Reviewer #1 Comment on essd-2021-470 (Stefano Galelli)

Dear Stefano Galelli,

Thank you for your time and efforts in reviewing our manuscript. We are very happy to hear your positive feedback on our datasets which provide strong support for many aspects. We are very happy about the agreement that the presented data set is an important contribution to the large-scale studies that will take place in the context of increasing activity in the reservoir and dam sector and are pleased to be able to contribute with this data set. Please find attached point-to-point responses regarding your comments (marked in **purple**) and made corresponding changes in the main manuscript (in **red**). We hope that the improved manuscript can help the readers to better understand our study.

Kind regards.

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.

R1C0: Thank you for your positive comments identifying the strengths of our work.

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.

R1C2: Yes, you are correct! In this study, we constructed hypsometry curve (SWA-WSE curve) for each reservoir using satellite-based water level and surface water area datasets. We then apply this relationship to estimate WSE from SWA for periods when WSE is unavailable and inverse the function to estimate SWA from WSE for periods when SWA is unavailable. Using Eq.3, we calculated monthly reservoir water storage change (RWSC).

$$\Delta V_t = \frac{1}{2}(WSE_t - WSE_{t-1}) \times (SWA_t + SWA_{t-1}), \qquad (3)$$

Please note that we provided storage variation (i.e., RWSC), not storage. To ensure the accuracy of hypsometric curves, we strictly select water level-area data pairs, i.e., "The monthly WSE was estimated by directly averaging all measurements within each month. Attributed to the denser and more frequent records of SWA, we selected SWA values with contaminations ratio smaller than 5% for the construction of hypsometry curve for each reservoir." The data pairs were assumed to give five hypsometric relationships, among which the best one with highest R2 value is served as the hypsometry relationship of the reservoir. The derived RWSC results are evaluated against in-situ observations, based on our evaluations, favoring the success of the framework and our datasets. We give some references adopted the same methodology (i.e., constructing hypsometry relationships using satellite water level and area, then calculating RWSC) below.

References:

Gao, H., Birkett, C., and Lettenmaier, D. P.: Global monitoring of large reservoir storage from satellite remote sensing, Water Resour. Res., 48, W09504, doi: 10.1029/2012WR012063, 2012.

Bonnema, M., and Hossain, F.: Assessing the potential of the Surface Water and Ocean Topography Mission for reservoir monitoring in the Mekong River basin, Water Resour. Res., 55, 444–461, doi: 10.1029/2018WR023743, 2019.

Busker, T., de Roo, A., Gelati, E., Schwatke, C., Adamovic, M., Bisselink, B., Pekel, J.-F., and Cottam, A.: A global lake and reservoir volume analysis using a surface water dataset and satellite altimetry, Hydrol. Earth Syst. Sci., 23, 669–690, doi: 10.5194/hess-23-669-2019, 2019.

Zhong, R., Zhao, T., and Chen, X.: Hydrological model calibration for dammed basins using satellite altimetry information, Water Resour. Res., 56, e2020WR027442, doi: 10.1029/2020WR027442, 2020.

Zhang, S., Gao, H., and Naz, B. S.: Monitoring reservoir storage in South Asia from multisatellite remote sensing, Water Resour. Res., 50, 8927–8943, doi: 10.1002/2014WR015829, 2014.

Song, C., Huang, B., and Ke, L.: Modeling and analysis of lake water storage changes on the Tibetan Plateau using multi-mission satellite data, Remote Sens. Environ., 135, 25–35, doi: 10.1016/j.rse.2013.03.013, 2013.

Liu, J., Jiang, L., Zhang, X., Druce, D., Kittel, C. M. M., Tøttrup, C., and Bauer-Gottwein, P.: Impacts of water resources management on land water storage in the North China Plain: Insights from multi-mission earth observations, J. Hydrol., 603, 126933, doi: 10.1016/j.jhydrol.2021.126933, 2021.

Li, Yao, et al. "A high-resolution bathymetry dataset for global reservoirs using multi-source satellite imagery and altimetry." Remote Sensing of Environment 244 (2020): 111831.

