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The improvement of a forecasting system and the evaluation of the quality of its forecasts are recurrent steps in operational practice. However, the evaluation of forecast value or forecast usefulness for better decision-making is, to our knowledge, less frequent, even if it might be essential in many sectors such as hydropower and flood warning. In the hydropower sector, forecast value can be quantified by the economic gain obtained with the optimization of operations or reservoir management rules. Several hydropower operational systems use medium-range forecasts (up to 7-10 days ahead) and energy price predictions to optimize hydropower production. Hence, the operation of hydropower systems, including the management of water in reservoirs, is impacted by weather, climate and hydrologic variability as well as extreme events. In order to assess how the quality of hydrometeorological forecasts impact operations, it is essential to first understand if and how operations and management rules are sensitive to input predictions of different quality.
This study investigates how 7-day ahead deterministic and ensemble streamflow forecasts of different quality might impact the economic gains of energy production. It is based on a research model developed by Irstea and EDF to investigate issues relevant to the links between quality and value of forecasts in the optimisation of energy production at the short range. Based on streamflow forecasts and pre-defined management constraints, the model defines the best hours (i.e. the hours with high energy prices) to produce electricity. To highlight the link between forecasts quality and their economic value, we built several synthetic ensemble forecasts based on observed streamflow time series. These inputs are generated in a controlled environment in order to obtain forecasts of different quality in terms of accuracy and reliability. These forecasts are used to assess the sensitivity of the decision model to forecast quality. Relationships between forecast quality and economic value are discussed.
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