

Reference for Interannual driver of the seasonal cycle of CO₂ fluxes in the Southern Ocean

Luke Gregor, Schalk Kok, and Pedro M. S. Monteiro

This paper is much improved and I thank the authors for considering each of the concerns and recommendations of the first-round reviewers. I think with some minor revisions, this paper will be ready for publication and an excellent contribution to the field. Below are a few comments and suggestions. Also, the included line numbers seem to not extend past 100 before starting again from 00 so I include page and line numbers in order to help locate my references.

I think that Figure 2 is very clear to help the reader visualize the products described here. Figure 2d is specifically interesting. However, it should be considered that the amount of area covered by the summer MIZ region is different from the winter MIZ region. When calculating the standard deviation you need to account for that.

Figure 3: The ice mask varies by season in this figure but I don't understand what the source of the mask is. The SOM-FFN product specifically has the same coverage through all seasons I know. Is the mask just the regions where all 3 ensemble members have values for that season? I could see that the chosen MLD or Chl product input could limit this coverage during certain seasons, but just making it clear where that comes from would be helpful. Also, you could consider not showing the MIZ region all together since you state on Page 9, in line 21 that you are excluding it from the paper.

Throughout the manuscript, I strongly suggest you take care when using the word "data" to describe the output from these machine learning methods. Someone not as familiar with the topic could be led to believe we actually have observations everywhere that you show (for example on Page 11, line 84).

Lastly, in the synthesis, it should be noted that this shorter timeframe could bias/limit the results presented here and only with increased timeseries of not only pCO₂ but also these drivers (and the need for continued sustained satellite observations) will this work be validated and improved upon.