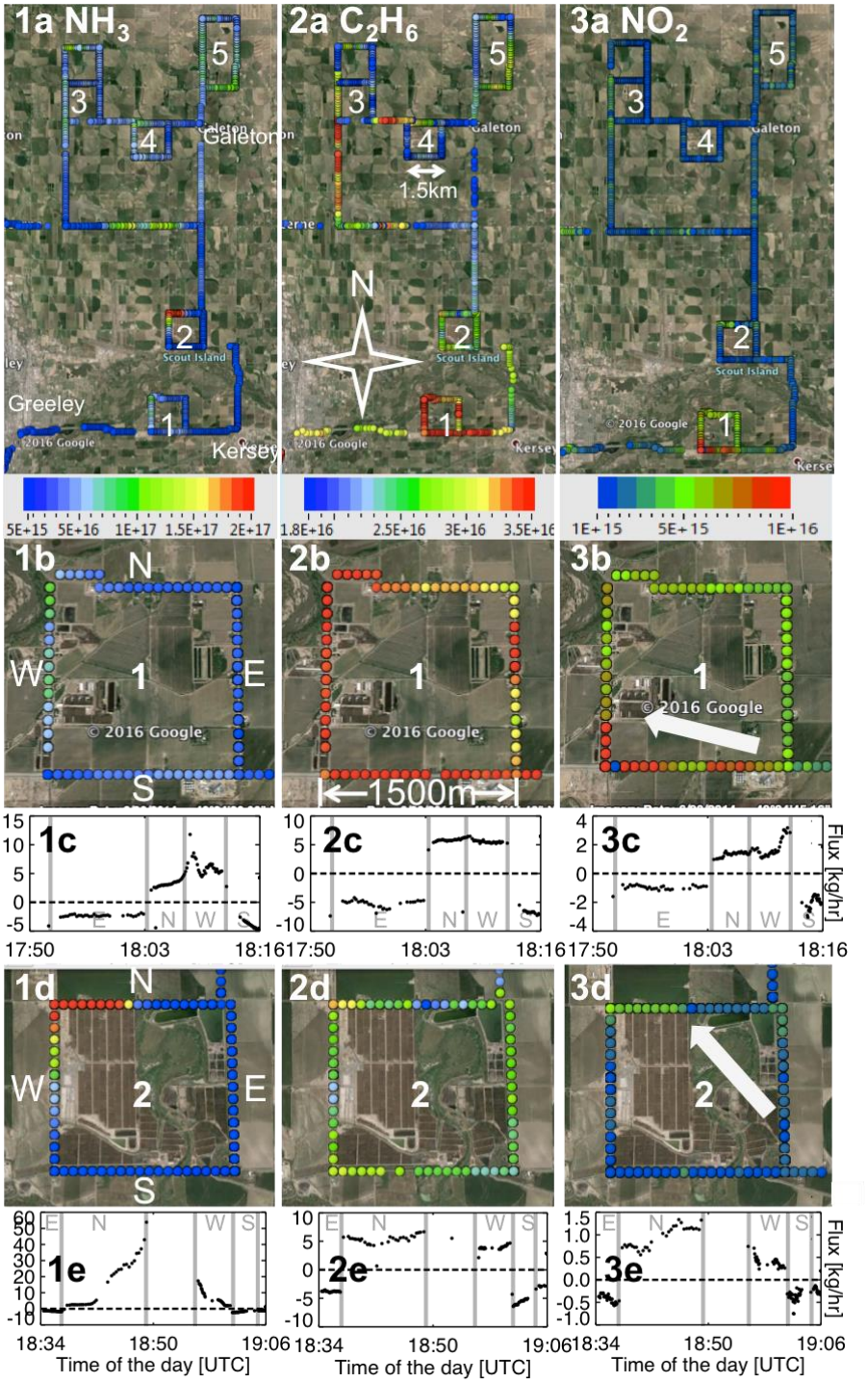

Figure S3: Zoom of the area east of Greeley, CO with the RD10 drive track color coded by the VCD of (left column, 1) NH_3, (middle, 2) C_2H_6, and (right, 3) NO_2. Row (a) shows the 5 sites of interest, (b) site 1, (d) site 2 from Fig. 6. Rows (c) and (e) show a timeseries of the flux, calculated using equation (1); the arrows in 3b and 3d indicate the mean wind direction at each site. (Background image from Google Earth 2016)

