Geophysical Research Abstracts
Vol. 17, EGU2015-6153, 2015
EGU General Assembly 2015

Rainfall-runoff simulation in urban hydology - An indoor physical model

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According to the UN the current levels of urbanization are unprecedented and so is the number and size of the world's largest cities. Moreover, in the next four decades, all of the world's population growth is most likely to take place in urban areas. This growth will include a draw in some of the rural population through rural to urban migration. The increase in size of individual concentrations of people (e.g., cities) is a consequence of the urbanization process that has an important role on the rainfall-runoff process.

This reality implies more attention to the study of urban flooding, among other natural hazards. This work aims to present a laboratory (indoor) physical model at a 1:100 scale of an urban area under simulated rainfall (pressurized nozzles). The model, a V-shaped rectangular area (2.00m $\times$ 4.00m) with the ability to adjust its longitudinal and transversal slopes, allows placing blocks simulating several geometries of buildings. This model was conceived and developed at the Institute of Science and Technology of the Federal University of Alfenas (MG) in Brazil, where it is used for research and teaching activities.

Several experiments were completed in order to simulate the rainfall-runoff process over an impervious area with and without buildings, with distinct longitudinal and transversal slopes. Significant differences were found in the shape of the resulting hydrographs. This work will allow assessing the possibility of scaling the results obtained with this indoor model to a larger-scale (1:25 to 1:10) outdoor model which is currently being designed.