RC1: , Anonymous Referee #1

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:

1. *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.*
2. *There are too many technical details provided within the manuscript. These could be moved, as mentioned above.*

While we were writing we were very much aware of the length of the manuscript and tried to strike a balance between completeness and conciseness. Your comments mean that our sense of balance is not in line with the reader's senes. Therefore, in the revised version, we have moved several flowcharts and figures to the Supplement and shortened the text so that the revised manuscript is 9 pages shorter.

3. *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.*

Indeed, the driving force behind HydroSat at its inception was not the SWOT mission yet. However, the reason for the frequent references to the SWOT mission in the current manuscript is that SWOT did become over time a sort of guiding framework. The added value of the HydroSat products to the SWOT mission is highly relevant, as it was highlighted in the Summary and Conclusion section. Across the rivers, SWOT estimates discharge using several algorithms as well as consensus values calculated from several individual algorithms. Most of the algorithms use Bayesian principles, i.e., they rely on prior data. Hydrologic variables provided by HydroSat can effectively be used as potential prior information for each of the discharge algorithms through available water levels (SR and HR), river width from satellite imagery, and discharge estimates (SR and HR). In the case of lakes and reservoirs, the time series of surface water extent and volume anomaly provided on Hydrosat will improve SWOT estimates in terms of both temporal resolution and coverage. This supports studies aimed at understanding the long-term behavior of lakes and reservoirs.

In the revised manuscript, we have made the beneficial role of HydroSat for the SWOT mission more explicit in the introduction.

4. *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.*

We have intentionally refrained from providing statistics in this manuscript for the following reasons:

- Many databases, including HydroSat, are constantly updating their products. Therefore, statistics based on a particular snapshot of the data could yield a misleading conclusion about a database.
- Due to the lack of in situ data, performing a statistical analysis of all available data from all available databases/repositories is not possible. Therefore, providing statistics on a few selected cases would never be representative and could provisionally downgrade or upgrade a particular database.
- The geographic distribution of virtual stations offered by different data providers is also very different. Such comparison will at the end be highly limited to less complicated case studies.
- We believe that the scientific community needs more HydroSat-type data repositories for a better understanding of the freshwater cycle. Lumping them with statistical metrics would lead the activities to a winner-loser game that is definitely not constructive for further development of similar products.
- Finally, we believe that the uniqueness of the HydroSat global data is legitimised by their availability in many ungauged basins and their scientific basis.

5. *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.*

Indeed. In the revised manuscript, we have highlighted the main advantage of the HydroSat in the introduction section. Thank you very much for this comment.

6. *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.*

Considering that we have different products with different input data and methods, a classical structure with Introduction, Datasets, Methodology, Results would probably bewilder the readership. But we do acknowledge your point that the manuscript needs a clearer structure. So instead, the revised manuscript is restructured so that we use the same structure (sub-sections) for each product as described below:

- A short introductory text (with references to other existing datasets)
- HydroSat products
- Data and methodology

This indeed made the manuscript much more structured and clear.

7. *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.*

This is now clear in the subsection "Data and methodology" for each product. Moreover, in the caption of figures with time series we provided the input data (wherever it was not clear).