

Hydrol. Earth Syst. Sci. Discuss., referee comment RC1
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Comment on hess-2020-665

Anonymous Referee #1

Referee comment on "Development and evaluation of 0.05° terrestrial water storage estimates using Community Atmosphere Biosphere Land Exchange (CABLE) land surface model and assimilation of GRACE data" by Natthachet Tangdamrongsub et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2020-665-RC1>, 2021

Development and evaluation of 0.05° terrestrial water storage estimates using CABLE land surface model and GRACE data assimilation

The paper "Development and evaluation of 0.05° terrestrial water storage estimates using CABLE land surface model and GRACE data assimilation" is a very interesting and meaningful study aiming to improve the spatial detail of terrestrial water storage through CABLE land surface model. The work also improves the TWS accuracy by assimilating the GRACE TWS observations. The developed CABLE 0.05 and inclusion of GRACE DA increases the TWS estimates and the accuracy of GWS estimates. In addition, this work could be applied in other region because of the publicly global datasets, which is very useful for further studies.

General comment: Globally, the paper is well written and structured. It is worth for publication, but minor revisions should be considered. For example, there are some results that are not shown in the paper (you mention these), but for the readers they do not know what it is. It could be better if these results can be shown more specifically.

Next, I put the questions and doubts referring to the line number.

2 Study area and data:

- 144 – 145: "temporal disaggregation is applied to CHIRP precipitation ...". We know that precipitation is not a continuous variable. Disaggregation can lead to some unexpected errors. So why not using the satellite precipitation data that are sub-daily

scale?

- 166 - 167: The temporal mean value of model simulated TWS is used to convert Δ TWS into absolute TWS. This could be accepted, but you use the period of 2003 to 2012. Why not use the whole simulation period? Because your simulation period is from 1981 to 2012.

4 Results and discussions

- 301: What is the point of the phase estimates? Could you explain it more specifically?
- 307 – 308: For CABLE 0.5, the correlation length (CL) of August is the smallest. The CL of June is higher than that of seven months. For CABLE 0.05, the CL of May is the smallest but is not that small. Besides, the CLs of June and July is approximately equal to that of January and February. How to explain these?
- 385 – 386: It is not surprised to obtain this result because you add the information of GRACE into the model. More information will lead to more similarities.
- 399: "You state that the GWS is the primary driver of the TWS trend in Line 321. However, the result show that the SMS is a major contributor of TWS. Could you explain it?"
- 399 – 400: The GRACE mostly shows or indicates the changes of groundwater, so it is apparent to have this result.
- 428: A positive value means the former (vertical) is better than the latter (horizontal), right? So the negative value (-0.1) implies that CABLE 0.05 (OL) has a lower correlation than the GRACE DA 0.5 (DA), if I understand it correctly.

Figures

Figure 1

- 780: Should it be Fig. 14?

Figure 7

- 805: How about use the same color bar for Fig. 7c with Fig. 7a and d, so that the figure will show more details about the relationship and the comparison.

Figure 11

- 822: What is the unit of x axis for the delta TWS (the first row)? Please add the unit for the figures if necessary.
- 823 - 824: Why not conduct the analysis over basins not for the whole Australia? Since you do the analysis for the whole area in the previous analysis.

Please also note the supplement to this comment.

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<https://hess.copernicus.org/preprints/hess-2020-665/hess-2020-665-RC1-supplement.pdf>