

Weather Clim. Dynam. Discuss., community comment CC1  
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## Comment on wcd-2021-4

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Community comment on "Acceleration of tropical cyclones as a proxy for extratropical interactions: synoptic-scale patterns and long-term trends" by Anantha Aiyyer and Terrell Wade, Weather Clim. Dynam. Discuss., <https://doi.org/10.5194/wcd-2021-4-CC1>, 2021

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This is a well-written manuscript, and I find it enjoyable to read. I have no major comments except some suggestions. I hope these suggestions would be helpful for the authors to improve the presentation of their findings.

- Title: This paper covers both the acceleration and deceleration of tropical cyclone motion. It is not clear whether "acceleration" here indicates general changes of motion speed or just an increase of movement speed. It might be helpful to rephrase the title to avoid confusion. A clarification in the abstract and/or main text would also be helpful.
  
- Line 2: "While... has not". This sentence does not appear essential here.
  
- Line 2-4: This sentence probably needs some clarification. What are the interested "synoptic-scale patterns"? Are these patterns related to tropical cyclones or extratropical wave packets? It might also be useful to describe "tangential and curvature components of their (??) acceleration" more clearly.
  
- Line 18: Chan (2005) and references therein provide useful information on this topic.  
- Chan, J. C. (2005). The physics of tropical cyclone motion. *Annu. Rev. Fluid Mech.*, 37, 99-128.
  
- Line 51: Some recent modeling studies present evidence suggesting that changes in extratropical weather could affect TC motion. These studies could help to better motivate this theme of investigation.

- Zhang, G., T. Knutson, and S. Garner, 2019: Impacts of Extratropical Weather Perturbations on Tropical Cyclone Activity: Idealized Sensitivity Experiments with a Regional Atmospheric Model. *Geophys. Res. Lett.*, 46, 14052– 14062.
- Zhang, G., Murakami, H., Knutson, T.R., Mizuta, R. and Yoshida, K., 2020. Tropical cyclone motion in a changing climate. *Science Advances*, 6(17), p.eaaz7610.
- Hassanzadeh, P., Lee, C.Y., Nabizadeh, E., Camargo, S.J., Ma, D. and Yeung, L.Y., 2020. Effects of climate change on the movement of future landfalling Texas tropical cyclones. *Nature communications*, 11(1), pp.1-9.

- Line 86-87: "... remain independent of modeled products to characterize the storms". The classification of recent storms by forecasters is partly based on models. But as recognized later, reanalysis datasets have issues with tropical cyclones, so the IBTrACS is still a reasonable choice.
- Line 100: It would be helpful to conceptually link tangential and curvature changes of storm motion to physical factors (e.g., steering flow).
- Fig. 3: Is it possible to mark the mean vectors and/or tracks of storm motion? This will help to infer how environmental flow affects the storm motion. Also, HGT1000 can be below sea level due to the low central pressure of TCs. It might be more intuitive to use sea-level pressure here. Finally, the values of the colorbar are hard to read because of the small font size.
- Fig. 5: For the acceleration case, it might also be helpful to plot the trough anomalies to support the argument that "tropical cyclone merges with the extratropical stormtrack" (Line 219). After all, trough anomalies are commonly discussed in the context of extratropical storms.
- Line 257: During vortex interactions, a merger usually happens between vorticity anomalies of the same sign. It is a little odd to discuss a merger of positive and negative HGT/vorticity anomalies.
- Section 6 and 7: The discussion is supported by the same figure and probably can be consolidated into one section.
- Section 8: The transition from the discussion of translation speed to the discussion of acceleration is abrupt around Line 320. If this discussion of translation speed is deemed important, it probably should be consolidated with the discussion of Fig. 15 and Table 5 to keep the logic flow smooth. Otherwise, the results between 301 and 319 could be briefly summarized.

- Line 474: A weakening of extratropical cyclone activity is also projected by CMIP models (e.g., Chang 2013).
- Chang, E. K. (2013). CMIP5 projection of significant reduction in extratropical cyclone activity over North America. *Journal of Climate*, 26(24), 9903-9922.
  
- Line 459-461: This part probably can be moved to the beginning of Section 8 to better motivate the trend analysis.