

Hydrol. Earth Syst. Sci. Discuss., referee comment RC3
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Comment on hess-2022-284

Anonymous Referee #3

Referee comment on "Diagnosing modeling errors in global terrestrial water storage interannual variability" by Hoontaek Lee et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2022-284-RC3>, 2022

This study models the error between the global TWS IAV observations of GRACE and two models, SINDBAD and H2M. The authors found that the global TWS IAV is mainly driven by humid tropical and semi-arid regions, and identified the hotspots of modeling errors of the global TWS IAV mainly in tropical regions that span across climatic regions. The study presents a novel way to attribute global variability to each pixel and focused on regions where hydrological cycle components in models may not be sufficiently well represented due to their complex hydrological and climatological processes.

The study in general is well-written and easy to follow. Additional to comments made by the two Anonymous Referees, which I consider important to answer, my comments are as follows:

- As the study identifies humid regions of northern South Americas as one of the main drivers of global TWS IAV, I suggest including these references in the discussion in which global models are compared with GRACE products in a very important instrumented tropical basin.

Bolaños Chavarría, S., Werner, M., Salazar, J. F., & Betancur, T. (2022). Benchmarking global hydrological and land surface models against GRACE in a medium-sized tropical basin. *Hydrology and Earth System Sciences*, 26(16), 4323-4344.

Bolaños, S., Salazar, J. F., Betancur, T., & Werner, M. (2021). GRACE reveals depletion of water storage in northwestern South America between ENSO extremes. *Journal of Hydrology*, 596, 125687.

- I am a bit confused with Equation 1, in figure 1 I think it is clear that TWS IAV is the result of detrending and deseasonalizing TWS, but in Equation 1, I understand that only TWS is deseasonalized.
- I think it is necessary to define what is the meaning of SREX Regions, I don't identify what is.
- Why the preference for the JPL mascon if there is another mascon product like the mascon CSR that has the same resolution?

Save, H., S. Bettadpur, and B.D. Tapley (2016), High resolution CSR GRACE RL05 mascons, *J. Geophys. Res. Solid Earth*, 121, doi:10.1002/2016JB013007.

- Figure 2 a) describes a "NSE is the Nash-Sutcliffe Efficiency", but it does not appear in the figure