



## **Estimating UK emissions of methane and nitrous oxide from 1990 to 2015 using surface observations from the DECC and GAUGE network**

Alistair J. Manning and the UK DECC and GAUGE networks Team  
alistair.manning@metoffice.gov.uk

Real-time, high-frequency near-surface observations of methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O) have been made in and around the UK from the late 1980s until the present. The network of sensors has grown from one on the west coast of Ireland, Mace Head, in the 1980s, to now more than ten. The sensors fall under two networks called; UK Deriving Emissions Linked to Climate Change (UK DECC) and Greenhouse gAs UK and Global Emissions (GAUGE).

These near-surface observations have been used within the UK Met Office Bayesian inverse modelling system, InTEM (Inversion Technique for Emission Modelling) to estimate the UK emissions of CH<sub>4</sub> and N<sub>2</sub>O each year from 1990 until 2015. InTEM uses the UK Met Office atmospheric transport model, NAME (Numerical Atmospheric-dispersion Modelling Environment), driven by 3-D analysis meteorology from the ECMWF (European Centre for Medium Range Weather Forecasting) ERA-Interim dataset (1989-2011) and from the Unified Model, the UK Met Office meteorological model (2003-2015). As the number of observations available become more numerous, the temporal and spatial resolution of the estimated emissions are increased. The prior emissions are given very high uncertainty so the results are measurement focussed and thus are independent of the national inventory process. The choice of underpinning meteorology is an area that has had little attention thus far due to the complications of running with two independent sources of meteorology. In this work, for the years 2003 – 2011, we have explored the impact on the estimated emissions of changing the driving meteorology.