



## Ensemble and probabilistic forecast of Mediterranean flash-flood events

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Hydrometeorological prediction is affected by several uncertainties: soil moisture initial conditions, hydrological model error, meteorological uncertainties forecasting. For Mediterranean areas which are often affected by devastating flash-floods, those uncertainties are even higher. Indeed, the nature and temporal and spatial scales of precipitating systems leading to flash flood, make difficult its forecast even for high-resolution convection-resolved numerical weather prediction systems.

Since last autumn, the ISBA-TOPMODEL hydrometeorological system, developed within the framework of the GMES/PREVIEW project, is used driven by meteorological forecasts from AROME, the new high-resolution operational model of Météo-France. Hourly discharges at several outlets of the Cévennes-Vivarais (Massif Central) region are predicted every day. This hydrometeorological chain gives us the opportunity to evaluate the uncertainties of the high-resolution rainfall forecast and investigate their propagation in the hydrological model.

After evaluating the uncertainty of the rainfall from the deterministic AROME forecast by comparison to observed rainfall (radar and raingauges), two methods are investigated in order to take into account of the uncertainties of the rainfall forecast and produce ensemble and probabilistic discharge forecast. The first one uses high-resolution ensemble forecast rainfall fields produced by dynamical downscaling with AROME of the large scale ARPEGE ensemble forecast. The second method introduces perturbations in the AROME rainfall fields assuming conservation of some statistical or physical properties of the rainfall forecast. In this way, we hope to take into account location errors, bias in the rainfall intensity distribution and bias in the areal rainfall at the hydrological scales. The two methods have been carried out on the 21 and 22 October 2008 flash-flood events over the Cévennes-Vivarais region. The hydrological responses obtained with those two methods are compared.

This study aims at preparing an ensemble flash flood forecast system that will be run during the observing periods of the HYMEX field experiment (<http://www.cnrm.meteo.fr/hymex/>).