Remote sensing of methane from the ground, air and space

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In recent year, remote sensing has been established as a powerful measurement method for atmospheric methane concentrations complementing in-situ measurement techniques. Remote sensing can be applied to different platforms including ground, aircraft, UAVs and satellites allowing observations on a range of spatial scales for numerous applications.

Here, we will first present results obtained from the GOSAT satellite mission to assess the spatio-temporal distribution of methane over Europe and its year-to-year variations. We will also evaluate methane calculations from atmospheric transport models which make use of state-of-the-art emission inventories for methane.

We will also report results from a new shortwave infrared spectrometer GHOST which has been developed for airborne remote sensing as part of the NERC/STFC CAST project. In spring of this year, GHOST has been flown on the NASA UAV Global Hawk to acquire larger-scale surveys over the Pacific Ocean for testing atmospheric transport models over remote areas and to help with validation of satellite observations over the ocean. More recently, GHOST has also been flown in the UK on the ARSF research aircraft (Dornier 226) to derive methane emissions from a landfill site, an urban area (Leicester) and a wildfire in Northumberland (UK).

Finally, we will show some first results from a new ground-based Fourier transform spectrometer (FTS) station at Harwell (80 km west of London) which is expected to join the TCCON network; the key validation network for satellites; and from a new portable FTS (EM27SUN) instrument which is well suited for use in remote or urban areas on a campaign basis.