EGU24-14711, updated on 25 Apr 2024
https://doi.org/10.5194/egusphere-egu24-14711
EGU General Assembly 2024

First Initiative in the Arabian Peninsula to Measure Methane Emissions from the Oil & Gas and Waste Sector by a Helicopter Probe

Heidi Huntrieser[1], Eric Förster[1], Falk Pätzold[2], Lutz Bretschneider[2], Niclas Maier[1], Jaroslaw Necki[3], Jakub Bartyzel[3], Pawel Jagoda[3], Benjamin Witschas[1], Anke Roiger[1], Astrid Lampert[2], Oman Environmental Services Holding Company (be´ah)[4], and Mark Lunt[5]

[1]DLR-Oberpfaffenhofen, Institute of Atmospheric Physics, Wessling, Germany (heidi.huntrieser@dlr.de)
[2]Technische Universität Braunschweig, Institute of Flight Guidance, Braunschweig, Germany
[3]AGH-University of Kraków, Faculty of Physics and Applied Computer Science, Kraków, Poland
[4]Oman Environmental Services Holding Company (be'ah), Muscat, Oman
[5]Environmental Defense Fund (EDF), Perth, Australia

Within the framework of the Oil and Gas Methane Partnership 2.0 (OGMP 2.0), initiated by the United Nations Environment Programme (UNEP), companies in the Oil and Gas (O&G) sector have committed to monitor and to reduce their methane (CH_4) emissions. Presently, more than 120 companies have joined OGMP 2.0 covering operations in 70 countries around the world, one of which is Oman. Methane is one of the most potent greenhouse gases after carbon dioxide and the focus of worldwide initiatives to combat global warming. This includes UNEP's International Methane Emissions Observatory (IMEO), which focuses on improved data collection and delivery not only from O&G, but also from other emission sectors including waste. According to Oman's latest Biennial Update Report, the solid waste sector is the second largest CH_4 emitter behind the O&G sector and represents 15% of Oman's CH_4 emissions. However, until now, no sector-specific measurement-based studies on such emissions exist for Oman.

Here, we present a novel measurement study, supported and funded by UNEP´s IMEO. The approach involves measuring CH_4 emissions from both O&G installations and landfills using the unique helicopter-towed probe HELiPOD equipped with in situ CH_4 instrumentation complemented by mobile ground-based CH_4 measurements. Quantifications of CH_4 mass fluxes from individual sources or clusters can be provided from these measurements. The methodology was deployed during the METHANE-To-Go-Oman field experiment lasting from November to December 2023 in collaboration with partners from the O&G and waste industry in Oman. Within four weeks, more than 70 flight hours were successfully flown with a helicopter in the northern and southern parts of Oman, which required a complex setup. For each of the 26 flights, different flight strategies were implemented depending on the wind situation at the probed sites, which was characterized by a continuously running wind lidar. The HELiPOD probe (weight 325 kg, length 5 m) was equipped with a sensor system measuring the 3D wind vector and in situ instrumentation (Picarro G2401-m and Licor-7700) to measure CH_4 with a high precision (1 ppb)

and temporal resolution (up to 40 Hz), which is necessary for a precise calculation of the CH_4 mass flux. An initial overview of the measurements is presented focusing on a showcase from a landfill.

By comparing our collected data (top-down approach) with methane mass flux estimates provided by the industry (bottom-up approach), we aim to assist the involved companies and related governments in prioritizing their methane emission mitigation actions and policies for future endeavours.