

Biogeosciences Discuss., referee comment RC1  
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## Comment on bg-2021-224

Anna Denvil-Sommer (Referee)

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Referee comment on "Reconstruction of global surface ocean  $p\text{CO}_2$  using region-specific predictors based on a stepwise FFNN regression algorithm" by Guorong Zhong et al., Biogeosciences Discuss., <https://doi.org/10.5194/bg-2021-224-RC1>, 2021

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The authors developed a new ML approach to reconstruct global surface ocean  $p\text{CO}_2$  that considers an impact of different predictors in different ocean regions. Based on Self-Organizing Map method authors defined 11 biogeochemical provinces. A stepwise FFNN regression algorithm was applied to each of these provinces to establish a set of predictors that are highly responsible for  $p\text{CO}_2$  variability in considered province. Based on selected predictors and analysis of FFNN size (number of neurons) a monthly  $1^\circ \times 1^\circ$  surface ocean  $p\text{CO}_2$  product from 1992 to 2019 was constructed. The results show a good agreement with validation data and independent observations.

I found this work well-organized and easy to read. It was interesting to see new predictors (phosphate, nitrate, silicate, dissolved oxygen) and their role in  $p\text{CO}_2$  variability. The authors presented important results for the Indian Ocean where due to the lack of observations different methods show their disagreements.

Please find in the attachment several points that need to be clarified before publication.

Please also note the supplement to this comment:

<https://bg.copernicus.org/preprints/bg-2021-224/bg-2021-224-RC1-supplement.pdf>