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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 real time flood forecasting systems as a means to provide flood warnings based on the comparison with rainfall amounts (either estimated or forecasted). This approach results in a simple system to be used also by non expert technicians and defines a complementary tool to 'classical' rainfall-runoff transformation hydrological modelling. Despite its simple usage, a flood forecasting system based on thresholds requires great accuracy in definition of critical rainfall. Special attention is to be kept in parameterization of 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 flood event distributed hydrologic model FEST. Representation of the soil moisture initial condition is based on the AMC (Antecedent Moisture Condition) of the conventional SCS-CN method. The case study is the River Arno, in Italy. A detailed analysis of the most recent flood event shows how a more accurate accounting for the watershed wetness based on actual soil moisture can improve system's predictive skill.