Earth Syst. Sci. Data Discuss., referee comment RC1
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Comment on essd-2021-470 (Stefano Galelli)

Stefano Galelli (Referee)

Referee comment on "High-resolution water level and storage variation datasets for 338 reservoirs in China during 2010–2021" by Youjiang Shen et al., Earth Syst. Sci. Data Discuss., https://doi.org/10.5194/essd-2021-470-RC1, 2022

General comments

Manuscript essd-2021-470 describes a novel dataset providing water surface, level, and storage information for 338 reservoirs in China. In my opinion, this is a much-needed dataset that fills in an important gap, since data on water reservoirs are typically not available to the international community. I believe many studies and downstream applications will thus benefit from these data.

Overall, both manuscript and dataset are well organized, although a few important probably deserve more attention. In particular:

1. I am not entirely convinced about the approach used to estimate the hypsometric relationships, which, if I understand correctly, are based on water level and surface data estimated from satellite data. In general, water level data are rather reliable, while it is always a challenge to get the right water surface data (a matter that explains the use of image enhancing techniques), a problem that might affect the quality of the curves. So, why not using a DEM to get the right curves? This could be done for many reservoirs. Estimating the hypsometric relationships from a DEM would also limit the need for water surface data.

2. It looks like many reservoirs have a negative value of storage (Figure 7). What further confuses me is that the gauged data have also negative values. How do you explain this matter (for both estimated and gauged data)? Shouldn’t this problem be corrected? And wouldn’t a more precise hypsometric relationship help?

3. The quality of the presentation (including figures) could be enhanced. Please refer to

my comments below.

4. Are the water level and storage data retrieved from http://xxfb.mwr.cn/index.html available in the repository? Please correct me if I am wrong, but I couldn't find them. If that's true, I would encourage to authors to share those—it is not possible to download them from the aforementioned website.

Specific comments

- Line 60 ("It is obvious that …"). This sentence is not clear. Are you referring to China? If yes, I would state it clearly.

- Line 61-62. I suggest being more precise here. What are the reservoirs for which data are already available? Are the data public? And, importantly, what type of data are available?

- Line 74. What do you mean with "difficult to be accessed"? Can they be accessed?

- Line 64-85. Vu et al. (2022) has just released a water level, surface, and storage dataset for 10 reservoirs in the Lancang Basin, China, for the period 2008-2020. This dataset was created using satellite data and modelling techniques similar to the ones reported here, so this is why I'm mentioning that study. Please note I'm a co-author of that paper, so please feel free to discard my comment.

- Table 1 is very informative (and I would leave it as is); however, it somewhat mixes studies and datasets that have different geographical foci and intents (e.g., global v. regional). I would therefore suggest including another table specifically focussed on China. It will help readers understand what is currently available—and how this study complements the state-of-the-art.

- Line 111. "Testbed"?

- Line 112-113. This sentence is not clear.

- Figure 1. I suggest improving / re-drawing Figure 1. It's very hard to visualize the reservoirs (pink squares). Also, the colour-bar for the elevation is missing.

- Section 2.1. How about the Repeat cycle of SARAL/AltiKa?

- Equations (1) and (2). Which technique did you use to estimate the various corrections? Were these corrections applied uniformly to all reservoirs or were they site-specific?

- Line 178. I would say a few words about the algorithm developed by Zhao and Gao (2018). Also, is the code available?

- Line 179. What do you exactly mean with "reservoir shapefiles"?

- Line 180-186. I found this part to be not that clear.

- Line 190-203. I'm a bit confused by this approach: why not estimating the hypsometric relationships from the DEM? The SRTM mission, for instance, was carried out in 2000, so the SRTM-DEM could provide detailed hypsometric relationships for all reservoirs built after the year 2000.

- Line 2010-211 ("especially the regions where the reservoir storage are dynamic"). What does this mean?

- Line 231-239. I have nothing against qualitative assessments (and in fact think it's useful in this case), but I suggest being precise about how the letter grades were assigned. Ideally, the assessment should be reproducible.

- Figure 4. Please consider the option of using the same symbol (with different size or different colour) to provide information about RMSE. I found the combination of symbols and colours to be confusing.

- Figure 6. What do the different colours (red, blue) represent?

- Line 295. Do you mean Figure 6?

- Line 301. Do you mean Figure 7?

- Figure 7. Shouldn’t you correct for negative values?

- Section 3.3. The content of this sub-section does not qualify as Result (Section 3). Why not placing it in a stand-alone section? Perhaps, it could be moved to the repository.

- Line 390-394. Not clear.

References

Vu, D. T., Dang, T. D., Galelli, S., and Hossain, F.: Satellite observations reveal 13 years of reservoir filling strategies, operating rules, and hydrological alterations in the Upper Mekong River basin, Hydrol. Earth Syst. Sci., 26, 2345–2364, https://doi.org/10.5194/hess-26-2345-2022, 2022.