



Flash-flood warning in a British catchment using a rainfall thresholds based approach: a case study

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The paper describes the application of a methodology for the implementation of an operational flash flood guidance system, for catchments where only rainfalls measurements are available; the methodology provides a tool for the forecasting of flash floods in natural catchments which is capable of handling all sources of uncertainty linked to false or missed alarms. The proposed methodology uses flood precursors (rainfall thresholds) which are generated off-line and then used for comparison with real time measured or predicted rainfall values; given a river section, the rainfall threshold identifies the spatially averaged rainfall depth which, for different durations, produces the critical discharge. The derivation of the rainfall thresholds is based on the resolution of the "hydrologic inverse problem", which consists in deriving the total rainfall that is required to produce the critical discharge, given the current soil moisture conditions and the temporal evolution of the rain storm. The application of the method is to the Boscastle catchment (20 km²), Cornwall, UK.

On 16 August 2004 an extreme rainfall event took place near the north Cornish coast when up to 200 mm of rainfall fell in a period of approximately 5 hours. The flooding on the Valency Stream and its tributary the River Jordan caused significant damage in Boscastle, with over 70 properties flooded, 3 destroyed, damage to roads, bridges, water and sewerage infrastructure and power supply; a large number of cars were washed away and the Boscastle Harbour was filled with sediment that was washed down the river. The peak discharge was estimated to be approximately 180 m³/s and the return period of rainfall of the order of 1000 to 2000 years. A detailed survey of the inundated area after the event enabled the identification of the river sections where flooding occurred.

The results show the good performance of the system; hence, the application of such a procedure would have allowed this extreme event to be forecasted and a flood warning to be issued.