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Forecasting the weather
- ensemble techniques
in probabilistic weather prediction

Improvement of meteorological and hydrological probabilistic monthly forecasts over France with an analog method

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Optimal operation of hydro-power plants requires accurate forecasts of precipitation and temperature which are then integrated into hydrological models to forecast river flows and water volumes in reservoirs. Precipitation is a difficult parameter to forecast, especially at long lead times (monthly and over), one of the reasons being the too coarse resolution of numerical weather prediction systems. In a previous study, we adapted EDF's analog method to ECMWF's monthly forecasts of precipitation over 9 basins in France. The analog method is simply based on the influence of large scale circulation (represented here by the geopotential at 700 and 1000 hPa over North Atlantic and Europe) on local meteorological parameters. We highlighted an overall improvement of analog precipitation ensemble forecasts compared to raw forecasts and climatology. The prediction skill is mostly pronounced for extreme events (low and heavy precipitations) for a four weeks lead time.

This study looks at the possibility of using these forecasts further ahead. First it extends the previous study to fifty watersheds over France and re-evaluates the skill of the precipitation probabilistic forecasts. Then, these precipitations forecasts are used to generate hydrological probabilistic forecasts using the MORDOR model developed at EDF. Performance analysis of hydrological forecasts are then conducted along three axis : influence of lead time, of basin type (mountain/plain watersheds and size) and of large scale circulation (weather regimes).

If the analog method significantly improves the performance of meteorological and hydrological monthly forecasts, they will be used to improve operational water resource management and decision making.