While the hypsometric relationship from a DEM is practical and would also limit the need for water surface data, but not appropriate for our study. We give some reasons below.

1. Firstly, we agree with you that SRTM-DEM have problems in providing reliable bathymetry and hypsometric relationships for reservoirs built before 2000 (SRTM-DEM was developed in 2000, and most reservoirs are in high-fill state at that time) (Vu, D. T., HESS, 2022; Li et al., RSE, 2021). Many studies used SRTM-DEM to construct hypsometric relationships for reservoirs built after 2000 (Vu, D. T., HESS, 2022; Bonnema et al., WRR 2016). Although SRTM-DEM developed in 2000 can provide detailed hypsometric relationships for reservoirs built after 2000, in our study, only 161 out of 923 reservoirs recorded in GRanD database are built after 2000, and in our final retained datasets, only 47 out of 338 reservoirs are built after 2000 (See reservoir attributes.xlsx in our datasets). Constructing hypsometric relationships from DEMs at a national scale is not appropriate for our study and cannot satisfy our needs, since we aim to provide comprehensive reservoir WSE, SWA and RWSC at a national scale. Other DEMs such as MERIT-DEM and NASADEM are new and more likely to fail provide real detailed bathymetry of reservoirs.
2. Secondly, we adopted an enhancement algorithm developed by Zhao and Gao (2018) to map monthly SWA dynamics. The data can cover near all Chinese reservoirs and are evaluated as good performance in our study as well. Following our procedures described in Section 3.3, the constructed hypsometry relationships are mainly to

calculate RWSC, which are evaluated against in-situ datasets and verified as high-quality datasets. In this sense, we could say that relationships derived in this study are reliable.

3. Thirdly, we aim to provide comprehensive reservoir datasets including water level, area and RWSC, thus, to make full use of satellite datasets (area, water level) for calculation can provide references in the background of booming satellites. We also cite the code and reference (Vu, D. T., 2022, hess; zenodo), and we will construct hypsometric relationships for these 47 reservoirs built after 2000 based on SRTM-DEM in our datasets as an alternative.

Hope above responses can address your questions.

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.

Dung Trung Vu. (2022). Codes and Data of Satellite Observations Reveal 13 Years of Reservoir Filling Strategies, Operating Rules, and Hydrological Alterations in the Upper Mekong River Basin. https://doi.org/10.5281/zenodo.6299041

Bonnema, M., Sikder, S., Miao, Y., Chen, X., Hossain, F., Ara Pervin, I., Mahbubur Rahman, S. M., & Lee, H. (2016). Understanding satellite-based monthly-to-seasonal reservoir outflow estimation as a function of hydrologic controls. Water Resources Research, 52, 4095–4115. https://doi.org/10.1002/2015WR017830

Yamazaki, Dai, et al. "A high-accuracy map of global terrain elevations." Geophysical Research Letters 44.11 (2017): 5844-5853.

Li, Yao, et al. "Constructing Reservoir Area–Volume–Elevation Curve from TanDEM-X DEM Data." IEEE journal of selected topics in applied earth observations and remote sensing 14 (2021): 2249-2257.

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?

R1C2: Thank you for the comment. We would like to clarify that we provide storage variations in our datasets, i.e., reservoir water storage change (RWSC), not the storage. Sorry for this misunderstanding and hope this can address your questions.

As already mentioned in the introduction, RWSC is an important variable that directly reflects the change of water stored in the reservoir, and can be implemented into global hydrological/hydrodynamic models for better streamflow simulation. Our plan is to fill a data gap, i.e., the remotely sensed reservoir water level, area, and RWSC in China, which can be applied as constraints to calibrate models or directly used for reservoir analysis. We listed all previous studies producing these three types of datasets in Table 1. Furthermore, in sections 4.2 and 4.3, we demonstrated the blueprint applications of our datasets, taking the Ankang reservoir as a case study, to show the value of our RWSC data in estimating reservoir release. RWSC can also be used to develop a reservoir storage forecast system at 1- to 3-month lead that can be valuable for water resource management in China.

