Large Fugitive Methane Emissions from Urban Centers Along the U.S. East Coast

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Urban emissions remain an underexamined part of the methane budget. Here we present and interpret aircraft observations of six major urban centers along the East Coast of the United States. We use direct observations of methane (CH_4), carbon dioxide (CO_2), carbon monoxide (CO), ethane (C_2H_6), and their correlations to quantify CH_4 emissions and attribute to natural gas. We find the five largest cities emit 0.84 (0.61,1.12) Tg $CH_4 \cdot y^{-1}$, of which 0.79 (0.51,1.14) Tg $CH_4 \cdot y^{-1}$ can be attributed to natural gas. These urban centers in combination emit more CH_4 than major energy production regions such as the Four Corners area or the Bakken shale. Our estimates are more than twice that reported in the most recent gridded EPA inventory. The estimated fugitive natural gas emissions from these five cities alone exceed current nation-wide estimates of natural gas emissions due to local distribution.

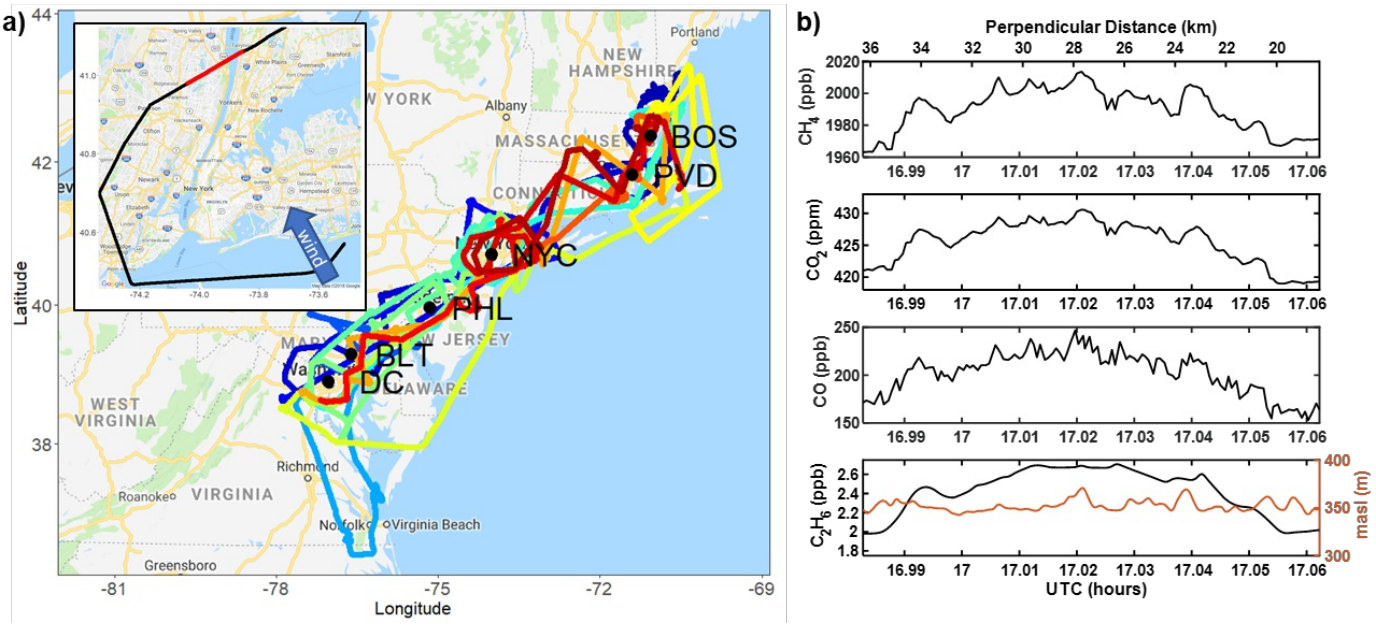

Figure 1. (a) Flight coverage by the East Coast Outflow (ECO) campaign around the major urban regions of Washington, DC (DC); Baltimore, MD (BLT); Philadelphia, PA (PHL); New York, NY (NYC); Providence, RI (PVD); and Boston, MA (BOS). Each flight is represented by a different color. The inset shows the flight path (black) and the region representing the downwind plume (red) for NYC on May 9th, 2018. Map source: *Google Maps*, Accessed 9/18/2018 (b) The tracer concentration time series of the NYC plume corresponding to the inset of (a).