



## Using ensemble precipitation forecasts for hydrological purposes

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Almost a quarter (23 %) of the total area of Hungary can be influenced by floods. This affects 700 cities and villages with 2,5 million people. Hungary's endangerment in terms of floods can be compared only to the Netherlands' in Europe. Therefore, the precipitation forecast for hydrological purposes plays important role in Hungary. The available meteorological analysis and forecasting tools and results at HMS are linked to the flood forecasting system. Meteorological forecasts include the ALADIN/HU model, which has 8 km horizontal resolution and provides temperature and precipitation forecasts 2 days ahead and the ECMWF model producing forecasts up to 10-days. The precipitation forecasts are based mainly on the deterministic model, but we pay more and more attention to the ensemble forecasts especially in cases when the results of the deterministic model differ significantly from the EPS average. The precipitation probability fields and the plums diagrams are now essential requirements of the precipitation amount forecasts.

In this study we investigated the performance of the ensemble forecasts and the deterministic model. Two case studies were chosen. The first one is connected to heavy precipitation event causing flood in Hungary in Upper Tisza-sub-basin in March 2001. Three basins were chosen, which have different geographical features. Taking all cases into account our verifications show, that the ensemble mean of precipitation forecasts generally produces better results than the deterministic model in three river basins especially after 3-4 days. However it is remarkable that in case of heavy precipitation in mountainous regions the deterministic model, due to its higher resolution provided better results not only for the first 1-3 days, but up to 6-7 days as well, because this version was more able to capture the orographic effect.

The second case study connected with heavy precipitation occurred in the central part

of Hungary in August 2005. On 4 August the low dominated over Central Europe, leading to torrential rainfall in Hungary. (The 24-hour accumulated precipitation was more than 100 mm). In this case in contrast to the deterministic ECMWF forecast 48-hour before the start of the event, which predicted the large amount of precipitation too far east, the EPS was more successful in predicting the area of the event. The 20 % of the EPS members showing a consistent signal more to the west, closer to the event. Just as in the consecutive ECMWF deterministic forecasts (based on 02. 08. 2005 12 UTC and 03. 08. 2005 12 UTC), the precipitation over Hungary is largely missed in the fine resolution ALADIN model as well. Therefore, especially for precipitation forecast the EPS needs to be taken into account for short range as well.