

Review #2; RC2

Dear anonymous referee #2,

thank you for your work! As you will see in the point-by-point responses below, all of your remarks make sense to us. We are especially grateful for pointing us to additional recent literature in such a constructive way.

Yours sincerely,
the authors

Point-by-point responses:

Pg. 2, Lines 5-7: I would cite more recent studies here and include recent analyses of observations. Up to the mid 2000s there is evidence from models (e.g., Le Quéré et al., 2007; Lovenduski et al., 2007) and observations (please cite Landschützer et al., 2015) that Southern Ocean carbon uptake may have slowed relative to the expected increase due to the increase in atmospheric CO₂. More recent observational studies (please cite Landschützer et al., 2015; Munro et al., 2015; and Xue et al., 2015) suggest that the sink may have strengthened over the last decade.

-A: Thanks - we will add the respective information/references to the revised version of the manuscript.

Pg. 2, Line 8: I would say something more general like the “the link between variability in surface winds and Southern Ocean carbon uptake remains inconclusive”

-A: Agreed - will be changed in the revised version of the manuscript.

Pg. 2, Lines 16-22: I would also mention current observational/model studies that have examined carbon uptake associated with mesoscale eddies within the Southern Ocean (please cite Song et al., 2016). This paper includes an analysis of the Drake Passage Timeseries which represents the densest dataset of pCO₂ observations within the ACC. Observations are compared to results from a high-resolution (approximately 0.1 degree) simulation of the Southern Ocean region surrounding the Drake Passage. Both observations and model output indicate how a shifting balance of physical and biogeochemical processes drive air-sea carbon flux during different seasons and gives important context to the complexity of the topic presented here.

-A: Agreed - we will add the respective information/references to the revised version of the manuscript.

Figures: Fig. 7 is the most important in the paper particularly Fig. 7c. I think it would be helpful to include a Table summarizing these results with the linear rate of decrease in C uptake with uncertainty over the 50 years of

increased winds. Alternatively, you could present the difference in C uptake with uncertainty between the last twenty years of spin-up and the last five or ten years of increase winds (i.e., years 46-50 or 41-50).

-A: This is in-line with recommendations/suggestions from the other reviewer and makes sense to us. We will add a table with the respective information to the manuscript.

Figs. 8-11 might be more appropriate in a supplemental information section if allowed so that the reader focuses on the figures most important to the overall story.

-A: We will explore this option.

TECHNICAL COMMENTS:

Pg. 2, Line 2 ...

-A: We will apply all your corrections in the revised version of the manuscript. Thank you for combing through so thoroughly.