We also agree with that storage is also important, but out of the scope of this study. Anyway, we are willing to give some points to this. Firstly, previous studies (and our study) mainly focused on developing RWSC rather than storage (Table 1). This can be attributed to the fact that the state-of-the-art of estimating accurate storage data need the accurate reservoir bathymetry, which is difficult to obtained from satellites. Secondly, although some studies make a good attempt, for example, Li et al. (2020) developed a bathymetry dataset for ~400 global reservoirs, the application is limit to large reservoirs which are observed by IceSat-2 mission, that has a coarse spatial resolution! So, it is impossible for us to adopt their methodologies to produce the remotely sensed storage for a large number of reservoirs in China.

References:

Li, Y., Gao, H., Zhao, G., and Tseng, K. H.: A high-resolution bathymetry dataset for global reservoirs using multi-source satellite imagery and altimetry, Remote Sens. Environ., 244, 111831, doi: 10.1016/j.rse.2020.111831, 2020.

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

R1C3: Thank you for the comment. The manuscript and figures are improved accordingly. Please find the responses 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.

R1C4: Yes, you are right. The in-situ datasets are updated day-by-day, thus, not possible to download the historical time series. I apologize for not making our collected in-situ datasets publicly available on Zenodo as we have a federal grant that limits the sharing of in-situ dataset. Moreover, we have no right to make all of them publicly available, now. Anyway, we are happy to share some data for users to do some case studies, please feel free to contact the corresponding author.

General Comments:

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

Changed as: Obviously, there is a data gap with regard to comprehensive reservoir information in China.

- 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?

Changed as: Records of a few Chinese reservoirs are available from these databases or previous studies (Table A1). Taking reservoir water level as an example, approximately 30 Chinese reservoirs are available from three datasets (Hydroweb, G-REALM and DAHITI).

Table A1. Summary of recent studies and databases producing the remotely-sensed data on surface water area (A), water surface elevation (H), and storage variation (V) in China.

Data type	No. of reservoirs	Data sources	Time and temporal resolution	Link
H	32	Hydroweb	1992–2021, 10–35 day	http://hydroweb.theia-land.fr/
H	8	DAHITI	2002–2021, 10–35 day	https://dahiti.dgfi.tum.de/en/
H	~30	G-REALM	1992–2021, 10–35 day	https://ipad.fas.usda.gov/cropexplorer/global_reservoir
H	<10	Tortini et al. (2020)	1992–2018, sub-monthly/monthly	https://doi.org/10.5067/UCLRS-GREV2
A	/	Bluedot	2016–2021, sub-monthly	https://blue-dot-observatory.com/
A	923	GRASD	1984-2018, monthly	https://doi.org/10.18738/T8/DF80WG
A	~8	Yao et al. (2019)	1992–2018, sub-monthly/monthly	https://lakewatch.users.earthengine.app/view/glats
A	24	Liu et al. (2020)	2004–2020, monthly	not publicly accessible
A	<10	Tortini et al. (2020)	1992–2018, sub-monthly/monthly	https://doi.org/10.5067/UCLRS-AREV2
V	<4	Busker et al. (2019)	1984–2015, monthly	not publicly accessible
V	24	Liu et al. (2020)	2004–2020, monthly	not publicly accessible
V	<10	Tortini et al. (2020)	1992–2018, sub-monthly/monthly	https://doi.org/10.5067/UCLRS-STOV2
V	10	Vu et al. (2022)	2008-2020, monthly	https://doi.org/10.5281/zenodo.6299041
A, H, V	338	Shen et al. (2021)	2010-2020, monthly	https://zenodo.org/record/5812012

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

No, they are not openly accessible, but probably accessible upon request? We rephrase this sentence as: Moreover, the remotely-sensed datasets (e.g., lake/reservoir storage variations by Busker et al., 2019 or RWSC by Avisse et al., 2017) are not publicly available.

- 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.

Sorry for missing this new reference, and much thanks for your work and contributions. We added this in our Introduction, Table 1, Table A1.

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.

- 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.

We created Table A1 specifically focussed on Chinese reservoirs. See above response.

- Line 111. "Testbed"?

