## General Assessment

The authors have made **substantial and commendable improvements** since the first review. The manuscript is now much clearer, the figures are improved, and several technical explanations have been tightened. I am pleased to say the manuscript is close to being publishable.

There is, however, one remaining area that would benefit from a redrafting of the discussion, rather than simply adding text. This concerns how the manuscript interprets the behaviour of the two rainfall-retrieval relationships and the resulting comparison to rain gauges:

*Revise the discussion to emphasise DSD-driven microphysical interpretation (rather than attenuation) as the main reason the rain rate relationships exhibit different behaviour.*

The improvements made so far are appreciated, and the manuscript now presents the R–KDP derivation clearly. However, the current draft still places **strong emphasis on the attenuation benefits** of R–KDP and does not sufficiently explore the **underlying microphysical reasons** that explain:

- why the externally derived **Z–R** relationship behaves the way it does,
- why the authors' **new R–KDP** relationship performs differently,
- and why surface gauge comparisons differ strongly with altitude.

In particular phrases such as "The radar signal is strongly attenuated, which explains why only the R(kdp) estimator works satisfactorily for these two stations." should be avoided, as the interpretation is much more nuanced than this given the altitude and DSD variations. Since the Z–R relationship is inherited from existing literature, and the R–KDP relationship is developed by the authors, the paper's contribution will be much stronger if the discussion explicitly contrasts the two on a physical basis, rather than mainly operational or attenuation-based grounds.

In particular, the manuscript would benefit from a **light redrafting** to better explain:

- the **vertical evolution of DSDs** in outer tropical-cyclone rainbands (e.g., breakup-dominated layers aloft vs broader DSDs near the surface) as evidenced by the rain gauges at different altitudes (note that the Z-R relationship used is least effective for the two gauges at 2km+ altitude, and works better at lower altitude where Dm would be greater),
- differences in **Dm and Nw** regimes and how these influence **Z ($D^6$ sensitivity)** versus **KDP ($D^4$ sensitivity)**,
- the implication that **Z–R relations borrowed from literature** are implicitly tuned to certain DSD shapes, while

- the **new R–KDP relation** developed here is sensitive to how well it captures the actual microphysics of the event and is strongly influenced by the higher rain-rates coming from Commerson and Bellecombe (Figure 9) at high altitude.

To help with these interpretations I have included some valuable references below. Importantly, these changes do not require new analysis (although more would strengthen the interpretations)—only a **re-framing of the existing material** so that the interpretation of results aligns more visibly with established microphysical understanding. The authors should make it very clear that the R-KDP relationship derived here is unique to this situation, particularly the sampling (both radar and gauge) at high altitude before warm rain processes become more dominant and generate broader DSDs with larger drops.

The goal is to help the reader see *why* the two relationships diverge, not just *how* they diverge and to guide any future implementation of rainrate relationships using X-band in this region.

## Conclusion

This revision demonstrates clear progress, and I want to emphasise that the work is very nearly ready for acceptance. A **minor redrafting of the discussion**—shifting the focus from attenuation benefits to a clearer and more specific **DSD-based physical interpretation**—will make the manuscript both clearer and more scientifically robust.

Once this final refinement is completed, I will be happy to recommend the manuscript for publication.

**Radhakrishna, B.** (2022) *Raindrop size distribution (DSD) during the passage of tropical cyclone Nivar: effect of measuring principle and wind on DSDs and retrieved rain integral and polarimetric parameters from impact and laser disdrometers.* **Atmospheric Measurement Techniques**, 15, pp. 6705–6722.

**Thurai, M., Bringi, V.N., Wolff, D.B., Marks, D.A. & Pabla, C.S.** (2020) *Drop Size Distribution Measurements in Outer Rainbands of Hurricane Dorian at the NASA Wallops Precipitation-Research Facility.* **Atmosphere**, 11(6), 578.

**Wu, D., Zhang, F., Chen, X., Ryzhkov, A., Zhao, K., Kumjian, M.R., Chen, X. & Chan, P.W.** (2021) *Evaluation of Microphysics Schemes in Tropical Cyclones Using Polarimetric Radar Observations: Convective Precipitation in an Outer Rainband.* **Monthly Weather Review**, 149(4), pp. 1055–1068.

**Yang, S., Du, Y., Han, B., Wu, C. & Kong, H.** (2025) *Microphysical Characteristics of Tropical Cyclone Choi-wan (2021) Outer Rainbands Derived From Polarimetric Radar Observations on a Research Vessel.* **Geophysical Research Letters**, 10.1029/2024GL112557.