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Evaluation of an Operational Flood-Forecasting Model through Uncertainty Propagation Analysis from QPFs to QDFs and to a regional scale Warning System. The AMPHORE Case Studies.

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As far as the operational implementation of real time flood forecasting systems to Civil Protection is concerned, the hydrological model main requirements are: reliability and rapidity. Nevertheless the quick response of medium and little sized catchments can be addressed to in no way but increasing the useful forecasting horizon, so that meteorological models are often and often coupled with hydrological simulation. On the one hand this chaining allows to forecast floods on little catchments with a response time ranging from 6 to 12 hours, on the other originates new problems about the reliability of Quantitative Precipitation Forecasts (QPFs) and about space and time scales, characteristics which are different in the two models, creating additional accuracy problems to Quantitative Discharge Forecasts (QDFs). Furthermore it has to be considered how QDF uncertainty can affect the warning system reliability. In AMPHORE project, the evaluation of a forecasting operational system based on a distributed hydrological model is addressed. Both the ‘event based’ approach, using the FEST model, and the ‘water balance’ supported approach, using the FEST-WB development, are considered. The former adopts the classical SCS-CN model for abstractions; the latter makes use of a simplified local water and energy balance scheme, accounting for soil, vegetation and atmosphere interactions, to provide Antecedent Moisture Condition (AMC) at rainfall beginning. In this work, particular care is focussed on the understanding the role that the AMC of soil plays in the run-off formation and on the flood hydrograph definition. Comparison between the

two approaches showed that the ‘water balance’ approach, while needing calibration, gets more reliable showing that the simple estimation methods (based on antecedent precipitation) adopted in event-based simulations often proved to be inadequate. The use of the FEST-WB model is then analysed in the operational setting experiments, i.e. the hydrological model is forced with rain observation till the time of forecast and with the QPF for the successive period, as it is usual in real-time procedures. Analysis focuses on AMPHORE case studies in Piemonte (period 2000-2003).