WEDNESDAY 16 FEBRUARY 2005

AEROSOLS: WHEN SMOKE GETS IN OUR EYES

Dr Eleanor Highwood, **Dept of Meteorology, University of Reading**
http://www.met.rdg.ac.uk/aer Aerosols and climate

Aerosol is one of the largest sources of uncertainty in the understanding of past climate changes and our prediction of future climates. It is also increasingly apparent that aerosols affect our existing climate and weather. This talk gives an overview of aerosol properties and impacts on the climate system and discusses areas in which considerable research effort is required, such as aerosol-cloud interactions and describing sources and distributions. The issue of the impact of black carbon on the climate system will be reviewed in more detail.

Aerosols and health: When smoke gets in your lungs: Dr Rob Kinnersley, Environment Agency (rob.kinnersley@environment-agency.gov.uk)
The adverse impact of ambient aerosols on human health goes hand-in-hand with their climatic impact to make them important determinants of our fate. Epidemiological studies have repeatedly shown their influence on rates of illness and death through lung and heart disease, and they are responsible for bringing forward hundreds of thousands of deaths around the world each year. We are only now beginning to fully understand the mechanisms underlying these observations. It seems that both size and composition of these particles play a crucial role in their toxicity. Our growing understanding of their behaviour is leading to ideas about how we might develop metrics and standards which may come to offer better protection to the population.

Dr Alex Baker, **School of Environmental Sciences, University of East Anglia -** Earth, wind and fire: their influence on aerosol chemistry over the Atlantic Ocean

Aerosol plays an important role in the exchange of matter between the land, atmosphere and oceans. Nutrients are delivered to the oceans in aerosols that originate from anthropogenic combustion processes (nitrogen) and from wind-blown desert dust (iron and phosphorus). Conversely, the oceans are a significant source of iodine-containing gases to the atmosphere. This iodine can form new aerosol particles (which may influence climate) and also participates in ozone destruction reactions in the lower troposphere. The chemical speciation of iodine in aerosol appears to be crucial in determining its reactivity in the atmosphere and its impact on ozone chemistry. This talk

will illustrate the atmospheric supply of iron and nitrogen to the Atlantic Ocean and examine some unexpected differences in the chemical speciation of iodine in aerosol at the boundary between the northern and southern hemispheres.

Dr Jim Haywood, Met Office. In-situ and remote sensing measurements of the physical and radiative properties of aerosols.

Aerosols are thought to exert a significant yet poorly quantified radiative forcing of the climate system and therefore may play an important role in climate change. We will investigate the mechanisms by which aerosols affect the solar and terrestrial radiation balance of the earth/atmosphere system and thereby the climate of the Earth. A combination of recently developed in-situ and remote sensing techniques will be discussed to elucidate the complex problems of accurate representation on the Earth radiation balance. These measurements will be shown to be essential if global modelling efforts are to be better constrained.

Laboratory techniques for studying the properties of model aerosols

Ms Claire Badger**, Centre for Atmospheric Science, University of Cambridge** : http://www-tonycox.ch.cam.ac.uk

In order to model the effects of aerosols on climate and the chemistry of the atmosphere an understanding of properties of aerosols such as phase, water content and reactivity is essential. A wide range of laboratory experiments can be used to investigate these properties under controlled conditions using proxies for atmospheric aerosol. For example, in our lab in Cambridge we study the kinetics of heterogeneous reactions on aerosol surfaces using an aerosol flow tube, the water content of aerosol particles using Fourier Transform Infra-Red spectroscopy and their growth using a Tandem Differential Mobility Analyser. The data provided by these and other experimental techniques can be used to improve the representation of aerosol processes in atmospheric models.

Ms Kirsty Pringle, Institute for Atmospheric Science, School of Earth and Environment, University of Leeds. www.env.leeds.ac.uk/~kirsty

A brief history of global aerosol modelling: recent successes and future challenges,
In this presentation I will examine why aerosols remain such a large uncertainty in our

understanding of climate change by considering the range of models used to assess the climate impacts of aerosol. To this end I will:
1. Introduce the hierarchy of aerosol models that has been developed
2. Present recent work designed to assess the level of sophistication required to adequately represent aerosol distributions in climate studies
3. Consider some of the key challenges facing the aerosol modelling community in the context of the issue of model sophistication. For example I will examine the inclusion of the (often non-linear) aerosol /chemistry /cloud /climate couplings in a variety of different model sophistications and identify the success and failures of the different approaches.