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Interactive Comment

Interactive comment on "Wind-profiler observations of gravity waves produced by convection at mid-latitudes" by Y. G. Choi et al.

Anonymous Referee #1

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This paper analyzes wind profiler observations to identify periods of active convection in the troposphere and their possible relation to gravity waves above the tropopause. Up to now, there are only a few observational study of this important topic. Therefore, the results will be of interest to the ACP readership. However, this ACPD version contains same weaknesses and leads to additional questions which should be addressed by the authors before the paper can be published in ACP, especially to receive more real conclusions in comparison to the present suggestions. In general, the title of the submitted paper "Wind-profiler observations of gravity waves" requires more knowledge of the waves or the title should be changed to" detection of regions with enhanced convective activity".



Major remarks:

Following Hooper et al., GRL, 32, 2005, the observations of large vertical velocity variability based on wind profiler observations are suggested to be associated with periods of strong convective activity. Here, it is proposed that the enhanced vertical velocity perturbations above the tropopause are associated with internal gravity waves generated by the convection. However, to get more insight in the gravity wave characteristics, the available horizontal winds as described in Sect. 2 have been only used here to estimate the variances of the mean zonal and meridional winds. Why the authors didn't make use of the 3D winds to investigate the gravity waves in more detail, following well-known methods e.g. described in previous "Aberystwyth" papers (Thomas et al, Ann. Geophys. 17, 115, 1999, and continuative articles of R. Worthington) or spectra of the zonal and meridional wind components as shown in cited paper of Vincent et al., 2004? The obtained conclusion, that it is "suggested that the large vertical velocity perturbations above the tro-popause are gravity waves" (Page 11044 in the submitted paper) will be much clearer if such information are included or at least discussed in more detail.

Figure 1 shows a wind maximum at around 9.5 km associated with the edge of a jet which is located approximately 200 km to the south of Aberystwyth. Why the discussed gravity waves above the tropopause are associated with periods of strong convective activity? Why these waves are not induced by the mentioned jet?

Additionally to the used references, the authors should make use of the investigation of convectively forced short period gravity waves and their conclusions as recently published by Böhme et al., Q. J. R. Meteorol. Soc., 2004, 130, pp. 2933 - 2952. Their study is based on wind profiler data and includes very interesting discussions to understand these processes.

Some minor comments:

Figure 3 and 4 representing time series of the vertical velocity, can be combined in one

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Figure.

There is no use of mathematical formulae, but their inclusion seem to be necessary to improve the readability of this paper, e.g. to explain how the confidence level in Figure 2 is defined, or to understand the sentence "The ratio of intrinsic frequency to buoyancy frequency determines the angle to the vertical at which the wave propagates" (page 11037).

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