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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The genesis of Typhoon Nuri as observed during the Tropical Cyclone Structure 2008 (TCS-08) field experiment – Part 1: The role of the easterly wave critical layer" *by* M. T. Montgomery et al.

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Review of the manuscript entitled "Intermediate and High Resolution Numerical Simulations of the Transition of a Tropical Wave Critical Layer to a Tropical Depression", by M. T. Montgomery, L. L. Luisier, R. W. Moore, and Z. Wang, submitted to Atmospheric Chemistry and Physics.

Recommendation: Accept with minor revision

General comment

This paper presents an observational study of the genesis of Typhoon Nuri during a recent field experiment (TCS08) in the western North Pacific. The genesis is interpreted in terms of the 'marsupial' hypothesis proposed in a recent paper in ACP by Dunkerton et al. and shows that the genesis of Nuri was consistent with this hypothesis. The idea is that, relative to the translating tropical wave disturbance within which the storm forms, there is a region closed circulation. This region provides a largely protected environment, allowing the air within it to steadily moisten, thereby providing conditions that are conducive to the development of sustained deep convection. The paper is interesting, well written and complements the earlier study of Dunkerton et al. I think it could be strengthened even more by a more complete description of the the effects that vertical shear on the radial and vertical extent of the "moisture pouch" during the evolution of the pre-Nuri disturbance. In particular, it would be interesting to know how large and how deep the authors consider that the pouch needs to be before genesis becomes likely.

Minor comments Abstract, second sentence: This sentence has too many "and"'s and needs breaking up. Abstract, p2, L2: I suggest deferring the use of 'marsupial forecasts' in the abstract as few potential readers will know what these are. P2, middle: It would be appropriate to reiterate here how Ritchie and Holland define "tropical cyclogenesis". P3, Pa2, 2 lines up: Do "monochromatic" easterly waves exist in nature? P2, Pa3: The idea of Kelvin's cat's eyes will be familiar to many readers in the context of two-dimensional flows. However the concept as it applies to a vertically-sheared flow may not be. Since this extension is very germane to the present problem, it should be discussed in this paragraph. P5, Pa3, L1: What, exactly, is a "lawn mower" pattern? P6, Sec. 2.2.1: Total precipitable water is a two-dimensional field. How can it be used to track moisture in three dimensions? Also, items (i) – (iii) should use the present tense. P7, L3 and elsewhere: "Hovmoller" should be written "Hovmoeller" or "Hovmöller" P8, Pa2, L9: The adjective "GFS FLN TWP" is a bit indigestible, even though a list of acronyms is provided! P8, Pa2, last line: What are the error bounds on the cited speed? Would it be better to write either 7 m s-1, or 7.0 m s-1? P9, Pa2, L4: I suggest

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"The increase . . . " P9, Pa3, L3: What, exactly, is weak? P9, Pa4, L3: When the 'pouch' enters a region of strong vertical wind shear, its vertical coherence must be reduced. The question that arises and that should be addressed here is: by how much? How does the horizontal extent of the Lagrangian separatrix decrease with height? Presumably, this can be estimated from the model. P10, L1: I suggest replacing 'to the south through southeast' by 'in the south to southeast sector'. P10, L8: I suggest " . . . merged almost entirely . . . " P10, Pa3: I suggest using MKS units and placing "40 kt" in brackets. P10, Pa3, last sentence: Further comment on the resilience of the pouch to vertical shear as outlined in my general comment above would be worthwhile including here. P10, last line: the term "hurricane heat content" is misleading as it refers to a property of the ocean. What is wrong with the conventional term "ocean heat content"? P11, L6: Which "result"? The result of reducing the CAPE? P11, Pa2, penultimate line: I suggest inserting a comma after "DMW08". P12, Pa2, 2 lines up: Up to what heigh is the closed circulation observed? This is important for the efficacy of the pouch. P12, Pa3, penultimate line: "invest" is forecaster jargon that requires explanation. P13, Pa3, L1: the term "skew-T data" should be explained. P14, Pa2, L1: I suggest " . . . will be argued next . . . ". P14, Pa2, 4 lines up: I suggest replacing "begins" with "began".. P15, Pa4, penultimate line: Which "curvature term"? P19, L5: I suspect that 6.96 m s-1 is too accurate – see comment above. P19, Pa2, L4: Past tense required " . . . as genesis approached . . . " P19, 6 lines up: I suggest inserting "it" after "within". P20, L4: What, exactly, are "diabatically amplified eddies"? P20, Pa. 3, L5: I thought that elements of this pathway had been elucidated to some degree by Montgomery and coworkers. Maybe " . . . has yet to be elucidated" is too modest! P20, L7 up: I suggest deleting "also". P23, Pa3, last sentence: The expression in brackets reads as an afterthought and would be better if it were included as part of the sentence. P23, Pa4, penultimate line: To what does "this" refer?

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