

Interactive comment on “A uniform $p\text{CO}_2$ climatology combining open and coastal oceans” by Peter Landschützer et al.

Anonymous Referee #2

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The reviewer enjoyed this article very much because the authors described how they merged open and coastal ocean $p\text{CO}_2$ mapped climatology. The reviewer also observed that writing nature is very clear and good and procedures that they did are very clearly described. It is however the reviewer would like to suggest some to improve this article, therefore this article can be published ESSD after minor revision as stated below.

1, Page 4 line 4- On the data treatment about the overlapping area: The authors defined the open region and the coastal region as “covering broadly the open ocean at a distance of $1^\circ\text{U}\grave{\text{e}}$ off the coast and, the second dataset, by Laruelle et al. (2017), covering the coastal domain plus the adjacent open ocean up until 400km away from the shoreline”. And in page 6 line 2 the authors stated “landward limit of the NNopen

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is located on average at around $1^\circ\text{U}\grave{\text{e}}$ (or roughly 100km) offshore”. As the authors know 1 degree latitude is almost 110.6 km to 111.7 km but 1 degree longitude depends on latitude and varied from 111.2 km to zero. Therefore the authors should make clear how they define and treat the data as the open ocean. 2, page 7. Figure 3 is important to understand how the authors merged the open ocean product and the coastal region product. Therefore it might better to enlarge this figure 3. The reviewer also suggests adding a numerical table to show an example of how they merged. 3, page 10 In the Figure 5, the maximum of a color bar of mismatch percent means that clear red indicates exceed 10 %. The reviewer suggests extending this color bar at least 15 % or 20 % to clearly show the regions where the mismatch is large because a smaller mismatch region does not need to highlight but a larger mismatch region should be highlighted. 4, Page 14 line 3. The authors discussed about Sea of Japan. It is however this region is a marginal sea and it not appropriate to compare NNopen and NNcoast here because the Sea of Japan might be included into coastal region following 400 km definition from the Japanese coast and Korean/Russian coast. Furthermore, there are probably no observed data at the Korean/Russian side based on Figure 9 (c). Therefore it is better to delete this part from this article. 5, Figure 6,7,8,9,10,11,12: In (d)(e)(f) of these 7 figures, it is a little bit difficult to see the differences. Especially to distinguish difference zero region and no data region because the authors assigned no fill to both regions. Please re-draw these figures. 6, P21 line 19- The authors stated that “Despite the lack of seasonal observations along the West coast of Australia, both products agree well with regards to the seasonal cycle and differences stay within of $8\text{-}10\mu\text{atm}$ between the different products.”. The reviewer observed in figure 13 that in these three regions NNopen and NNcosat products showed a minimum or a maximum although there are no observed data at the time of a minimum or a maximum—eg. a minimum in September on the west coast of Australia. The reviewer cannot understand how NNopen and NNcosat products there were produced and showed a minimum/maximum. Please explain this. 7, Page 21 line 17- The authors stated that “Therefore, the combined $p\text{CO}_2$ climatology is not only a step forward in including the

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full oceanic domain with all its complexity into carbon budget analyses, but also help identify areas where additional continuous observations are critically needed to close current knowledge gaps.”. The reviewer completely agree this statement and would like to suggest to add some recommendations explicitly from the authors to the community about areas where additional continuous observations are critically needed to close current knowledge gaps. If the authors do so, the contribution of this article to the community will increase much. End of comments.

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