Watershed Discretization in Urban Watersheds for Rainfall-Runoff Modeling

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Abstract. An appropriate level of discretization is one of the initial decisions to make when setting up a rainfall–runoff model in an urban watershed. Discretization is the spatial detail in which a watershed is subdivided into sub-watersheds to get a more homogeneous representation.

In order to analyze the hydraulic effects of such procedure, an urban watershed was initially lumped as one homogeneous watershed without link conduits. Next, runoff was routed through a single conduit and finally, it was discretized in nine and 14 sub-watersheds. The last two cases simulate a network drainage and reflect the water transport to the outlet, but this information could be complex to model or not available.

EPA-SWMM 5.0.006a was used as the main tool to perform the routing analysis. The dynamic wave flow routing method was used to rout flow through the conduit links. This routing method was selected over the kinematic wave method because it solves the complete one-dimensional Saint Venant flow equations and therefore produces the most accurate results.

Based upon the resulting hydrographs, recommendations are given to discretize urban watersheds. For example, estimating the runoff length and then, computing the width would yield to more accurate results.

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