Operational use of ensemble hydro-meteorological forecasts at EDF (French producer of energy)

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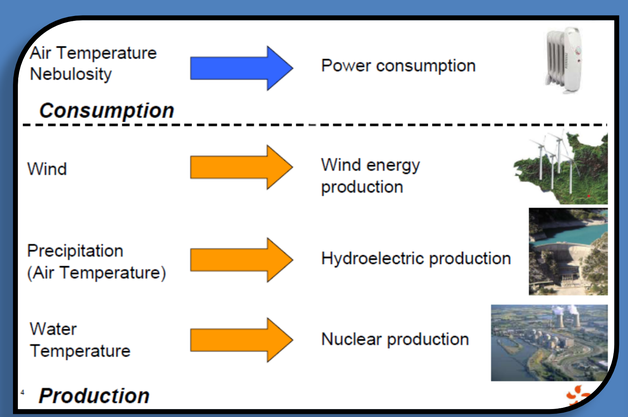
EDF: A WEATHER-SENSITIVE COMPANY

Water resources management is a central concern for EDF, both in the fields of **safety, regulation** and **energy production**. In order to ensure an efficient water resources management, EDF performs hydro-meteorological forecasts on about 120 watersheds in France. Given that the actual quality of meteorological and hydrological forecasts do not allow decision-making in a certain future, meteorological and hydrological ensemble forecasts allow a better representation of forecasts uncertainties.



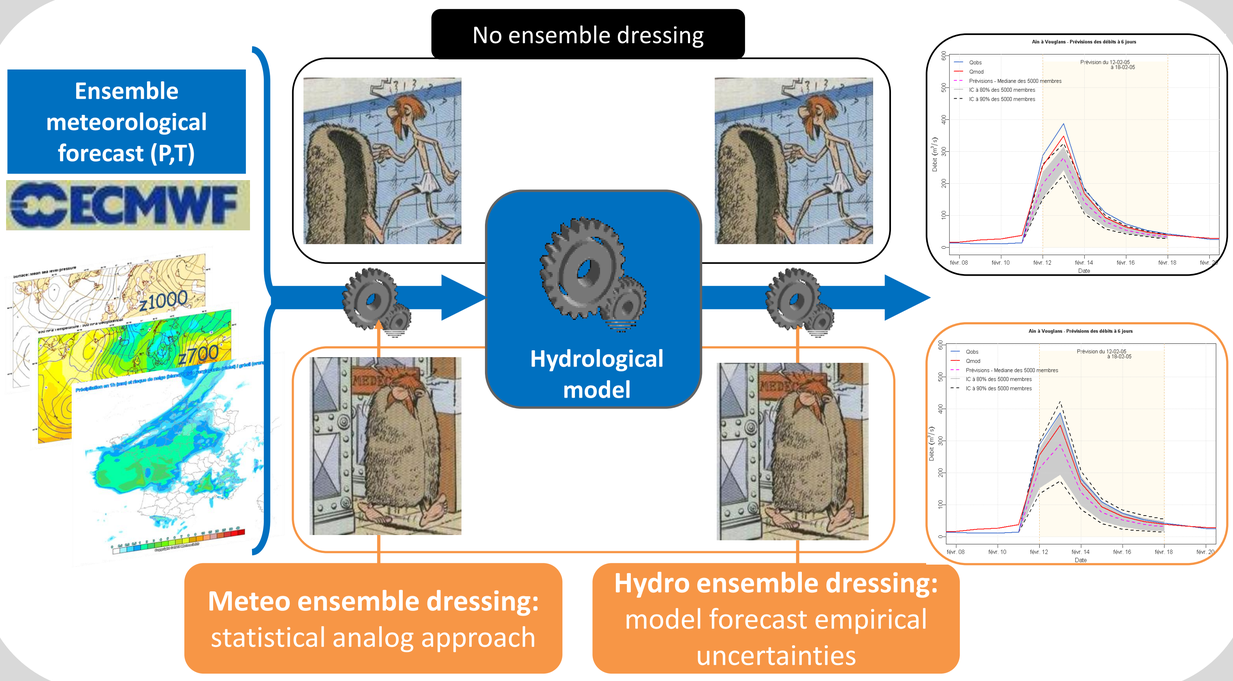
Loire at Grangent, november 2008.

