



The Po flood management in Italy: guidelines and methodologies

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In order to accomplish the 2007/60 European flood directive requirements, an innovative flood forecasting system, based on ensemble techniques, is developed to face hydrogeological risk situations and to define alert strategies on the most important interregional Italian basin. The system is composed by three modelling chains that simulate the whole Po basin and river system behaviour starting from observed data and forecast meteorological data. Each chain consists of a hydrological model simulating the response of the basins and a river routing model for flood wave propagation. Particular emphasis has been dedicated to the linkage of meteorological forecasts and hydrological and hydrodynamic modeling in order to evaluate the performance and reliability of flood forecasts up to three days. In this way, the estimation of the uncertainty associated with the meteorological prediction is exported by the meteo-hydrological modelling chains into the flood forecast results. Moreover, the coupling of more than one hydrological-hydrodynamic chain allows to take the uncertainty about runoff generation and routing simulations into account, providing range of discharge predicted values.

The availability of forecasted water levels and discharge values allows to obtain a wide range of information both about the actual river state, provided by the hydrological and meteorological observations from the real time monitoring system (rain gauges, water level gauges and radar maps) and the future river state provided by the input from meteorological Limited Area Model COSMO-I7 and the local ensemble prediction system (COSMO-LEPS). The present paper describes a guideline for the system management rule adopted by the Po River Interregional Agency (AIPO) and the regional operational centers of the Po basin (thus supporting the Control and Command Unit as stated by the 2004 Civil Protection Italian Directive).

The methodological scheme is based on a "state approach" in which state changes are defined according to observed and predicted values of hydrometeorological parameters and travelling times of river sections.

Focusing on the single state definition - forecasting, vigilance and monitoring - the methodology takes into account the analysis of input data and modeling system outputs, providing the evaluation of forecast performances (performance indicators).