

Probabilistic hydrological nowcasting using radar based nowcasting techniques and distributed hydrological models: application in the Mediterranean area

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The exposure of the urban areas to flash-floods is particularly significant to Mediterranean coastal cities, generally densely-inhabited. Severe rainfall events often associated to intense and organized thunderstorms produced, during the last century, flash-floods and landslides causing serious damages to urban areas and in the worst events led to human losses. The temporal scale of these events has been observed strictly linked to the size of the catchments involved: in the Mediterranean area a great number of catchments that pass through coastal cities have a small drainage area (less than 100 km²) and a corresponding hydrologic response timescale in the order of a few hours. A suitable nowcasting chain is essential for the on time forecast of this kind of events. In fact meteorological forecast systems are unable to predict precipitation at the scale of these events, small both at spatial (few km) and temporal (hourly) scales. Nowcasting models, covering the time interval of the following two hours starting from the observation try to extend the predictability limits of the forecasting models in support of real-time flood alert system operations. This work aims to present the use of hydrological models coupled with nowcasting techniques. The nowcasting model PhaSt furnishes an ensemble of equi-probable future precipitation scenarios on time horizons of 1–3 h starting from the most recent radar observations.

The coupling of the nowcasting model PhaSt with the hydrological model Continuum allows to forecast the flood with a few hours in advance. In this way it is possible to generate different discharge prediction for the following hours and associated return period maps: these maps can be used as a support in the decisional process for the warning system.