

Response Letter

Thanks for the referee_1's comment.

The author respond to the comments from referee_1.

Referee's comment is noted with C#X, and the response is given with the corresponding R#X.

C#1. The authors used “observed wave parameters “ referring to the neutral wind Doppler shifted values. I think it is better to refer them as “apparent”.

R#1: gravity wave parameters such as observed phase speed, horizontal wavelength and period are commonly used in the society of atmospheric gravity waves. Apparent phase speed and apparent period are substituted with apparent ones, but apparent wavelength is not proper, because wavelength is a solid value. Anyhow, the ‘apparent’ is supplementally noted for the observed phase speed and period in the context.

C#2: L182 “... Korean peninsula can propagate any directions ...’. Change to ‘... in any directions ...’

R#2: It is corrected as indicated.

C#3: L252 “The small percentage of evanescent waves may imply that the majority of the observed waves is not locally originated from, at least the altitude range of 90 – 100 km.” Probably should just say that majority of the waves is free propagating wave.

R#3: It is corrected as using the recommended phrase. Thanks for pointing out.

C#4: L286 “The evanescent waves may be generated in situ at the airglow layer, probably as secondary waves, not propagated from the lower atmosphere. The evanescent waves were very rare (less than 2%) in our analysis of the BHO images. “

- It will be good to show some examples of all sky images of the evanescent waves.

For the case of evanescent wave, gravity wave is almost not able to be distinguished with bare eyes from the all sky images probably due to low intensity of airglow. The wave outline is emerged as processed with image signal processing.

- As to the sources of the wave, do you have any references?

Simkhada, D.B., et al. (2009), Analysis and modeling of ducted and evanescent gravity waves observed in the Hawaiian airglow. *Ann. Geophys.* 27, 3213-3224.

Nielsen, K. et al (2012), On the nature of short-period mesospheric gravity wave propagation over Halley, Antarctica, *J. Geophysical Res.* 117, D05124.

The two papers present the raw image of evanescent wave. Simkhada et al. (2009) presented a result of modeling for evanescent wave. The evanescent wave is produced in the mesosphere at 75-95 km altitudes from the wave, which was forced in the troposphere and encountered the opposing strong background wind field while the upward propagation. It is added in lines 286-289. And The preexisted sentence is modified to “The evanescent waves may be formed by the

wave generated in the lower atmosphere, or by the secondary wave generated in situ at the airglow layer.”.

Both papers presented all-sky images taken for clear evanescent gravity waves.

- Do you see any sign of the instability in the mesospheric region?

C#5: Did you do any binning of the CCD images?

All-sky images were obtained with 4×4 binning to increase signal to noise ratios.

The sentence is added in Line 94-95.