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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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This paper represents a "proof of concept" study of the so-called "marsupial paradigm" put forward by Dunkerton, Montgomery, and Wang in their recent ACPD study. The paper is well written and the evidence presented certainly provides compelling support for the paradigm in my opinion. For the most part the text and figures are right to the point and straightforward, although jargon gets a bit in the way in a few places. I think the paper is in good shape overall and needs only some minor revisions. I recommend emphasizing one point, which is the fact that the wave studied displays many of the

features of classical Pacific easterly waves. I think that this would help strengthen the authors' case even more. A related, but thornier issue concerns the tendency by many researchers and operational forecasters to classify virtually any westward disturbance within the ITCZ as an "easterly wave". While this issue cannot be dealt with in any detail here, I believe the problem should at least be pointed out (see below).

Other minor comments and wording suggestions by page number:

The abstract in for the most part clear and concise, on line 4 I suggest: "base state was an easterly trade wind flow"

Abstract, Line 4 from bottom: "real time forecasts were produced using"

Pg. 19161, line 9: suggest a more explicit "wave energy dispersion from pre-existing depressions" or some such statement. A nice recent theoretical and simple modeling study of this dispersion is presented by Krouse et al., 2008 JAS pg. 644.

Regarding the footnote on Chen's analysis: this approach does not attempt to distinguish between easterly waves and other waves such as mixed Rossby-gravity and equatorial Rossby modes, which Dickinson and Molinari, and Frank and Roundy, among others, have also implicated in genesis over the northwest Pacific. While this could be a messy can of worms that the authors may not want to get into here, it is a potentially serious factor for the operational use of the authors' approach as well, which relies heavily on the "easterly wave" path to genesis. This is not to say that the marsupial approach wouldn't be able to identify a "pouch" for these other disturbances, but at least a mention of these issues, and the fact that there is ongoing work in progress to reconcile these different views, seems warranted.

Pg. 19162, line 17: this would be a good place to first define "sweet spot" in the main text.

Pg. 19163, throughout this paper, and in DMW, the term "pouch" is never quite defined, although DMW allude to it as the "region of re-circulating quasi-horizontal flow". It might

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be worth pointing out that the term is here rather loosely associated with the region of high TPW, thought to be protected to some extent from external environmental air.

Pg. 19165: “lawn mower” and “square spiral” need to be defined.

Pg. 19167, line 16: “not as vulnerable” actually I would suggest that the west Pacific is not at all vulnerable to the Saharan air layer, but it is subject to dry air intrusions from eastern Asia.

Pg. 19169: Interestingly, for this case at least, the easterly wave exhibits quite a typical phase speed slowdown as it propagates westward, (see discussion accompanying Fig. 6 in Serra et al. 2008 JAS pg. 1266). The other typical feature in Fig. 3 is its gradual shift from a westward to a northwestward track, which occurs even for non-developing easterly waves

Line 7: It’s probably best to state the phase speed as “around 7 m/s”, since it cannot be measured to the stated precision.

Line 15: the use of “southerly” here and “northerly” on the next page to describe a motion (and not a wind direction) is confusing, I suggest instead “southward” and “northward”.

Are the authors speculating that the convection to the south was the source of a spin up of additional vorticity that caused the “sweet spot” to move southward? It seems that this would then have to be due to a southward movement in the critical latitude, since the trough axis location is nearly meridionally oriented in Fig. 8. It also seems from Fig. 8 that this spinup may have also retarded the steady westward movement of the sweet spot.

Pg. 19171: It will be difficult to see the blue triangles in Fig. 5, these should be enlarged.

HHC should be designated as “oceanic HHC” here since this term may not be familiar to some. Shouldn’t the definition in footnote 3 read: “for z>Z26? The meaning of

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"incremental depth" is elusive unless one actually goes to Leipper and Volgenau, it might be worth stating that this is calculated "for every .5 m" if this is what NRL still does (I could not easily find their definition).

Pg. 19172, line 2: suggest saying "somewhat reduced potential temperature" since the moisture content might also be affected.

I cannot find the black circles in Figs. 7 or 8. The lines in Fig. 8 need to be brought out more. The diamond in the bottom panel of Fig. 9 will be very difficult to find in the journal version.

In Fig. 7, the convective field is located east of the trough axis (in the southerlies) and translates into the trough axis as the disturbance propagates westward. This feature is again very typical of Pacific easterly waves, starting with the classic studies of Reed and Recker.

The term "invest area" should be defined for those not familiar with operational hurricane terminology.

Pg. 19174, top: This is a very convincing demonstration of the utility of the co-moving frame for tracking, and I think it would be a good spot to point out the potential operational benefits here.

line 15: suggest "presence of near equatorial westerlies"

"has been cited by some" who are you referring to? Operational forecasters or other researchers studying this case?

"genesis of this easterly wave" you mean the genesis of Nuri within this easterly wave.

Line 24: use "152.8 to 145.3"

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 19159, 2009.