

# Impact of climate change on UK air transport:

**BKCC**

Building Knowledge  
for a Changing Climate

## How climate change will affect aircraft and airports and the future impacts of air travel

### Project Outcomes

The project aims to provide quantitative answers to the following questions:

1. What impact will changes in the future wind field have on CO<sub>2</sub> emissions by aircraft?
2. What impact will changes in future temperature and relative humidity have on the probability of contrail formation?
3. What impact will changes in severe weather patterns have on the operation of current and proposed airports?
4. What are the other relevant climate variables that can affect future CO<sub>2</sub> emissions?

The work will identify the sensitivities of the mechanisms through which aviation contributes to climate change and identify those mechanisms most significant for the UK context. It will explore the climate impacts associated with factors including:

- Increased use of existing airport infrastructure, including measures to address the congestion associated with continuing industry growth;
- Increased use of regional airports, particularly the effects of diverting some traffic from congested airports in the South East; and
- Changes in the fleet of aircraft operating in and over the UK.

It will also fully model the cumulative effects of current trends affecting climate and hence the climate impacts associated with aviation.

### Air Travel and Climate Change

Rapid growth in air travel has ensured that aviation remains a significant and growing contributor to climate change, despite technological advances that continue to improve efficiency and reduce emissions as new aircraft are introduced. The aviation impacts occur not only from emissions of CO<sub>2</sub>, but also from other emissions (such as oxides of nitrogen, which can increase ozone and reduce methane). As clouds play an important role in climate, the formation of contrails is also a contributor, particularly where those contrails are long lived and spread to form large cirrus clouds.

### Project Description

This project uses an air traffic control simulation model (RAMS, supplied by [www.isa-software.com](http://www.isa-software.com)). Using air traffic data provided by UK National Air Traffic Services (NATS) and Eurocontrol, the simulator makes detailed calculation of aircraft trajectories, taking into account

their performance characteristics, which are specified using the Eurocontrol base of aircraft data (BADA). The model allows detailed analysis of air traffic controller workload and airspace congestion and the flight trajectory information feeds into calculations of contrail formation and of carbon dioxide and other emissions.



UK sectors



UK airspace

Using climate forecast data to identify scenarios, air traffic simulations will be carried out for a range of atmospheric states to identify the impacts of a changing climate on aircraft operations and the feedback for the future climate impact of aviation.

The project will also explore both the climate and operational issues associated with estimates of UK air transport growth. This will combine climate scenarios with a range of scenarios for air traffic growth and distribution and will identify existing or proposed airports or routes particularly vulnerable to changing climate and those likely to make an increased impact on climate as a result of changing local atmospheric conditions.

### Sharing the Outcomes

This project is a PhD studentship which began in October 2004 and will run for 3 years. We expect to begin publishing results from the first phase of the project within 18 months of the start date.

See website for up-to-date details:

[www.cts.cv.ic.ac.uk](http://www.cts.cv.ic.ac.uk)

Anticipated project completion date:

September 2007

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