Detecting Fugitive Emissions at Well Sites Using EM27/SUN Data

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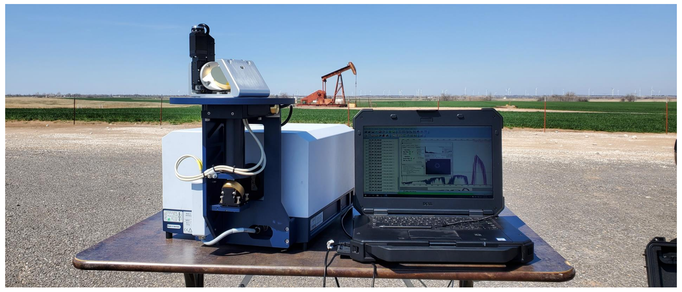
Abstract

Policy goals are trending toward reducing oil and gas emissions[1], as they are known sources of many environmental and economic challenges[2]. The industry must find new and innovative ways to minimize emissions. To combat emissions, they must be detected first. One way to detect trace gases in the atmosphere is remote sensing technology. An example of this technology is the Bruker EM27/SUN, which detects trace gases in total column concentrations. In this project, the EM27/SUN is deployed at a well site to geographically pinpoint the location of excess emissions. The EM27/SUN was successful in identifying emission location, and the methodology applied at this site can be implemented at many more sites.

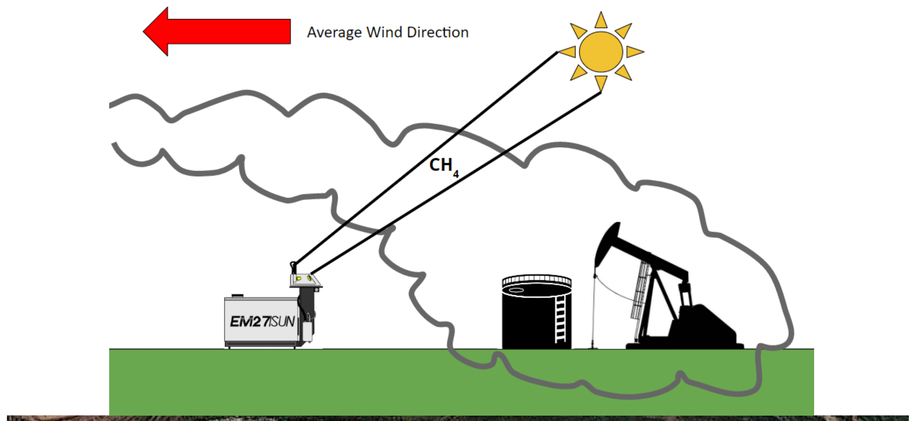
Introduction

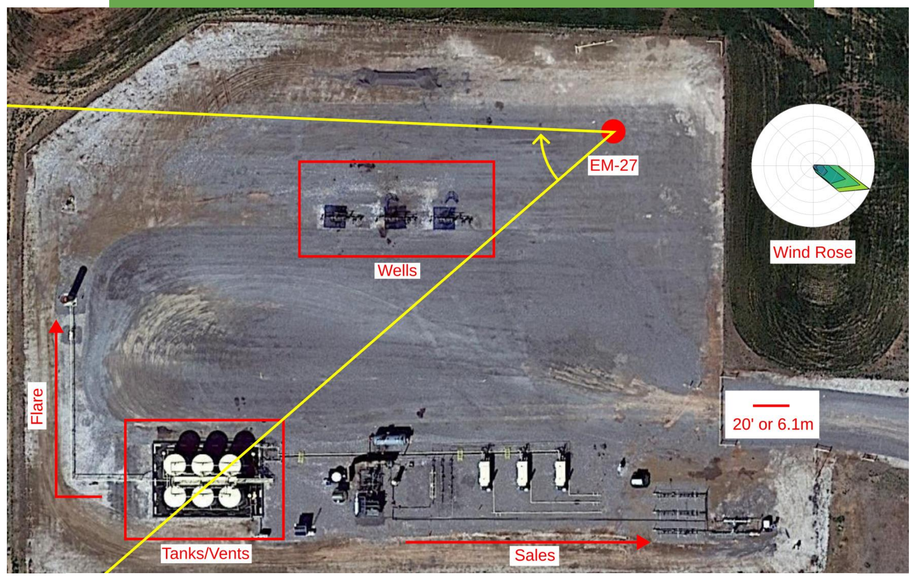
Fugitive emissions are excess emissions of gas to the atmosphere, often a leak at an industrial site that comes from equipment such as a valve, pump, or pipeline[3]. Fugitive emissions of methane (CH_4) contribute to global warming and present a target for governmental compliance issues[4]. Excess methane can create potential hazards for workers. Economic loss occurs when hydrocarbons are allowed to escape into the atmosphere instead of being stored and sold. In order to combat fugitive emissions, effective detection techniques must be implemented.

