Ocean Science Discussions

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Comment on os-2022-13

Anonymous Referee #2

Referee comment on "Hydrography, circulation, and response to atmospheric forcing in the vicinity of the central Getz Ice Shelf, Amundsen Sea, Antarctica" by Vår Dundas et al., Ocean Sci. Discuss., https://doi.org/10.5194/os-2022-13-RC2, 2022

The authors conducted a very detailed and comprehensive analysis of the mooring data in front of one of Getz Ice Shelf fronts. They combine the mooring data, many TS profiles collected by seals' tags and CTD, with results from a regional model and ERA5 reanalysis atmospheric forcing. The authors use statistical methods to link the temporal variation of the hydrographic properties in the mooring site to the wind stress near the shelf break.

This manuscript is well-written and nicely structured with a logical flow that is easy to follow. The authors include all data available in this region to produce a thorough work, which will be very valuable for general readers – as most of us read little about this ice shelf due to the limited data.

Major comments

1. The authors did impressively thorough work, but I think not all of your work should be included in this manuscript. To my understanding, the key findings of this manuscript are the comparison between this ice-shelf front to other ice-shelf fronts nearby in the Amundsen Sea, the reason why they are different (from your manuscript, mainly bathymetry), and the mechanisms driving the temporal variation of the hydrographic properties (from your manuscript, mainly wind stress). However, this manuscript focuses a lot on other minor details, e.g.,

- "The correlation is predominantly negative, but shorter periods of positive correlation occur, most notably during summer 2017" (line 212), which is not related to any of your key findings
- The green diamonds in Fig. 4abd for the strong cooling events found in GW6f, which are not significant in your mooring observations and not mentioned afterwards

- The authors also mentioned the advection time from the shelf break to the ice front several times, which is again, not related to any of your key findings

Those details make this study very comprehensive, but at the same time, they distract the readers from the main story.

2. I think the authors should focus on *explaining* the temporal variation of data with the physics behind it, instead of *describing* the variation. For example,

- In lines 199-213, the authors describe every tiny anomaly in the line figures, without mentioning why the correlations are generally less significant in summer than in winter. Provided that no significant seasonality in TS was observed in the mooring site, the seasonality of the significance of the correlations can be a fair scientific subject that is within the scope of this study
- In the model results section, the authors describe the shape of the lines in Fig. 7 panel by panel, without giving a *convincing* explanation (you hypothesise some mechanisms but do not explore further – you may also want to leave those hypotheses that lack evidence in future work) of how they are connected to the hydrography at the mooring site

I think the authors should remove those descriptive senesces that are less important so that readers can focus on the new data and the key findings of this study.

Technical corrections

Line 106-107, "We note that trough openings are generally deeper in the regional model than in the IBSCO bathymetry." I think the authors mean "deeper in the regional model than in the observations (e.g. multibeam survey)"? - as the model uses IBSCO?

Line 221, Fig. 7c, I think you mean Fig. 7d

Line 230, Fig. 7a, I think you mean Fig. 7a,b,c

Fig. 7d, in the legend, “current at V_NE” might be removed?

Fig. 7e, (you might do it on purpose?) but the thick black line for the 12-month meaning average is missing

Line 251, "Peaks that occur at all three locations tend to first occur at V_NE, then at V_CN, and finally at GC6…" I do not see that in the figure? For me, the most striking peak was in 2007, and the peaks arrived at different locations in the opposite sequence.

Line 355, the comma after "Ekman pumping anomaly" is missing