

Aircraft-based Quantification of Individual Oil and Gas Facilities' Methane Emissions

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Inventory-based (bottom-up) estimates of methane (CH_4) emissions from oil and gas operations have been evaluated recently in the U.S. using atmospheric data (top-down). Since top-down estimates are consistently larger than those from bottom-up approaches, more research is needed to explain this difference. This work focuses on top-down emission estimation at the facility-level using aircraft measurements. We estimated emission rates of isolated facilities by measuring CH_4 , ethane (C_2H_6), and carbon dioxide (CO_2) dry air mole fractions in a closed circular path around each facility at multiple altitudes, and by employing Gauss's theorem to integrate the trace gas flux normal to the flight path. This presentation focuses on measurements conducted to evaluate the estimation method: emission rate quantifications from (i) controlled (known) releases of C_2H_6 , and (ii) power plants using published, plant-specific, hourly CO_2 emission rates. Existing results indicate that the method can accurately quantify emissions within less than 25% error.

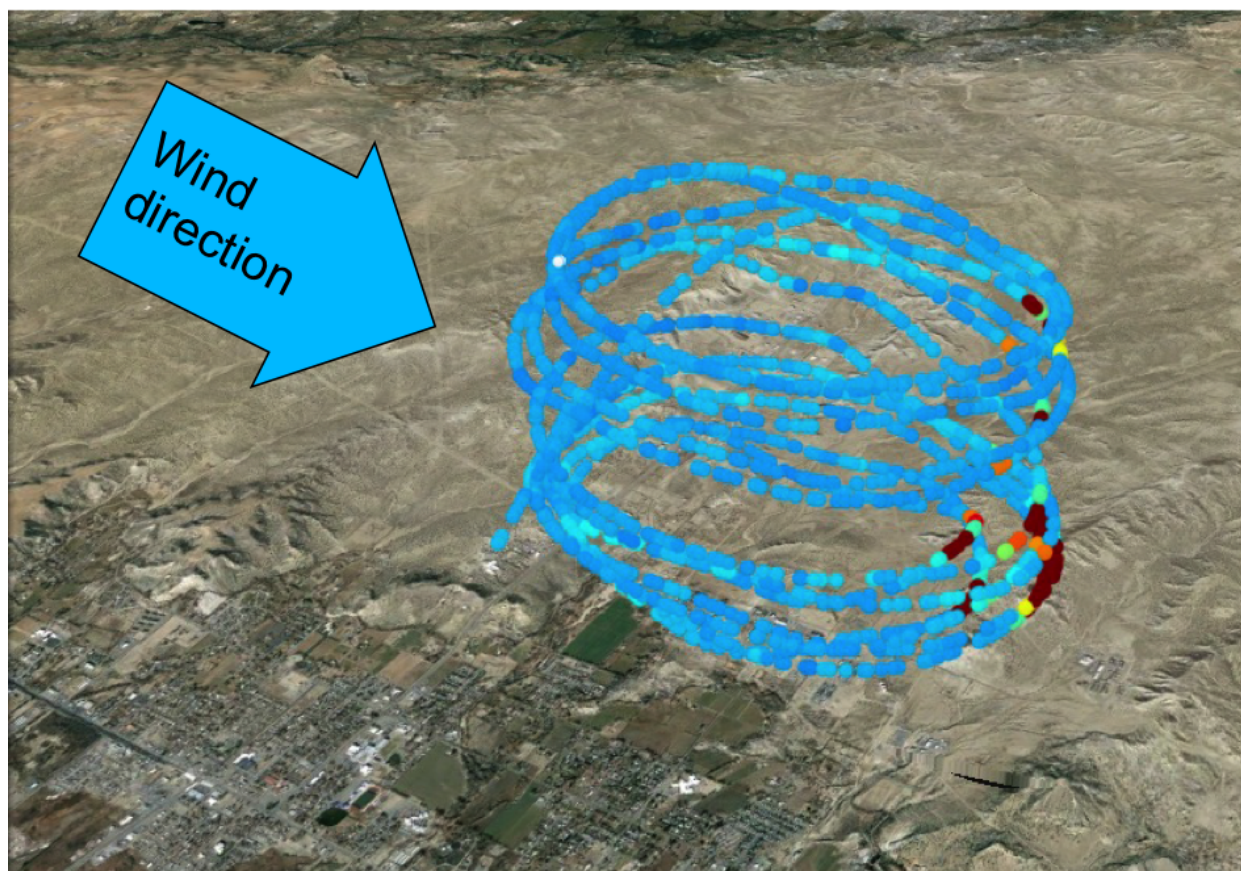


Figure 1.

Flight path and CH_4 levels (color-coded) above an oil and gas facility indicating an isolated CH_4 source.