A 12-month UK air quality aircraft campaign and model evaluation

Eleanor R. Smith\(^1\), Angela Mynard\(^1\), Rachel N. McInnes\(^1\), Matthew C. Hort\(^1\), Paul Agnew\(^1\), Noel Nelson\(^1\), Joss Kent\(^1\), Andy Wilson\(^1\), David Tiddeman\(^1\), James Bowles\(^1\), Justin M. Langridge\(^1\), Kirsty Wivell\(^1\), Kate Szpek\(^1\), Paul A. Barrett\(^1\), Robert King\(^1\) and Alexander T. Archibald\(^2\)

Overview

Ground based measurements from across the UK are used to evaluate the Met Office air quality model which is used to produce the UK national air quality forecast. There is, however, limited data available on the vertical distribution of key pollutants in the UK boundary layer which restricts modellers from evaluating the vertical structure in their models.

Flight Planning

Air quality forecasts are used in the flight planning process to identify any areas of interest. A number of different flight pattern techniques are used to collect measurements throughout the boundary layer. This range of observations allows the model performance at the different vertical levels to be investigated.

Model Simulations

Air quality forecast simulations are re-run for each of the flight days using the Met Office Civil Contingencies Aircraft (MOCCA), which has been instrumented to allow measurements of gaseous and aerosol pollutants. These observations, along with the existing ground site measurements, will allow a more detailed evaluation to be performed of the 3-dimensional atmospheric composition simulated by the air quality forecast model.

Outcomes

- The aircraft measurements will be used alongside ground based observations to evaluate the national air quality forecasts and investigate model performance throughout the boundary layer.
- The emerging dataset will be used to improve our model simulations and will form a valuable resource for other modellers.
- The MOCCA Clean Air dataset and analysis software will be made publicly available for use by other groups wishing to make use of this unique new dataset of long term atmospheric boundary layer composition measurements.