Review of "A storyline-based approach towards changing typhoon intensities over the Pearl River Delta under future conditions using Pseudo-Global Warming" by Olschewski et al.

The authors presented a thorough storyline-based analysis over the Pearl River Delta under future conditions using Pseudo-Global Warming (PGW) modeling techniques. They perturbed the historical initial and boundary conditions obtained from ERA5 reanalysis and handed to the regional model WRF according to the climate change signal projected by the CMIP6 ensemble under SSP5-8.5, in which each of the 16 selected CMIP6 models acted as the basis for an individual storyline of future typhoon intensity. Results indicate a general increase in typhoon intensity across all metrics for six of the seven inspected typhoons. This increase is notably higher for specific storylines, and the projected increase in the extreme values of the inspected metrics significantly exceed the median change of all storylines.

Overall, the manuscript is well-written and well-organized, and is equipped with a large workload and high-quality numerical experiments as key supporting materials. I believe the method is scientifically valid and the results are logical and reasonable. Based on the current phase of the manuscript, if the authors can properly address the following comments, I would recommend accepting it for publication.

Minor Comments

1. The authors utilized CMA and JMA best track data to evaluate the model's performance. Meanwhile, the Hong Kong Observatory (HKO) also provides best track data for tropical cyclones that affect the PRD. Due to Hong Kong's geographical location, HKO's best track data is generally considered to be of high quality for the PRD region. If it does not require a significant amount of extra work, the authors may want to consider comparing their results with HKO's best data in Figures 4 and 5.

2. The CMA best track archives the 2-minute average maximum sustained wind speed at the 10-meter level, while JMA archives 10-minute values. On the other hand, the default output for WRF is the instantaneous wind speed of the grid area mean, which may be related to the integration time step and grid area. It would be helpful if the authors could clarify how they compared these different definitions of wind speed, and whether they used any conversion coefficients.

3. The authors employed spectral nudging to enhance the performance of TC tracks. Although the authors have justified that the nudging operation does not affect the inner core of the simulated typhoon, studies have shown that nudging in perturbed experiments may limit the intensity of TCs (Moon et al. 2018; Li et al. 2024). Therefore, it is a trade-off to turn on nudging to reproduce comparable TC tracks in the PGW experiments. The authors may want to consider discussing this in L250-255.

4. L165: Please give specific reasons for the preference of using grid-cell basis compared to spatial mean.

5. L175-180: Although seven selected typhoon events did not occur in May and June, it is still valuable to fill the 2-month gap in Figure 2 to give a complete picture of summer-time seasonal cycle of global warming signal for readers' reference.

6. L210: The authors have provided a justification for using WRF instead of HWRF. However, it is important to note that the ocean coupling effect, such as cold wake feedback and wind-sea wave interactions, may also impact the intensity of TCs, which cannot be captured by WRF-only simulations (e.g., Mogensen et al. 2017; Magnusson et al. 2019; Li et al. 2022). Therefore, the authors may want to address some of these limitations in their study.

7. L230-235: The authors utilized the Rapid Radiative Transfer Model (RRTM) for longwave radiation and the Dudhia scheme for shortwave radiation in their WRF configuration. To the best of my knowledge, RRTM shortwave scheme is typically used in conjunction with the longwave radiation scheme. Therefore, it would be

beneficial if the authors could provide a justification for why they did not use the RRTM shortwave scheme in their study.

References

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