Supplement

Figure S1: **Time series of average CO₂ concentration differences between CAMS and CarbonTracker at four lateral boundaries (west, east, south, north), averaged over vertical layers above 0.7 km AGL, of D01 for 00 UTC in blue and 12 UTC in red. The lines indicate the spatial means over each boundary (a latitudinal transect for western and eastern boundaries / a longitudinal transect for southern and northern boundaries). The shaded areas extend over one standard deviation (± 1σ) computed over the grid cells that make the lateral boundary (spatial standard deviation). The yellow symbols indicate the days when the wind blows from outside of the domain at the respective domain boundary. The numbers on the right side of figure indicate annual means of (i) the spatial mean and (ii) the spatial standard deviation.**
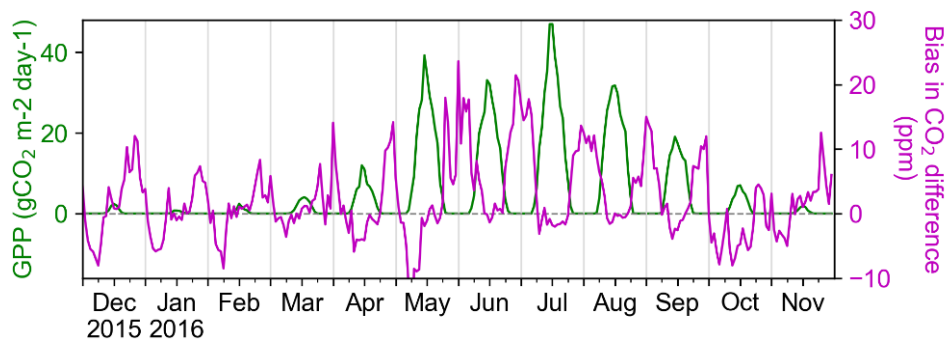

Figure S2: **Mean diurnal cycle of the modeled gross primary production (GPP) at SAC (green line, left scale), and the misfit between the modeled and observed CO₂ horizontal differences between CDS and SAC (magenta line, right scale) for 12 calendar months.**
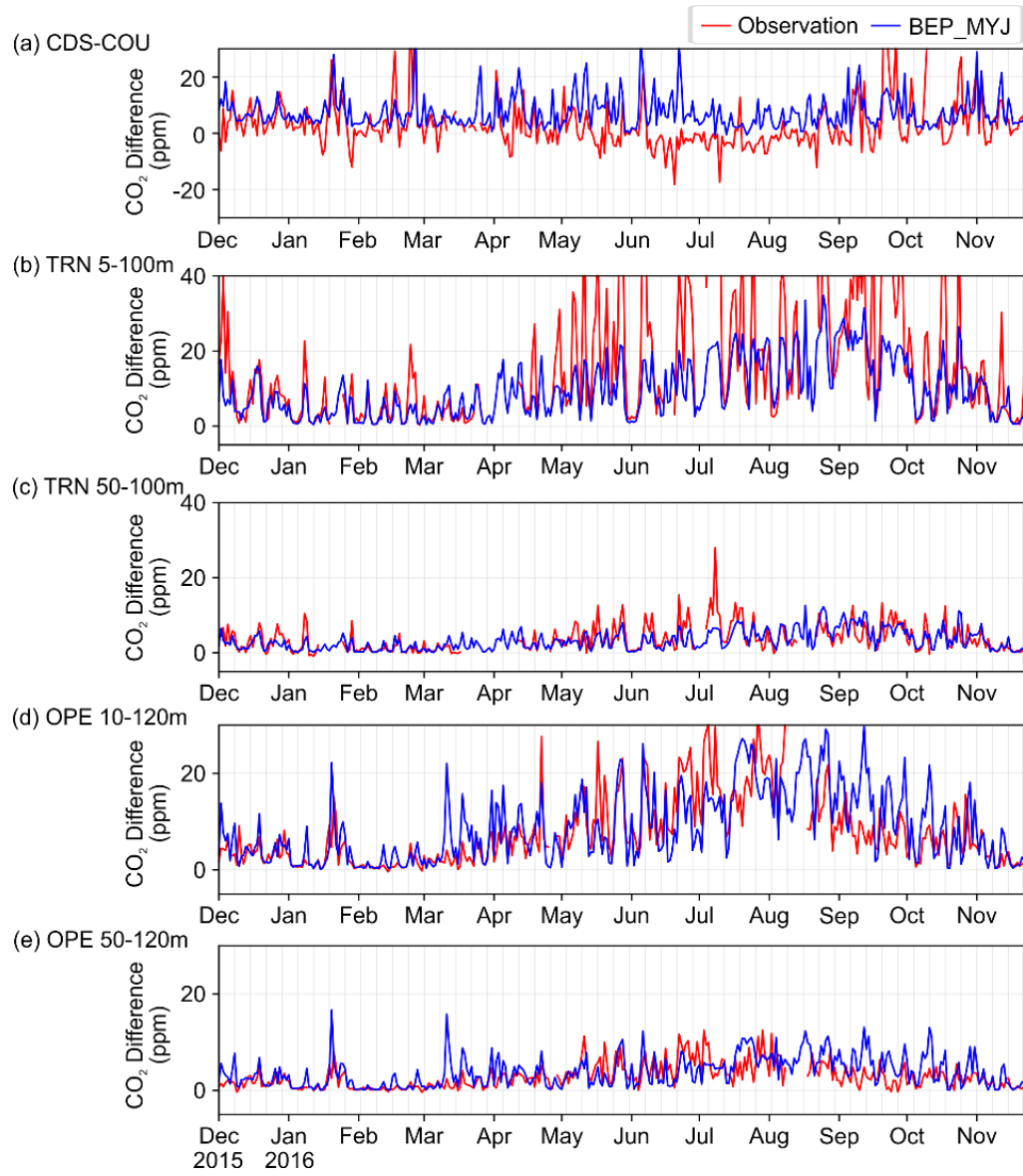
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Figure S3: Daily nighttime mean (21-05 UTC) CO_2 differences. (a) horizontal differences between CDS and COU; Vertical differences at TRN (c) between 5 m and 100 m AGL, and (c) between 50 m and 100 m AGL; Vertical differences at OPE (d) between 10 m and 120 m AGL, and (e) between 50 m and 120 m AGL.

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