

RC2: ['Comment on essd-2021-174'](#), Anonymous Referee #2

The paper presents a rather unique dataset that provides several hydrological variables obtained with satellite data related to: 1) water level time series of rivers and lakes; 2) surface water extent of rivers and lakes; 3) terrestrial water storage anomaly; 4) water storage anomaly for lakes and reservoirs; 5) river discharge estimates for rivers.

Globally, I found the idea to collect all these variables together quite interesting and useful for hydrological applications even if the dataset is far from to be exhaustive and complete, at least for some variables: for example, water level and water storage anomaly cover quite all the globe, whereas the surface water extent and the river discharge are estimated only for some stations (and sometimes not coincident).

About the paper, it is very long with a lot of information and a few innovative elements. Actually, most (maybe all) of the procedures to derive the hydrological products have been already published. Therefore, the paper shows a collection of already published algorithms and procedures with a remark of the main results and validation. I really appreciated the comparison with other datasets, but I am quite dubious about the general content.

We thank you for your review and sharing your concerns. First of all, the length of the manuscript was also pointed out by another reviewer. So, after transferring some materials to the supplement and restructuring the text, the revised manuscript is shorter and much clearer now.

Regarding the structure of the paper, we would like to point out that we followed the ESSD guidelines for data description papers, in which detailed analysis (as in a research article) remains outside the scope. According to ESSD, articles in the data description category should not focus on instrumentation, methodology, data extraction, or data treatment except when that information helps quantify uncertainties or otherwise facilitates validation of data presented

It is indeed true that there are published papers behind many of these data sets. However, none of these published studies have demonstrated the applicability of their proposed method at a large scale. In the geosciences and remote sensing, applying an existing method to a new case study often brings new scientific challenges that require further modifications. This is exactly the case with most of the HydroSat products. In fact, here the focus is the data itself and the aspect of having unique datasets over many ungauged basins around the world. We describe the methodology to help the readers to understand the caveats and uncertainties involved in the data and also to facilitate comparison and validation of presented data.

In addition, the citation to four unpublished papers (Behnia et al. and Elmi et al.) makes this paper more uncertain for two reasons: first, the content described in the papers is not still accepted by the scientific community, and if from one hand it is good for the originality of the content of this article, on the other hand, no many details are provided on that specific procedures to allow the acceptance; second, no way to check the under review or submitted papers, to verify the originality of the content of this paper.

One of these four unpublished works has now been published. In the revised manuscript, we have excluded the references to the unpublished works. The methods are described in the text and in the Supplement.

So, despite it is a big paper with a lot of science behind, I think it is not good enough to demonstrate the novelty of the datasets.

Please see our response to your first point. We see the novelty of the work in the data itself and the fact that we offer a global dataset for water cycle monitoring. Apart from that, as mentioned above, there are modifications to already existing methods described in this manuscript for the first time (see the previous point), which elevates the novelty of the work.