Comprehensive high-resolution assessment of diffuse area and point source methane emissions from the oil and gas sector using MethaneAIR and MethaneSAT

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Oral

Accurate and comprehensive data on methane emissions, their sources, and trends over time are crucially needed to facilitate effective emission mitigation across diverse oil and gas production basins and regions. MethaneSAT is a new satellite mission launched in March 2024 and managed by MethaneSAT, LLC – a wholly owned subsidiary of Environmental Defense Fund. The mission is designed to provide quantitative data on total regional methane emissions while spatially disaggregating the diffuse area emissions at kilometer-scale resolution as well as detecting and quantifying high-emitting point sources. MethaneAIR is an airborne precursor instrument with similar spectroscopy to MethaneSAT. In 2023, MethaneAIR completed nearly 60 methane measurement flights in 15 major oil and gas production regions that account for ~85% of total US onshore oil and gas production, along with a few flights in Canada. Total area methane emissions were quantified using a geostatistical inversion modeling framework that exploits the instrument's high spatial resolution, wide spatial coverage, and high precision, while simultaneously accounting for the detections of high-emitting methane point sources, which were quantified using a modified divergence integral method. In this presentation, we discuss the results of the MethaneAIR quantification of regional methane emissions in key US oil and gas production regions, highlighting comparison with previous literature assessments, and underlining the basin-to-basin variability in total methane emissions, methane loss rates, and the contributions and characteristics of diffuse area methane sources versus high-emitting point sources. These comprehensive wide-area methane emission assessments at high spatial resolution were previously not possible with existing methane remote sensing approaches. Our presentation also previews the unique attributes of the MethaneSAT mission and the transparent and comprehensive methane flux data products it will provide, helping catalyze action toward fast methane mitigation on a global scale.

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