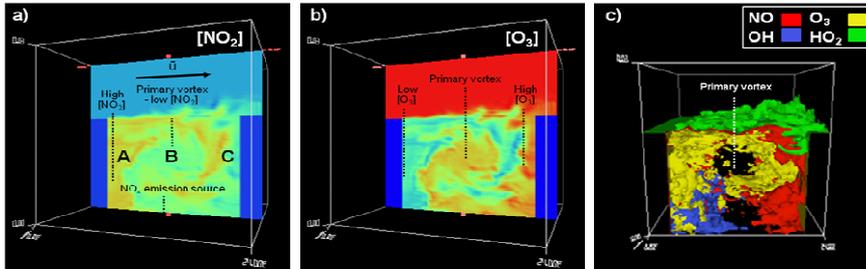


BlueBEAR provides a substantial computing resource that properly supports the research work of research staff and students at Birmingham. It provides a cost effective facility that optimises the effectiveness of research and ensures the University continues to be a world-class academic learning and research environment.

Street Canyon Atmospheric Composition: Coupling Dynamics and Chemistry



Challenges

Modelling atmospheric composition and chemistry on the street canyon scale is important as poor ventilation combined with increased emissions can cause pollutants to build up to harmful levels. Most practical applications that predict pollutant concentration focus on the dynamical processes that affect the dispersion of pollutants. Such models are often inadequate in their representation of the chemical reactions and transformations of pollutants which have a significant impact on street canyon atmospheric composition and therefore the air quality of these areas.

Solution

A **Large Eddy Simulation (LES) model** has been developed that can accurately simulate the atmospheric motion and mixing, which result from background air flowing over a street canyon, and the chemical interactions between the various species present. The chemistry used within the LES to date has been limited with only a few chemical reactions included. Development of the LES by applying a more realistic and detailed chemical reaction scheme will give a better understanding of the key processes that determine the atmospheric composition within street canyons.

Results

Using the enhanced LES model the transport and chemical reaction of species within and above the canyon will be studied. The enhanced model will provide a powerful tool to observe the effects of mixing and chemical processing on atmospheric composition and to address a number of key questions relating to atmospheric composition for example: How different is the air quality in the street canyon from the overlying, background atmosphere? How does this depend upon the dynamics? What variability in pollutant levels is expected across a street canyon (e.g. comparing concentration at points A, B and C in the **Figure 1a**)



Client Profile

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Product Used

LES model run on BlueBEAR.
Vis5D for 3-D data visualisation.
Matlab statistical toolbox.

Funding

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