

Interactive comment on “Investigating basin-scale water budget dynamics in 18 rivers across Tibetan Plateau through multiple datasets” by Wenbin Liu et al.

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Responses to review comments (Anonymous Referee 3)

Main points:

Tibetan Plateau is a typical data-sparse and high-altitude region. The basin-wide water and energy budgets over plateau are, so far, not well understood due to the lack of in situ observations of the land surface processes. In this manuscript, the authors investigated the general hydrological regime (e.g. seasonal cycle and trend) in 18 basins over plateau through the use of multi-source dataset. On one hand, the in

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situ data in plateau is extremely sparse. On the other hand, there are considerable global/regional datasets including observation-based, remote sensing retrievals, land surface model simulations and reanalysis/GCM outputs. It is thus a very interesting way to understand the general water budgets in the plateau through integrating the multiple datasets, although there are certain uncertainty inherits from various data. The topic fit well with the scope of HESS and the manuscript is overall well-written and organized.

I also found it is a resubmission. After going through the old version and the corresponding revisions/responses, I think the old manuscript has been significantly improved. The uncertainty is a challenge for multiple dataset based analysis; it usually cannot be easily investigated in the analysis due to the consistency of different datasets (for example, the TRMM and GRACE data are only available after 2000; they are thus difficult to incorporate in the main analysis during 1982-2011). However, the authors have carefully compared the obtained results with some of the existing observation-based studies and discussed the uncertainty issues in Section 3.4 (Table 3 and figure 12 and figure 13). I think it is reasonable. Overall, I do not find major problems with this manuscript and would recommend its publication after minor revision considering the issues rose below.

Many thanks for your invaluable comments/suggestions. Based on your suggestions, we have revised the manuscript accordingly (please see the point-to-point responses below).

Minor points: (1) How did you consider the water balance closure in your study?

In this study, we considered basin-scale water balance through the water balance equation ($P-Q-ET=D(s)$, P is observed precipitation, Q is observed streamflow at the basin outlet, ET is basin-wide evapotranspiration and $D(s)$ is water storage change). Because ET cannot directly be observed at the basin-scale, we defined $P-Q-D(s)$ as true ET at the basin scale based on water balance equation when $D(s)$ can be estimated

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from GRACE data. We further defined P-Q as biased ET when GRACE data is unavailable. We corrected biased ET by true ET using a water-balance based two-step procedure. The water balance closure is empirically considered during the process of bias-correction in ET calculation.

(2) Line 25: I suggest add “in situ” before “hydro-climatic” to make the sentence more clearly.

Added! Thanks.

(3) Line 26: “the seasonal cycles and trends. . .”

Done!

(4) Line 35-37: This sentence is not clear to me. How about change it for “. . .past 30 years, except for . . .Yalong River which were. . .East Asian Monsoon”?

We totally agree with you. In the new version, we have revised this sentence as follows (Line 35-37 in the revised manuscript), “Increased P, ET and Q were found in most TP basins during the past 30 years, except for the upper Yellow River basin and some sub-basins of Yalong River which were mainly affected by the weakening East Asian Monsoon”. Thanks.

(5) Line 56-57: “. . .and their responses to”.

Revised!

(6) Section 2.2.3. I think this paragraph is not useful.

We have removed Section 2.2.3 in the new version, Thank you.

(7) Line 346 and Line 348. I suggest unify the use of “ ” and “Ã” between two data throughout the manuscript.

We have unified them for “Ã” throughout the revised manuscript.

(8) Line 350: It should be Table 2?

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Yes, revised.

(9)Line 536: please delete “of glacier and”.

Deleted, thanks.

(10) Figure 10: it is difficult to find whether the trend of Q/P in Xining station is positive or negative.

The Sen's slope is 0 for Q/P in Xining. It means that the Q/P in Xining station is unchanged.

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