

The Cryosphere Discuss., referee comment RC1
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Comment on tc-2022-126

Anonymous Referee #1

Referee comment on "Slowdown of Shirase Glacier, East Antarctica, caused by strengthening alongshore winds" by Bertie W. J. Miles et al., The Cryosphere Discuss., <https://doi.org/10.5194/tc-2022-126-RC1>, 2022

Review comments for "Slowdown of Shirase Glacier caused by strengthening alongshore winds" by Miles et al. (tc-2022-126)

General comments: This study estimated a time series of ice flow speed of Shirase Glacier for 47 years (from the early 1970s to the present) and showed that Shirase Glacier had experienced a long-term slowdown. While many Antarctic ice sheets/glaciers are losing their mass, the behavior of the glacier is very unique among Antarctic ice sheets/glaciers. The authors have collected several different datasets (position and thickness of ice sheets/glaciers, wind speeds, ice-shelf basal melt rate, and so on) and integrated them into their conclusion. The main conclusion of this study is that alongshore easterly wind plays an important role in regulating the glacier dynamics (speed and thickness) through the wind-driven CDW transport onto the continental shelf regions. Although I have put several comments below, the paper is nicely written and prepared, and thus I recommend publishing in The Cryosphere.

1. Abstract and Introduction.

Sentences about the mean field and the temporal variability are mixed up. It is very confusing. The present form gave me (readers) an impression that it is very natural for warm ice shelves to experience increases in ice-shelf basal melting over decades (and future). As this paper's subject, I think it is not obvious.

2. Figure 1

Please add information of longitude and latitude.

3. L97: ">10 km" Is the inequality sign orientation correct?

4. L147 In my reading of the reference, they used ERA-Interim (not ERA5) to force the ocean model.

5. L162: I don't understand the equation. Alongshore wind can be calculated from the inner product between the defined unit vector and wind vector.

6. L170: The expression "extent" should be "length" if the unit of some figures uses "km"/"m/a".

7 Figure2e: Which side is grounded/floated?8. L189-203: How did you calculate the percentages (8% and 4%)? What is the reference speed?

9. Figure3

Vertical axes for "Ice speeds" and "Alongshore Wind Speed" should be exchanged to place the explanatory variables on the right side. Please add short tic marks showing 1-year interval on the horizontal axis. Since data for the 1960s and 1970s are available in ERA5, please extend the black line for wind speed.

10. Section4.2

It would be helpful for readers to insert a figure showing the linear trend of wind (e.g., 1979-2020 or the full length of your analysis 1960-2020), like Fig 2a in Hazel & Stewart (2019).

11. 331-335: The sentence is just speculation and is unsuitable in conclusion, although it is ok in Discussion (4.2).

12. I feel that some figures/panes showing precipitation are missing. Please consider adding the panel in Fig. 3.