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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Technical Note: Combining Quantile Forecasts and Predictive Distributions of Stream-flows" *by* Konrad Bogner et al.

Anonymous Referee #1

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Forecast combination is an important and topical problem. In this light, the paper is a welcome hydrologic case study.

However, I was unable to appreciate the technical details, and couldn't follow the comparison between Bayesian Model Averaging (BMA), Nonhomogeneous Gaussian Regression (NGR/EMOS) and the Beta transformed Linear Pool (BLP), for the following reasons.

1. Combination methods

BMA and NGR/EMOS convert a set of M point forecasts, say k_1, ..., k_M into a single, combined predictive distribution. In the case of BMA, the combined predictive

distribution is a mixture distribution, in the case of NGR/EMOS it is a single Gaussian distribution.

In contrast, BLP converts a set of predictive distributions, say F_1, ..., F_M, into a single, combined predictive distribution.

As I understand Section 3, the authors produce a set of M = 7 predictive distributions (six postprocessed ones, and the raw COSMO-LEPS ensemble), say F_1, ..., F_7. This clearly fits the BLP framework, except that I do not understand how the quantile forecasts were converted into predictive distributions. How was this done?

And how was BMA and NGR/EMOS applied? As noted, BMA and NGR/EMOS require point forecasts as input. So did you reduce the predictive distributions F_1, .., F_7 to point forecasts, e.g., by computing their respective means k_1, ..., k_7, before applying BMA and NGR/EMOS? Is this what you did? If so, how did you proceed in the quantile case? If not, what else was done?

How are the BMA kernel distributions specified? Which distribution family do they belong to? Normal, Gamma?

2. Combination weights

Figure 1 shows "[h]ourly weights" for BMA, BLP and NGR. On the left-hand side, what period of time is represented by the horizontal axis? On the right-hand side, combination weights are plotted in their dependence on the "probability level". This I don't understand; perhaps "quantile level" is meant, but even then neither BMA nor NGR/EMOS nor BLP have weights that vary with a quantile level. What is shown here?

3. Suggested reorganization

Moving (thoroughly edited and expanded versions of) the first two paragraphs in the "Results" section to the beginning of the "Methods" section would make the "Methods" section, and the paper as a whole, easier to understand. Please use the set of predicitive distributions F_1, ..., F_7 as a starting point, and then explain how these

distributions serve as inputs to BMA, NGR/EMOS, and BLP.

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