

Comment on **essd-2021-174**

Anonymous Referee #1

Referee comment on "HydroSat: geometric quantities of the global water cycle from geodetic satellites" by Mohammad J. Tourian et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2021-174-RC1>, 2021

Manuscript handles a very important topic of creating a database for hydrological studies. Authors combined various satellite datasets with an aim to provide consistent output of surface water extent of lakes and rivers, water level of inland water bodies, water storage anomaly of hydrological basins, lakes and reservoirs, and river discharge for large and small rivers. Paper is original and unique. It also consists of huge science behind the output datasets. Despite its advantages, some shortcomings may be found. These are listed below:

- Paper is very long. It is sometimes hard for the reader to stay focused on the main research idea. I would advise the authors try to shorten the manuscript by putting some less important information into Appendices. It would make the paper more clear.
- There are too many technical details provided within the manuscript. These could be moved, as mentioned above.
- I am not really sure why SWOT mission is mentioned several times across the manuscript. It does not bring any new conclusion or outlook on the results the authors provide. I would advise these comments to be removed.
- I really miss any comparison of dataset to the existing databases. I mean from the Figures you provide it is clear that your dataset is more or less similar to the existing ones, but maybe some statistics would be useful. At least to show why your dataset is unique and why it should be used instead of others.
- Main advantages of database should be pointed in the introduction section. It is now not really clear where the uniqueness of your database is. While I believe it is new, it should be strictly pointed at the beginning of the manuscript.
- I would advise the authors to clearly divide the manuscript into sections covering introduction, datasets, methodology, results and comparisons, conclusions. For now all the above sections are somehow mixed, which made it hard for me to follow the main topic.
- It is not really clear which satellite missions are employed for creating individual outputs. (Or maybe I missed it somewhere?). It would be better if all datasets are strictly listed or mentioned/described.