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Improving medium-range ensemble streamflow forecasts through statistical post-processing

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Probabilistic hydrologic forecasts are a powerful source of information for decision-making in water resources operations. A common approach is the hydrologic model-based generation of streamflow forecast ensembles, which can be implemented to account for different sources of uncertainties – e.g., from initial hydrologic conditions (IHCs), weather forecasts, and hydrologic model structure and parameters. In practice, hydrologic ensemble forecasts typically have biases and spread errors stemming from errors in the aforementioned elements, resulting in a degradation of probabilistic properties. In this work, we compare several statistical post-processing techniques applied to medium-range ensemble streamflow forecasts obtained with the System for Hydromet Applications, Research and Prediction (SHARP). SHARP is a fully automated prediction system for the assessment and demonstration of short-term to seasonal streamflow forecasting applications, developed by the National Center for Atmospheric Research, University of Washington, U.S. Army Corps of Engineers, and U.S. Bureau of Reclamation. The suite of post-processing techniques includes linear blending, quantile mapping, extended logistic regression, quantile regression, ensemble analogs, and the generalized linear model post-processor (GLMPP). We assess and compare these techniques using multi-year hindcasts in several river basins in the western US. This presentation discusses preliminary findings about the effectiveness of the techniques for improving probabilistic skill, reliability, discrimination, sharpness and resolution.