

Science for Environment Policy

Methane: satellite data may improve emissions estimates

Greenhouse gas (GHG) inventories are significantly underestimating methane emissions from a region in the southwest of the United States, and potentially elsewhere, a new study has found. The authors of the study suggest that satellite data could be used to identify and quantify new sources of methane, such as fracking.

Inventories of estimated GHG emissions, which are used by policymakers to track progress on emissions targets, often report lower levels of methane than are actually measured in the atmosphere. This may be because there are new sources of methane unaccounted for. It may also be that known sources emit more methane than anticipated.

One methane source is the hydraulic fracturing process, 'fracking'. This is used to extract oil and gas from shale rock by injecting fluid at high pressures. However, it is not yet clear how much methane is released by fracking.

To gain new insights into the differences between measured and estimated emissions of methane, the researchers combined Earth-based and satellite observations. Using data collected from [an instrument](#) on board the [European Space Agency's Envisat](#) satellite, they discovered a large and previously unidentified source of methane in the southwest US.

Satellite maps of methane emissions for 2003–2009 show that the unaccounted-for emissions come from a region called Four Corners. This lies at the intersection of the boundaries of four states — Colorado, New Mexico, Arizona and Utah. Although the maps show other methane hotspots across the US, this one was present more persistently over the six-year period.

The satellite data produces emissions estimates that are significantly higher than those predicted by modelling with Earth-based data. According to the study's results, the Four Corners region alone may generate 0.6 million tonnes of methane every year. This is 1.8 times higher than that reported in the US [Environmental Protection Agency's](#) GHG inventory and 3.5 times higher than European estimates for the same region in the [Emission Database for Global Atmospheric Research](#) (EDGAR).

If the estimates are accurate, then the Four Corners region may be responsible for 5% of all US methane emissions from the coal mining, natural gas and petroleum sectors combined.

To check their findings, the researchers made additional ground-based observations at Four Corners in 2013. This provided more detailed data than the satellite observations on the daily fluctuations in methane emissions, and confirmed that the estimates produced by modelling are too low.

The study does not quantify the contribution of fracking to these emissions. Fracking only began in the region in around 2009, so the researchers conclude that the emissions are largely due to established gas, coal and coalbed methane mining and processing. However, they do suggest that the same space-based approach could be used to identify and quantify new and increasing sources of methane. Growing shale gas activity in the Four Corners region means that fracking is likely to become a more important source in the near future.



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