



Estimating dispersed and point source emissions of methane in East Anglia: results and implications

Neil Harris (1,9), Sarah Connors (1,2), Ben Hancock (1), Pip Jones (1), Jonathan Murphy (1), Stuart Riddick (1,3), Andrew Robinson (1), Robert Skelton (1), Alistair Manning (4), Grant Forster (5), David Oram (5), Simon O'Doherty (6), Dickon Young (6), Ann Stavert (6), Rebecca Fisher (7), David Lowry (7), Euan Nisbet (7), Guilia Zazzeri (7), Grant Allen (8), and Joseph Pitt (8)

(1) University of Cambridge, Chemistry, Cambridge, United Kingdom (neil.harris@ozone-sec.ch.cam.ac.uk), (2) now at European Geophysical Union, Munich, Germany, (3) now at Princeton University, New Jersey, USA, (4) Meteorological Office, Exeter, UK, (5) University of East Anglia, Norwich, UK, (6) University of Bristol, Bristol, UK, (7) Royal Holloway, University of London, London, UK, (8) University of Manchester, Manchester, UK, (9) now at Cranfield University, Bedford, UK

We have been investigating ways to estimate dispersed and point source emissions of methane. To do so we have used continuous measurements from a small network of instruments at 4 sites across East Anglia since 2012. These long-term series have been supplemented by measurements taken in focussed studies at landfills, which are important point sources of methane, and by measurements of the $^{13}\text{C}:^{12}\text{C}$ ratio in methane to provide additional information about its sources.

These measurements have been analysed using the NAME InTEM inversion model to provide county-level emissions (~ 30 km x ~ 30 km) in East Anglia. A case study near a landfill just north of Cambridge was also analysed using a Gaussian plume model and the Windtrax dispersion model. The resulting emission estimates from the three techniques are consistent within the uncertainties, despite the different spatial scales being considered. A seasonal cycle in emissions from the landfill (identified by the isotopic measurements) is observed with higher emissions in winter than summer. This would be expected from consideration of the likely activity of methanogenic bacteria in the landfill, but is not currently represented in emission inventories such as the UK National Atmospheric Emissions Inventory. The possibility of assessing North Sea gas field emissions using ground-based measurements will also be discussed.