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Modelling floods in urban areas using spatially distributed hydrological models: A case study on the Oued Fez catchment

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Urban catchments are heterogenous in terms of landuse and have both natural and artificial drainage networks. Therefore, modelling them is not a straight forward task. Distributed event-based rainfall-runoff models may be useful tools for this task.
Oued Fez, located in norther Morocco, is a perfect illustration of the hydrological context of north African cities as it has spatially variable landcover and impervious surfaces which yield fast hydrological responses. Several heavy floods have plagued the city. Although lumped models have been used on this catchment, distributed approaches using sub-daily discharge measurements are less widespread. In this work we use the ATHYS modelling platform to model 36 rainfall-runoff events monitored on the Oued Fez catchment over the 2008-2012 years. Two production functions, SCS (1972) and a modified version of Girard's model (Girard et al., 1981) are coupled to the lag and route transfer function. A high resolution Digital Elevation Model (ALOS PALSAR RTC, 12,5m resolution) is used to determine the drainage network. The road network is used to force drainage directions along the motorways. 4 types of landuse classes are used to parameterize the production function and 2 types for the drainage network. Tests are carried out using both the natural and modified drainage networks and the results are compared using Nash and Sutcliffe's efficiency measure (1972), the ratio of simulated to measured runoff volume and peakflow. The preliminary results indicate that both models can correctly reproduce high intensity runoff events and that in this context, the SCS model yields better results. In order to fully assess the impact of the road network, further tests are being carried out using the kinematic wave approximation.