Interactive comment on "RECOG RL01: Correcting GRACE total water storage estimates for global lakes/reservoirs and earthquakes" *by* Simon Deggim et al.

Anonymous Referee #1

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General remarks: The manuscript introduces very interesting new corrections for the GRACE TWS data. While the manuscript is well written, for my liking it is too long. The problem is not, the often met, too less science and results, but the too much. Probably this would be enough for two publications... But this probably not changeable any more For a data publication is has to much validation/application but could spend more detail on the data set itself. Before Section 4 I thought the aim of the paper was about publishing two new data sets, after Section 4 I am not sure about the aim of the manuscript any more? Thus, please state more clearly what the aim is. Also the beginning of Section 4 could use a short introduction setting the frame for what is coming. About the sections in general: You should incorporate Section 3 in Section 2,

it recaps lots of information given in Section 2 and it would fit in there quite well. On the other hand, Section 4.5 should stand alone as it discusses the general limitations of the data sets and as it is now is a bit lost in Section 4. Finally, why do you not include the GRACE-FO time span already?

Overall, I think the manuscript is publishable after a major revision addressing my mentioned concerns.

Specific remarks: Abstract: First two paragraphs sound more like an introduction. Please shorten it. Section 2.1.1: Please provide more information on the Dahiti processing. Eg. did it uses the Ales+ retracker as suggested by the citation? What missions are used. About the accuracies of the time series, have they not improved since 2015. I would have expected this (or hoped for)! Section 2.1.2: Until Section 4.5 I thought you use time varying surface area data. Going back, I realized, this was what I expected in such a work. To my knowledge such data sets exist. Why do you not use them? Section 2.1.3: Why does a discretization on a 0.025° grid help to capture long and narrow reservoirs? Section 2.1.4: We found in recent investigations, that filtering a non GRACE data set with a DDK filter, introduces striping artefacts. This was most pronounced for a lake mass product over areas with sparse or no surface water data. Do you see something similar? Do you accept them to have a as similar as possible filtering of the data sets? I found paragraph l 200f and Figure 3 very confusing. The figure shows 3 different things (nicely in three different colors) but in the text only two are mentioned. Please make a stronger connection between text and figure (eg. colors in text and numbers in figure). Eq 5: The left-hand side of the equation is location depending, the right-hand side not? Section 4.3: I think I read this section now 10 times and I still do not know what you are showing in Fig 11. Is Fig. 11(a) the RMS between GPS time series and RECOG-LR? Then what is what in the equation? Eq 7: What is q? Also not clear that overline(TWS_j,q) is (and typo in the later?)

Minor remarks: l 47: replace Flechtner et al. 2016 to Kornfeld et al. 2019 (10.2514/1.A34326) l 85: You mean the WGHM? Then say so. Could you also give

a real citation not only a conference abstract? L 97 ff: Please also provide length of time series of different resolutions. L 198: surface water mass variations Eq 1: Up to which degree and order? L 246: When and where do you see 30cm correction? Fig 10: Even as a non-colorblind I cannot distinguish between black and blue line. Perhaps also put the two panels below each other to enlarge plots? L 399: I hope you have not used AOD1B Rl05, but Rl06. Then cite Dobslaw et al. 2017 https://doi.org/10.1093/gji/ggx302 l 436: You could also cite Boergens et al. 2020 https://doi.org/10.1029/2020GL087285