6b.11 Constraints on simulated black carbon distribution in WRF-Chem

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Accurate estimates of the spatiotemporal distribution of black carbon (BC) are critical to studies on air quality, health, and climate. However, BC distributions from models show large discrepancies when compared to observations. These discrepancies are attributed to lack of observational constraints in representing sources and sinks of BC. Here, we assess the simulated BC distribution in WRF-Chem using available BC measurements from EPA-AQS, IMPROVE, and CSN. We configured WRF-Chem using MOZART chemistry, NEI 2005, MEGAN, and FINNv1.5 for anthropogenic, biogenic and fire emissions, respectively. We also take advantage of a larger number of CO measurements, in conjunction with derived relationships of BC and CO to improve BC distribution. In particular, we optimize model CO using Bayesian synthesis inversion and derive BC/CO ratios from WRF-Chem. Comparisons of CO and BC with 2008 summer observation show underestimation of fire and anthropogenic emissions in western and southeastern US, respectively. BC/CO ratios are reasonably captured in southeastern US but are underestimated in the western US. We find that optimizing CO using EPA-AQS provides improvements in BC but only over areas where BC/CO ratios are close to observed values. This highlights the need to improve BC/CO ratios in WRF-Chem through other model and/or statistical approaches.