

Methane emission flux from Indianapolis, IN: identification and contribution of sources to the total citywide emission

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We report the city-wide methane emission flux from Indianapolis, IN, the location of the INFLUX project, a test case for development of improved urban area-wide emission fluxes. Using an aircraft-based mass balance approach, we determined methane emissions directly downwind from the city. On average, the citywide CH₄ flux determined from several mass-balance flight experiments was 110 moles s⁻¹, a factor of ~8 smaller than the South Coast Air Basin, CA methane emission for 2007 – 2010 (Wennberg et al., 2012). Results from several flight experiments consistently showed elevated CH₄ concentrations at specific coordinates along the horizontal transects downwind of the city, e.g. as shown in Figure 1a. In-flight investigations combined with back trajectories using measured wind directions at the coordinates of the hotspots showed that the CH₄ enhancements were from the southwest side of the city where a landfill and a transmission regulating station (TRS) were located. This aircraft-based finding was supported by results from surface mobile methane measurements within the city (Figure 1b). Using data from several flight experiments, our initial results showed that the landfill-TRS contribute ~30% on average to the total city-wide methane flux. We used our surface mobile measurements to estimate the relative contributions from these two sources, as well as to determine other sources that contribute to the citywide flux. It appears that most all of the rest of the flux derives from the natural gas distributions system.

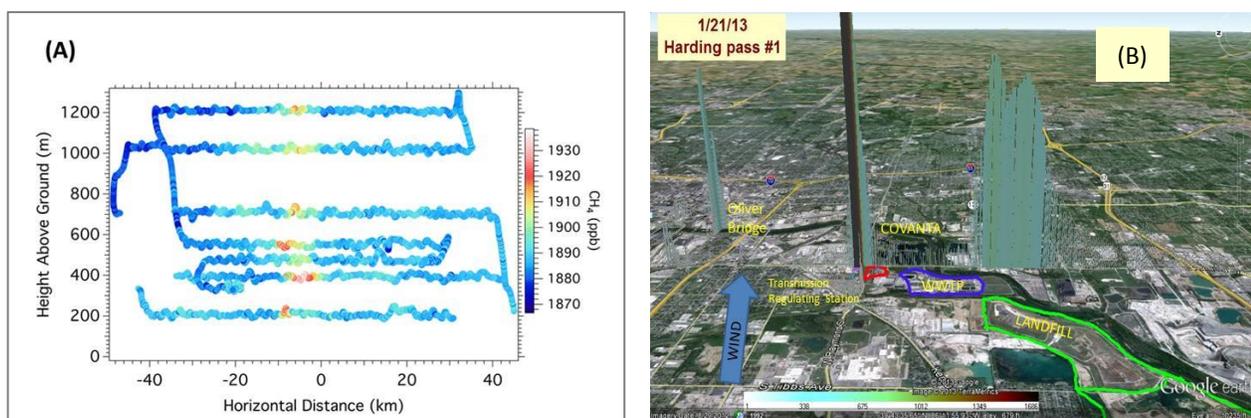


Figure 1. (A) Methane distribution as a function of altitude and distance along the horizontal transect downwind of the city on June 1, 2011. (B) Observed methane enhancements directly downwind of a landfill and a natural gas transmission regulating station on the southwest side of the city during a surface mobile measurement on January 21, 2013.