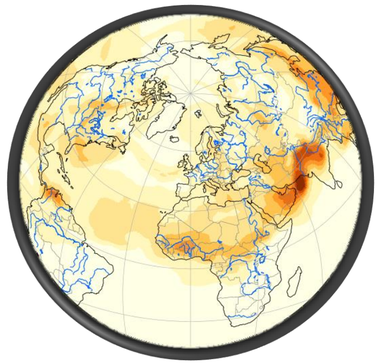
NCEO Atmospheric Methane

National Centre for Earth Observation
NATURAL ENVIRONMENT RESEARCH COUNCIL

Atmospheric methane EO datasets

- NCEO staff have produced a novel proxy GOSAT methane product as an Essential Climate Variable dataset with R&D and pre-operational funding from NERC and more operational funding from the European Space Agency and EU Copernicus which is widely used across the world (~40 papers in the last 5 years; close to 100 international users)
- Decadal length time series are critical for providing an early-warning system to detect large-scale shifts in the Earth system and the monitoring and verification of country-level emissions. The launch of GOSAT was in 2009 so we have much more than a decade of data.
- Considering the typical lifetime of satellite platforms, this implies the combination of successive missions into a consistent data record suitable to address climate time scales.
- In response, NCEO is working on GOSAT-2 data and has also undertaken extensive R&D to derive methane (partial) columns from the IASI instrument (18 years of data) complementing the more surface-sensitive GOSAT record
- NCEO is working with NPL to support international agreement for definition of methane standards for high spatial resolution anthropogenic plumes.



NCEO develops improved inverse model techniques to link emission and chemical losses to changes in atmospheric methane by mathematically combining atmospheric chemistry transport models with observations, taking account of uncertainties. These feed into:

Real world insight

Improved scientific understanding of natural emissions of methane and their global-scale impacts. NCEO scientists revealed that recent rapid increases in atmospheric methane are linked with growing tropical emissions that themselves, are linked with to a potential emerging climate variation.

Improved process-based emission models for better climate projections

The International narrative

Our work has been highlighted by initiative initiatives, e.g. COP26-28, IPCC, WMO Greenhouse Gas Watch, WG-Climate CEOS.

Our work has also shaped the national determined contributions from South Sudan where there are large wetland emissions of methane.

Analysing methane change

We are using cutting-edge inverse methods to integrate information from ground-based sensors and satellite observations of rainfall, surface hydrological flows, and vegetation phenology to help interpret seasonal and year-to-year changes in methane emissions.

We are also harnessing AI to digest the ever-growing data volumes and to develop new data products.

Data-informed regional mitigation

We using this measurement framework to refine models that can feed into the UKESM and improve understanding how the Earth system will respond with future climate. They can be used to identify the most effective regional mitigation strategies.