INTRODUCTION AND MOTIVATIONS

For medium-sized catchments, characterized by short response times, hydrological predictions have to rely on quantitative precipitation forecasts (QPFs) issued by meteorological models. In order to represent the uncertainty inherent to QPFs, which can be relevant at the scales of interest for hydrological purposes, the ensemble forecasting approach is becoming a common practice to provide multiple precipitation scenarios to be used as the input for a hydrological model. Here the hydrological model TOPKAPI is used to propagate the uncertainty in the flood forecasts, providing probabilistic hydrological prediction.

Two different ensemble approaches are tested in a real-time configuration:
1. COSMO-LEPS, the operational Limited-area EPS of the COSMO Consortium, which has been developed to combine the advantages of global-model ensembles with the high-resolution details gained in limited-area model integrations, so as to improve the Late-Short (i.e., 48h) to Early-Medium (i.e., 120h) range forecasts of severe weather events.
2. A multi-model forecasting system based on four mesoscale models (BOLAM, COSMO, MOLOCH and WRF), implemented at different horizontal resolutions, ranging from 8 to 2.5 km. It is aimed at improving short-range forecasts (up to 12h) of intense precipitation.

COSMO-LEPS may provide an alert window between 3 and 5 days in advance. The high resolution multi-model ensemble may provide a more accurate timing and magnitude of the event.

SYNOPTIC SITUATION

- Deep trough elongated from North to South and associated with cold air moving toward the Mediterranean;
- Several frontal systems moving in the cyclonic circulation over western Mediterranean;
- Warm air advection on the east side of the trough, sustained by intense southerly moist flow;
- Blocking over Eastern Europe;
- Lee orographic cyclogenesis in the second part of the event.

CONCLUSIONS
- The COSMO-LEPS provides a weak indication of the possibility to exceed the lower warning threshold 4-5 days ahead.
- The COSMO-LEPS predicts a much better timing 3 days ahead, but does not give correct indications about the intensity.
- The multi-model ensemble provides an indication of the possible occurrence of an event exceeding the lower warning threshold, even if with great variability in timing, 2-3 days ahead of the event.
- As for the multi-analysis multi-boundary contribution, the use of GFS instead of IFS as initial condition improves the results in some cases and thus adds information to the ensemble.
- Forecasters experience and attitude are fundamental for a correct interpretation of probabilistic predictions at different lead times.

REFERENCES
- Marsigli C., Montari A. and Paccagnella T., 2008: A spatial verification method applied to the evaluation of high-resolution ensemble forecasts. Meteorological Applications, 15, 125-143.