1. Line 12: …physical features and dynamical processes….?

Since I also examine thermodynamic processes, I would really need to say “physical features, and dynamic and thermodynamic processes”, which is wordy. To avoid this wordiness, to remain consistent with the title of the manuscript, and to avoid changing numerous instances of “features and processes” throughout the manuscript, I would prefer to just keep “features and processes” as is.

2. Line 14: constructing instead of conducting?

Good catch. Yes, “constructing” is preferred over “conducting”. This change has been implemented on L14 of manuscript v2.

3. Lines 22-26: Split into two sentences?

I split the sentence into two on L22–27 of manuscript v2. To stay within the 250-word limit, I changed “The ESA of AC16” to the “The ESA” on L22 and L25 of manuscript v2.

4. Line 85: …low forecast intensity skill…?

Since I used the wording “low forecast skill of intensity” in Biernat et al. (2023), I rather keep the wording the same for consistency.

5. Line 90: Does EGR need a reference?

I think it would be good to have a reference for EGR. I added the reference Hoskins and Valdes (1990) on L91 of manuscript v2.

6. Line 156: Link back to my comment on line 12 about features and processes.

Based on my response to your first comment, I prefer to keep the wording as “features and processes” for consistency.

7. Indicate number of cyclone tracks plotted in Fig. 1? Since all the tracks are red I am having trouble distinguishing between the individual tracks. I don’t want to lose “track” of things….

The label “*N* = 13” on the upper-right hand corner of Fig. 1 is intended to indicate the number of strong low-skill AC tracks.

8. Line 164 and Fig. 2a: What prompted the cyclonic storm track loop after 12-15 Aug immediately after peak intensity was reached?

The following is my speculation about what may have prompted the cyclonic storm track loop. During 0000 UTC 15–1200 UTC 16 August, there appears to possibly be cyclonic wave breaking over the Arctic, as suggested by the evolution of the amplifying upper-tropospheric ridge downstream of AC16 (Figs. 10c–f). The TPV that AC16 becomes vertically superposed with moves along the edge of the upper-tropospheric ridge as the apparent cyclonic wave breaking is occurring (Figs. 10c–f), which may contribute to the cyclonic loop of AC16.

9. Figure 3: It’s hard to distinguish between the observed cyclone position in the ERA-5 analyses from the ensemble cyclone forecast positions. Use a circle with an X instead of a solid circle to connote the observed cyclone position?

The position of ERA5 is now placed on top of the colored circles and is now marked by an “X” within a black circle in Fig. 3. The Fig. 3 caption has been adjusted accordingly on L48 of the table and figures document and on L734 of manuscript v2.

10. Lines 250-251: Can we be more precise about the structure of these upper tropospheric maxima than just saying that they are likely TPV signatures?

I did add the following text after “signatures of TPVs” on L252–253 of manuscript v2: “, given that TPVs are characterized by a cyclonic PV anomaly and are common features in the Arctic (e.g., Cavallo and Hakim 2010). This is the main point I want to make about the structure of the upper-level PV maximum as I mainly want to focus on the evolution of the maxima and the interaction between these maxima and the strong low-skill ACs, which is discussed in L246–286 of manuscript v2.

11. Line 240: What so you make of the zonally elongated EGR pathway upstream of the AC in Fig. 5?

Figs. 4a–d show a zonally elongated region of strong lower-to-midtropospheric baroclinicity between relatively cold air located upstream of the composite AC and relatively warm air to the south and east of the relatively cold air. The presence of the relatively warm Eurasian landmass south of many of the strong low-skill ACs (Fig. 1) that track over the colder Arctic Ocean may contribute to the zonally elongated region of strong lower-to-midtropospheric baroclinicity (Figs. 4a–d) and the corresponding zonally elongated region of relative strong EGR (Figs. 5a–d). The zonally elongated region of strong lower-to-midtropospheric baroclinicity and corresponding zonally elongated region of relatively strong EGR may also reflect cold fronts extending away from the strong low-skill ACs.

12. Lines 227-228: Should this text be a parenthetical aside?

I now make this text a parenthetical aside on L228–229 of manuscript v2.

13. Fig. 4a: Specify wind speed level for clarity?

The Fig. 4 caption currently specifies that the wind speed is at 300 hPa.

14. Lines 262-264: How is this different from the normal occlusion process whereby a surface low eventually becomes situated directly below the upper-level cutoff cyclone?

A study by Vessey et al. (2022) (referenced in the manuscript) composite the 100 most intense summer ACs and 100 most intense North Atlantic extratropical cyclones. They indicate that the ACs develop an axi-symmetric cold core structure around the time of peak intensity, which is when TPVs often become vertically superposed with the ACs. They indicate that the North Atlantic extratropical cyclones undergo occlusion in the sense that cold air wraps around warmer air at the cyclone center. They indicate that there is a much lower tropopause over ACs compared to the North Atlantic extratropical cyclones, suggesting that ACs are more strongly influenced by the stratosphere and TPVs compared to the North Atlantic extratropical cyclones. The lower tropopause over ACs and the axi-symmetric cold core structure of ACs may contribute to ACs having a longer lifetime after reaching peak intensity compared to North Atlantic extratropical cyclones. Therefore, although ACs and midlatitude cyclones may both become situated below an upper-level cyclone, ACs are more likely to be situated beneath a TPV with a lower tropopause, which may contribute to the different evolution.

