Review of "Understanding the drivers of near-surface winds in Adélie Land, East Antarctica", by Davrinche et al. (egusphere-2023-2045)

General

In this clearly-written paper, the authors use output from a run of the MAR model to study the drivers of winds along a well-instrumented transect in East Antarctica. They use a well-established methodology due to van den Broeke and van Lipzig (2003) to decompose the pressure gradient force into large-scale, thermal wind and katabatic components and then examine how variations in each component contribute to the spatial variability of the near-surface wind and its temporal variability from daily to seasonal timescales. Previous studies of winds in this region have focussed on katabatic driving but this study reveals the importance of forcing by large-scale pressure gradients, particularly on shorter timescales. Although the study focuses on a single transect, the results are likely to hold for all of East Antarctica between around 0 and 150°E, where topography and synoptic meteorology are similar to those in the region studied here. The paper is a useful contribution to our understanding of the meteorology and climatology of Antarctica and I recommend that it should be published after minor revision that takes into account the points listed below.

Specific points

1. L48: "Interdiurnal" is not very clear. Maybe "...the variability of these winds on daily to monthly time scales"?

2. L65: Replace "…and fast easterlies on the shore" with "…and strong easterlies along the coast".

3. Figure 1: Is the spacing of the dots related to the model grid?

4. L72-73: Do you know why the model correlates better with tower data?

5. L94: "…a horizontal resolution…"

6. L111: Capitalise "Near" at start of second sentence.

7. L129-130: Have you investigated how sensitive your results are to the various parameters used to decompose the potential temperature profile into its "background" and "near-surface" components? Demonstrating that your results are insensitive to the exact choice of, e.g. the height range for calculating θ_0 would add confidence to your findings.

8. Figure 3: Please include the station identifier in the legend for each panel in column (a) to help the reader.

9. L198: "This includes a good representation of the seasonal cycle (Fig. 3b) …". Actually, it looks as if MAR significantly overestimates the annual cycle at the D17 tower.

10. Table 3: You only show magnitudes of the accelerations here. Have you looked at the x- and y-components separately and, in particular, investigated whether (within expected uncertainty) they sum to zero, indicating closure of the momentum budget. Again, this would add confidence to your findings.

11. L271-272: Why have you excluded ADVH from the list of terms studied? From Table 3, it looks as if it is locally and seasonally as important as some other terms.

12. L276: “…spatial standard deviation…”. Is this the standard deviation of all transect gridpoints for the mean July profile? Is this a useful metric - I would have thought that the range tells you everything that you want to convey?

13. L277: Maybe "...the product of the surface slope and the potential temperature deficit..."?

14: L284: Maybe "...inland of the coast", rather than “…from the coast” to avoid ambiguity?

15: L288: Figs. 7a and 7b referred to in wrong order.

16: L292-293: Maybe replace “This weaker mean intensity is due to the changing location of synoptic perturbations.” with "However, the magnitude of the large-scale acceleration term varies greatly with a changing synoptic situation."

17: L323: ”… EITHER the seasonal variability of the total wind speed, OR…”

18: L416: Maybe “might not…” rather than “would not…”?