

Weather Clim. Dynam. Discuss., referee comment RC1  
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## Comment on wcd-2022-3

Anonymous Referee #1

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Referee comment on "Storm track response to uniform global warming downstream of an idealized sea surface temperature front" by Sebastian Schemm et al., Weather Clim. Dynam. Discuss., <https://doi.org/10.5194/wcd-2022-3-RC1>, 2022

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### Summary

Using an idealized aquaplanet model, the authors investigate the changes of storm track in response to uniform global warming downstream of a midlatitude SST front. They found a local enhancement of eddy kinetic energy (EKE) downstream of SST front, and attribute the EKE enhancement to the internal baroclinic conversion from eddy available potential energy (EAPE). By analyzing the EAPE budget, they further show that the EAPE enhancement downstream of SST front is due to change of baroclinic conversion efficiency. They also provide the response of several life cycle characteristic of extratropical cyclones using tracking algorithm.

### Recommendation

Several prior studies have examined the overall poleward shift of storm track without the presence of diabatic forcing, but less attention has been paid to the local increase of storm track downstream of SST front. I believe this study brings an important contribution to storm track response by considering the local SST-front effect. The results are novel and robust. I thus recommend the authors to perform a minor revision by considering the comments listed below.

Minor comments:

In the abstract, the authors suggest a tripolar pattern of storm track under global warming, with a poleward shift of storm track, enhance EKE downstream of the SST front and a regionally reduced EKE increase at polar latitudes. The local minimum of EKE in polar region in Figure 2 (label 3) is much less obvious than the other two characteristics (labels 1 and 2). Moreover, less attention has been paid to explain this response in the main text. I thus suggest the author to either revise the abstract or add more discussions on the storm track response in the polar region.

Lines 55-60: The sentence is too long and hardly to understand the logic behind it.

Line 84: I don't understand why you use "an otherwise" here, maybe delete that?

Line 90-92: I suggest the author to revise this sentence. Maybe from the perspective of EAPE/EKE budget analysis?

Line 121: remove "the" before "there is no seasonality..."

Lines 123 and 124: the EKE represents eddy kinetic energy. Please add the word "energy"

after “eddy kinetic” in the two places.

Figure 4: It is perhaps better to highlight the key region of conversion efficiency downstream of SST front in Figure 4. This is helpful for the reader to understand that the downstream enhancement of baroclinic conversion is caused by the conversion efficiency instead of baroclinicity or eddy total energy.