



EGUsphere, referee comment RC4
<https://doi.org/10.5194/egusphere-2022-876-RC4>, 2022
© Author(s) 2022. This work is distributed under
the Creative Commons Attribution 4.0 License.

Comment on egusphere-2022-876

Anonymous Referee #4

Referee comment on "Regionalizing the sea-level budget with machine learning techniques" by Carolina M. L. Camargo et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-876-RC4>, 2022

The authors offer a new perspective on regional sea level budget (SLB) closure by focusing on two machine learning (ML) algorithms. They show how self organizing maps (SOM) and d-MAPS allow to identify spatially coherent regions and (i) close the SLB in most of those regions and (ii) further reduce the uncertainties otherwise present when using the gridded data alone. Importantly, by focusing on two ML tools they are able to demonstrate the robustness of their conclusions under the models architecture considered.

This is a good, well written paper and it further demonstrate the benefit of focusing on coherent patterns rather than gridded data. I recommend publication after some minor revisions.

(a) Section 2.1. Is terrestrial water storage included in the sea level budget? If not, can the authors give an explanation on why it was not considered?

(b) Figure 1. In a recent paper, Wang et al. 2021 closed the sea level budget at tide gauges locations. In Figure 1 of Wang et al. 2021, the authors show different components of sea level (SL) ranging from stereodynamic SL to GIA, Glaciers etc. Can the authors explain possible differences between their Figure 1 and the one in Wang et al. 2021. In any case the authors should at least cite that work.

(c) Section 2.3.

(c.1) It would be clearer if SOM and d-Maps are introduced in two different subsections or paragraphs (Section 2.3.1 and 2.3.2)

(c.2) I understand that in both SOM and d-Maps, domains are identified after removing the seasonal cycle and trends. This is reasonable. It is my understanding though that after the domain identification step, the time series considered in each domain are averaged time series with seasonality and trends included. Is this correct? This should be clearly stated in the manuscript and it is missing at the moment (my bad in case I missed it).

(d) Section 4.1. The budget is closed in 77/92 d-Maps domains. I wonder if the remaining 15 domains where the budget is not closed are mainly found in the Southern Ocean. In that region I see lots of very small regions which could be just noise. If that is the case I suggest the author to add this in the paper.

(e) Figure 4. "Sea level budget trends (mm/yr) for (a) d-MAPS and (b) SOM" I think it should be the opposite: Sea level budget trends (mm/yr) for (a) SOM and (b) d-MAPS.

J. Wang, J. A. Church, X. Zhang, J. M. Gregory, L. Zanna, and X. Chen. Evaluation of the local sea-level budget at tide gauges since 1958. *Geophysical Research Letters*, 48:e2021GL094502, 2021. doi: <https://doi.org/10.1029/2021GL094502>.