Geophysical Research Abstracts
Vol. 14, EGU2012-11623, 2012
EGU General Assembly 2012

A new UK Greenhouse Gas measurement network providing ultra high-frequency measurements of key radiatively active trace gases taken from a network of tall towers

A Grant (1), S O'Doherty (1), AJ Manning (2), PG Simmonds (1), RG Derwent (3), JB Moncrieff (4), and WT Sturges (5)

(1) Atmospheric Chemistry Research Group, School of Chemistry, University of Bristol , Bristol, United Kingdom (aoife.grant@bristol.ac.uk), (2) Met Office, Exeter, UK, (3) rdscientific, Newbury, UK, (4) School of Geosciences, University of Edinburgh, UK, (5) School of Environmental Sciences, Universtiy of East Anglia, Norwich, UK

Monitoring of atmospheric concentrations of gases is important in assessing the impact of international policies related to the atmospheric environment. The effects of control measures on greenhouse gases introduced under the Montreal and Kyoto Protocols are now being observed. Continued monitoring is required to assess the overall success of the Protocols. For over 15 years the UK Government have funded high-frequency measurements of greenhouse gases and ozone depleting gases at Mace Head, a global background measurement station on the west coast of Ireland. These continuous, high-frequency, high-precision measurements are used to estimate regional (country-scale) emissions of greenhouse gases across the UK using an inversion methodology (NAME-Inversion) that links the Met Office atmospheric dispersion model (Numerical Atmospheric dispersion Modelling Environment - NAME) with the Mace Head observations. This unique inversion method acts to independently verify bottom up emission estimates of radiatively active and ozone-depleting trace gases. In 2011 the UK government (DECC) funded the establishment and integration of three new tall tower measurements stations in the UK, to provide enhanced resolution emission maps and decrease uncertainty of regional emission estimates produced using the NAME-Inversion. One station included in this new UK network was already established in Scotland and was used in collaboration with Edinburgh University. The two other new stations are in England and were set-up early in 2012, they contain brand new instrumentation for measurements of greenhouse gases. All three additional stations provide ultra high-frequency (1 sec) data of CO_2 and CH_4 using the Picarro© Cavity Ring Down Spectrometer and high frequency (20 min) measurements of N_2O and SF_6 from custom built sample modules with GC-ECD.
We will present the new tall tower UK measurement network in detail. Using high-frequency measurements at new operational sites, including Mace Head, we will present the latest inversion results from the new network highlighting the enhanced resolution in regional emission maps for the UK. These results are presented to the UK government periodically and provide independent verification of the emission estimates of radiatively active trace gases. These results also inform policy makers on the accuracy of inventory emissions estimates of radiatively active and ozone-depleting trace gases.