Effects of soil moisture parameterization on a real- time flood forecasting system based on rainfall thresholds

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The rainfall threshold is the cumulated rainfall depth required to cause flooding flow at the basin outlet. Thresholds are used in operational flood forecasting systems as a means to provide flood warnings based on the comparison with rainfall amounts (either observed or forecasted). This approach results in a simple system that can also be used by non expert technicians; it is a complementary tool to "classical" rainfall-runoff modelling systems. Despite the simple usage, a flood forecasting system based on thresholds requires great accuracy in definition of the critical rainfall. Special attention is required in modelling the basin moisture condition. The aim of this paper is to assess a reliability analysis of a framework for the definition of rainfall thresholds using the distributed hydrological model FEST. The AMC value (antecedent moisture condition) of the conventional SCS-CN method is employed to describe the soil moisture initial condition. The case study is the Arno River basin located in Italy. A detailed investigation of the most recent flood events shows that precise accounting of the watershed wetness based on analysis of actual soil moisture can improve the prediction accuracy of flood forecasting systems.