Author response to Topic Editor comments, and changes to the manuscript

March 2025

The line numbers we refer to in this response correspond to the latest revised version of the manuscript.

Comments from Sarah Arndt (Topic editor)

You estimate alkalinity based on the carbonate, borate and water self-ionisation alkalinity (CBW). This is fine for oxygenated oceans, but inaccurate under anoxic/euxinic conditions because this approach neglects the contribution of TH2S. Since the model is also suitable for paleoclimate simulations, I suggest that you highlight this limitation in the appropriate section so that future users are aware.

We have added two sentences, new lines 139-143 : It is also important to note that, despite these improvements, our treatment still omits certain chemical species that may become relevant under specific conditions. For instance, the contributions of H_2S and HS^- to alkalinity are non-negligible in anoxic or euxinic environments (Xu et al. 2017).

References

Xu, Y.-Y., D. Pierrot, and W.-J. Cai (2017). "Ocean carbonate system computation for anoxic waters using an updated CO2SYS program". In: *Marine Chemistry*. SI: Honoring Frank Millero 195, pp. 90–93. DOI: `10.1016/j.marchem.2017.07.002`.