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Three Years of Experience in Implementing, Maintaining, Verifying and Explaining Operational Hydrological Ensemble Prediction Systems

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When speaking about their hydrological ensemble prediction systems (HEPS) hydrologist can look back to a very short history. As one of the first HEPS the "European Flood Alert System" EFAS has been operational since 2003. Applications for mesoscale area are more recent and linked to the availability of limited-area atmospheric EPS such as COSMO-LEPS. Several (semi-)operational ensemble forecasting chains were developed for the demonstration period of the MAP D-PHASE project in summer and fall 2007. Some of these chains continued to work after the end of MAP D-PHASE and are generating to-date operational ensemble forecasts for different areas. Today, three years later, there is much more experience on how to implement and maintain such kind of systems. However, four major issues are still open:
1) With continuous evolving of the atmospheric EPS it is almost impossible to obtain a long homogeneous time series of hydrological ensemble forecasts for a sound verification. The consortium running COSMO-LEPS increased the number of members from 10 to 16 in mid-2006, while in December 2009 the resolution was increased from 10x10 km to 7x7 km.
2) The verification procedures adopted for verifying atmospheric EPS are not completely adequate for hydrological purposes. New verification metrics focused on flood-peaks, flood-volumes and timing of peak-discharge are needed.
3) When propagating atmospheric EPS in operational HEPS only one of three major sources of uncertainty is considered. The predictive uncertainty of the hydrological model and the uncertainty in initial conditions are omitted.
4) Communication of ensemble forecasts to end-users is an unresolved issue. Most end-users still request support for taking YES/NO decisions and are generally lost when interpreting the outputs of HEPS. Only a minority among them is able to define its own cost-loss function in order to take full advantage of probabilistic forecasts.
Many of these aspects and open points are also key issues of the COST-731 action which started in 2005 and will and in 2010.
The presentation will cover the aforementioned topics and presents examples taken from operational HEPS realizations from the MAP D-PHASE and COST731 communities.