Author Comment (AC) – Final Response

egusphere-2026-1697:

Multi-model high-resolution analysis of Tropical-Like Cyclone Daniel with WRF and ICON: peculiarities and sensitivity to convection schemes.

Legend: RC1 in blue, RC2 in green, AC in black.

P. Serafini, on behalf of all co-authors

Dear Co-Editor,

Dear Referees,

We would like to express our sincere gratitude to the Co-Editor and both Referees for their time, insightful evaluations and constructive guidance throughout the peer-review process. We are pleased that the substantial revisions have addressed the primary scientific concerns and that the manuscript is considered close to final acceptance.

Below, we provide a point-by-point response to the two remaining minor points raised, detailing the exact modifications incorporated into the revised manuscript and supplementary material.

Response to Referee #1

- **Comments:** None.
- **Response:** We thank Referee #1 for reviewing our revised manuscript and for their positive assessment.

Response to Referee #2

Point 1: Make sure the observational cross-validation is visible in the manuscript, not only in the response letter

Referee Comment:

The authors' response explains that Hérincs (2023) was cross-validated against ERA5 and CERRA, and that the HRV track was compared with reanalysis tracks using the 15 km buffer. This is useful and partly addresses my concern about the observational reference. However, in the track-changes manuscript, the discussion still appears to rely mainly on Hérincs (2023), UKMet analysis, and the HRV track. If the ERA5/CERRA cross-validation remains only in the response letter, please add a concise summary of it to the manuscript itself, or point clearly to the supplementary material where this comparison is shown.

Authors' Response:

We fully agree with the referee. To ensure that this cross-validation is completely transparent to readers and accessible within the paper, we have added **Supplementary Section S4** *"Cross-validation of the Hérincs (2023) estimates"*, accompanied by Figure S9 as in the response letter. Furthermore, we have incorporated a dedicated paragraph in the main body of the manuscript (Section 4.2 lines 357–369) explicitly describing the cross-validation against ERA5 and CERRA reanalyses and detailing the physical reasoning behind maintaining the Hérincs dataset as our qualitative temporal reference.

- **Revisions in Manuscript (Lines 357–369):**

"Hérincs (2023) reconstructs the pressure evolution from buoy, ship and land-station records (shown in our Fig. 3a), cross-checked against the UK Met Office analysis, and derives the wind estimates from station and satellite data. We cross-validated these estimates against ECMWF ReAnalysis v5 (ERA5) (Hersbach et al., 2023) and a higher-resolution Copernicus European Regional Reanalysis (CERRA) (Schimanke et al., 2021). The comparison (Fig. S9) shows a consistent temporal evolution across datasets, with two systematic differences. First, the Hérincs pressures are slightly lower than the reanalysis values, while the absolute minimum is similar. Second, in Hérincs the minimum occurs offshore before landfall, whereas the reanalyses place it several hours later, over land. We consider the offshore timing more consistent with the expected behaviour of a marine warm-core cyclone: over the sea the vortex continues to extract latent and sensible heat from the surface, while the low surface roughness limits frictional spin-down; both supports are cut off at landfall. The land-based minimum in the reanalyses likely reflects their coarse effective resolution and the scarcity of in-situ MSLP data over the southern Ionian, which limit the analysed depth of a small-core vortex until it reaches the better-observed coast. For the wind, the reanalyses show a positive bias of up to 10 m s^{-1} with respect to Hérincs, but the temporal trend is consistent. On this basis we retain the Hérincs dataset as a qualitative reference for the temporal evolution."

- **References Added:**
    - Hersbach, H., Bell, B., Berrisford, P., Biavati, G., Horányi, A., Muñoz Sabater, J., Nicolas, J., Peubey, C., Radu, R., Rozum, I., Schepers, D., Simmons, A., Soci, C., Dee, D., and Thépaut, J.-N.: *ERA5 hourly data on single levels from 1940 to present*, Copernicus Climate Change Service (C3S) Climate Data Store (CDS), https://doi.org/10.24381/cds.adbb2d47, 2023.
    - Schimanke, S., Ridal, M., Le Moigne, P., Berggren, L., Undén, P., Randriamampianina, R., Andrea, U., Bazile, E., Bertelsen, A., Brousseau, P., Dahlgren, P., Edvinsson, L., El Said, A., Glinton, M., Hopsch, S., Isaksson, L., Mladek, R., Olsson, E., Verrelle, A., and Wang, Z. Q.: *CERRA sub-daily regional reanalysis data for Europe on single levels from 1984 to present*, Copernicus Climate Change Service (C3S) Climate Data Store (CDS), https://doi.org/10.24381/cds.622a565a, 2021.

Point 2: Operational recommendations and causal language about convection treatment

Referee Comment:

Temper operational recommendations and causal language about convection treatment. The revised manuscript now properly acknowledges that Daniel is a single case and that WRF–ICON differences may reflect the full model-physics package, not only convection treatment. Nevertheless, some wording remains too categorical. In particular, the statement that "for operational purposes, these results suggest that ≈ 2 km convection-permitting simulations should not be run as purely explicit" is too strong for a single-case study, especially given the non-significant track ranking and the metric-dependent performance. I suggest rephrasing this as a Daniel-specific hypothesis, for example: "For Daniel under the present configurations, retaining a shallow-convection parameterization improved some aspects of the simulation, especially for selected precipitation and structure metrics."

Authors' Response:

We agree with the referee that categorical statements regarding operational modeling guidelines are too strong when derived from a single-case evaluation. We have softened the phrasing in Section 5 ("Discussion and Conclusion") to frame our finding specifically around Cyclone Daniel and the tested configurations.

- **Revisions in Manuscript (Section 5, Line 552):**
    - **Previous wording:**

"For operational purposes, these results suggest that ~2 km 'convection-permitting' simulations should not be run as purely explicit. A hybrid approach..."

    - **Revised wording:**

"For Daniel under the present configurations, retaining a shallow-convection parameterization improved some aspects of the simulation, especially for selected precipitation and structure metrics. Here, a hybrid approach..."

We believe these updates thoroughly satisfy the final requests of the Co-Editor and Referee #2. Thank you once again for your constructive guidance during the editorial process.

Sincerely,

The Authors