MODELLING AIR POLLUTION ON BUILDINGS IN URBAN AREAS

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Contamination of building air from external pollution sources can be a problem, particularly in urban areas where outdoor pollution levels can be high. The ingress of external pollution into buildings is dependent on both wind-induced pressure and pollutant concentration distributions on the building. Areas on the building faces where there is a combination of high pressure differential across the building and high pollutant concentrations on its surface are 'high risk' areas for ingress of external pollution. Siting ventilation inlets away from these areas can minimise ingress of external pollution. To determine where high risk areas are likely to occur, it is necessary to understand, firstly, whether a pollution source in a given location affects a building at all and, secondly, the distribution of concentrations that the source is likely to generate on the building. The effects of external pollutant source positions on the magnitude and distribution of concentrations on urban buildings have therefore been investigated in a boundary layer wind tunnel using generic building arrays at a nominal model scale of 1:100. The results show that the region of influence of sources around the building under study is variable in shape and size depending on the building geometry, the layout of the surrounding buildings and the incident wind direction. Sources close to the test building generate large variations in concentration across its faces. However, this result was not universal and in some cases, the regions from which sources generated complex concentration distributions on the building under study were quite extensive.