



Toward an empirically-based characterization of methane emissions from oil and gas: from atmospheric measurements to effective emission reductions

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Methane, the principal component of natural gas, is a powerful greenhouse gas. While there are several sources of anthropogenic methane (e.g., agriculture, waste sector), oil and gas infrastructure is physically concentrated and the number of organizations responsible for operating this equipment is relatively limited: creating an opportunity for rapid cost-effective mitigation that can yield significant and rapid climatic benefits.

There is uncertainty in the scale and location of methane emissions from oil and gas infrastructure within and among regions of the world. An empirically-based characterization of emission sources is critical to improving emission inventories and implementing effective mitigation strategies.

We synthesize results from recent multi-scale field studies (i.e. aircraft-based, ground-based) across North America, where empirical data clearly indicate that emissions are higher than inventories suggest, and there is a disproportionate contribution from a small fraction of high-emitting sites/facilities to total emissions.

We highlight specific examples where the information produced by the multi-scale studies has guided a diversity of decision makers including (i) improvements/updates to national emission inventories, (ii) collaborations that focus on detecting and quantifying high-emitting sources, (iii) national and sub-national entities that have incorporated empirical data into the design of effective regulations.

Finally, we identify sectors and geographies within the oil and gas supply chain where similar work is needed to reduce uncertainty and identify further mitigation opportunities. We summarize how the Climate and Clean Air Coalition (CCAC) Oil and Gas Methane Study and the Integrated Global Greenhouse Gas Information System (IG3IS) will expand this effort, and the importance of ensuring transparency of the collected data, external review, deployment of multiple methodologies, and publication of results in peer-reviewed journals.