



## **Probabilistic forecasting of antecedent soil moisture conditions as flash flood precursor variables**

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Flood forecasting is a rather complicated task, particularly in those catchments which are prone to flash flood formation or which the response time is of the order of few hours and, even brief anticipation is important and welcomed. In this context, some kind of hydrological precursors can be considered to improve the effectiveness of the emergency actions (i.e. early flood warning). Now, in literature has been widely recognized how soil moisture is an important factor in flood formation, because the runoff generation is strongly influenced by the antecedent soil moisture conditions of the catchment. The basic idea of the work here presented is to use soil moisture forecasting to define a first alert phase in flash flood forecasting chain.

For the soil moisture conditions modelling and forecasting, the UBC model which is a semi-distributed continuous conceptual hydrologic model was used. The model is made up of several sub-routines: the sub-routine for the distribution of the meteorological data, the soil moisture accounting sub-routine, and the flow routing sub-routine. The soil moisture sub-model sub-divides the water input (rain and snowmelt) into four components of runoff namely, fast, medium (interflow), slow (upper groundwater) and very slow (deep groundwater). An important aspect of the soil moisture sub-model is the "impermeable area" - fast responding region of a watershed which is assumed to be adjacent to a well developed stream channel system. This area changes as a function of soil moisture deficit and has been used to describe the fast responding watershed runoff behaviour. Application of the proposed methodology has been carried out with reference to two river basins, one in Cyprus and another in Sicily, Italy.