Changed.

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

We rephrase this sentence as: Furthermore, to densify reservoir water level observations, merging data from multiple altimetric missions is meaningful given that satellite altimetry tracks are sparse and not available for all reservoirs (Jiang et al., 2019; Li et al., 2019).

References:

Jiang, L., Nielsen, K., Dinardo, S., Andersen, O. B., and Bauer-Gottwein, P.: Evaluation of Sentinel-3 SRAL SAR altimetry over Chinese rivers, Remote Sens. Environ., 237, 111546, doi: 10.1016/j.rse.2019.111546, 2020.

Li, Xingdong, et al. "High-temporal-resolution water level and storage change data sets for lakes on the Tibetan Plateau during 2000–2017 using multiple altimetric missions and Landsat-derived lake shoreline positions." Earth System Science Data 11.4 (2019): 1603-1627.

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

We added this information Table 2. The SARAL/AltiKa satellite flew on the same repeat orbit as ENVISAT with a 35-day repeat cycle until July 2016, and was then switched to drifting orbit mode.

- 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?

The different re-tracking algorithms mentioned in Table 1 are used to correct the Rrange in Equation (1). While the remaining corrections in Equation (2) such as geophysical and atmospheric corrections are directly taken from the official altimetry products. We added this information in our main text. Following the official user-guideline, they are site-specific.

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

We added a few words: This algorithm filled the gaps in area time series when the contamination in a Landsat image is between 5-95%, and applied interpolation and extrapolation for the missing monthly area estimates (i.e., no images or >95% invalid data). For more information and GEE code, please refer to Zhao and Gao (2018) and Shen et al. (2022).

The code is not available from Zhao and Gao, but we can make our written code available. Please contact the first author, Youjiang Shen (yjshen2020@gmail.com)! Once the paper accepted, the code will appear on Zenodo as well (the same link).

- 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.

See the modified Figure 1 below.

