

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

by Priestley M. and Catto J.

General comments:

This manuscript presents an extended analysis of the changes in the intensity of extratropical cyclones applying different metrics in a warming climate using the CMIP6 models. Low, middle and upper wind speeds associated with the extreme cyclones are also investigated.

The highlight of the present study is the vast number of climate models and scenarios. The results confirm with high robustness what previous studies have been hypothesized using idealized models. The frequency of extreme cyclones will increase (except summer in NH) and produce a broad footprint with stronger winds near the surface over the warm region for most of the seasons and hemispheres.

I find the present manuscript well-written, the analysis consistent and the topic of interest to the community of WCD. Therefore, the manuscript should be published. Minor issues have been found that need to be addressed before the manuscript can be published. My detailed comments are found below.

Specific comments:

1) You mentioned that changes in the meridional component play an essential role in the wind response at the upper level. Still, it is not possible to identify it in your figures. Would it be possible to add arrows to your wind anomaly composites? or maybe show changes in the v-component?

2) Differences have been found between the system relative and earth relative composites, which means that the storms will travel faster in NH DJF. Do you know if the increase in the storm's speed is the same at the three different levels? I wonder if the cyclone will tend to tilt as the climate warms.

3) Why will the speed of the cyclone in summer decrease while in winter it will increase in the NH? Can you explain a bit more?

4) Line 283 "*The reduction in wind speeds surrounding the core of the cyclone are likely a result of the reduced cyclone pressure gradient (not shown).*" - A reduction in wind speed is related to a weaker pressure gradient, just by balance, but why will the cyclone pressure gradient be weaker? Do you have an explanation?

5) “Figure 11 shows timeseries of the winter and summer seasons in the NH and SH for the area of the cyclone composite above a fixed threshold of 17 m/s”. - Why did you choose the threshold of 17 m/s?

Technical corrections:

- Can you define SSP and CMIP6? It is easier to read for people who are not familiar with these terms.

- Line 283 “The reduction in wind speeds surrounding the core of the cyclone **are** likely a result of the reduced cyclone pressure gradient (not shown).” Can you show it? is it possible to plot SLP or geopotential height? - “is” instead of “are”

- Line 287 “This furtherweakening suggests **that** (as with the strengthening in the same location in NH DJF) **that** there are changes in cyclone speed, and therefore a slowing down of cyclones in NH JJA in the future” - “that” appears twice

-Line 503 “are absent or smaller in magnitude **that** the EXT cyclones” - “than” instead of “that”

-Line 497 “... from the cyclone centre (Fig. **13c,f**)...” - Fig. 14c,f ?

-Supplement: Figure S3. Composites of cyclone wind speeds at **850 hPa**... - is it at 500 hPa?