Comment on os-2022-19
Anonymous Referee #2

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 CO$_2$ uptake in dynamic environments. The biogeochemical focus is DIC and TA and
CO$_2$ 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
calculifying organisms? Figure G2 calcite saturation is shown here, check consistency with
Figure G1 and include definitions and how they are determined in the text.