

Interactive comment on “Bias correcting precipitation forecasts to improve the skill of seasonal streamflow forecasts” by Louise Crochemore et al.

Anonymous Referee #3

Received and published: 1 April 2016

This paper deals with an interesting topic, the effect of bias corrections on the quality of seasonal streamflow forecasts. It is mostly well written and the overall structure of the paper is good. However, I found the following issues that need revision before I could recommend the paper to be published.

Main points:

1) My most important point is that the paper is too long. I suggest to set a hard (!) reduction requirement of at least 25% (number of words). It is up to authors to decide which parts they remove or shorten. Just a few suggestions from my side: discuss fewer bias correction methods, remove almost completely page 13 line 3 – page 14 line 7, remove third and fourth sentence of section 3.2.1.

2) In the paper sharpness is discussed with the assumption that quality increases with sharpness. Mason and Stephenson (2008) write that “in the extreme case of no predictability, the forecast probability should always be equal to the climatological probability”. So, forecasts can be too sharp, which should be a conclusion from e.g. Figure 2, where sharpness for longer lead times is larger than that of the reference. So, the sharpness results and conclusions should be reconsidered.

3) A better (and longer) introduction to PIT diagrams is needed. Since these diagrams are not well explained in the paper, I was not able to understand the PIT results. I suggest at least to write much more clearly how these diagrams are constructed, to show a figure like Figure 2 from Laio and Tamea, to clarify what PIT values (vertical axis of figures in paper) are and to add a text to the horizontal axis of the PIT diagrams displayed in the paper. How does the area in the diagrams measure reliability? Is the area also sensitive to bias? Is that acceptable? In Section 3.3.1. the text mentions “concentration of points” but only lines are shown in the diagrams. So, what do you mean by “concentration of points”?

4) PIT area, MAE and CRPS are all sensitive to bias, as far as I can see. This should be mentioned in Sections 3 and 7 and discussed in Section 7.

5) Section 2.2 mentions that observations are used to initialize streamflow. What about the initialization of snow and soil moisture? These form important contributions to predictability.

6) Sections 3.2.1. and 3.2.2. about the bias correction methods need references. EDM and GDM seem to be have strange effects: a specific amount of daily precipitation is corrected differently for different years, depending on the monthly amount of precipitation. What is the motivation to possibly employ these two methods? Perhaps some of the investigated methods should not be considered at all, see point 1 about shortening the paper. I found LS-m and EDMD-m the most interesting methods.

Minor points:

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page 1, line 16: “contributes” instead of “contribute”.

page 2, line 7: “widespread use of” instead of “the widespread of”

page 2, line 21: remove “rather than by initial conditions”

page 3, line 13: “varied between” instead of “derived from”

The hydrological model also needs temperature as input to compute potential evapo-transpiration. Write clearly how this input is constructed.

page 3, line 18: add “heavily” before “influenced”

page 3, line 23: replace “interannual” by “long-term mean”. Over which years? On a monthly basis? Also for hindcasts?

page 3, section 2.2: motivate why the focus is solely on the influence of precipitation input .

page 6, section 3.3: So, do the evaluations for lead week 1 for the winter include all the hindcasts made on December 1, January 1 and February 1? These are then 15 members issued in December and January and 52 members issued in February. How do you deal with this inequality? And do the evaluations for lead week 6 for the winter include all the hindcasts made on November 1, December 1 and January 1? Explain this clearly.

page 7, line 8: “coinciding with” instead of “superposed with”

page 7, line 24: “Ranked” instead of “Rank”

page 8, line 6: What is the observation period?

page 8, line 14: From which period are the observations?

page 8, line 23: “caused” instead of “brought”

page 8, line 28: “becomes negative”. What is done if there is more than one transition

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from a positive to a negative score?

page 9, line 28: “this is observed in the majority of catchments”. This does not seem to be the case. There is roughly an equal number of curves below and above zero.

page 13, figure 6: I would expect no bias at all in the lower right and left panel. What is the cause of these biases? Are the remaining biases caused by the one-year-leave-out method? If so, I would expect them to vary randomly around zero.

page 13, line 13: “in the easternmost part” instead of “at the most eastern part”

page 14, line 30: add “cumulative” before “probability”

page 17, figure 8: “Fraction of catchments” instead of “Number of catchments”

page 18, last line: As far as I can see the CRPS is not lower after bias correction.

page 19, line 3: replace “in regards to” by “with respect to”

I recommend to combine figure 2 with figure 10 into one figure, and figures 3 with figure 11 into one figure, etc. The reader now has to turn over pages to compare the figures.

Figure 15: how are seasons represented?

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