**Annales
Geophysicae**
Discussions

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Interactive
comment

Interactive comment on "Nonlinear forcing mechanisms of the terdiurnal solar tide and their impact on the zonal mean circulation" *by* Friederike Lilienthal and Christoph Jacobi

Anonymous Referee #2

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Paper summary:

Base on the Middle and Upper Atmosphere Model (MUAM), this paper investigates the exact contribution of the forcing mechanisms of the terdiurnal solar tide (the absorption of solar radiation and the nonlinear interactions between different tides and between GWs and tides). The impact of these forcing mechanisms, especially the nonlinear interactions, on the terminal tidal amplitude and zonal mean circulation is also studied.

I have no major issues with this paper.

I would like the authors to discuss the following minor comments:

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[Discussion paper]

1. The model does not generate non-migrating tides in the current configuration as described in section 2. Please add "migrating" before "terdiurnal solar tide" in the title.

2. "In order to reduce the time of computation for the simulations with enhanced forcing mechanisms, only the January runs are performed as an ensemble. The other months represent the conditions for the year 2000, only". Please discuss the potential difference or evaluate the influence of these two kinds of precessing methods.

3. Figure 1 and Page 5 Line 1: "This is due to the fact that MUAM tends to underestimate tides in general, which is frequently seen in other models, too".

Page 5 Line 14: There are differences in the seasonal variation of the TDT from different models.

What's the reason behind these phenomena?

Besides, would you please demonstrate why you present the seasonal cycle of TDT at 109 km?

4. Figure 3 and Page 7 Line 4: "... in the forcing locally amounts to +500% ... and to ... +1800% ....". The +500% and +1800% cannot be tell in Figure 3b and Figure 3h, although you have demonstrated the maximum and minimum values. You can add some red contours with the exact contour values in Figure 3 especially in Figure 3 (b, d, f, and h).

5. You can simply illustrate the limit of the standard deviations. Only the interval of the standard deviations in Figures 1, 2, and 4 can not demonstrate the exact values.

6. Page 7 Line 30: "...becomes instable for some months." The results of which months in Figure 6 are unstable?

Problems in figures and grammatical suggestions:

Figure 3:

Figure description and titles of the Figure 3 are inconsistent.

For example:

1. "July" in the figure description; "Jan and Apr" for the titles of Figure 3

2. "Zonal drag" due to GW-tide interactions in the figure description, "Zon. Acc." in the titles of Figure 3

3. a∼h is not noted in Figure 3. There are similar problems in Figures 4, 5, 6.

Figures 6 and 7:

1. What's the difference of the vertical mean and global mean? The results of which latitude are demonstrated in Figures 6 and 7.

2. You can add some descriptions about the "factor of fgw" in the manuscript.

Page 1 Line 4: "Scondar y sources" -> "Scondary sources"

Page 1 Line 15: "the internal gravity waves (GW)" -> "the internal gravity waves (GWs)"

Page 1 Line 16: "orography"->"geography"

Page 2 Line 15: "be subject of" -> "be subject to"?

Page 3 Line 18: "as described above" -> "as described in section 1"

Page 4 Line 25 "rREF" -> "REF"; "maximums" -> "maxima"

Page 5 Line 6: You presented the results at 109 km which can not represent the whole middle atmosphere. Thus, "in the middle atmosphere" is not exact in this sentence.

Page 5 Line 6: "So the midlatitude" -> "For example, the midlatitude"

Page 7 Line 25: "the respective slopes are given in the legend." -> "the respective slopes (s) are given in the legend."

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