

Results from the North American Carbon Program Midcontinent Intensive Regional Experiment

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The Midcontinent Intensive campaign presents a unique testbed for examining the ability of atmospheric inversions to constrain regional carbon balance and its spatial structure. We present here the high resolution inversion developed for the campaign, at 20km resolution from June to December 2007, and comparison of this inversion to the agricultural and forest inventories conducted in the region. Atmospheric transport was simulated with the non-hydrostatic atmospheric model WRF-Chem at 10km resolution, coupled to a backward Lagrangian Particle Dispersion model. Two different prior fluxes were used to evaluate the impact of the prior flux structure on the final flux estimate, one from the SiBcrop model at 10km resolution, and the second from the CarbonTracker inverse system at one degree. The eight observation sites deployed in the area were used to constrain the CO₂ fluxes at a weekly time step. We evaluated the impact of each site on the final estimates and tested different configurations (e.g. selecting sites in key areas or simply considering a sparser network). The study compares the observed impact on the final fluxes to the theoretical error reduction, and discusses the needs for future regional campaigns to assess the inverse carbon balance and its spatial structure at the mesoscale.

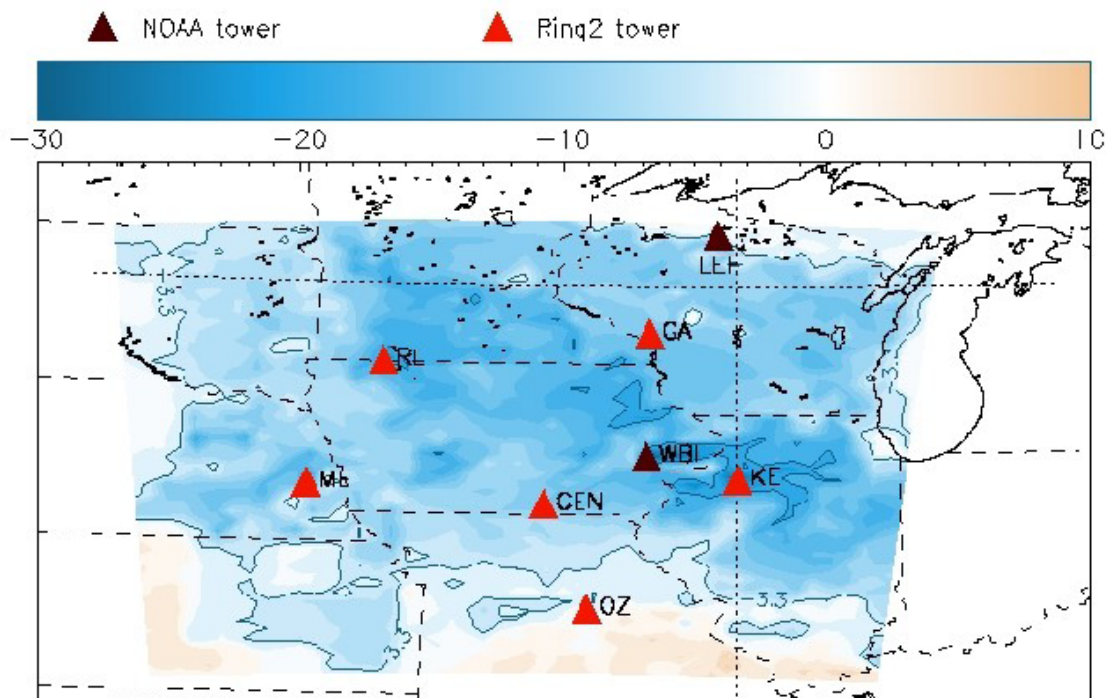


Figure 1. Posterior CO₂ fluxes in TgC.deg-2 from June to December 2007, over the Mid-Continent Intensive region using prior fluxes from the SiBcrop vegetation model.