A point-by-point response to the reviews for "Reconstruction of global gridded monthly sectoral water withdrawals for 1971–2010 and analysis of their spatiotemporal patterns" by Zhongwei Huang et al

Manuscript Details: Reconstruction of global gridded monthly sectoral water withdrawals for 1971-2010 and analysis of their spatiotemporal patterns, https://doi.org/10.5194/hess-2017-551

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We thank the reviewer for the very valuable comments and suggestions to improve the manuscript. Our point-by-point responses are listed below.

Response to Anonymous Referee #1

Referee comments in Italics

In this study, the authors reconstructed the global water withdrawal patterns from collected data by statistical downscaling. The spatial and temporal patterns of water withdrawal, along with sectoral divisions were analyzed. This work is not trivial. Estimating water withdrawal in a small watershed and considering various sectors is hard enough, not to say at the global scale. As a result, I do not think readers should blame the simplifications taken here.

Response: We appreciate the positive and constructive feedback from the referee on our manuscript.

However, I do have a concern of the irrigation part. It seems that the observations used for calibration is very sparse, especially in developing countries. For example, in the two major countries with water withdrawal – China and India, only data from West Bengal and Beijing were used. The result might be very biased because of the spatial variability of climate, water resources, and population density. Considering that 68% of water withdrawal is used for irrigation, this might lead to large errors in the final result.

Response: We agree with the reviewer that irrigation is the largest water withdrawer and consumer of water globally and certainly in countries such as China and India. The mentioned example of using sparse data was specifically for the temporal downscaling of domestic water withdrawals, but not for irrigation. For irrigation, we used the gridded irrigation water withdrawal estimates from Global Hydrological Models (GHMs) as a base layer to spatially and temporally downscale the reported country-level irrigation data from FAO AQUASTAT and USGS. As for the domestic sector, we collected monthly domestic water withdrawal from various sources (Table 2) to guide the temporal downscaling of domestic water withdrawals. As the referee mentioned, in the two major countries with water withdrawal – China and India, only data from West Bengal and Beijing were used. Given that domestic water withdrawal is roughly 7% of total water withdrawal in India and 12% in China, we acknowledge that more data would help improve the temporal downscaling of domestic water withdrawals, and future work should focus on collecting high resolution water withdrawal data both spatially and temporally. In the revised version of our manuscript, we have discussed these aspects in detail.

Also in Table 2: The second column is a mixture of cities, counties and states. In addition, it is better to indicate which state the city is located as it is not uncommon for multiple cities to have the same name.

Response: Thanks for your kind comment. We have revised Table 2 as suggested.

In Table 3, did you calibrate the R value in Japan and Spain too, or you just adopted the value from literature?

Response: We adopted the R value in Japan and Spain from the literature because we don't have monthly water withdrawal data for these two countries. We have clarified this distinction in the revised manuscript.

Overall, the study is novel, the topic is suitable to HESS, and the manuscript is well written. I suggest a minor revision addressing my concerns mentioned above.

Response: Thanks to the referee for the positive feedback. We have revised our manuscript based on the suggestions and comments.