**Presentation 4     Modelling   dispersion   in   full   scale   urban environments**
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It is a great challenge to model dispersion with a resolution down to one meter in full scale urban environments. For example, it is known that the mean concentration obtained from small scale physical or numerical models can be about one order greater than that obtained in field experiments. The discrepancy might be due to the variation of wind direction and magnitude, thermal buoyancy effects and the small roughness elements in the full scale urban region. This paper focuses on studying the effect of the variation (i.e. with the frequency lower than those of the dominant turbulent eddies) of wind direction and magnitude on dispersion. A new inflow technique is applied in Large-Eddy Simulation (LES) of flow and dispersion over the DAPPLE field site located at the intersection of Marylebone Rd and Gloucester Pl in Central London (http://www.dapple.org.uk/). As a start, dispersion in two wind directions (i.e. -51.4° and -90° with Marylebone Rd direction) over DAPPLE site is investigated. The plume width within and immediately above the canopy at 80m downwind of the point source in -51.4° wind is about twice of that in -90° wind, and subsequently the mean peak concentration of the former is about half of the latter. This raises a question – what is the mechanism behind? At least one conclusion can be drawn here – dispersion is very sensitive to wind direction in urban region.

Met Office's Mesoscale Unified Model (UM) data are being used to drive the LES computations. However, there is a significant lack of information for scales between the sampling interval of UM data - one hour - and the dominant turbulence scale - one minute (turbulent eddies smaller than this scale are generated using our inflow approach). DAPPLE wind data measured on the BT Tower at 190m above street level have been processed and used to drive the LES. The LES predicted dispersion is compared with the field measurements, which shows that using realistic wind conditions improves the LES data significantly. This will also help to determine how useful it is to use current UM data to drive small scale computations or to develop an approach to patch the 'hole' on the spectrum for general purposes. One of our priorities for future work is to model thermal buoyancy effects on dispersion in urban environments, which will also be addressed in the presentation.