

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 #3

Referee comments in Italics

This manuscript aims to reconstruct a global monthly gridded (0.5 degree) sectoral water withdrawal dataset for six water use sectors (irrigation, domestic, electricity generation (cooling of thermal power plants), livestock, mining, and manufacturing) for the period 1971-2010. And the reconstructed gridded water withdrawal dataset is open access. This paper is suitable for the HESS scope and also a valuable contribution to examining issues related to water withdrawals at fine spatial, temporal and sectoral scales.

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

The spatial distribution of water withdrawal for electricity generation depends on the distribution of the power plants. Most of the power plants are not concentrated in densely populated area. However, in this paper, spatial downscaling of water withdrawal for electricity generation (water withdrawal for cooling of thermal power plants) is based on population density maps. It should be future explained and discussed.

Response: We agree that there are some limitations in the spatial downscaling of water withdrawal for electricity generation in this study, and future research should look into constructing a global database of power plants with details about their locations, construction year, fuel type, cooling technology, water source, generation capacity, capacity factor, etc. We have discussed this in details in the revised manuscript.

In this paper, the spatial downscaling of water withdrawal for water withdrawal of electricity generation, domestic, mining and manufacturing was based on the population density maps. According to the gridded population map of the world (Center for International Earth Science Information Network (CIESIN) Columbia University), there are no people in Taklimakan Desert, some “no man’s land” areas in Qinghai-Tibet Plateau, Sahara Desert. However, there are some water withdrawal of those sectors (please see Figure 5, 6, and 7). And in Figure S3, the dominant water withdrawal sector is manufacturing in Taklimakan Desert and some “no man’s land” areas in Qinghai-Tibet Plateau, and is domestic in Sahara Desert. Please check it.

Response: Thanks for your thoughtful comments. The gridded population maps we used for spatial downscaling are from HYDE during 1971-1989 and GPW during 1990-2010. Upon reassessing the two population products, we found that HYDE generally shows no population while GPW shows some population in these places (e.g., deserts and no-man lands). And since the results in Figure 5, 6 and 7 were all calculated based on the long-term annual mean value (1971-2010), the domestic, manufacturing, mining and electricity generations sectors which depend on population density will have water withdrawals in these “no-man” grids, but the withdrawals are very small. In the revised manuscript, grid cells with annual sectoral water withdrawal less than 0.01mm will be not taken into account when analyzing the spatiotemporal patterns, and related figures have been revised, and further discussion on the limitation in spatial downscaling techniques are also discussed.