

## Full details

All details held on the selected case study are shown below.

Went live on	Title	Reference
16 Dec 2009	New light on UK ozone-heat-mortality	SID0236

### Synopsis

Modelling how future environmental change will affect the impact of climate and air pollution on human health.

### Description

Results from a recently-developed high-resolution version of a coupled climate/chemistry model, and from a new epidemiological study of ozone-heat-mortality relationships in the UK have been combined to examine the legislation and actions needed to guard UK human health in increasingly hot weather and heatwaves.

NERC funded the interdisciplinary project team, which comprises environmental scientists in the School of GeoSciences at the University of Edinburgh and public health epidemiologists from the Public and Environmental Health Research Unit (PEHRU) at the London School of Hygiene and Tropical Medicine, under the Joint Environment & Human Health Programme, alongside other Research Councils, Government agencies and The Wellcome Trust.

"Only through this unique funding programme has this interdisciplinary collaboration and our research to investigate present-day and future climate and air pollution-related health burdens in the UK been possible", says principal investigator Dr Ruth Doherty of the School of GeoSciences at the University of Edinburgh.

Ozone forms when pollutants from sources like car exhausts and burning organic matter break down in the atmosphere as sunlight hits them. The gas irritates people's lungs and causes respiratory problems, as well as damaging plants and harming crop yields. During the August 2003 heatwave period, elevated ozone concentrations were measured at sites in London and elsewhere.

This and other ozone photochemical episodes caused breaches of the UK air-quality objective for ozone. Simulations performed with the project model (WRF-EMEP4UK) reproduced the August 2003 heatwave temperatures and ozone concentrations. "Crucially, our model is able to reproduce observed temperature and ozone trends in the UK, including photochemical ozone episodes and heatwaves which often occur in tandem." says Dr Doherty.

The project also analysed ozone-heat-mortality relationships in 15 cities across the UK . "While heat showed robust effects on summer mortality, estimates for ozone depended upon the modelling of temperature. However, there was some evidence that ozone effects were worse on hot days, whichever temperature measure was used." says Sam Pattenden, project co-Investigator in PEHRU at the London School of Hygiene and Tropical Medicine.

Model results of simulated temperature and ozone for 2003 and 2005-2006 have been used along with epidemiological evidence on the relationships between ozone, heat and mortality to estimate present-day and future health burdens across the UK for a range of possible emission scenarios.

These scenarios span a range of possible futures, based on assumptions ranging from current air-quality legislation being fully implemented to a more optimistic case with maximum feasible reductions, through to a more pessimistic case with continued strong economic growth and minimal implementation of air-quality legislation.

The research has been supported by NERC's Environment and Human Health programme.

### Impacts

### Research and funding

<b>Funding type</b>	Research Programme
<b>Date of research</b>	December 2007 - February 2010

### Researchers at Universities

<b>Grant reference</b>	NE/E008593/1	
<b>Investigator</b>	Dr R Doherty	University of Edinburgh, Sch of Geosciences
<b>Co-investigator</b>	Dr DS Stevenson	University of Edinburgh, Sch of Geosciences
<b>Co-investigator</b>	Dr M Heal	University of Edinburgh, Sch of Chemistry

<b>Classification</b>	
<b>Science themes</b>	Environment, pollution and human health
<b>Science areas</b>	Atmospheric
<b>Policy areas</b>	Pollution, Health