

Ocean Sci. Discuss., referee comment RC2
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Comment on os-2022-19

Anonymous Referee #2

Referee comment on "The role of tides and sea ice on the carbonate chemistry in a coastal polynya in the south-eastern Weddell Sea" by Elise Sayana Droste et al., Ocean Sci. Discuss., <https://doi.org/10.5194/os-2022-19-RC2>, 2022

This study presents physical and biogeochemical measurements in a polynya and discusses variability and controlling factors during a complete tidal cycle in 2 different years in the eastern Weddell Sea. The data and discussions include using numerical output from a tidal model and considerations of snapshot sampling that may lead to biases and are an important contribution to marine carbonate chemistry, biogeochemical cycling and air-sea CO₂ uptake in dynamic environments. The biogeochemical focus is DIC and TA and CO₂ fluxes in the context of sea ice and tides. Calcium carbonate saturation for both aragonite and calcite are mentioned in the appendix figures but not really in the text. Some additional text in the Introduction and Methods is required to show how these variables were calculated, what they mean for these coastal polynya system and would put the results into greater context with regards the organisms found here. It would also be helpful to include more discussion of and reference to the theoretical lines drawn in Figure 5, whereby a short description of key processes that drive variability in the carbonate system in the Introduction would improve the understanding. Figure 3 green markers in panel A are difficult to see. Figure D1 panels C and D descriptions are reversed in the caption. Figure E1 interpretation would be assisted by marking depths of discrete samples in panels C and D to better compare to higher vertical resolution in panels A and B. There is assumption that the interpretation of biogeochemical data from the discrete samples is reliable as the physical variables from the high resolution CTD data, however additional processes such as primary production/respiration, location of a deep Chl maximum... would imprint additional variability particularly in the surface layer that is not captured by changing salinity and temperature (water mass) interactions. A comment in the text to consider this and consider adding references to support the statement that would complement the discussion. Figure G1 determining the difference between red dashed and dotted lines was difficult, perhaps a more striking difference would assist here (e.g. different colours). Aragonite saturation is mentioned here and would benefit from an introduction in the main text in terms of the definition and how it is determined, and relevance of the value depicted by the red line here, low value towards 1 relevant for calcifying organisms? Figure G2 calcite saturation is shown here, check consistency with Figure G1 and include definitions and how they are determined in the text.