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Improving the meteorological input of dispersion models for urban applications

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The applicability of dispersion models like a Lagrangian particle model for urban areas depends strongly on the meteorological input provided. Conventional meteorological stations in urban areas are often placed at ground level, surrounded by the built-up area, and thus their measurements reflect the influence of the specific surroundings which might not be representative for the whole city or at least the quarter of interest. The COST-Action 715 therefore recommended to place meteorological stations above average roof level best between 2 and 5 times the mean building height so that measurements representative for the area of interest can be obtained. Another issue is the measurement of atmospheric stability in urban areas. Conventional discrete stability classification schemes rely either on cloudiness or on net radiation data, parameters which only marginally reflect urban conditions; the third variable, the vertical temperature gradient, is seldom available. Measurements with 3D ultrasonic anemometers allow to deduce the Monin-Obukhov length which shows the modifications of atmospheric stability due to the increased sensible heat flux over urban areas. The placement of 3D ultrasonic anemometers at the upper bound of the roughness sub-layer or better within the inertial sub-layer thus enables for representative urban wind and stability information for dispersion modelling.

In the Austrian city of Linz, a 3D ultrasonic anemometer was placed in August 2006 on top of a school building in the city centre. Another 3D sonics is situated downwind of the city in a rural setting. Thus urban modifications of flow and stability can be determined, and a comparison of atmospheric stability deduced from a conventional meteorological station can be undertaken. This enables to compare the influence of conventional and advanced meteorological input for Lagrangian dispersion calcula-

tions. Results will be shown for a single-stack pollutant placed within the city boundaries.