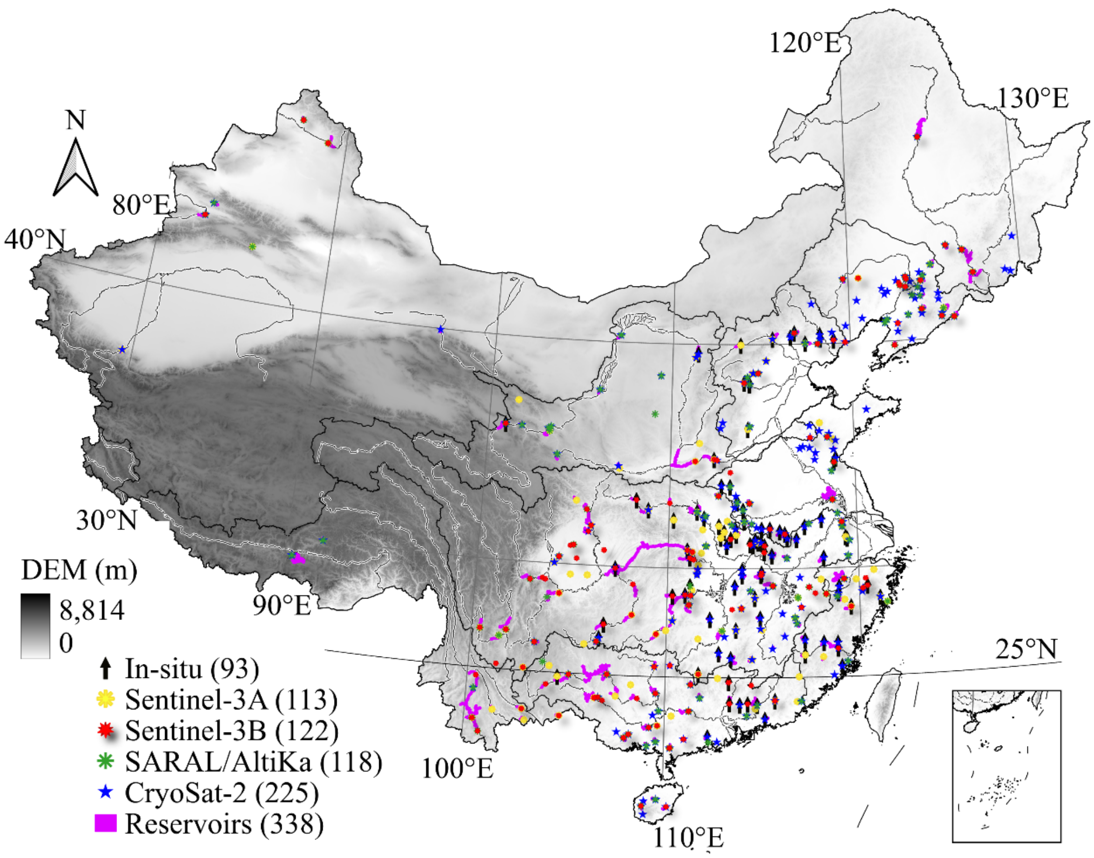

Figure 1: Map of reservoirs covered by multisource satellite altimeters and stages. 338 reservoirs are finally retained in our datasets. For more details, please refer to Sect. 3.1.

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

We need the reservoir shapefiles from GRanD base to mask the Landsat images, and then applied the algorithm developed by Zhao and Gao, to calculate the area time series. This step is required in the algorithm, and we listed some references below.

References:

Zhao, G., and Gao, H.: Automatic Correction of Contaminated Images for Assessment of Reservoir Surface Area Dynamics, Geophys. Res. Letters, 45, 6092–6099, doi: 10.1029/2018GL078343, 2018.

Li, Y., Gao, H., Zhao, G., and Tseng, K. H.: A high-resolution bathymetry dataset for global reservoirs using multi-source satellite imagery and altimetry, Remote Sens. Environ., 244, 111831, doi: 10.1016/j.rse.2020.111831, 2020.

Zhao, Gang, et al. "Evaporative water loss of 1.42 million global lakes." Nature Communications 13.1 (2022): 1-10.

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

Sorry for this confusion, we would clarify the procedure of GRSAD algorithm in the following three steps. And then, give our rephrased texts.

1, Selection of the reservoirs: Chinese reservoirs recorded in the GRanD database (Lehner et al., 2011) were selected. Please note the reservoir shapefiles were generated from the SRTM-DEM, and they may reflect a low-fill or dry-season state with smaller area values than the maximum. Therefore, the masks were created using a buffer distance to ensure that the maximum extents of the reservoirs were covered. However, there are tradeoffs between large and small buffer distances because the continual increase in water area with buffer distance could indicate either very large increases in water area beyond static reservoir shapefile or capture of non-target reservoir waters (e.g., nearby lakes or rivers). To determine the optimal buffer size, we used five distances (30, 60, 90, 120, and 1000 m) and approached the issue of optimal buffer distance by assessing proportional water increases with increasing sizes across reservoirs (See supplement text 1).

2, Extraction of the Landsat images within the reservoir masks. JRC Landsat datasets contain two types of datasets: monthly raw images (classify cell into water, no-data, not water) and water occurrence map (frequency 0-100).

3, Strength of GRSAD algorithm. GRSAD automatically repairs the contaminated images to get the full water coverage (i.e., directly seen water area, and the water area covered by contaminated sources such as clouds). Compared with the raw time series directly extracted from the JRC, the enhanced time series from the GRSAD has significantly improved continuity.

We have rephrased this paragraph as:

The GRSAD algorithm is executed within the reservoir masks to construct area time series during 2010–2020. However, these static reservoir masks were generated from the SRTM-DEM, and may reflect a low-fill state with smaller values than maximum areal extent. This problem can be addressed by buffering a specified distance outward from the reservoir shapefile to capture all valid area changes of the reservoir. However, there are tradeoffs between large and small buffer distances because the continual increase in water area with buffer distance could indicate either very large increases in water area beyond static reservoir mask or capture of non-target reservoir waters (e.g., nearby rivers or lakes). We used five distances (30, 60, 90, 120, and 1000 m) to determine the optimal buffer distance by assessing proportional water increases with increasing sizes across reservoirs (Supplement Text 1).

