

Columbia University

IN THE CITY OF NEW YORK
LAMONT-DOHERTY EARTH OBSERVATORY

March 25, 2021

Dear Associate Editor Fortunat Joos –

Thank you for noting the need for these additional corrections. We address each one as follows:

1) Line 2: It is incorrect to say “UNFCC Paris Agreement, committing to mitigate global anthropogenic carbon emissions so as to limit global mean temperature increase to no more than 1.5_C.” Please see the Paris Agreement and change the text accordingly.

We have revised this to read “Nearly every nation has signed the UNFCC Paris Agreement, committing to mitigate anthropogenic carbon emissions so as to limit global mean temperature increase to well below 2°C compared to pre-industrial, and to pursue efforts to limit the increase to 1.5°C.”

2) Line 450: “Cwarm only accounts for the impact of warming on solubility “. In my understanding, this should read here and elsewhere (e.g., in the caption of Fig. 5) in the MS: “Cwarm only account for the impact of warming on solubility and inorganic carbonate chemistry” as chemical equilibrium constants also change with temperature.

Yes, this is correct. We have changed “solubility” to “solubility and inorganic carbonate chemistry” throughout.

3) Fig. 5: The present coloring is inconsistent with the attribution presented in Tab. 1. Please color the difference between the run with constant chemical capacity (C_{ccc}) and the historical scaling always by light green. Now this difference, denoting the “transport effect” according to Tab. 1 is colored by light blue if the “transport effect” is positive. As evident in Fig. 5, the “transport effect” as determined with the IRF model is positive under RCP8.5 and also partly positive under the other two scenarios. Please make the color scheme in Fig. 5 consistent with the attribution as described in the main text and in Tab. 1 and with the text on line 389 to 392.

Yes, we agree that section 2.4 and Figure 5 were not consistent. Instead of changing the figure, we have decided that it is clearer to revise section 2.5 to clarify that we can define $C_{transport}$ only when the sum of the CESM emulation (C_{total}) and the warming and chemistry effects remain less than the historical scaling. Otherwise, the upper bound on potential uptake by the ocean is simply the no chemistry change, no warming run (C_{ccc}). We have made other minor edits throughout the text to integrate this improved presentation.

4) “..transport to begin to play a role after 2060” suggest to rewrite to “..transport effect to begin to play a role after 2060” and similar on line 561

Thank you, we have made this change on both lines.

Thank you again for your careful attention to this manuscript.

Sincerely,



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Sean Ridge