Title: Inverse estimates of greenhouse gas sources and sinks using regional measurement networks

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Abstract:

Inverse analysis of regional greenhouse gas (GHG) measurement networks have proven to be a successful approach to determining GHG total fluxes in addition to their spatial and temporal variability. Regional networks have been deployed in the U.S. for the North American Carbon Program Midcontinent Intensive (MCI) regional study, the state of California, the Indianapolis Flux Experiment (INFLUX), the LA Megacities project, the city of Boston, the Gulf Coast Intensive and the Marcellus Shale regional experiment, in addition to the background North American tower and aircraft monitoring network. I will present a brief review of the state of this field of research in addition to more detailed results from the MCI and INFLUX. I will discuss the methods used in these inverse flux estimates with careful attention to the uncertainties in the estimates, and the causes of these uncertainties. In both cases I will also present comparisons to detailed inventory estimates constructed specifically for these experiments. We find in general that the temporal variability in fluxes is relatively easy to detect, followed by net regional fluxes, and that spatial differences in fluxes require the highest fidelity in terms of measurement density and atmospheric transport modeling. I will also discuss ongoing efforts to introduce sector-specific GHG source estimates into our inversion system, and efforts to quantify and reduce atmospheric transport errors.