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Methane emissions from the Groningen natural gas field in the Netherlands

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The Groningen natural gas field in the Netherlands is one of Europe's major gas fields. This region uses a "production cluster" infrastructure that incorporates extraction, some processing and storage into a single facility. The Groningen province is also the site of intensive agriculture and cattle operations. We present results from a multi-scale measurement campaign of methane emissions combining airborne-based and ground-based estimates.

An instrumented van performed downwind measurements of production clusters. The continuous measurement of ethane was crucial in distinguishing biogenic methane sources in the studied region (cattle, bodies of water, agricultural fields) from oil and gas sources. Emissions were quantified via Gaussian dispersion methods and compared to inventory. Results reveal that production volume alone is not a good indicator of whether, and how much, a site is emitting methane.

An instrumented aircraft performed measurements of the entire region and of selected large facilities. Canisters collected during the flights were analyzed for ethane, and used to calculate the proportion of fossil fuel versus biogenic sources of methane. Discrepancies between the inventory-predicted and observed emissions are discussed, focusing both on total regional methane emissions and on the fraction of fossil versus biogenic sources.

This study's uncertainties and unknowns demonstrate the need for additional research, particularly focusing on regional emissions apportionment and inventory refinement.