

# ***Interactive comment on “Impact of Gravity wave drag on the thermospheric circulation: Implementation of a nonlinear gravity wave parameterization in a whole atmosphere model” by Yasunobu Miyoshi and Erdal Yiğit***

## **Anonymous Referee #2**

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The paper describes an experiment of including a gravity wave parameterization routine for the whole atmosphere, i.e. including the thermosphere, in a general circulation model, thereby replacing the old, linear, parameterization scheme which is only active in the middle atmosphere. The authors show comparison of zonal mean winds, semidiurnal tidal parameters, and some figures of parameterized gravity wave drag and wind in the thermosphere. The authors conclude that the new routine provides a better zonal mean climatology, better representation of the semidiurnal tide. Having parameterized gravity wave in the thermosphere also makes it possible to investigate the interaction

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between tides and gravity waves. The paper is generally well written, and the results may be of interest to the community. I recommend publication after some more minor modifications and additions.

Zonal means: The authors present only results for the zonal mean zonal wind. I would have liked to see temperature and meridional wind results as well. These are directly influenced by gravity waves, and play a crucial role e.g. for transports around the MLT.

Tides: the authors show semidiurnal tidal signatures. Are there any useful results for other tides, like diurnal or terdiurnal tide?

Minor issues

Title: Gravity → gravity

Abstract, L 17: dynamical → dynamical factor

Page 1, L 25: insert “the” before behaviour

Section 1.2, 1st paragraph: Forbes et al analyzed the SW2 in the exosphere, please describe that more clearly.

Page 3, model description: the gravity wave propagation strongly depends on the phase speed spectrum. Are there observational constraints for the selected spectrum?

Page 6, l 15/16: within the one-hour period. This indicates a change in time, better: at different longitudes

L18: shows A height-longitude

L24 THE Yigit

L24 mechanism → mechanisms

Page 7, L2: the diurnal variation is also significant at midlatitudes

L14/15: also in the mesosphere. Please describe in more detail

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Page 8, L8/9 Recent studies... please provide a reference

Page 9, l 26: have → has

Page 10, reference Gavrilov et al.: nonlineareffects → nonlinear effects

Caption Fig. 5: ...except for THE zonal...

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