

I am very thankful to Dr. Siv Lauvset for her two constructive and very helpful evaluations of the manuscript, which have strongly improved its quality. Below, I have addressed the points that were raised by Dr. Lauvset in the second review round point by point. The reviewer's text is shown in black and my responses in blue.

Reviewer 1: Dr. Siv Lauvset

The author has revised the manuscript according to my first review, and the revised version reads very well and is ready for publication. I still think some of the figures are hard to interpret due to the choice of colors, but I respect the author's desire to align with the IPCC color scheme. I only have a few technical comments (detailed below).

Response: Thank you for your positive and constructive evaluation of the manuscript.

Line 115: It is unclear whether the "robustness of drivers" refers to the robustness of the drivers themselves, or the robustness of determining what the drivers are. Please clarify.

Response: For clarification the sentence was changed in the revised manuscript as follows:

"The long time-period with different climate states in each model gives ample material to perform statistical analyses and the different future scenarios allow to test how robustly potential drivers predict the decadal variability of the ocean carbon sink under continuously rising and under strongly decreasing carbon emission trajectories."

Line 125: Replace "thus" with "this"

Response: Changed as suggested.

Line 153-155: The sentence is incomplete.

Response: The two last words of the sentence were removed to correct the sentence. It now reads:

"This reduction in the difference in the magnitude of the carbon sink also reduces differences between the magnitude of trends and slightly improves the relationships found here."

Line 155: replace "would" with "are"

Response: Changed as suggested.

Figure 2: In the caption it says that green shading indicate the 1990s and 1940s. The correct is that they indicate the 1920s and 1940s.

Response: Changed as suggested.

Line 335: move "large" after "five"

Response: Changed as suggested.

Line 349: Misspelling - should be SSP1-2.6

Response: Changed as suggested.