



Hydro-meteorological chain for flood forecasting in the alpine region: a multi-model comparison

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This study is part of the international MAP-D-PHASE Project (Demonstration of Probabilistic Hydrological and Atmospheric Simulation of flood Events in the Alpine region), whose main objective is to demonstrate the benefits in forecasting heavy precipitation and related flood events, by coupling atmospheric and hydrological models.

The analysis is focused on the River Toce, a middle-size alpine basin, in North-West of Italy.

The hydro-meteorological chain include both probabilistic forecasting based on ensemble prediction systems with lead time of a few days and short-range forecasts based on high resolution deterministic atmospheric models. D-PHASE hydrological ensemble forecasts are based on the 16 meteorological members, provided by COSMO-LEPS model (5 day lead-time) with a horizontal resolution of 10 km. Deterministic hydrological D-PHASE forecasts are provided by MOLOCH weather model, with a horizontal resolution of 2.2 km, nested into BOLAM. Two output with different initial and boundary conditions are used: one based on GFS (48 h lead-time) and the other on ECMWF (39 h lead-time).

In addition, further simulations (outside of MAP-D-PHASE Project) were carried out with another deterministic weather model, WRF (60 h lead-time), with a horizontal resolution of 4 km, provided by Epsom Weather Centre.

The hydrological model used to generate the runoff simulations is the rainfall-runoff distributed FEST-WB model, developed at Politecnico di Milano.

A re-analysis for an intense precipitation event, affecting the Toce river basin at the end

of November 2007, is shown. The results show a significant overestimation of peak discharge and flood volume on some members of ensemble system, with a reduction of the error as much as the meteorological model initialization is close to the flood event. The hydro-meteorological chain based on deterministic models shows good performances.