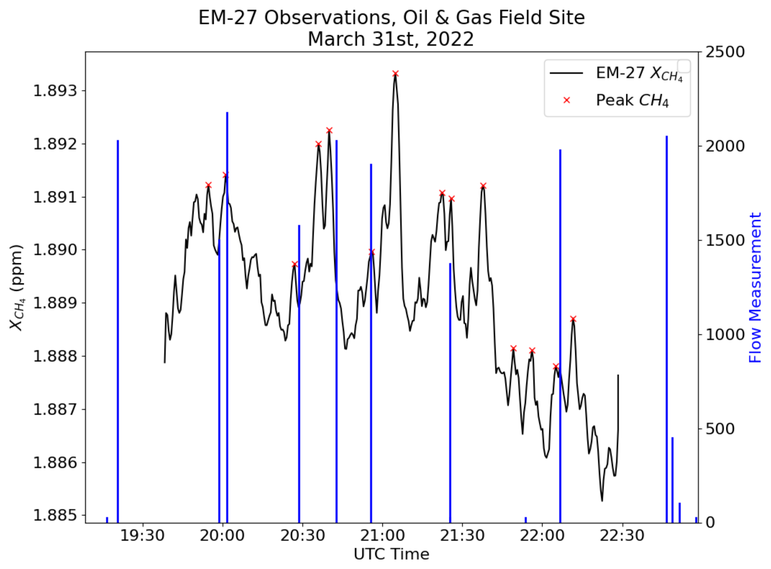
The Well Site



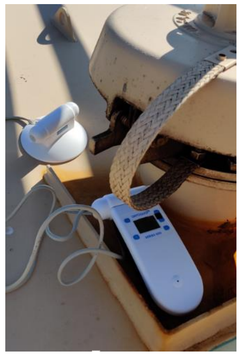
Diagrams, Maps, and Data







Findings



As the EM27/SUN swept across the oil site, a peak in CH_4 was detected between the hours of 20:30PM to 21:30PM (UTC). The EM27/SUN was set up so that gases from the storage tanks would blow into the column. Operators then reported evidence of a leak somewhere within the site. Researchers at the site were then able to identify the exact part of the system that was leaking using a small handheld methane sensor. The small sensor was able to verify the observation made by interpreting EM27/SUN data. Instead of observing a difference in flow rate, the EM27/SUN was able to geographically pinpoint a location for a CH_4 leak.

Scaling/Future Directions

The implementation of an EM27/SUN team would work at scale for many well sites. Once a leak has been identified using pre-existing automation, a team would deploy the EM27/SUN at the suspect site. The EM27/SUN would then be able to give operators a better idea of the location of the leak and would take less time and money than other systems available. The EM27/SUN is also mobile and could be moved between sites easily[5]. Overall, an alternative method of fugitive emission detection has been demonstrated and could be implemented to reduce total oilfield emissions to benefit stakeholders.

Citations/Acknowledgements

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4. Global Methane Assessment. *Climate and Clean Air Coalition, United Nations Environment Programme.* 2021.
5. Hase, F., Frey, M., Keil, M., et. al. 2016. Addition of a channel for XCO observations to a portable FTIR spectrometer for greenhouse gas measurements. *Atmospheric Measurement Techniques* **9**: 2303-2313.

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