~ 120 watersheds (~250 000 km²)
Two forecasting centers (~20 forecasters)
Grenoble & Toulouse

Compared to classical deterministic forecasts, 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.

AUTOMATIC ENSEMBLE FORECASTING CHAIN

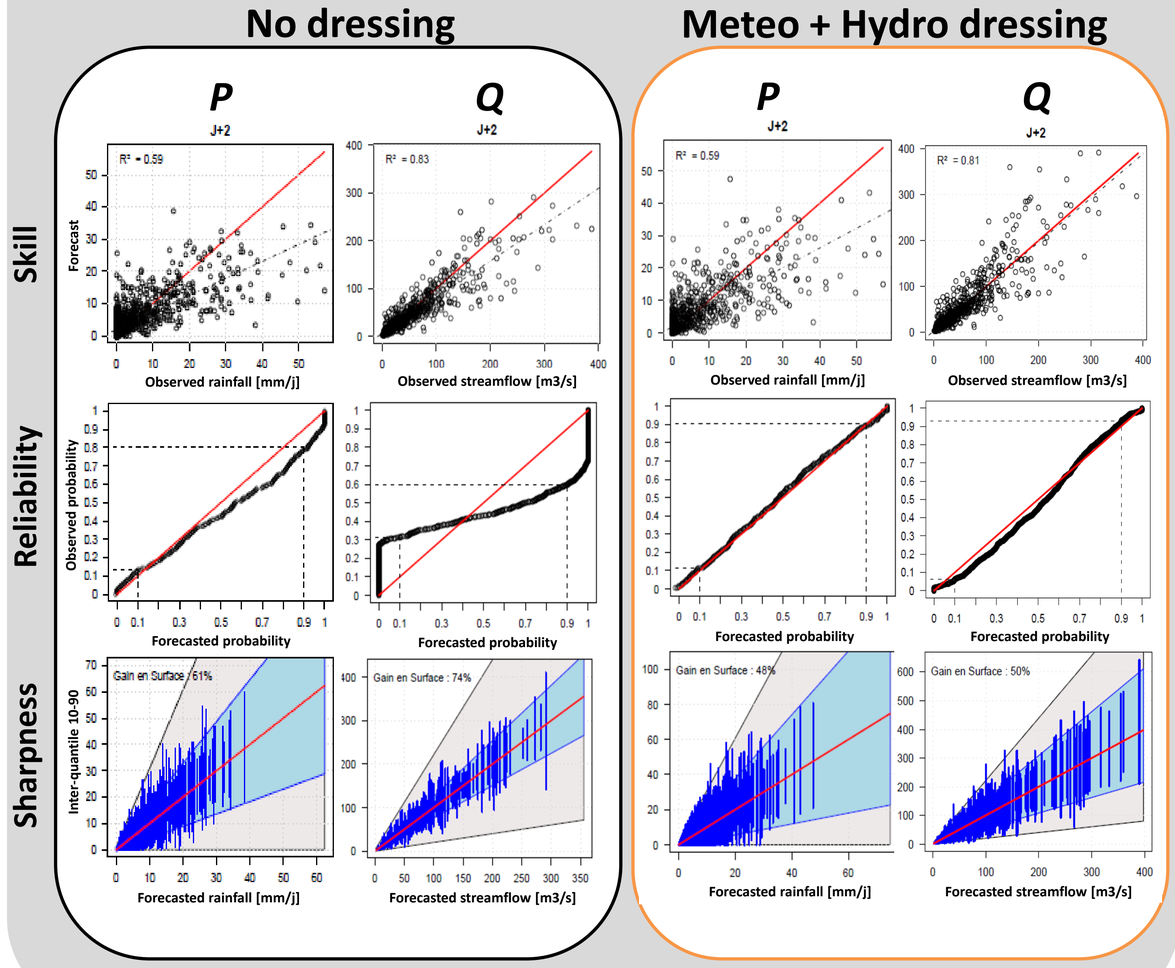
1. Raw ensemble forecasts generally suffer from under-dispersion
2. Ensemble forecasts dressing/post-processing is then necessary to ensure a good reliability



Rainfall ensemble $P_{MIX} = k.P_{ECMWF}[i].\left[\frac{P_{ANALOG}[j]}{\overline{P_{ANALOG}}}\right]^{\alpha}$

