Atmos. Chem. Phys. Discuss., 9, C6848–C6849, 2009
www.atmos-chem-phys-discuss.net/9/C6848/2009/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Modelling surface ozone during the 2003 heat wave in the UK" *by* M. Vieno et al.

A. Lewis

acl5@york.ac.uk

Received and published: 6 November 2009

As an originator of some of the data used in this paper I read with interest this comprehensive study of ozone over the period of August 2003. My comment here is on the importance of disentangling the sensitivity of ozone under generally 'typical' August UK atmospheric conditions and those of ozone in genuinely heat wave conditions.

The definition of heat wave is rather fuzzy. What is called a heat wave in August in the UK, is nothing of the sort to someone living in Athens. Equally it would be difficult to persuade a Londoner that a daytime peak temperature of 22°C constituted a heat wave. Much of August 2003 in the southeastern UK was in fact not exceptional in terms of temperature, reaching daytime peaks of 21-25°C. Only the 6th, 9th and 10th August stand-out as being very unusual and conditions that one might define as heat

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

wave. It is these >30°C conditions that have provoked great interest, being predicted to dramatically increase in frequency in the UK due to climate change. Division of air quality and ozone behaviour during these three days and the rest of the more typical month is central if true heat wave impacts are to be assessed.

This appears particularly important when accounting for the effects of isoprene which has a non-linear emission rate with temperature. Taken over an extended period and over the entire UK domain, this species has very modest effects on simulated UK ozone; the paper estimates this to be low single figure ppb and this seems entirely reasonable. For the three truly unusual heat wave days however, the localised differences are much greater. The paper gives +45 ppb ozone for the 5x scenario (which matches reasonably well the observed isoprene) or -10 ppb ozone for the zero scenario.

These figures sit at odds with the paper conclusion that 'UK produced isoprene has been found not to be a major driver in the simulations for UK surface ozone during the August 2003 UK heat wave.'

A more precise definition of what the authors consider are heat wave conditions seems essential to qualify this statement, since findings for the month taken as whole appear rather different to those on the 6th, 9th and 10th August. My personal view is that it is not appropriate to badge periods of rather normal temperatures as heat wave, simply because they fall within a calender month that did have some exceptionally warm days.

Extreme UK heat events are currently very rare, and for future UK air quality still something of an unknown quantity. Failure to fully distinguish those real extremes from the more typical, may unintentionally result in an 'averaging away' of the impact of processes that only become significant in those rare events.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 19509, 2009.