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Use of scale models to study hydrological processes in urban areas

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The built environment has an important role on the rainfall-runoff process. According to the latest UN data, the clustering of population in urban areas recently surpassed 50% of the world population. This reality implies more attention to the study of natural hazards, namely, to flooding. In the present study physical modelling in laboratory environment is used to analyse some features of the built environment that influence the rainfall-runoff process e.g., less interception, changed depression storage, wetting of walls, changing of overland flow paths).

With this physical model, it is possible to test different configurations and geometries of buildings under simulated rainfall. Several sets of tests were carried out to simulate the rainfall-runoff process over an impervious area with different densities in construction, building heights and rooftop connectivities. The simulated scenarios included static and dynamic high intensity rainfall events, with and without the simultaneous action of wind. It became apparent that some specific features of the built environment have a significant impact in the hydrological response to rainfall events (e.g., peak flow). The combined action of wind and rainfall also showed to have a strong influence on the rainfall-runoff process in urban areas.