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Operational Ensemble River Forecasting in the United States and Australia: Practices and Challenges

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Operational river forecasts have been long produced to support water resources management in the United States and Australia. These forecasts cover a range of timescales from flash flooding (e.g. minutes to hours ahead) to seasonal (e.g. months ahead) and are generated by a range of statistical (e.g. regression-based) and dynamical (e.g. rainfall-runoff) model based techniques. Forecast uncertainty is commonly estimated operationally by using an ensemble of future precipitation scenarios and/or a measure of historical model error. Retrospective ensemble forecasting and the use of reforecasts for bias-adjustment and post-processing have become popular research topics and a few successful demonstration projects exist in both countries. Practical methods of post-processing, such as ensemble dressing, have been used to improve the probabilistic reliability of forecasts. The translation of predictions of probability distributions of streamflow into temporally and spatially consistent ensemble hydrographs remains an area for further development. However, probabilistic forecast communication and use remains a stumbling block for many. Furthermore, ensemble generation and post-processing typically require completely automated systems, making it difficult for humans to contribute their expertise to the forecasting process. This talk draws on ten years of experience as an operational forecaster with the US Department of Agriculture and as a developer of short-term flood forecasting systems to support the Australian Bureau of Meteorology.