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Operational hydrological ensemble forecasts in France, taking into account rainfall and hydrological model uncertainties.

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In operational conditions, the actual quality of meteorological and hydrological forecasts do not allow decision-making in a certain future. In this context, meteorological and hydrological ensemble forecasts allow a better representation of forecasts uncertainties. Compared to classical deterministic forecasts, ensemble forecasts improve the human expertise of hydrological forecasts, which is essential to synthesize available informations, coming from different meteorological and hydrological models and human experience.

In this paper, we present a hydrological ensemble forecasting system under development at EDF (French Hydropower Company). Our results were updated, taking into account a longer rainfall forecasts archive. Our forecasting system both takes into account rainfall forecasts uncertainties and hydrological model forecasts uncertainties. Hydrological forecasts were generated using the MORDOR model (Andreassian et al., 2006), developed at EDF and used on a daily basis in operational conditions on a hundred of watersheds. Two sources of rainfall forecasts were used : one is based on ECMWF forecasts, another is based on an analogues approach (Obled et al., 2002). Two methods of hydrological model forecasts uncertainty estimation were used : one is based on the use of equifinal parameter sets (Beven & Binley, 1992), the other is based on the statistical modelisation of the hydrological forecast empirical uncertainty (Montanari et al., 2004 ; Schaefli et al., 2007).

Daily operational hydrological 7-day ensemble forecasts during 4 years (from 2005 to 2008) in few alpine watersheds were evaluated. Finally, we present a way to combine rainfall and hydrological model forecast uncertainties to achieve a good probabilistic calibration. Our results show that the combination of ECMWF and analogues-based rainfall forecasts allow a good probabilistic calibration of rainfall forecasts. They show also that the statistical modeling of the hydrological forecast empirical uncertainty has a better probabilistic calibration, than the equifinal parameter set approach.

Andreassian et al., 2006. Catalogue of the models used in MOPEX 2004/2005. Large sample basin experiments for hydrological mode parameterisation : results of the Model Parameter Experiment, IAHS Publ. 307, 41-94.

Beven & Binley, 1992. The future of distributed models : model calibration and uncertainty prediction. Hydrological Processes, 6, 279-298.

Obled, C., Bontron, G., Garçon, R., 2002. Quantitative precipitation forecasts: a statistical adaptation of model outputs though an analogues sorting approach. Atmospheric Research, 63, 303-324.

Montanari, A. and Brath, A., (2004). A stochastic approach for assessing the uncertainty of rainfall-runoff simulations. Water Resources Research, 40, W01106, doi:10.1029/2003WR002540.

Schaefli, B., Balin Talamba, D. and Musy, A., (2007). Quantifying hydrological modeling errors through a mixture of normal distributions. Journal of Hydrology, 332, 303-315.