



Hydrological modelling of peri-urban river basins

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Due to the expansion of urbanization, peri-urban zones face a quick land-use change. The control over this phenomenon has become a major issue for flood and water pollution management. Nevertheless, so far we are still on the pursuit of a well adapted model to these particular basins. We aim to develop such model by studying the Chézine basin, in the framework of the French national project AVuPUR (ANR-VMCS, 2008-2010). The ultimate goal is to provide tools for simulating the impacts of land use evolution as well as those caused by climate change. The possibility of integrating the model into a meteorological platform is thus essential. In this context, the system that regroups a Soil-Vegetation-Atmosphere Interactions scheme (ISBA, Noilhan and Planton, 1989) and a hydrological model (TOPMODEL; Beven and Kirkby, 1979) is chosen to set the basis of the new peri-urban catchment model. This work consists on adapting the model by including urban zones, represented by impervious surfaces and sewer network. The transfer function also needs to be perfectionned and adapted for a good representation of both rural and urban flows. In order to better understand the hydrological dynamics of these particular bassins, a 9-year data analysis has been accomplished. The localization of urbanization throughout the basin and the soil pre-event moisture state play a crucial role on the variability of hydrological responses. The application of the First Differenced Transfer Function method for extracting a unit hydrograph from observed rainfall-runoff data reveals the existence of different shapes of transfer functions for the basin according to its initial moisture state. This behavior is successfully reproduced by a geomorphological transfer function, based on the Hayami solution for the kinematic wave equation. Simulations allow a visualization of the impact of the current urbanization on the hydrological cycle of the catchment and the prevision of the impact of future land-use evolution. The sensibility of the system under climate change previsions will also be studied using this model.