Invited Talk

A rigorous statistical framework for estimating the long-term health effects of air pollution

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Summary: The adverse health effects resulting from exposure to air pollution are well known across the world, and have a substantial financial and public health impact. For example, in the UK air pollution is estimated to reduce life expectancy by 6 months, with corresponding huge annual health costs. Numerous epidemiological studies have been conducted to assess the health impact of air pollution, most of which have focused on the effects of a few days of high concentrations. Much less research has focused on the effects of long-term (chronic) exposure, which can be assessed by comparing the levels of pollution and ill health in populations living in small geographical regions, such as electoral wards, over a number of years.

This talk will discuss spatio-temporal modelling of daily levels of four most important air pollutants: Ozone, Nitrogen dioxide, and two forms of Particulate matters for the five year period 2007-2011 in the UK. These high resolution pollution models will provide estimates and measures of uncertainty for individual pollutants and overall air quality at any spatial and temporal resolution. The output of these models will then be used in a model for health outcome which will provide an accurate representation of the localised spatio-temporal correlation in small-area health data. Our ultimate goal is to develop a unified modelling framework for propagating uncertainty from the pollution model to the health outcome model which enables us to provide the most detailed linkage of health and air pollution data yet attempted. Models suitable for this linkage will be discussed and preliminary results will be presented.