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Interactive comment on "Satellite-based remote sensing data set of global surface water storage change from 1992 to 2018" *by* Riccardo Tortini et al.

Anonymous Referee #2

Received and published: 18 February 2020

The manuscript entitled "Satellite-based remote sensing data set of global surface water storage change from 1992 to 2018" by Tortini et al. presents estimated global surface water storage changes (ΔV) in large lakes and reservoirs using a combination of paired water surface elevation (WSE) and water surface area (WSA) extent products. In their approach, they used data produced by multiple satellite altimetry missions (TOPEX-Poseidon, Jason-1, Jason-2, Jason-3, and ENVISAT) from 1992 on, with surface extent estimated from Terra/Aqua Moderate Resolution Imaging Spectroradiometer (MODIS) from 2000 on.

They used the relationships between elevation and surface area to produce estimates

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Discussion paper

of ΔV even during periods when either of the variables was not available. They produce time series of ΔV as well as WSE and WSA for a set of 347 lakes and reservoirs globally for the 1992–2018 period.

In general I find the idea of manuscript very interesting and I also see the need for having such data base. Indeed, the production of long-term, consistent, and calibrated records of surface water cycle variables such as the data set presented here is of fundamental importance to baseline future SWOT products.

Major comments:

I believe the paper suffers from missing an important point. The authors calculate first the correlation coefficient between the two variables and use it as one of the decision parameter for taking the mean value instead of data itself. The correlation coefficient between two data set represents the linear dependency between two data sets, while the relationship between water level and surface area represent the bathymetry and the bathymetry of a lake should not follow a linear behaviour. I would strongly suggest to change this in the paper and in case the authors would like to assess the monotonic behaviour between water level and area, then they should use the Spearman rank correlation and not simply the Pearson correlation.

My second major comment goes to the methodology for the area extraction. Figure 6 shows some vertical lines of points, which represent same area for different water levels. This is highly suspicious.

Specific comments:

page 2, line 30, please mention River and Lake https://earth.esa.int/web/guest/-/river-and-lake-products-from-altimetry-4617 and HydroSat http://hydrosat.gis.uni-stuttgart.de

page4, Section 2.1, Did you make sure that all data from different data centers have the same background models for atmospheric refraction? How did you deal with the

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intersatellite bias?

page 5 line 3, what is an acceptable accuracy? please quantify!

page 7, equation 1, I did not grasp the equation. shouldn't be WSA t+1 - WSA t?

page 7, line 26, considering linear regression is wrong. See my major comment.

Figure 6, the extracted area is so noisy that similar area are obtained for different height. And in fact, no obvious linear relationship can be recognized.

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