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Comment

# ***Interactive comment on “Horizontal divergence of typhoon-generated gravity waves in the upper troposphere and lower stratosphere (UTLS) and its influence on typhoon evolution” by S. H. Kim et al.***

**S. H. Kim et al.**

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Comments: In the last paragraph, more clarity or a statement is expected about the relative contribution or comparison of short period gravity waves (with 20-30 km horizontal wavelength) with that of  $\sim 24$  h wave (with large horizontal wavelength) to the horizontal divergence or the interaction between them. As mentioned in the paper that domain averaged HDTGW (indicating short period gravity waves role is minimized) the feedback seems active between large period gravity wave and the horizontal divergence. It is apparent the interaction is two way process and may be difficult to speak about the cause and effect, however a tentative statement may be given at this stage

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about the time-evolution of the typhoon once the inertia gravity wave is produced.

Response: The domain-averaged HDTGW is due mostly to long-wavelength and low-frequency components of GWs of IGWs that are likely generated by low-frequency convective sources in outer rainbands. It is not straightforward to clearly separate the role of short-period GWs and  $\sim 24$  h GWs on the feedback between TGWs and typhoon evolution. However, as long as typhoon evolution has a period near 24 hours, in terms of MSLP, we can guess the contribution by short-period GWs is limited. Following the reviewer's suggestion, relative importance in contribution by long and low-frequency GWs to the feedback process is included in the last section of revised manuscript (line 340, page 17).

Comments: I think use of HDTGW is more precise than HDTGWs in the text.

Response: We agree with you. Along with the other reviewer's suggestion, we have changed HDTGWs to HDTGW in the revised manuscript.

Comments: Page 4, L 6, Year of the typhoon after the date may be mentioned.

Response: Thank you for your suggestion. It is changed.

Comments: Page 4, Correction L10, 12:00UTC 8 -> 12:00UTC 8 August (or Aug), without mentioning month seems incomplete. Make it uniform at all places in the text.

Response: Thank you for your suggestion. We have added month throughout the manuscript.

Comments: Figure 1: Font size of Fig (s) is too small and be increased proportionately.

Response: We improved Fig. 1 following the reviewer's suggestion.

Comments: Page 9, L 12-14 - the reason is not known?

Response: The difference between HDTGW and total divergence is that the total divergence includes additional divergence by perturbations with intrinsic frequencies longer

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than and shorter than IGW frequency range shown in Eq. (2). At this moment, it is not clear which parts of wave spectrum (low- or high-frequency or both) makes phase difference between HDTGW and total divergence. Following the other reviewer's suggestion, we calculated the total and HDTGW averaged over subdomains (200 km by 200 km) within a total domain shown in Fig. 2a. The result is included in the revised manuscript without figures (line 212, page 12). Please refer figures of subdomain results in the response to the first reviewer's comments.

Comments: Page 13. L6, Already, acronym HDTGW is defined, no need to define again.

Response: It is changed as the reviewer suggested.

Comments: Page 14. L9, azimuthal angle -> varying azimuthal angle

Response: It is changed.

Please also note the supplement to this comment:

<http://www.atmos-chem-phys-discuss.net/13/C12088/2014/acpd-13-C12088-2014-supplement.pdf>

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Interactive comment on Atmos. Chem. Phys. Discuss., 13, 28953, 2013.

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