Reply to Anonymous Reviewer 3 of "The vorticity budget of developing Typhoon Nuri (2008)" by D. J. Raymond and C. López Carrillo

September 20, 2010

Reviewer's comments are inset. Replies are full width.

> General Comment: This paper examines the vorticity budget of developing Typhoon Nuri. Analysis of Doppler radar and dropsonde observations over a four day period provide a detailed picture of the evolution from an easterly wave to a typhoon. Interestingly, Nuri formed in a moderately sheared environment and its development was not accurately forecast. The circulation centers at low and mid levels were displaced by as much as 2-3 degrees during the early stages. The area of overlap between the regions exhibiting closed cyclonic circulations at these two levels is protected from environmental incursions, and was therefore argued to be the likely area in which the core of the developing cyclone spins up. This conclusion is consistent with the recent marsupial pouch theory developed by Dunkerton et al. (2009) and Montgomery et al. (2009). These results are interesting and add to our knowledge of the kind of environments that can support tropical cyclone development.
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> Specific Comments:
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> 1. Page 16592, line 2: The term in brackets in Eq. 3 is not the absolutes vorticity, so this statement is incorrect.

Actually, ζ_z is previously defined as the absolute vorticity.

> 2. Figure 2: the caption does not explain the figure adequately.

We have added an explanation as to what the color shading means.

> 3. Figures 15 and 16: These figures show a significant increase in the mid level circulation between Nuri 1 and Nuri 2. The explanation given seems to be mainly vorticity stretching in VHT's, with tilting contributing at higher levels. Another possible explanation is that a large stratiform anvil develops from merger of VHT

> anvils aloft. Melting and evaporation at the base of the ice layer drives a mid level inflow that subsequently results in a spin up of the mid level circulation. Are you able to discount this possibility?

We cannot discount the possibility that cooling due to the melting of ice influenced the heating profile and thus the mass flux profile. Addressing the factors controlling the mass flux profile is outside the scope of this paper.