

Earth Syst. Sci. Data Discuss., referee comment RC3  
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## Comment on **essd-2021-328**

Anonymous Referee #3

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Referee comment on "A monthly surface  $p\text{CO}_2$  product for the California Current Large Marine Ecosystem" by Jonathan D. Sharp et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2021-328-RC3>, 2022

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### **general comments**

The manuscript applies a machine-learning technique to a surface  $p\text{CO}_2$  data set in order to fill the gaps of the data set. The resulting data product is assessed at multiple levels, against field data and similar data products: its uncertainties are determined, its vulnerabilities are discussed, it is compared to other data products, its features are described, as well as its effect on the flux calculations.

Overall, the article is of very high quality. The subject is current and of high importance in our current state of the climate. It is the result of a great amount of work, well thought out and very clearly presented.

The methodology is very sound. the authors properly selected, processed and referenced their data. The machine learning method is clearly described. Their evaluation of the model selected is thorough and proper, as detailed above.

The visualization of the data and the product is sufficient and clear for the most part (see one specific comment).

I also think that the separation of material between the main text and the appendices is appropriate.

Lastly, the manuscript is well written, clear and concise and does a good job at explaining complex concepts.

I only have a few minor comments, I leave it up to the authors whether they want to take the few suggestions below into consideration.

### **specific comments**

- On line 117, the authors mention that they back calculated the pCO<sub>2</sub> from fCO<sub>2</sub> values. I am wondering why since the correction is small and would not affect the air-sea difference?

- around line 120, the authors mention the fact that SST and SSS are not really surface values, due to intake depths. At the same time, I think it is also important to note that these data have not been QC'd.

- The authors assess the effect of data availability on the model (section 2.6) and the effect of sporadic sampling on the coastal flux estimates. It would have been interesting to assess the sensitivity of the model to entire cruises, which would give a realistic idea of cruise data dependence.

- In figure 8, the comparison of the SeaFlux and RFR-CCS products would be better served by plotting the difference between the 2. As I said, just a suggestion.

### **technical corrections**

- line 516: replace "Also show.." by "Also shown..."