A multi-model approach to QPF for hydrological predictions

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A multi-model approach to quantitative precipitation forecasting (QPF) is proposed, in order to have a range of possible meteorological inputs to feed a hydrological model. In this way the estimation of the uncertainty associated with the meteorological prediction can be exploited by a meteo-hydrological modelling chain, providing an estimation of the uncertainty associated with the discharge prediction. The ensemble of forecast rainfall scenarios is built on the QPFs provided by six meteorological model runs. These runs have been performed using four different meteorological limited-area models (LM, BOLAM, MOLOCH and WRF), employed at different horizontal resolution. The physically based rainfall-runoff model TOPKAPI generates simulated streamflows. The proposed methodology, simulating a real-time forecast, is implemented for episodes of intense precipitation, whose ground effects have been evaluated over the south-eastern Apennines area in the Emilia-Romagna Region, northern Italy. The forecasting chain turns out to be useful for warning purposes concerning the prediction of discharge peaks, showing that the forecast accuracy is highly dependent on the correct space-time localisation of the precipitation input. The study pertains to the activities of the RISK AWARE (RISK-Advanced Weather forecast system to Advise on Risk Events and management) project, whose main goal is to add value to the meteorological information providing the prediction of possible ground effects from a civil protection point of view.