Mobile methane monitoring for energy sector applications

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Canadian governments have pledged to cut energy sector methane emissions 40–45 per cent below 2012 levels by 2025. Effective methane-reduction policy relies on accurate and spatially extensive emissions data. In this study, we describe a vehicle-based gas monitoring system equipped with Cavity Ring Down Spectroscopy (CRDS) and other instruments to measure and map methane emissions while driving. The system acquires geo-located ppb-level concentration measurements of several gas species at high temporal frequency (>1 Hz) while driving, in addition to several meteorological parameters. A novel multi-stage computational analysis first attributes plumes to source types on the basis of geochemical ratios, followed by back-trajectory analysis to map plumes back to known oil and gas infrastructure. Finally we perform an emissions rate analysis for the source using the EPA AERMOD dispersion model formulation. Using the system, it is possible to screen 100– 400 well pads per day for methane emissions, or an order of magnitude faster than conventional industry techniques. The various computational components can in some cases run in real time. In this presentation, we provide an overview of the methodology, and provide field study examples from a national initiative to map methane emissions from more than 10 000 pieces of active and legacy infrastructure across 5 Canadian provinces. The methodology is extensible to methane mapping within and outside the energy sector and can be mounted on vessels of opportunity.

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