Review- Future changes in the extratropical storm tracks and cyclone intensity, wind speed, and structure

I have reviewed the current manuscript by Matthew D. K. Priestley and Jennifer L. Catto. In this study the authors investigate cyclone-centered composites in an ensemble of 9 CMIP6 simulations, with 4 different climate change scenarios. They investigate changes in cyclone numbers and intensity using different measures, such as changes in maximum vorticity and wind speeds, in summer and winter seasons in both hemispheres. Overall, this is a well-written paper that presents a thorough analysis of future cyclone-related changes. While the results mainly recover previous results from CMIP5 models, it is still important to investigate these changes in the updated CMIP6 data. I therefore think the paper is suitable for publication, after some minor revision.

Comments:

- You suggest that the decrease in the number of cyclones can be understood through the reduced lower tropospheric baroclinicity that is a result of Polar Amplification with global warming. However, if this is true, then why do the number of extreme cyclones increases? If baroclinicity is reduced I would expect the number of extreme cyclones to decrease as well. Also, why is the summer response in the NH different? Polar Amplification also occurs in summer in the NH.

- Lines 201-202: "Furthermore, the amplification of polar temperature in the NH is not projected to be as large in the SH (Fan et al., 2020), further maintaining the mid-latitude baroclinicity." - I don't understand this sentence. The polar amplification is largest in the NH, not in the SH.

- For the intensity calculations that are based on vorticity, you can consider taking the total vorticity (and not the deviation from the large scale flow), to see if results are robust (perhaps some of the changes are associated with changes in the large scale flow?).

- Lines 275-276: "This increased speed, coupled with a strengthening of system wind speeds, may lead to increased wind impacts." Actually, the impact can be smaller if they move faster- it means that the duration or persistence of the storms decreases.

- Your claims about the increase/decrease in propagation speeds- you can calculate these directly from the statistics part of the tracking algorithm, for the mean speed of the cyclones.

- The suggested slowing of the cyclones in JJA is consistent with K. Kornhuber and T. Tamarin-Brodsky 2021 (“Future Changes in Northern Hemisphere Summer Weather Persistence Linked to Projected Arctic Warming”) and other studies suggesting a slow-down of the midlatitude circulation during NH summer, and could be a result of the poleward shift of the large-scale jet.

- The suggested argument about the strengthening of upward vertical velocities and weakening of downward motions is consistent with the findings of O’Gorman et al. 2018 (“Increase in the skewness of extratropical vertical velocities with climate warming: Fully nonlinear simulations versus moist baroclinic instability”) for idealized GCMs, and with T. Tamarin-Brodsky and O. Hadas 2019 (“The Asymmetry of Vertical Velocity in Current and Future Climate”), for cyclones and anticyclones in a comprehensive CMIP5 model. It is related to the increase in dry static stability (influencing the downward motions) vs. the decrease in the “reduced” or “effective” stability which decreases locally in updraft regions due to the effect of moisture.

- Line 460: “...and anticyclonic turning near/at the tropopause.”- where do you see this in the figure?

- The section about the North Atlantic cyclones- I think you should compare, wherever possible, your results to Dolores-Tesillos et a. 2021 (“Future changes in North Atlantic winter cyclones in CESM-LENS. Part I: cyclone intensity, PV anomalies and horizontal wind speed") who performed a similar analysis in a different set of simulations.

- “A large amount of the change in wind speed in the Earth relative framework appears to be due to changes in the propagation speed of cyclones."– again, you can check this directly from the statistics tool for the mean speeds of cyclones.

- “...and instead variables that are less influenced by the large-scale atmospheric state, such as winds or vorticity, are used."- I’m not sure how true it is that the wind field is a variable which is less influenced by the large-scale atmospheric state..

- Figures in general: wherever possible, please make fonts and other marks larger.

- Figure 11 caption: SSP5-95=SSP5-85.