

Gulf offshore oil and gas production has double the climate impact as inventories report

April 3 2023, by Jim Lynch



Central-hub multi-platform complexes in the Gulf of Mexico emit far more methane than official inventories report, according to a study led by the University of Michigan. Researchers flew over the region in a Mooney airplane to measure greenhouse gas emissions. This photo, from one of their flights, shows a central hub collecting oil and gas from surrounding smaller satellite production platforms. Credit: Paolo Wilczak.

By directly measuring greenhouse gas emissions from an airplane flying over the Gulf of Mexico, a University of Michigan-led team found that

the nation's largest offshore fossil fuel production basin has twice the climate warming impact as official estimates.

The work could have bearing on future energy production in the gulf, as decisions about expanding oil and gas harvesting depend on calculations of the [climate](#) impact.

While a gap between reported and measured [methane emissions](#) in the basin has been noted in the past, this study is believed to be the first to quantify methane and [carbon dioxide emissions](#) and identify the main culprits. It turns out older platforms located closer to land emit far more methane than is reported in government inventories.

Simple steps could go a long way in mitigating those releases, the researchers say.

To conduct their atmospheric measurements, the researchers flew upward and downward in a cylindrical pattern around the platforms and measured amounts of both carbon dioxide and methane being released. They combined aircraft measurements with all previous field surveys to gather the largest sample size of Gulf of Mexico platform GHG emissions. Their observations quickly put a spotlight on certain oil and gas producing operations.



A forward-looking infrared (FLIR) camera shows hydrocarbon emissions from cold venting and an unknown piece of equipment at a central hub facility in the Gulf of Mexico. Credit: Alan Gorchoy Negrón

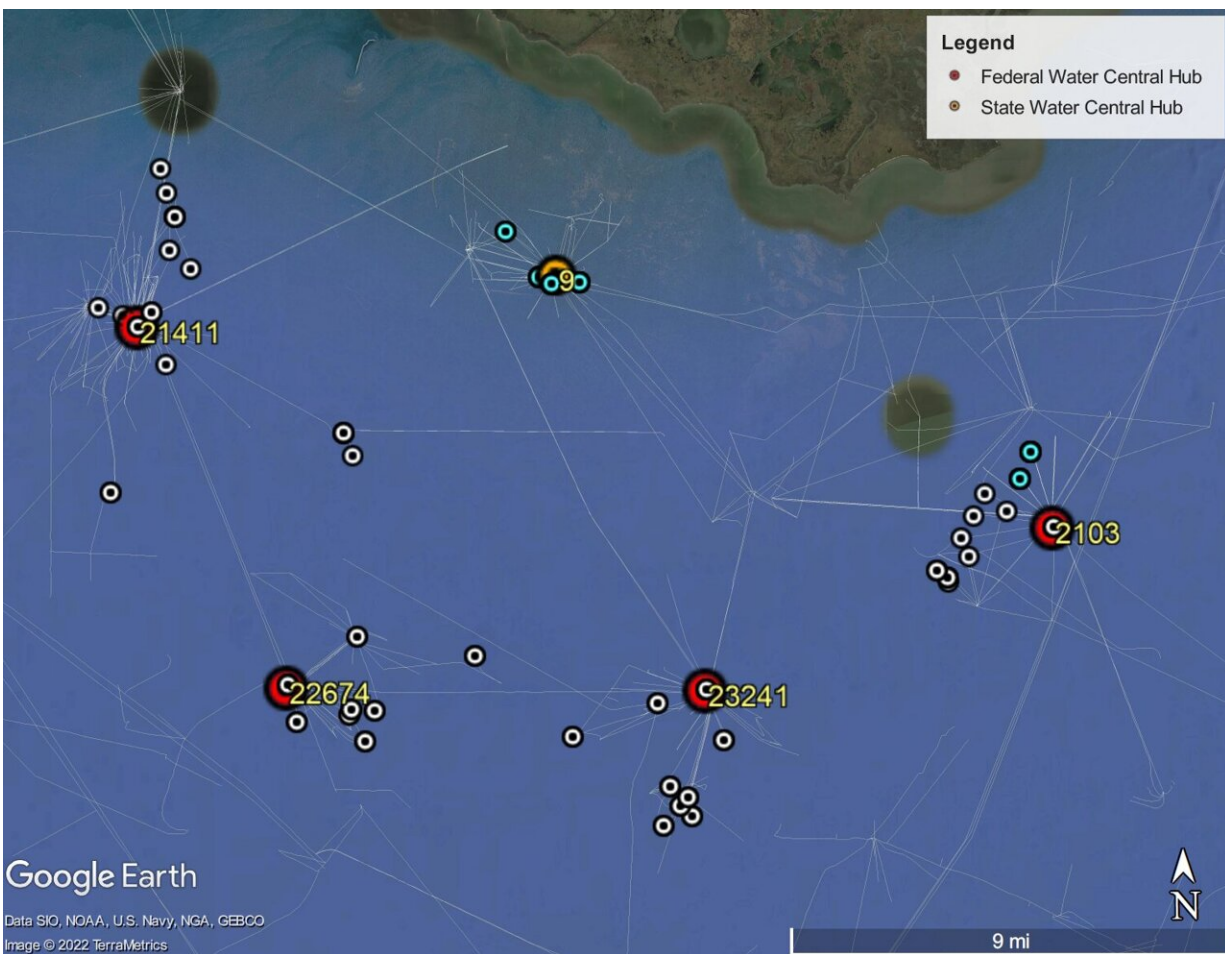
"What we found is that a certain type of shallow water platform had large methane emissions that elevated total [greenhouse gas emissions](#) for the entire Gulf of Mexico," said Eric Kort, U-M associate professor of climate and space sciences and engineering, principal investigator of the F³UEL project and corresponding author of the study published in the *Proceedings of the National Academy of Sciences*.

