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Communicating uncertainty in hydrological forecasts: mission impossible?

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Cascading uncertainty in meteo-hydrological modelling chains for forecasting and integrated flood risk assessment is an essential step to improve the quality of hydrological forecasts. Although the best methodology to quantify the total predictive uncertainty in hydrology is still debated, there is a common agreement that one must avoid uncertainty misrepresentation and miscommunication, as well as misinterpretation of information by users. Several recent studies point out that uncertainty, when properly explained and defined, is no longer unwelcome among emergence response organizations, users of flood risk information and the general public. However, efficient communication of uncertain hydro-meteorological forecasts is far from being a resolved issue.

This study focuses on the interpretation and communication of uncertain hydrological forecasts based on (uncertain) meteorological forecasts and (uncertain) rainfall-runoff modelling approaches to decision-makers such as operational hydrologists and water managers in charge of flood warning and scenario-based reservoir operation. An overview of the typical flow of uncertainties and risk-based decisions in hydrological forecasting systems is presented. The challenges related to the extraction of meaningful information from probabilistic forecasts and the test of its usefulness in assisting operational flood forecasting are illustrated with the help of two case-studies: 1) a study on the use and communication of probabilistic flood forecasting within the European Flood Alert System; 2) a case-study on the use of probabilistic forecasts by operational forecasters from the hydroelectricity company EDF in France.

These examples show that attention must be paid to initiatives that promote or reinforce the active participation of expert forecasters in the forecasting chain. The practice of face-to-face forecast briefings, focusing on sharing how forecasters interpret, describe and perceive the model output forecasted scenarios, is essential. We believe that the efficient communication of uncertainty in hydro-meteorological forecasts is not a mission impossible. Questions remaining unanswered in probabilistic hydrological forecasting should not neutralize the goal of such a mission, and the suspense kept should instead act as a catalyst for overcoming the remaining challenges.