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The COSMO-LEPS quantitative precipitation forecasts as input to streamflow predictions

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The quantitative precipitation forecast (QPF) is still a challenging task at the scales of interest for hydrological predictions. Although the use of high resolution limited-area models (LAMs) has improved the short-range prediction of locally intense events, it is sometimes difficult to forecast accurately their space-time evolution. Nowadays, the ensemble prediction techniques are widely used in the meteorological community, allowing to add probabilistic information to the forecasts, especially with respect to risk-related events. Moreover, meteorological ensemble systems have been recently used to provide a probabilistic input to river flow forecasts, in order to improve both their accuracy and the reliability of uncertainty estimates affecting hydrological model predictions. In the present study the meteorological mesoscale ensemble prediction system COSMO-LEPS is considered to operationally supply quantitative precipitation forecasts driving a distributed rainfall-runoff model with the aim to provide reliable real-time discharge ensemble forecasts for the Reno river basin, a medium-size catchment in northern Italy. The river hydrograph simulations are carried out by means of the physically-based model TOPKAPI. The performance of the proposed probabilistic forecasting chain is evaluated simulating the river flow forecasts provided for the autumn and spring seasons of the period 2003-2005. Furthermore, it is tested the impact of tagging each member of the ensemble with a probability measure representing the relative size of the cluster resulting from the cluster analysis of ECMWF EPS. The deterministic forecasting chain, operationally implemented, based on the same rainfall-runoff model fed with the precipitation forecast provided by the COSMO model-suite LAMI is used as term of comparison.