

Dear Dr. Roderick,

Thank you for this constructive review. Please find our responses below (**in bold**).

Best regards,

Wouter Berghuijs (on behalf of all authors)

This manuscript describes an initial evaluation of autocorrelation in catchment water balance components on a global basis.

The topic is highly suitable for the journal.

The manuscript is interesting, very well written and easy to follow.

I had very few substantive comments and the paper can be published more or less as is.

We appreciate this constructive review.

Line 53. I was pleased to see the caveat about inter-basin flows. I suspect this could be extended to land-ocean transfers as well. (If you are curious, google “wonky holes” and have a read. I have personally drunk fresh water over the side of a boat 50 km from land on the Great Barrier Reef. The local fisherman have known this for a long long time.)

In the revised manuscript, we will also mention land-ocean transfers. I was unaware of *wonky holes*, but they provide an excellent illustration of why land-ocean transfers should be mentioned.

Line 107. Typo? Should it be Sun et al 2018 (and not 2017) or is there another reference?

It indeed should be 2018. In the revised manuscript, we will correct this.

Line 114. Perhaps Thus py **roughly** expresses. Or “**approximately**” instead of roughly if you like but you need a qualifier here.

In the revised manuscript, we will add the qualifier “approximately”.

Figure 2e. Can you speculate on a likely physical explanation for the negative autocorrelation values, that occur in different climates, e.g. semi-arid South Western Australia, Botswana, bottom of South America, and in the cold parts of northern Russia and in other widely varying climates?

In the revised manuscript, we will speculate on the potential physical (and statistical) causes of this negative autocorrelation.

Figure 2eik. Focus on South Western Australia. You have autocorrelations as follows; -ve for rootzone (Fig 2e), -ve for evaporation (Fig 2i) and 0 for annual flow (Fig. 2k). Makes sense since in that region there is minimal streamflow and I would interpret this as a good plant growing year (enhanced evaporation) depletes rootzone moisture. But I could not imagine how that would work in northern Russia with the same spatial patterns as above. No change requested but I was intrigued. (I had personally imagined a study like this for years and am glad that it has now been done.)

In the revised manuscript, we will briefly discuss the potential causes.

Line 339. Typo? .. used **thus** far cause

We will correct this.