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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.

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3.1 [P. 5442, L. 28. "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 clar-

ify this statement.]

RESPONSE 3.1

The ERA-I rescaling is performed on a monthly basis using the GPCP (v2.1) precipitation. If the correlations of SAFRAN vs. ERA-I and SAFRAN vs. ERA-I-R were computed for a given month, the obtained correlation coefficient would be the same. In this study, the correlation is computed for a 18-yr period and for this reason, the correlation coefficient can be improved by the monthly bias correction.

3.2 [P. 5443, Eq. 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 ?]

RESPONSE 3.2

Indeed, in arid/semi-arid regions and/or during the dry seasons, the ERA-I (or ERA-I-R) monthly precipitation can be equal to zero. In this case, no correction is done and the corresponding ERA-I-G (or ERA-I-RG) 3-hourly precipitation remains equal to zero during the considered month, even if the corresponding GPCC monthly precipitation is not equal to zero.

3.3 [P. 5446, L. 5. "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?]

RESPONSE 3.3

Yes, "The TRIP river routing model" would be more appropriate.

No specific calibration of the TRIP model parameters at the 0.5degree grid cell reso-

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lution was performed in this study. The TRIP river parameters (slopes, river width and length and etc.) are provided at a spatial resolution of 0.5degree. They are the same as those described in Decharme et al. (2010) at a 1degree grid cell resolution. As in Decharme et al. (2010), a uniform groundwater time delay factor of 30 days is used.

3.4 [P. 5448. "scaled monthly anomalies" in equation 3 could be named as "z-score" that is used often.]

RESPONSE 3.4

Yes.

3.5 [P. 5449, L. 11. It is not clear how the scores are calculated, using daily, monthly or moving window of three months. Please clarify.]

RESPONSE 3.5

The seasonal monthly scores of the stations (see Figs. 8, 9, 10) are derived from daily values and determined using a moving window of three months (the previous and following months are included in the score calculation). The number of daily Q values used in the calculation of these scores varies from 1602 to 1656 (3 months x 18-yr). It must be noted that all the scores are based on daily values, except for RMSD, based on monthly anomaly values (Eq. (3)).

3.6 [P. 5449, Sect. 3.1. The r2 was applied to the full precipitation, and part of the signal can come 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.]

RESPONSE 3.6

Yes. This specific analysis will be performed.

3.7 [P. 5449, Sect. 3.1. 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,

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since in those areas GPCC estimates have a large uncertainty.]

RESPONSE 3.7

Yes. It will be emphasized that low r2 scores may reflect the lack of raingauge data in the GPCC product.

3.8 [P. 5450, 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?]

RESPONSE 3.8

Figures 4, 5 and 8 were produced (not shown) considering only one station per basin (closest to the river mouth), i.e. 56 stations (instead of 150). For Figures 4 and 5, exactly the same results as those presented in the original Figures were found. For Fig. 8, the differences between the ISBA versions were less marked but overall the same conclusions were obtained.

3.9 [Sect. 4.3.3. Better representation of the ISBA-TRIP. 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 multilayer 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?]

RESPONSE 3.9

Yes. Multilayer soil and snow models are available in the SURFEX platform. However, these models have to be implemented jointly, and in the context of large scale river

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discharge simulations, this configuration is still in the evaluation process.

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