- 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.

Hope the above responses (R1C2) addressed your question. Yes, you're correct. The SRTM-DEM could provide detailed detailed hypsometric relationships for all reservoirs built after the year 2000. However, in our datasets, only 47 (338 in total) reservoirs are built after 2000. Other DEMs such as MERIT-DEM and Tan-DEM are new and more likely to fail provide reliable bathymetry of reservoirs. So, we used the satellite-based water level and area to construct the hypsometric relationships, which are further used to construct the time series of reservoir water storage change. This is a common practice in the previous studies as well.

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

WE found that Seasonal filling and emptying of reservoirs can be nicely captured especially for those reservoirs have large dynamics in water (see Fig.10a,b,d). We rephrased this sentence: Seasonal filling and emptying of reservoirs can be nicely captured.

- 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.

Thank you for your comments. While qualitative grades are not as reproducible as best fit statistics, they have been used in the past to guide users to preferable time series when no other error metrics are available (Birkett et al., 2002). For the remainder of our reservoirs (without in-situ data), we performed a qualitative letter evaluation represented by a letter grade ranging from A (highest level of confidence on the data quality) to D (lowest level of confidence). The grades are determined based on the number of data points in the time series, obvious outliers, and time series continuity. More specifically, for reservoir water level, we give the number of data points, the time-series and data source in our datasets (see evaluation of merged wse time series of 276 reservoirs.csv and time-series of wse of 276res.pdf). For reservoir water storage change, we give the number of data points, the CC values of water level-area, R2 values of fitted area-water level curves, number of water level-area data pairs in our datasets, (see evaluation of RWSC of 232res.csv and Time-series of rwsc of 232res.pdf). Letter grades take into consideration all of these criteria, but in general reservoir with an A rating would have one or fewer obvious outliers, would have of fitted area-water level curves, and would fit nice area-water level curves with an over 0.7 R2 value. A D rating might be applied to a reservoir with ten or more outliers and with less data points or low R2 values. We explicitly recorded and document which reservoirs in our datasets are evaluated using this qualitative approach, and all associated statistics and time-series in both PDFs and Excel files.

References:

Coss, Stephen, et al. "Global river radar altimetry time series (GRRATS): new river elevation earth science data records for the hydrologic community." Earth System Science Data 12.1 (2020): 137-150.

Birkett, C. M., Mertes, L., Dunne, T., Costa, M., and Jasinski, M.: Surface water dynamics in the Amazon Basin: Application of satellite radar altimetry, J. Geophys. Res.-Ser., 107, LBA-26, https://doi.org/10.1029/2001JD000609, 2002.

- 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.

Changed. We used the same color with different symbol for better visualization. Please note that information about RMSE is also provided in our datasets. See modified Figure 4 below.

