

Interactive comment on “An intercomparison of approaches for improving predictability in operational seasonal streamflow forecasting” by Pablo A. Mendoza et al.

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This is an interesting and well written comprehensive evaluation of over a dozen statistical, dynamical and hybrid seasonal streamflow forecasting techniques. The evaluation is done for about 20 years of 5 reservoirs in mostly snow-dominated climates of the Pacific Northwest US. My suggestions for changes are minor at best, with detailed comments below:

Title: I don't think "predictability" is the right word for the title. It implies something that's immutable and intrinsic, in the sense of theoretical maximum predictability, which is not something that could be "improved". Predictive skill of certain techniques or a forecasting enterprise can be improved, however.

C1

Line 57 "current operational practice in the US still takes little to no advantage of large-scale climate information for realtime seasonal streamflow forecasting" and later line 64-65 "these [operational] approaches rely solely on the predictability of [initial hydrologic conditions] and do not leverage any type of large-scale current or future climate information". From my experience as a forecaster, there were only very limited locations and leadtimes where the climate information provided substantial benefits. Things like El Nino indices were used in pacific northwest and southwest US for early (i.e. January) and pre-season (i.e. October-December) forecasts. I think it's strong to say that there was no use at all of climate information.

Line 89 Following the list of statistical water supply forecasting techniques. It may be useful to include in that list <http://onlinelibrary.wiley.com/doi/10.1111/j.1752-1688.2009.00321.x/abstract> because it also includes z-score regression and describes operational products.

Line 172 The universal use of the log transform on all the predictands. Operationally, forecasters use linear, square root, cube root and log transform statistical models, with log being the most extreme. The use of log everywhere wouldn't have been my first choice, and is probably responsible for "forecast blowouts" like 1993 in the Apr-1 / e panel on figure 11 (far lower right corner, only the lower whisker is visible on the chart). But since it's applied the same everywhere, it means that the intercomparison is valid in a relative rather than absolute sense. You might reassure the reader that you tried other transforms and the results were insensitive.

Line 261 The use of stepwise approach to model building. I think what you're describing here is the case where El Nino is predicting fall precipitation, and by the time January 1 comes around the precipitation is "in the bank" and so continued use of El Nino as a seasonal streamflow predictor after January 1 is redundant, if the equation also includes IHC variables. This was a common operational challenge in the US and a frustration to forecasters.

C2

Line 379 I think you find that El Nino provides a small amount of predictability in October-December and by 1 January comes, initial hydrologic conditions are comparable to El Nino skill, but then by 1 February and later, IHC are heavily dominant. This is consistent with <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.177.3158&rep=rep1&type=pdf> https://scholar.google.com.au/citations?view_op=view_citation&hl=en&user=5hdY14AAAAA

For many years 1 February was the start of the operational forecasting season and so there is little surprise that hydrologists were underwhelmed with what El Nino had to offer them. It wasn't until leadtimes were pushed back to 1 January, and then back to 1 October that hydrologists became more operationally interested.

Line 410 On explanations of why ESP is under-dispersive- The common way of explaining this is that NWS-style ESP does not consider parameter, data or model uncertainty, only uncertainty of future forcings.

Line 477 Generating custom climate indices beyond El Nino, creates useful information. I feel like this contradicts the statements on lines 383-385 where you say that this technique was the worst performer.

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