



## **Operational use of ensemble hydrometeorological forecasts at EDF (French producer of energy)**

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In the context of a national energy company (EDF : Electricité de France), hydro-meteorological forecasts are necessary to ensure safety and security of installations, meet environmental standards and improve water resources management and decision making. Given that the actual quality of meteorological and hydrological forecasts do not allow decision-making in a certain future, meteorological and hydrological ensemble forecasts enable a better representation of forecasts uncertainties. Ensemble forecasts improve the human expertise of hydrological forecasts, which is essential to synthesize available information, coming from different meteorological and hydrological models and human experience. In this context, the good estimation and communication of hydrological forecasts uncertainties is an essential step to improve the efficient use of forecasts by end-users.

In this paper, we first present the operational hydro-meteorological forecasts at EDF. The new ensemble forecasting system is also introduced. In order to ensure a good probabilistic calibration of forecasts, this system takes into account both meteorological and hydrological uncertainties, but also allows forecasters expertise. Probabilistic calibration is absolutely necessary to avoid misrepresentation of uncertainties and under-confidence of forecasts by forecasters and end-users. Hydrological forecasts are generated using the MORDOR model, developed at EDF and used on a daily basis in operational conditions on a hundred of watersheds. Two sources of probabilistic meteorological forecasts are used : one is based on ECMWF ensemble forecasts, another is based on an analogues approach. Deterministic meteorological forecasts from different global or mesoscale models are also used. Estimation of hydrological model uncertainty is based on the statistical modelisation of the hydrological forecast empirical uncertainty. Forecaster's expertise is used both to modify meteorological scenarii and streamflow forecasts.

After few months of pre-operational use at EDF, a first evaluation of this system may be done. It first reveals the interest of probabilistic forecasts, compared to deterministic forecasts, in a context of decision making. It also underlines the interest of combining automatic and human approaches, both to correct the biases of automatic ensemble forecasts and to stimulate forecaster's analysis. However, our experience also shows that improvements still have to be done, particularly in the field of communication of uncertainties to end-users.