"So if we can direct [mitigation efforts](#) at those sources to address the problem, it could have a huge positive effect."

These sources are larger "central-hub" multiplatform complexes that collect oil and gas from small production platforms for processing. Sampling showed these emit more methane than expected, due to direct venting into the atmosphere or releases from tanks and other equipment.

Actions to address these large methane emissions, whether through capturing the gas, flaring it instead of venting, or repairing or abandoning of facilities, could have outsized climate benefits.

The finding is similar to [research](#) published in September by the same team that showed inefficient flaring operations on land were releasing five times more methane into the atmosphere than expected. Together, these studies demonstrate the need for a more comprehensive way of assessing greenhouse gas emissions, and thus the climate impact of oil and gas production for a given region. Climate impact is determined by "carbon intensity," a metric for the levels of greenhouse gasses that are emitted per unit of oil or gas produced.



Central hub facilities in the Gulf of Mexico, shown in large red and orange circles, are multi-platform complexes that collect oil and gas via pipelines from surrounding, smaller production platforms for processing. This map shows how they are linked. White circles represent platforms in federal waters and blue circles those in state waters. White lines show pipelines. Credit: University of Michigan

When new oil and gas projects are under consideration, regulators assess whether the new builds will have the same or lower than the carbon intensity of expanded production elsewhere. This has already impacted decisions about oil and gas lease sales in the Gulf of Mexico. However, in these assessments, estimates of the carbon dioxide and methane released into the atmosphere have not historically been based on direct measurements, and many of them have not included [methane](#) emissions.

"We have presented the climate impact of both oil and gas production as an observation-based carbon intensity," said Alan Gorchov Negrón, a U-M graduate student research assistant and the study's first author. "This metric reflects a snapshot of real-time climate impacts and offers an easy way to integrate the growing number of field surveys of emissions from fossil fuel production into a consistent metric.

"Moving forward, policy or [investment decisions](#) can use consistent metrics such as this to choose fossil fuels from locations that minimize their climate impacts."

The study also involved researchers from Stanford University, Scientific Aviation, Carbon Mapper and Environmental Defense Fund.

More information: Gorchov Negrón, Alan M. et al, Excess methane

emissions from shallow water platforms elevate the carbon intensity of US Gulf of Mexico oil and gas production, *Proceedings of the National Academy of Sciences* (2023). DOI: [10.1073/pnas.2215275120](https://doi.org/10.1073/pnas.2215275120).
doi.org/10.1073/pnas.2215275120

Provided by University of Michigan

Citation: Gulf offshore oil and gas production has double the climate impact as inventories report (2023, April 3) retrieved 12 May 2024 from <https://phys.org/news/2023-04-gulf-offshore-oil-gas-production.html>

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