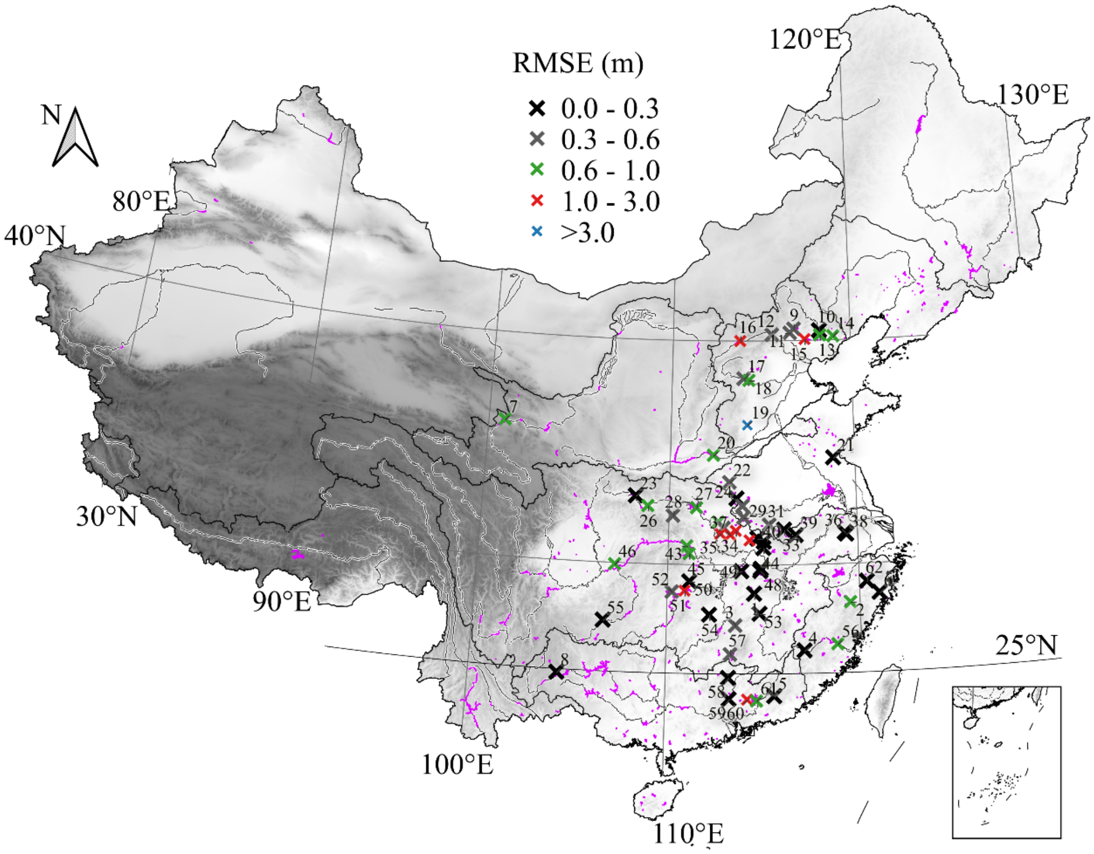

Figure 4: Performance of the merged WSE in terms of RMSE of 62 reservoirs. Note that, we merge WSE for a reservoir from multisource if available using the observations with the smallest RMSE among five (three for CS2) retracker or default PPCOG retracker. The categories are based on reported accuracy from Jiang et al., (2020). For validated RESERVOIR ID, please refers to the Table S1.

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

Sorry for this confusion, we added color legend in this figure. Blue line represents water level, while red line indicates the area time series.

- Line 295. Do you mean Figure 6?

No, it is Fig.3. We double check it.

- Line 301. Do you mean Figure 7?

No, it is Fig.3. We double check it.

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

We apologize for the confusion. Hope the above responses addressed your question. Reservoir water storage change is provided in our datasets, not the storage 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.

According to the normal practice in ESSD paper, we need such a data description in main text, we have placed in stand-alone section.

- Line 390-394. Not clear.

Sorry for the confusion. We would like to clarify this paragraph demonstrated that our datasets can be applied as constraints to calibrate models or directly used for reservoir studies. Specifically, we describe the flowchart of combining the hydrological models with our remotely sensed RWSC datasets to estimate reservoir outflow at national scale (blueprint application). Taking the Ankang reservoir as a case study, we argue that our datasets could help achieve this blueprint application by introducing the key components (e.g., RWSC) of reservoirs at national scale. We have rephrased the texts.

The simulated releases show good agreements to the observations, with KGE exceeding 0.90 and NRMSE below 0.04. We compare reservoir inflow and release simulations and notice that flow regimes at the Ankang reservoir have been substantially altered (Fig. 12 f). In conclusion, our RWSC dataset can be applied to reservoir release simulation, achieving satisfactory streamflow simulations. However, some limitations can be seen in our case study. Firstly, reservoir evaporation and precipitation are neglected for the tested reservoir with humid climate conditions. We suggest that these variables should be considered using high quality satellite datasets such as ET products or model simulations. Secondly, the case study cannot provide a big picture of reservoir regulations on streamflow at national scale. Similar studies should be done at the remaining reservoirs to achieve this goal. Acknowledging such limitations, we argue that the datasets could help achieve the blueprint application by introducing the key components (e.g., RWSC) of reservoirs at national scale.