High-accuracy, High-precision, High-resolution, Source-specific Monitoring of Urban Greenhouse Gas Emissions? Results to Date from INFLUX

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The Indianapolis Flux Experiment (INFLUX) is testing the boundaries of our ability to use atmospheric measurements to quantify urban greenhouse gas (GHG) emissions. The project brings together inventory assessments, *in situ* and flask measurements of GHGs and ancillary tracers from towers, aircraft and onroad platforms, and atmospheric modeling to provide high-accuracy, high-resolution, and source-specific monitoring of emissions of GHGs from the city. This presentation will highlight how observations from the different platforms and measurement methods can be integrated to attribute urban carbon dioxide (CO_2) emissions to specific source sectors and constrain overall emissions.

Recent research in several cities has shown that the urban biogenic CO_2 flux is poorly-known but non-negligible, even in winter, so that separation into biogenic and fossil components is essential if CO_2 emissions are to be reliably constrained. In addition to *in situ* CO_2 observations, we determine fossil fuel CO_2 (CO_{2ff}) at high resolution by combining flask $^{14}CO_2$ and carbon monoxide (CO) measurements with *in situ* CO observations. This improves both aircraft mass balance and atmospheric inversion estimates (using tower-based measurements) of urban CO_2 fluxes, relative to the use of CO_2 measurements alone. In the example of Indianapolis, this technique also allows separation and quantification of the CO_{2ff} emissions from the large Harding Street coal-fired power plant. We will also present results of our initial attempts to further resolve urban source-sector CO_{2ff} emissions using the wealth of information available from NOAA multispecies flask measurements and point to possible ways forward to resolve this challenging problem.

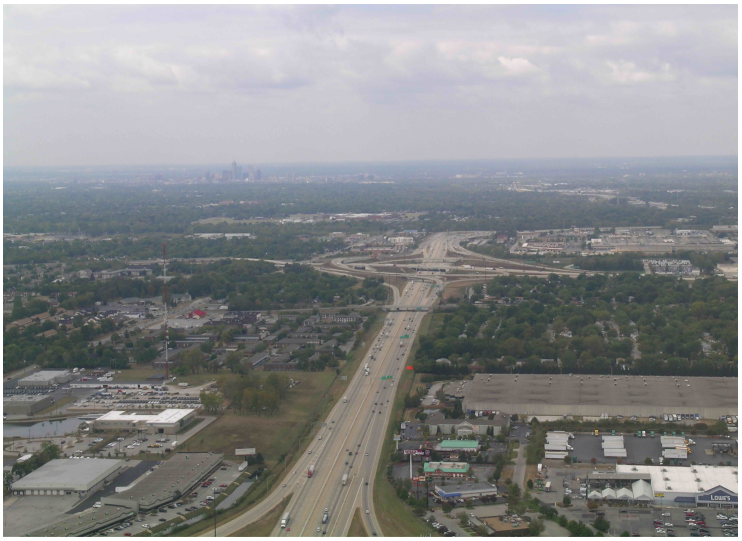

Figure 1. Looking west towards Indianapolis. INFLUX tower two is in the left foreground, photo was taken during an aircraft sampling flight.