

Interactive comment on “On the sources of global land surface hydrologic predictability” by S. Shukla et al.

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This article is an important and interesting study on the relative contribution of initial hydrologic conditions and seasonal climate forecast skill for global seasonal hydrologic prediction. The overall article is well written and comprehensive. So, I suggest minor revisions for this paper.

General comments. 1. This truly interesting article give primary information for global seasonal hydrologic forecasting : the sources of predictability of such forecast. Indeed, I think that before doing seasonal hydrologic forecast, the first step is to know the sources of predictability at seasonal scale. So, the authors use the ESP and reverse-ESP method. These methods are well explained in the manuscript.

C1469

Response: Thank you!

2. In sect.3, I think that it would be more appreciated if results about soil moisture and snow equivalent could be shown before results about cumulated runoff (as soil moisture and snow equivalent influence cumulated runoff).

Response: We have moved the figures for soil moisture and SWE before the figure for CR.

3. Finally, be careful please when you generalize northern and southern hemisphere. For example, p. 1995, from line 15 to 20 when you say : “ This contrast between hemispheres and forecast periods [: :] January to March are the highest precipitation months for most parts of the Southern Hemisphere and [: :] forecast period starting in July the high precipitation period for many region in the Northern Hemisphere. There are some regions [: :] noteworthy exceptions: : :”. It could be more appropriated to separate high latitude, mid latitudes, tropical and equatorial regions?

Response: Agreed! In response to the reviewer’s comments (and also reviewer #1 and reviewer #3) we have now removed those generalizations and tried to be more specific. We have also included figures showing the general pattern of the role of the IHCs and climate forecast skill over Koppen climate region as per the reviewer #1’s suggestion.

Specific comments.

4. In sect. 2.3, when you describe score, can you precise that is a deterministic score with calculation on the ensemble mean? And say one or two thing about other interesting score that can be used for seasonal hydrologic forecast (e.g. time correlation?)

Response: We in fact estimated RMSE for each experiment by first calculating squared error for each ensemble members and then estimating the square root of the mean squared error. We didn’t use the ensembles mean. We have added a sentence to that affect and also mention briefly other scores that could have been used for this analysis.

5. Could you add, please, some information about the first perspectives of this study?

C1470

the use of statistic or dynamic model, multi-model depending on the source of predictability for example?

Response: We are not sure if the reviewer is referring to climate models or hydrologic models. However we have now included a sentence stating frameworks to improve estimates of the IHCs that use a combination of hydrologic models.

Technical comments.

6. P1989-line 7. A small c for change instead of "climate Change".

Response: Corrected.

7. P1990-line 18. "More recently, Koster et al. (2010) and Mahanama et al. (2011) used a suite of hydrologic models .." What are the main conclusions of these studies? Could you say a little more?

Response: We have included a sentence stating the primary conclusions of those studies.

8. P1995. Line 1. Could you add an equation for Kappa?

Response: Added!

9. P1997_line 6. Do you mean fig. 2a?

Response: Corrected!

10. P1998- line 20. Do you mean fig.3a?

Response: Corrected!

11. P1998-line 24. Do you mean fig.2a?

Response: Corrected!

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