Plinius Conference Abstracts
Vol. 12, Plinius12-36
12th Plinius Conference on Mediterranean Storms
Corfu Island Greece, September 2010


# Operational flood forecasting: further lessons learned form a recent inundation in Tuscany, Italy

F. Caparrini (1,3), F. Castelli (2), and E. Di Carlo (3)

(1) Eumechanos, Florence, Italy (f.caparrini@eumechanos.it), (2) University of Florence, Department of Civil and Environmental Engineering, Florence, Italy (fabio@dicea.unifi.it), (3) Hydrologic Service, Tuscany Region, Pisa, Italy (enzo.dicarlo@regione.toscana.it)

After a few years of experimental setup, model refinement and parameters calibration, a distributed flood forecasting system for the Tuscany region was promoted to operational use in early 2008. The hydrologic core of the system, MOBIDIC, is a fully distributed soil moisture accounting model, with sequential assimilation of hydrometric data. The model is forced by the real-time dense hydrometeorological network of the Regional Hydrologic Service as well from the QPF products of a number of different limited area meteorological models (LAMI, WRF+ECMWF, WRF+GFS). Given the relatively short response time of the Tuscany basins, the river flow forecasts based on ground measured precipitation are operationally used mainly as a monitoring tool, while the true usable predictions are necessarily based on the QPF input. The first severe flooding event the system had to face occurred in late December 2009, when a failure of the right levee of the Serchio river caused an extensive inundation (on December 25th). In the days following the levee breaking, intensive monitoring and forecast was needed (another flood peak occurred on the night between December 29th and January 1st 2010) as a support for decisions regarding the management of the increased vulnerability of the area and the planning of emergency reparation works at the river banks. The operational use of the system during such a complex event, when both the meteorological and the hydrological components may be said to have performed well form a strict modeling point of view, brought to attention a number of additional issues about the system as a whole. The main of these issues may be phrased in terms of additional system requirements, namely: the ranking of different QPF products in terms of some likelihood measure; the rapid redefinition of alarm thresholds due to sudden changes in the river flow capacity; the supervised prediction for evaluating the consequences of different management scenarios for reservoirs, regulated floodplains, levees, etc. In order to quantitatively address these issues, a multivariate sensitivity hindcast of the above event is presented here, where variation of model predictions and subsequent likely decision making are measured against QPF accuracy, other possible levees failures, different reservoir releases.