15. Lines 314-316: ….as a representative strong low-skill AC?

I now state “which is a representative strong low-skill AC” when referring to AC16 on L318 of manuscript v2. I similarly changed “selected” to “representative” on L16 and L99 of manuscript v2 for consistency.

16. Fig. 6: What role is negative PV advection by the irrotational wind play in the grand scheme of things?

I have not looked deeply into the role of negative PV advection by the irrotational wind, but my speculation is that negative PV advection by the irrotational wind likely at least contributes to upper-tropospheric ridge building downstream of the strong low-skill ACs (Figs. 6a–d).

17. Lines 295-297: How would you respond if a referee were to ask you whether you would expect a similar or a different vertical structure for high-skill ACs?

I would speculate that features and processes that influence the evolution of low-skill ACs may also influence the evolution of high-skill ACs, but that these features and processes would tend to be weaker. I would speculate that there would tend to be weaker lower-to-midtropospheric baroclinicity, smaller lower-to-midtropospheric EGR, weaker TPVs, weaker IVT corridors, and smaller latent heating for high-skill ACs compared to low-skill ACs. I would also speculate that high-skill ACs would tend to be weaker, have weaker vertical interactions with TPVs, and have a weaker circulation throughout the troposphere compared to low-skill ACs. In Biernat et al. (2023), we showed that high-skill ACs during low-skill periods tend to be statistically significantly weaker, and tend to be located in regions of statistically significantly weaker lower-tropospheric baroclinicity, statistically significantly smaller lower-to-midtropospheric EGR, statistically significantly weaker IVT, and statistically significantly smaller latent heating, compared to low-skill ACs during low-skill periods.

18. Paragraph ending on line 284. This is a meaty paragraph. Curious to learn why you are reluctant to say outright that the Acs in question are becoming more equivalent barotropic? Construct a Lorenzian for additional proof?energy diagrsamenergy

Thinking more about this, I do think I can sufficiently say outright that the strong low-skill ACs are becoming more equivalent barotropic in structure. Therefore, I changed “possibly becoming more equivalent barotropic in structure” to “becoming more equivalent barotropic in structure” on L270–271 and L273 of manuscript v2.

19. Likewise in Fig. 11, the IVT upstream of the cyclone advances to the south and southeast of the cyclone beginning at T-24 h. How does the evolution of the IVT field with time square with the strength and location of the surface cyclone?

From tlow−24 h onward, AC16 is becoming occluded as it strengthens and reaches peak intensity, and so the warm sector of AC16 and the IVT corridor within the warm sector of AC16 become increasingly displaced from the center of AC16. For example, relatively high IVT values east and southeast of the center of AC16 at tlow−24 h (Fig. 11c) are located farther from the center of AC16 by tlow−12 h (Fig. 11d).

20. Fig. 10: What does it mean that strong divergent outflow associated with the 350-250-hPa irrotational wind pretty much ceases b\after T-24 h?

The ceasing of the strong divergent outflow during tlow−24 h through tlow−12 h (Figs. 10c,d) is likely in part a manifestation of the reduction of latent heating and weakening of the IVT corridor east of AC16 during this period (Figs. 11c,d).

21. Paragraph starting on line 332: How sensitive would your results be to a different value of thickness (e.g., 1000-700-hPa or 1000-300-hPa?).

After plotting 1000–700-hPa thickness and 1000–300hPa thickness, all results concerning the 1000–500-hPa thickness discussed in section 3b are consistent for the aforementioned two thickness fields. For example, the result that “AC16 is not positioned over a thickness minimum during 0000–1200 UTC 16 August” on L352–353 of manuscript v2 is consistent for all three thickness fields.

22. Fig. 12 caption: In the next-to-past sentence in the Fig. 12 caption you reference an accurate intensity forecast. In the last sentence you reference a more accurate intensity prediction. Are you trying to distinguish between prediction and a forecast and, if so, how?

This was an accident. Both sentences are meant to state “more accurate intensity forecast.” Therefore, I changed “prediction” to “forecast” in the last sentence of the Fig. 12 caption on L132 of the table and figures document and on L801 of manuscript v2.

23. Line 394: I am unable to see Iceland on Fig. 12. This is a very busy figure.

I added a label for “Iceland” in Fig. 12a. I added some text to discuss this label on L127 of the table and figures document and on L795–796 of manuscript v2.

24. Lines 526-527: Note that Andrea Lang is now at the University of Wisconsin-Madison.

I have updated Andrea’s affiliation on L528–529 of manuscript v2.