



EGUsphere, referee comment RC2  
<https://doi.org/10.5194/egusphere-2022-1032-RC2>, 2023  
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## **Comment on egusphere-2022-1032**

Anonymous Referee #2

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Referee comment on "Assessment of pluri-annual and decadal changes in terrestrial water storage predicted by global hydrological models in comparison with the GRACE satellite gravity mission" by Julia Pfeffer et al., EGU sphere,  
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This is an important study comparing the slow change in terrestrial water storage between GRACE solutions and two global hydrological models.

I am outlining below some major comments:

- The term slow change is not defined clearly. Does it include the linear trend? I see from the results it includes the sub-annual component, and I don't think the sub-annual changes can be slow changes. I suggest formulating these definitions using equations. Also, it will be helpful to show some raw time series for some areas for the slow change before and after applying the diffusive filter.
- Authors did a good job in combining multiple GRACE data, but I feel these efforts wasted by just using the ensemble of all data, also I don't think averaging the mascons and solutions together is a good strategy.
- Are all GRACE solutions have the same performance for the slow changes in TWS?
- It will be more informative to have two ensembles; one for the mascons and another for the spherical harmonics, and compare their performance.
- Paragraph #30. "located at the Earth's surface", not correct phrasing
- Paragraph #35. Do you mean seasonal components and the trend? Or by the decadal change, the author meant the linear trend.
- Paragraph #46. "Multidecadal Atlantic oscillations" → Atlantic multidecadal oscillations
- Since the two hydrological models do not simulate the glaciers storage; comparing them with GRACE data is not fair; and so, the results over the glaciers regions. One suggestion for the authors is to remove the linear trend and limit the comparison to the interannual and decadal fluctuations.
- Is the amplitude defined here as the  $\max(\text{TWS}) - \min(\text{TWS})$ ? if so, please define it clearly in the methods.
- One suggestion on the discussion sections; please start with results for these areas, and then discuss their hydrological characteristics.

