

Hydrometeorological ensemble forecasting of Mediterranean flash-flood events

B. Vincendon (1), V. Ducrocq (1), O. Nuissier (1), B. Vié (1), and G.-M. Saulnier (2)

(1) Météo-France, GAME/CNRM (Météo-France, CNRS), Toulouse, France (beatrice.vincendon@meteo.fr), (2) CNRS/EDYTEM, Université de Savoie, Chambéry, France

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.

During the last autumn, the ISBA-TOPMODEL hydrometeorological system, developed within the framework of the GMES/PREVIEW project, was used driven by meteorological forecasts from AROME. Hourly discharges at several outlets of the Cévennes-Vivarais region were predicted every day. Such a hydrometeorological system is useful 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 rain-gauges), two methods are investigated in order to take into account of the uncertainties of the rainfall forecast and produce an ensemble discharge forecast. First, we use the convective-scale ensemble AROME simulation rainfall fields to drive ISBA-TOPMODEL. Then, assuming conservation of some statistical or physical properties of the rainfall forecast some perturbations will be introduced in the AROME rainfall fields. 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 first method was carried out on two flash-flood events over the Cévennes-Vivarais region : 21-22 October 2008 and 1-2 November 2008.

In a next step, the second method will be implemented : we will tune the perturbations added to the rainfall forecast and use the obtained fields to drive the ISBA-TOPMODEL system in order to produce enough but relevant ensemble spread to sample the uncertainties in the convective-scale rainfall forecast. Then the hydrological responses obtained with both methods will be compared.

The ultimate aim is to prepare an ensemble forecasting system that will be run during the observing periods of HYMEX field experiment (<http://www.cnrn.meteo.fr/hymex/>).