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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Impact of upper-level jet-generated inertia-gravity waves on surface wind and precipitation" *by* C. Zülicke and D. H. W. Peters

Anonymous Referee #1

Received and published: 8 December 2007

The authors investigate the interaction of jet-generated IGWs for a case study in the Baltic sea area in order to support a hypothesized feedback mechanism between IGWs and convection triggering at the surface. Mesoscale model simulations are compared to a range of data from various sources and with different resolutions. While the subject of the paper is interesting and certainly falls into the scope of ACP, there are several major issues that require attention before the paper should be published.

Major comments

1. It should be clarified if the conceptual model presented on P. 15876, L. 9 is proposed here for the first time based on the results of this study, or rather adopted as a working

hypothesis based on previous studies (which?).

2. My major concern with this paper are with the presentation of the material. Many of the figures are covered with overly suggestive heavy lines, that partly oscure the data. As a reader I suspect it is not obvious I would come to the same conclusions without those lines. The authors should rather let the data speak for themselves.I make several suggestions below how the figures could be improved.

This is most critical in Fig. 3, as the dry simulation is a corner stone of the authors' argument. The dry run shows only a very weak divergence pattern. I do not see on what basis they can draw the lines J2, J3, J4, in particular the lower tropospheric portions. This should be discussed more critically.

3. The model simulations should be explained more extensively. Which model run contains which processes? Is the terrain height zero for both, MM5Wet and MM5Dry? So is MM5Wet actually a MM5Std without orography? Then the name MM5Wet is somewhat misleading. Also make clear which nests are actually used and presented in the subsequent analysis. What bias is introduced by considering the 24km resolution simulations from the idealised simulations in comparison to the 8km resolution simulations before? Also, the gravity wave parametrisation should be described briefly together with the simulation setup.

4. On P. 15893, L. 23: In the results section, the authors mention that the W2 event is related to the passage of a cold front. Why do they refer to it as an IGW signature here? It should be made clear in the discussion for which events it is not possible to strictly separate between the frontal forcing and IGW influences.

5. The authors mention that the implications for air-sea exchange are discussed at the end of the abstract. In my view, this statement is not justified compared to the very short discussion of air-sea exchange processes in section 4.4. At least, the word 'briefly' should be added to the respective sentence in the abstract.

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In addition, the paper should be proof-read by a native speaker. In particular the use of the past/present perfect progressive and of commas is distractive and should be corrected.

Detailed comments

pg. 15875, L. 22: increased

L. 24: consider citing e.g. Martius et al., 2007 for a climatology of such events.

Martius, O. and Schwierz, C. and Davies, H. C., 2007: Breaking waves at the tropopause in the wintertime Northern Hemisphere: Climatological analyses of the orientation and the theoretical LC1/2 classification. J. Atmos. Sci. 64(7): 2576-2592, doi: 10.1175/JAS3977.1

pg. 15876: 'figured out': colloquial style

P. 15877 L 6: something is wrong with this sentence

L. 11: add a reference

L. 14: it is not clear how the different nests were used here.

L. 19 onwards: coll. style (e.g. 'Lots of data'), section could be condensed

P. 15878, L. 18: Why did you not include precipitation from the ECMWF analysis?

P. 15879, L. 1: refer to the respective figure panel

L. 10: Where is the warm front located? Could you add a panel to fig. 1 showing the location of the fronts?

Figure 1: show map on all plots, use different symbols for Warnemunde and Gotland Basin

L. 25: the term MM5, which is the model name, is later also used to describe a certain simulation setup (normal run). This is confusing, I suggest using something like

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MM5STD for describing your standard simulation.

P. 15880, L. 6: make time stamp consistent (00:00 or 0000) throughout

P. 15882, L. 2: introduce GFZ. The information on the funding of the GASP seems irrelevant to me.

The data section is not very well organised and would profit from an introducing paragraph.

L. 14: clarify which resolution you are discussing here

L. 3: refer to figure panel. The precipitation band is hardly visible because it is overprinted by the dashed line.

L. 9: include map contours for reference!

Figure 2: show the underlying map for orientation in panels a,c,e. The heavy lines in a, e, f are overly suggestive, use finer line width. Use different contour color for geopotential in a. C3 crosses further E. It would be better to place descriptive symbols outside or at the border of the plot, where it does not overlay the data.

L. 23: I cannot follow this in the plot as it is completely obscured by heavy lines.

P. 15884, L 13: do you mean 'or'?

L. 17: this is somewhat repeating the information from the data section.

P. 15885: check for grammar

Figure 3: these figures are again heavily obscured by the thick lines. Also, the H and L panels should be removed from these plots, they make it impossible to see the divergence pattern. The ageostrophic wind contour should be placed underneath the divergence contours. In panels c and d, the thick 'U' shapes could for instance be replaced by thin horizontal lines with short vertical lines at the end (measures).

P. 15885-15886: This discussion could profit from a compilation of the calculations in

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Interactive Comment

a table.

L. 14: 'near the surface': give an altitude range here

P. 15888, L. 13: do you mean W2?

L. 19: refer to figure panel.

P. 15889, L 5: reformulate this section for clarity

Figure 7: panel f is missing

L. 20: check for grammar

P. 15892, L. 13: which time series are you referring to here?

L. 17: quantify this statement

P. 15894, L. 23: Only one signal 'is' contained.

P. 15895, L. 7: This paragraph is badly written, it contains many errors and unclear sentences.

P. 15896, L 2: This paragraph contains an interesting implication, but in my view takes a far too prominent position in the abstract for the extent to which it is discussed here.

P. 15897, L. 8: Note that the ECMWF analysis is available at T799 since the beginning of 2006.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 15873, 2007.