Comment on essd-2022-236
Anonymous Referee #2

In this work the authors describe a new product of global subsurface salinity at a high resolution (0.25°x0.25°) covering 41 vertical levels (in the range 1-2000m), named IAP0.25°. This product is obtained using a Feed Forward Neural Network model designed by the authors, which is trained from several input variables taken from satellite sets and reanalysis to reconstruct the subsurface salinity product. Interpolated in situ observations of salinity profiles has been considered as ground truth to compare reconstruction findings. Finally IAP0.25° is evaluated by comparison with three independent ocean products of salinity.

The overall presentation of the new product, results and evaluation metrics is of high quality, hence in my opinion the manuscript should be considered positively for publication in ESSD. I would suggest a minor revision, mainly because I find that improvements in presentation and some additional comments have to be considered. I give also line by line suggestions to ease revision (to be found in PDF attached).

- The paper is quite long: I find it is possible to shorten some parts by avoiding repetitive sentences or being more concise and direct in some subsections. This is particularly true, for example, for the Introduction. I believe that shortening the manuscript would aid the overall readability, hence facilitating the choice of using the authors’ dataset.

- The link of the IAP0.25° DOI should be given for the English version of the website page. Indeed you end up in the Chinese one and when you switch to English you are brought back to the home page, which is confusing. In the website the dataset is told to cover 0-2000m instead of 1-2000m (which is correctly reported in the manuscript and seen from the netcdf downloaded)
- The FFNN model description needs some additional details. In general the authors have fully described data and reconstruction and evaluation, but less attention has been paid in motivating the NN choice and structure. I believe that adding this kind of comments would aid in understanding the background ratio.

- Understanding which input mostly influences the salinity reconstruction and causes greater propagation error would be very interesting in this work, and in my opinion would enhance completeness of the presentation (this is stated as a future step in the Summary section, hence to be considered only as a suggestion).

- In several points some statements sound very vague or too general (see line by line comments hereafter). I suggest to be more precise. For example the authors could revise how they refer to machine learning in a vague way: it might be more interesting to focus on neural networks only, since this is the model choice for this study.

Please also note the supplement to this comment: https://essd.copernicus.org/preprints/essd-2022-236/essd-2022-236-RC2-supplement.pdf