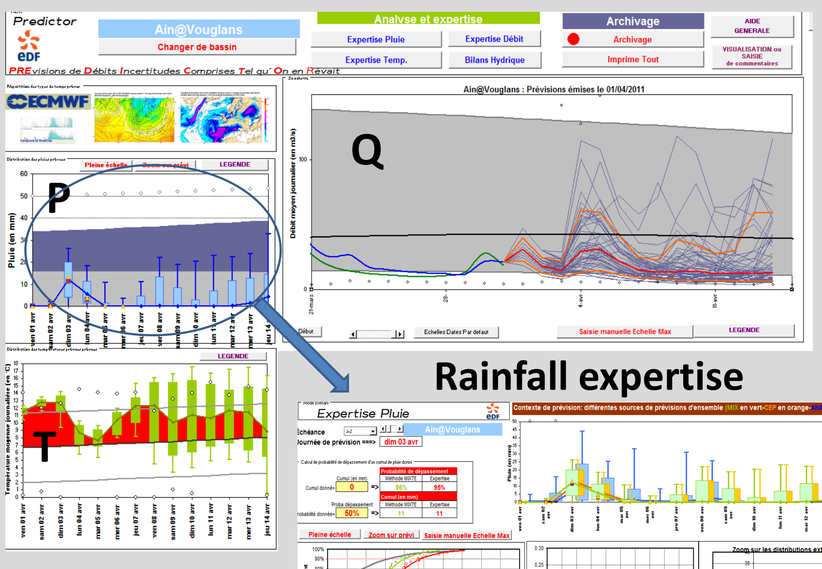
Streamflow ensemble $\overline{\overline{Q}} = \overline{Q} * EXP\left(N\left(\mu\left(\overline{Q}, dT\right), \sigma\left(\overline{Q}, dT\right)\right)\right)$

ENSEMBLE VERIFICATION



EXPERTISED FORECASTING SYSTEM

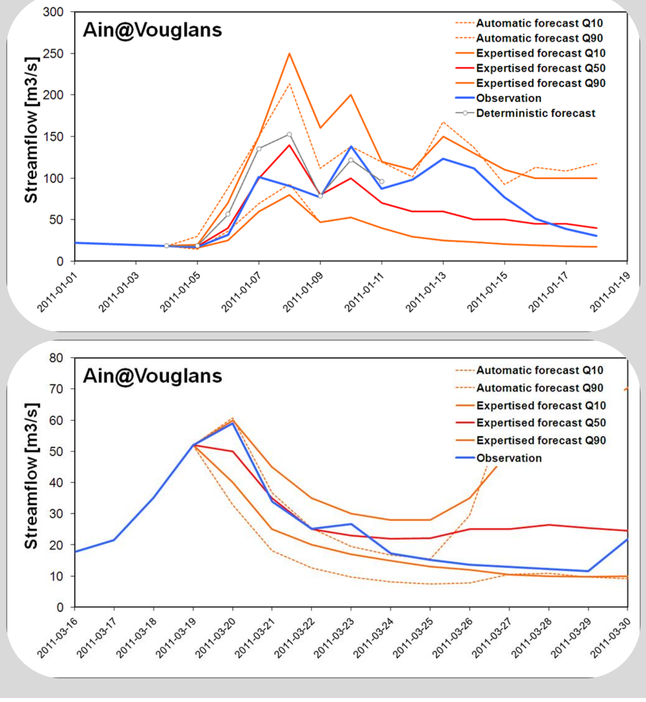
Forecasters interface



Forecasters may change the ensemble distributions, for rainfall/temperature and streamflow.

REAL FORECASTS

- ❑ The ensemble forecast system is operational since 2010-12-01
- ❑ About 400 expertised ensemble forecasts have been produced on about 15 french catchments



PERSPECTIVES

After few months of pre-operational use in the EDF hydro-meteorological centers, the semi-automatic ensemble forecasting chain shows fairly good performances. Next actions concern both:

1. The evaluation of ensemble forecasts performances on a larger set of watersheds (~30 watersheds)
2. Some methodological improvements to optimize the skill and the sharpness of the streamflow forecasts.
3. The forecasters training to develop their own expertise on probabilistic forecasts and better communicate their uncertainties.

REFERENCES

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