Rapid Vehicle-based Methane Emissions Mapping System (PoMELO)

Complex multi-source emissions quantification results

Overview

A **new report**[1] is now available that provides valuable insight into the emissions quantification performance of the University of Calgary PoMELO vehicle system. In a large, controlled release experiment at CSU METEC with multiple emissions points in complex configurations, the PoMELO system quantified emissions rates with a best-in-class linear model fit (r^2) of 0.71. Results improved when considering total pad emissions (r^2 = 0.84). These results suggest PoMELO is one of the most effective tools for triaging emissions rates on upstream oil and gas pads.

The PoMELO system is a truck-mounted methane measurement system designed to meet the needs of the oil and gas industry. The system consists of a roof-mounted, multi-sensor package coupled with advanced analytics and an operator-focused interface. Within minutes of arriving at a site, an operator can produce a full picture of emissions with emissions detections, quantifications, and localizations. Finalized data are available immediately, with automatically generated reports, GIS data, and spreadsheets.

With these data, crews can focus on target equipment – understanding leaks, vents, and process abnormalities as part of a comprehensive regulatory LDAR or emissions management program. Importantly **PoMELO reduces time-consuming OGI surveys of equipment that is not emitting.**

PoMELO is presently deployed in regulator-approved large-scale pilot LDAR programs in Alberta, Canada. This report follows up on a **past study**[2] that detailed the robust detection performance of the system.

METEC Test Campaign

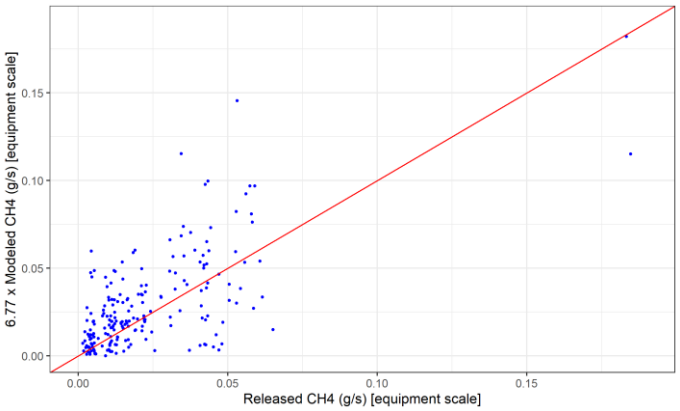
METEC is a dedicated upstream oil and gas LDAR technology testing facility at Colorado State University. Precisely metered emissions points are hidden in real oil and gas equipment installed in a mock facility. Testing at METEC is the most realistic controlled release testing presently available.

Over 5 days, 88 individual mock upstream pads were configured with 1-6 emissions points. A total of 209 individual equipment releases were tested. The experiments focused on complex scenarios with multiple closely-space emissions points that created mixed plumes.

Key Results

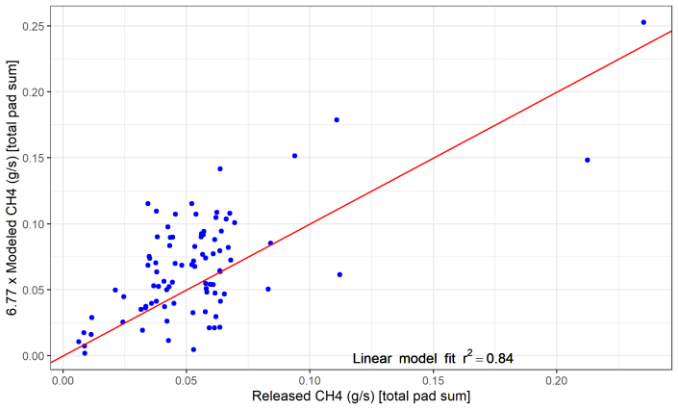
The PoMELO system was highly effective in triaging individual equipment emissions, with the proportion of release variance explained (linear model r^2) of 0.71. These situations are complex, with multiple plumes overlapping and realistic airflow interference – similar to real upstream sites.

Results also reveal where quantification performance is poor. Situations like low wind speeds, unstable flow, and measurements that are very close to emitting equipment systematically produced poor results. We now automatically flag these situations for operators in the software.



Above: *Comparison of modeled methane emissions (CH_4), compared against released rates. The 6.77 is a calibration factor determined from the experiment (see report[1]). Red line is 1:1.*

Results improved when considering total pad emissions. The proportion of variance (linear model r^2) explained by PoMELO was 0.84, demonstrating practical utility in jurisdictions focused on total pad emissions rates.



Above: *Site total comparison of modeled methane emissions (CH_4), compared against released rates. The 6.77 is a calibration factor determined from the experiment (see report[1]). Red line is 1:1.*

Implications for Industrial Deployment

These results suggest PoMELO is best-in-class among similar equipment scale measurement technologies (see report for detailed comparison). Complex multi-source emissions configurations are regular on upstream pads, and the ability for PoMELO to separate the methane contributions from multiple sources supports quantification-focused deployments.

Practical and useful on-site emissions quantification of equipment in complex situations is now possible.

Want to learn more?

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[1] Barchyn TE, Hugenholtz CH, 2022. Complex multi-source emissions quantification results for the PoMELO vehicle measurement system, test results from the CSU METEC facility. *EarthArXiv*. DOI: https://doi.org/10.31223/X5XP7B

[2] Barchyn TE, Hugenholtz CH, 2020. University of Calgary Rapid Vehicle-based Methane Emissions Mapping System (PoMELO) Single-Blind Testing Results from the Methane Emissions Technology Evaluation Center (METEC). *Harvard Dataverse*. DOI: https://doi.org/10.7910/DVN/BUT8GA.