



EGUsphere, community comment CC3  
<https://doi.org/10.5194/egusphere-2022-660-CC3>, 2022  
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## Reply on RC2

Jiping Xie

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Community comment on "Assimilation of sea surface salinities from SMOS in an Arctic coupled ocean and sea ice reanalysis" by Jiping Xie et al., EGU Sphere,  
<https://doi.org/10.5194/egusphere-2022-660-CC3>, 2022

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### *General comments*

*I would suggest showing maps of the different SSS satellite products for August and September to complement figure 3 (model fields). This will highlight differences between the product versions and between the different experiments presented in figure 3. It may also help to understand the differences in the increments in the ESS, LS and KS regions shown in figure 8. Since the increments (figure 8) are quite different in regions where no in situ data allows to evaluate their realism, it may be interesting to compare them to the mean SMOS innovations to see if it can explain the increment differences in expv2 and expv3. As it is difficult to see the SSS differences between the different experiments and the observations when looking at the absolute fields, showing maps of differences may be more efficient to illustrate the results.*

Yes, the monthly mean for Aug. and Sep. from the two products will be interesting as the reference for understanding the results in Fig. 3 and Fig. 8 as well. The Fig. 8 will be carefully considered whether to be replaced by the difference or not in the revision.

*In many regions, the model salinity shows less variation than the in situ observations (scatterplots), even if it is still improved with assimilation. For the Chukchi Sea, it is attributed to the climatology relaxation, but do you have any possible explanations for the other regions?*

The mode salinity also used the relaxation to constrain the possible model drift as Line 117-121: "To avoid a potential model drift, the surface salinity is relaxed to the same climatology with a 30-day timescale, and the relaxation is turned off wherever the difference from climatology exceeds 0.5 psu. The salinity flux from the SSS relaxation thus spreads evenly into the mixed layer depth without creating a new stable fresh layer at the surface."

In the revision, this point would be added for the concerned explanations.

*In few places in the article, regions are referred with "S number" that may be removed completely with just the use of the acronyms presented in figure 1.*

Thanks. It will be a good suggestion for well understanding.