FIELD EXPERIMENTS OF FLOW AND DISPERSION WITHIN STREET CANYONS USING OUTDOOR URBAN SCALE MODELS

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Abstract: In this study, we conducted filed experiments of flow and dispersion within street canyons using Comprehensive Outdoor Scale Model (COSMO). The study site was located on a portion of the campus of Nippon Institute of Technology, Saitama prefecture, Japan, where is at the northern suburb of Tokyo metropolitan area and is 100 km away from the Pacific Ocean. A total of 512 concrete blocks were placed in aligned array configuration on the concrete pavement to simulate built-up areas. The overall width and breadth of the site were 100m and 500m, respectively. The blocks were cubical with dimensions of H=W=B=1.5m and the spacing of the blocks was 1.5m such that the plane area density was 0.25. Instantaneous plume concentration and wind velocity were measured within and above street canyons in the middle of the test site. A line source was placed on the ground between the blocks and a tracer gas was released at a constant flow rate. Tracer gas concentrations were measured using fast-response photo-ionization detectors (PIDs) at several points on the central cross section of the canyon. Three dimensional wind velocity components were also measured using ultra sonic anemometers within and above the same canyon, simultaneously. Both concentrations and wind velocities were measured at 50Hz. During most of the experiments, wind direction was perpendicular to the building face. With both concentration and velocity fluctuation data, we investigated the effects of large scale turbulent eddies above the building height on the flow and plume dispersion within street canyons.