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## Air Quality in the UK: The Impact of Boundary Layer Meteorology

### Problem

According to recent government data, air pollution is linked to 40,000-50,000 premature deaths each year in the UK. Whilst, there is no doubt that the underlying cause is emissions of pollutants, air quality on any given day is mostly determined by meteorology. This impacts how quickly pollutants are transported away from the surface or mixed down from aloft. Regional chemistry transport models are used to forecast air quality and to assess the impact of emission controls. Their accuracy is largely dependent on how well they simulate the meteorology of the lower part of the atmosphere (boundary layer). Uncertainties in the boundary layer dynamics lead to large errors in modelled air quality.

### Aim

To assess the impact of uncertainties in modelled boundary layer dynamics on air quality predictions.

### Methodology

The student will use a state-of-the-art weather forecast model coupled with chemistry (WRF-Chem) to examine air quality in the UK. They will test different model boundary layer schemes and evaluate them against meteorological and pollutant concentration data. Most of these data will come from the UK-Air database (<http://uk-air.defra.gov.uk>) supported by DEFRA, the CASE partner. The student will work with the DEFRA National Air Quality Team, in particular with their data analyst, analyzing the data to develop an understanding of surface air quality patterns in the UK. For case studies the student will also assess vertical lidar data from the National Centre for Atmospheric Science (NCAS).

### Training

The student will receive training in use of numerical weather prediction/chemistry models and analysis of model and measured data. This will provide them with many transferable skills related to computer programming and modelling; data handling, analysis and visualization; model and measurement uncertainties; and problem solving. They will go on a WRF training course and courses run by NCAS (e.g. Introduction to Atmospheric Science; Introduction to Computational Atmospheric Science; Summer School in Atmospheric Measurements). By working with DEFRA, the student will learn about UK air quality policy and its implementation.

### Person Specifications

Background in maths, chemistry, physics, computing or environmental science. Interest in meteorology and air quality, and enjoyment of computer programming.

## **Project Supervisors**

Profs. Claire Reeves and Ian Renfrew (University of East Anglia)

Dr. Lucy Barnard (DEFRA)

## **Funding**

This project has been shortlisted for funding by the EnvEast NERC Doctoral Training Partnership, comprising the Universities of East Anglia, Essex and Kent, with twenty other research partners.

Successful candidates who meet RCUK's eligibility criteria will be awarded a NERC studentship. In most cases, UK and EU nationals who have been resident in the UK for 3 years are eligible for a full award. In 2016/17, the stipend was £14,296

## **Interviews**

Shortlisted applicants will be invited to interview. Interviews will take place on 14<sup>th</sup> and 15<sup>th</sup> February 2017.

## **Further Information and Applications**

For further information on EnvEast and how to apply, please visit [www.enveast.ac.uk/apply](http://www.enveast.ac.uk/apply).

For further details about the project, please contact Prof. Claire Reeves ([c.reeves@uea.ac.uk](mailto:c.reeves@uea.ac.uk)).