Statistical post processing of streamflow ensembles to improve reliability over a wide range of time scale

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Streamflow forecasts are subject to atmospheric and hydrologic uncertainties, the latter of which come from errors in the model initial conditions, parameters and structures, and from anthropogenic control such as irrigation and flow regulation. For implementation in operational hydrologic ensemble prediction, NWS has been developing statistical post processing techniques that account for these hydrologic uncertainties. The existing operational technique, referred to as the ensemble post processor, is a combination of probability matching and recursive regression. Its performance, in terms of reliability and resolution, has been demonstrated for short-term forecasts.

In order to produce reliable streamflow ensembles over a wide range of temporal scales of aggregation, ranging from hourly to annual, however, ensemble post processing must be able to account for the scaling properties of the observed flow in the post-processed ensembles. In this poster, we describe the ensemble post-processing framework for the EXperimental Ensemble Forecast System (XEFS) under development for operational implementation in NWS, and present preliminary results for scaling of post-processed streamflow ensembles via multi-scale probability matching. The technique is an attempt at approximately preserving complex temporal correlation structure in observed flow by successively applying probability matching at multiple temporal scales of aggregation. Also described in the poster are the key science issues associated with the proposed technique and the ensemble post processor as a whole.