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Forecaster priorities for improving probabilistic flood forecasts

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Hydrological ensemble prediction systems (HEPS) have in recent years been increasingly used for the operational forecasting of floods by European hydrometeorological agencies. The most obvious advantage of HEPS is that more of the uncertainty in the modelling system can be assessed. In addition, ensemble prediction systems generally have better skill than deterministic systems both in the terms of the mean forecast performance and the potential forecasting of extreme events. Research efforts have so far mostly been devoted to the improvement of the physical and technical aspects of the model systems, such as increased resolution in time and space and better description of physical processes. Developments like these are certainly needed; however, in this paper we argue that there are other areas of HEPS that need urgent attention. This was also the result from a group exercise and a survey conducted to operational forecasters within the European Flood Awareness System (EFAS) to identify the top priorities of improvement regarding their own system. They turned out to span a range of areas, the most popular being to include verification of an assessment of past forecast performance, a multi-model approach for hydrological modelling, to increase the forecast skill on the medium range (>3 days) and more focus on education and training on the interpretation of forecasts. In light of limited resources, we suggest a simple model to classify the identified priorities in terms of their cost and complexity to decide in which order to tackle them. This model is then used to create an action plan of short-, medium- and long-term research priorities with the ultimate goal of an optimal improvement of EFAS in particular and to spur the development of operational HEPS in general.