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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Characteristics of gravity waves resolved by ECMWF" *by* P. Preusse et al.

Anonymous Referee #2

Received and published: 10 June 2014

This is the 2nd round review of this manuscript. Compared with the original one, the revised version published on ACPD addressed most of my previous concerns and questions well. I especially thank the authors considering my advice of adding a core sentence to summarize each paragraph at the beginning or the end, which makes it easier to digest the major messages with limited amount of time (for most of the readers).

Despite some minor suggestions of wording, and figure editing, I don't have any major problems of the main ideas and methodologies conveyed through this paper. It's of high quality and certainly deserves a publication.

The only major concern I'd say, is that I don't like the discussion related to Fig. 7. I strongly suggest the authors deleting Fig. 7 and page 11983 and 11984. Firstly, this momentum flux calculation in Eqn. (4) is very bold. It has way too many simplifications and assumptions, as also mentioned by two long paragraphs on pp11983 and

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pp11984. Secondly, despite the noted caveats, |u'w'| in the troposphere is mostly tied to convections and other weather features (e.g., mid-latitude storm) that are supposed to induce large ageostrophic wind (u') or downdraft/updraft (w'). That's probably the major reason why you see a sharp decrease at the tropopause level in Fig. 7. Also, I don't see the "mushroom head" signature in Fig. 7. Could you please point out?

I don't think Fig.7 contains very much relevant nor critical information. Therefore, with so many caveats of the method to derive Fig. 7, it's better not showing it.

The 2nd suggestion: If not too computationally costy, I suggest you recompute and replot Fig. 9 using HIRDLS viewing geometry (i.e., filtering window) to filter the ECMWF resolved GWs. Right now it's more or less an apple-to-orange comparison. If you can't, it's better to justify how similar ILI filtering window is compared with that of HIRDLS, and what the potential uncertainties are that would be caused by the differences between two instruments.

Minor comments: pp 11964, L27: "incomplete, second," -> "incomplete. Secondly," pp 11964, L28: "simplifying" -> "simplified" pp 11971, L12-17: why not show a figure in the appendix? Also, do you consider realistic noise level? You need to remove instrument noise, signals from turbulence, trapped GWs, etc. before the calculation. pp11974, L1: Doing this every 150 km would introduce wave duplication/neglecting as the GWs are inhomogeneously distributed geographically. That would introduce an artifact to the density of Fig. 5 (left column). Could you add on your consideration? pp11978, L25: a naïve thinking is that since convective source itself is likely to be unstable inside the updraft/downdraft, you can't trace your GWs back to the middle troposphere anyway. Is that possible in your case?

pp11976, L25: "to the ground the ray-termination" -> "to the ground, the ray-termination".

Section 4.2, 1st paragraph: you can move the entire paragraph to the figure caption. It's not good to have an entire paragraph of explanation of a figure at the beginning of

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a section. Starting from the 2nd paragraph, you can note the line style/symbol colors in the parentheses.

pp11981, L1: “(not shown) a slightly higher” -> “(not shown), a slightly higher”.

pp11982, L15: “This we tested” -> “We tested this”.

pp11982, 1st paragraph: You cannot completely rule out the mid-troposphere excitation mechanism, as tropical deep convection top ($\sim$ 15 km) is always priorer to meet your extrapolated path.

pp11985, L20: It is very abrupt here to make the statement about the “altitude of strongest wind shear”.

pp11989, L13: “That” -> “Thus”.

pp11989, L12-16: Redundant. Same sentences reappeared at pp11979, L5-8.

pp11990, L1: Due to cloud inhomogeneity, it is very difficult to have such a large “w” in the entire grid. Is there another parameter other than the grid averaged vertical velocity that adds on the description of the distribution of vertical velocity within a grid box (e.g., the spread of vertical velocity)?

pp11990, 1st paragraph: So you don’t suggest any remedy here anyway?

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 11961, 2014.