

## Evaluating CarbonTracker (CT) Performance During the North American Carbon Program Mid-Continent Intensive Campaign

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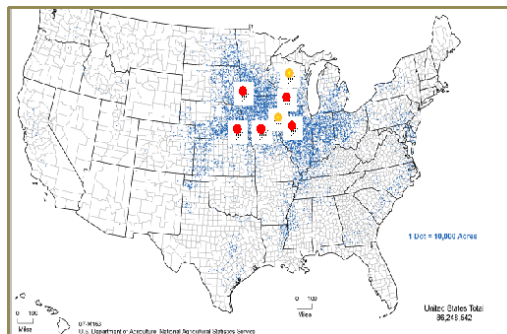
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The Mid-Continent Intensive (MCI) took place in Iowa and its border states from May 2007 to November 2009. The objective of the MCI was to provide dense atmospheric CO<sub>2</sub> monitoring in the region and to bring together experts from the “bottom-up” inventory and eco-system modeling community and “top-down” atmospheric modelers to estimate the region’s CO<sub>2</sub> budget. To alleviate the under-constrained nature of the inverse problem, researchers from Pennsylvania State University instrumented five transmitter towers in the upper Midwest to measure well-calibrated atmospheric CO<sub>2</sub> mole fractions at 110/120m above ground level (Ring 2 data set). The Global Monitoring Division (GMD) instrumented the West Branch Iowa (WBI) tall tower in July 2007 with quasi-continuous CO<sub>2</sub> and CO analyzers and daily air sample collection. GMD also conducted regular (~ bimonthly) aircraft profiles with discrete air sampling at 6 locations within the MCI region. Researchers from Purdue University collaborated with the GMD aircraft group for several flights in May-June 2007 with continuous CO<sub>2</sub> measurements.

Mid-afternoon averages from the Iowa tall tower WBI have been assimilated in the most recent version of CarbonTracker (CT2009). It showed a substantial impact on the optimized North America Temperate Crop Net Ecosystem Exchange. A branch inversion was done with the Ring 2 data being assimilated as well. Results from the branch inversion did not differ significantly from the CT2009 run. Furthermore the summertime positive biases of the modeled CO<sub>2</sub> at most North American site including WBI remain in both inversions. The inability of CT to match the observations better during the growing season in the MCI region and its more general summer time positive bias are being investigated. Here we will report on recent findings based on analyses with the Stochastic Time-Inverted Lagrangian Transport Lagrangian Particle Dispersion Model. We will also present some work done in collaboration with the other top-down working groups at Penn State University and Colorado State University.



**Figure 1.** U.S. Corn Belt (corn for grain, harvested acres, U.S. Department of Agriculture 2007). Over-plotted are the two NOAA Tall Towers in the region (Park Falls, Wisconsin and WBI, yellow dots) and the five Ring 2 short towers (red dots).