Response to Interactive discussion

Hydrology and Earth System Sciences (HESS)

Title: Assessment of Precipitation Error Propagation in Multi-Model Global Water Resources Reanalysis

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We would like to thank Reviewer for his insightful discussion and constructive suggestions. Below we provide a point-by-point response to his comments. Reviewer's comments are in red and our responses in black font.

The manuscript examines propagation of uncertainties in precipitation forcing (from satellite and reanalysis) and in land surface models into simulation of hydrological variables, specifically, surface runoff, subsurface runoff, and evapotranspiration. The study was conducted in the Iberian Peninsula. The importance of this ″ study is in presenting the large uncertainties exist in both precipitation and models, which induce substantial uncertainties in hydrological simulation. In accordance to previous studies, it is shown in this work that precipitation uncertainties have the largest role in prediction uncertainties, but the authors also show that there is a substantial uncertainties originate from the model itself. This finding is important to be emphasized and to take into account in hydrological simulations.

I have few suggestions for improvement:

1) I suggest adding a table comparing the different precipitation and reanalysis products, as was done for the land surface models. Such a table should include information about the resolution, and what data sets were used.

In the revised paper we will provide a new table describing the different precipitation products with necessary related information such as resolution, references etc.

2) Sensitivity to product resolution: the different forcing products have different resolution, which one could expect to affect the simulation results. It would be good to separate between the uncertainty related to the product itself and the one related to its resolution, which may too coarse for example for representing a given process. I suggest the authors to refer to this aspect.

In the revised paper we will clarify this issue. We would like to note that all precipitation forcing data were at 0.25 deg spatial resolution and 3-hourly temporal resolution.

3) There is almost no discussion of the role of the specific conditions in the Iberian Peninsula and their relations with the findings. For example, it can be expected that surface runoff

sensitivity to precipitation uncertainties would be different in arid/semi-arid region compared to mode humid areas. Since the study area includes a gradient of conditions, it would be good to compare the different indexes among regions and possibly discuss this issue in Section 5.

Very good comment. This aspect will be clarified in the revised manuscript.

4) What are the sources for additional data required for the models such as soil types, groundwater table, others?

In the revised paper we will include details about additional data required for the models.

Technical comments (typo errors and other):

P. 6 L. 4: "land" and "Land"

Thank you. It will be corrected in the revised manuscript.

P. 6 L. 10: "from" instead of "form"

Thank you. It will be corrected in the revised manuscript.

P. 7 L. 11: "3-hourly"

Thank you. It will be corrected in the revised manuscript.

P. 8 L. 11-12: ". . . the water flux reaching the surface exceeds the maximum infiltration rate of the soil". I believe the authors mean here the "final" infiltration, which is actually a minimum, but not the maximal infiltration.

Thank you. This sentence will be updated and modified in the revised manuscript to clarify this issue.

P. 9 L. 11: Please explain "Dunne runoff"

In the revised paper we will explain about Dunne runoff that would clarify this issue.

P. 10 L. 6: "a" is missing P. 13 Eq. 7: index i seems to be missing; why representing

range by max – min and not std? why not using "y" for reference?

Thank you. In the revised paper Eq. 7 will be updated based on reviewer's suggestion.

The maximum and minimum of ensemble values at each time step, indicate a comprehensive measurement (full coverage) of the expected prediction intervals relative to the reference value. Therefore, we chose ensemble range (Xmax – Xmin), instead of standard deviation.

P. 13 L. 10: please check, it is not clear

In the revised paper we will clarify.