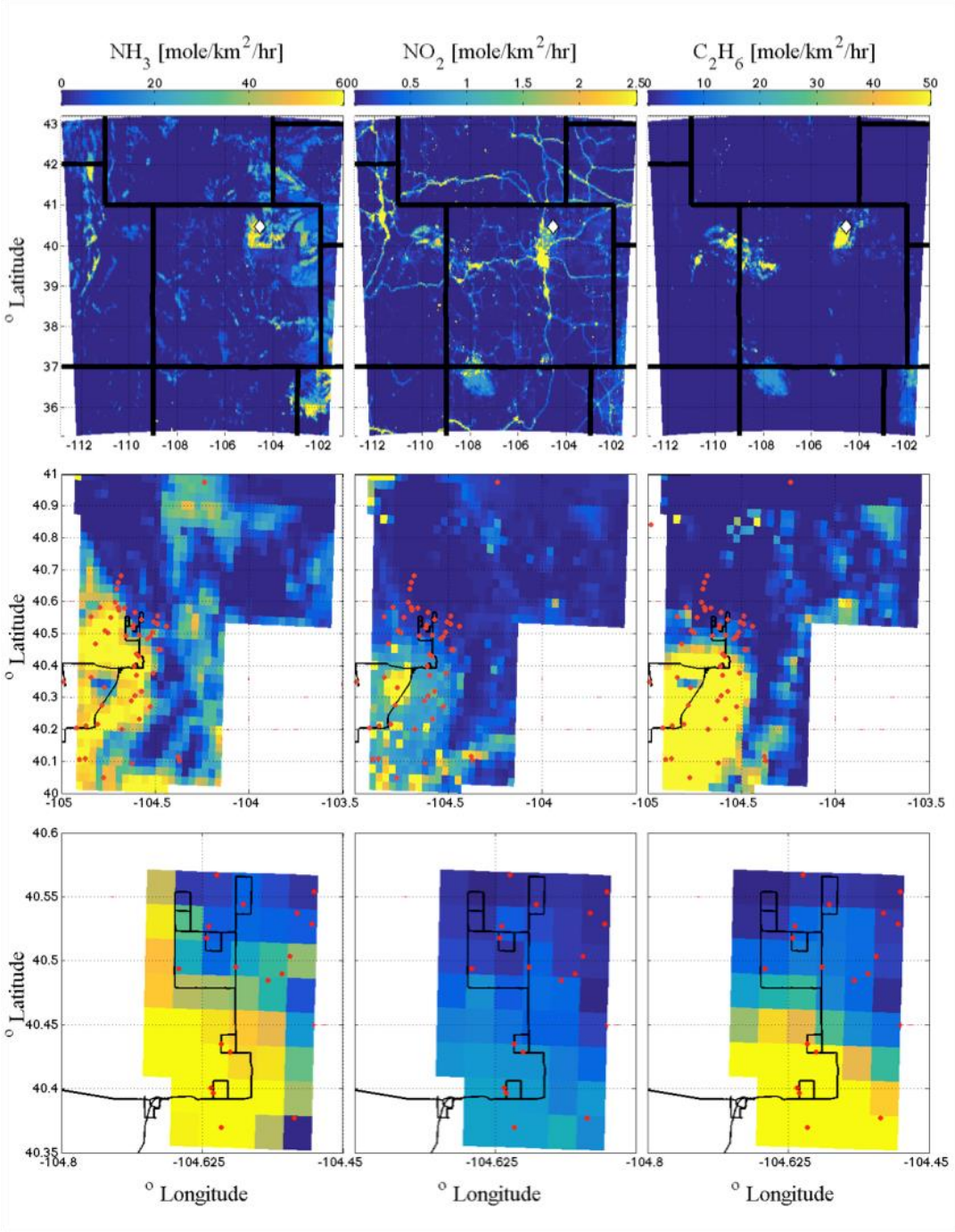

Figure S4: Emission Inventory (EPA, 2015) based on the July midday hourly emission rate during which NH_3 emission is larger than during other hours. NH_3 (left), NO_2 (center), and C_2H_6 (right); the bold black lines in the top panel indicate the state borders with Colorado in the center; the red dots in the middle and bottom panels indicate cattle and dairy farm locations, and the black line the research drive track.