

Main thematic area: *Economics/Science/Technology*
 Cost: £/££/£££

Characterising near-surface aircraft particulate emissions

Background

A key factor in the government's refusal to approve the building of a third runway at Heathrow was the additional emissions this would create. Pressures are greatest on ambient nitrogen dioxide (NO₂) levels around airports but particulate emissions are of growing concern. Mandatory EU standards for NO₂ from 2010 are focusing attention on improved understanding of source emissions and their dispersion. EC proposals to tighten standards for particulate emissions – 10 µm down to 1 µm – raise the stakes for source contributors at airports especially as particulate matter (PM) from road traffic reduces. There is a need to know more about specific PM composition, number and size as this is of relevance to the health debate that underpins standards.

Project objectives

This project will enhance knowledge about aircraft PM through development and use of a cheap portable instrument to provide the capability to measure the size, composition and number of particles, in a size range relevant for human health (0.1 to 10 µm), in real time. No such instrument is available commercially. This instrument will be used to characterise aerosol and inform modelling in an airport environment and it will enable:

- a better understanding of the processes in engine emission and plume: this is essential if the actual apportioning of their impact on air quality is to be assessed
- the taking of measurements to see if enhanced peak aerosol concentrations occur as aircraft induced vortices dissipate near the ground in the areas close to the airport. These measurements are required to verify dispersal models and identify pollution sources.

Lead: University of Oxford
 Duration: 24 months
 Partners: Cambridge, Cranfield

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Knowledge transfer

This project combines academic, technical knowledge and measurement experience with the expertise of airport and airline stakeholders. An academic KT Fellow will be seconded to BAA at Heathrow to build the particle measuring instrument and enable novel information on local air quality and PM to be obtained. The Heathrow noise pens used for engine tests provide an ideal opportunity to measure the particulate emission characteristics of a number of different aircraft engines. These tests will give, for the first time, the variation in particulate composition and size with aircraft engine type.

Given that the latest research indicates that particle composition, size and number are important parameters for human health, an ability to characterise aircraft particulate matter is needed to assist correct targeting of mitigation.

Apart from providing airport and airline stakeholders with a comprehensive description of particulate emissions, the project links with Omega activity to enhance knowledge of wake and vortex effects on dispersion of emissions. In turn, this will refine modelling capabilities used for current and future predictive assessment of airport air quality.

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