Hydrology and Earth System Sciences Discussions

Interactive comment on "Impact of precipitation and land biophysical variables on the simulated discharge of European and Mediterranean rivers" *by* C. Szczypta et al.

Anonymous Referee #3

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Summary

The manuscript presents an analysis of the impact of precipitation inputs and representation of evapotranspiration in the LSM ISBA in simulating river discharge in European and Mediterranean basins. The authors found that biases in precipitation (from ECMWF ERA-Interim) have an important and detrimental effect on river discharge simulations, that can be partially corrected using observation based datatsets (GPCP and/or GPCC). The representation of biophysical variables in ISBA, including carbon fluxes, Lead Area Index and their interaction with evapotranpiration can improve river

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discharge, but the authors highlight the importance of correct LAI estimates. There is also a comprehensive set of processes/parameterizations that are suggested to be tested (e.g. multi-layer soil). The overall motivation of the work is scientifically sound; the manuscript is well organized, written and documented. This is a good example of the integration between a LSM and hydrology components that has a broad interest to the community. Therefore I recommend the manuscript to be accepted after some minor comments (see below) have been addressed by the authors.

Comments:

1) p5442L28: "Also, ERA-I-R precipitation correlated much better with the SAFRAN precipitation on a 3-hourly basis than ERA-I". This sentence suggests that the rescaling applied to ERAI-I-R by Balsamo et al. (2010), changes the 3-hourly partition of precipitation. However, the rescaling used to generate ERAI-R only corrected the monthly mean, keeping the 3-hourly distribution the same as in ERA-I. Please clarify this statement.

2) P5443Eq.1: The ratio "P_GPCC/P_ERA-I " in eq. 1 applied as a multiplicative correction factor can have very large/small values in arid/ semi-arid regions and/or during the dry seasons, especially when P_ERA-I is very small. Was this ratio limited to some interval? or other method applied ?

3) P5446L5: "The TRIP hydrological model" , it would be more appropriate "The TRIP river routing model". How was TRIP configured? River parameters, ground water delay, etc ? Same as in Decharme et al. (2010) ? In Decharme et al. (2010), they used TRIP with a 1x1 resolution. In the present work, the routing was at 0.5x0.5 resolution, was it necessary to perform some calibration to the model parameters?

4) P5448: "scales monthly anomalies" in equation 3 could be named as "z-score" that is used often.

5)P5449L11:It is not clear how the scores are calculated, using daily, monthly or mov-

ing window of three months. Please clarify.

6) P5449: Section 3.1:

a)The r2 was applied to the full precipitation, and part of the signal can came from the mean annual cycle. I would suggest replacing or adding a new panel of the r2 calculated over the anomalies, i.e. removing the mean annual cycle in the datasets prior to the correlation calculation.

b) Some of the regions with low r2 also have a low station cover in GPCC (Figure 1) (e.g. close to the caspian sea), this point should be highlighted, since in those areas GPCC estimates have a large uncertainty.

7) P5450: section 3.2, discussion of figure 4. This is a very interesting way of displaying the results. However, the authors should highlight that each of the scores are not completely independent. Looking at Figure 2 there are river basins with several observations stations along the main stem, some of them very close, in this situation, the Eff in those stations can be very similar. If the authors would only select 1 station per basin (for example the stations closer to the river mouth) the distributions would still be the same?

8) Better representation of the ISBA-TRIP, section 4.3.3. The authors suggest that the treatment of soil hydrology with a multi-layer approach could improve the results. This seems to be already available in ISBA (Boone et al 2000; and Decharme et al. 2011). The same would be also for the snow pack representation, since there is also a multi-layer version in ISBA (Boone et al. 2001, J. Hydrometeor. 2, 374-394). This seems a bit strange, why in this study these options were not used already by default?