

Interactive comment on “Comparative study between ground-based observations and NAVGEM-HA reanalysis data in the MLT region” by Gunter Stober et al.

Anonymous Referee #2

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Comparative study between ground-based observations and NAVGEM-HA reanalysis data in the MLT region G. Stober et al.

The authors present a study of tidal variability at altitudes of 75 to 110 km in the northern mid-to-high latitudes, emphasizing periods around stratospheric sudden warmings. They compare observations from a number of sources, most notably meteor radars, to NAVGEM-HA analyses. They also present a diagnostic tool called an adaptive spectral filter. It is not clear to me what the central purpose of the study is: is this a validation of the NAVGEM-HA reanalysis? is this a methodology paper introducing the adaptive spectral filter? Is this a science paper focusing on the variability of the tides around

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sudden warmings? I am not sure what the reader is supposed to take away from this paper

One symptom of this is that the bullet-point list of conclusions in the final section is vague. Several bullet points claim that the reanalyses are 'realistic' and suitable for use as lower boundary conditions, but criteria for this claim are never discussed, and other validation papers cited seem to have drawn these conclusions already. Variations in the tide are attributed to variations in the 'wind patterns' of the middle atmosphere but no evidence is provided to support this claim. The merits of the ASF methodology (e.g. error estimates) are touted but never used. And another 'holographic reconstruction' methodology is used in the discussion section without ever being introduced.

I find the figures difficult to read, numerous, and not clearly organized with respect to the discussion, again my sense is that this is a symptom of the paper not having a clear purpose. Finally, the text of the manuscript is still rough around the edges, with incomplete sentences and missing references.

I've included a list of specific comments below. On the basis of the above comments it is my opinion that this manuscript should be substantially revised before it can be considered suitable for publication.

Specific Comments:

Section 2: Data and Model output:

The periods for which data are available for each data source are not given. Neither are the 'analyzed periods' specified.

To what end have the temperature observations been included?

Are the NAVGEM-HA outputs analyses or reanalyses? To what extent should the reader expect the tidal structures analyzed in this paper to be directly constrained by assimilated observations?

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What kind of sponge layer does the forecast model employ and over what levels does it act?

There are missing citations in the first and third paragraph of section 2.3.

Section 3: Diagnostics

The details of the ASF are vague to the point that it is difficult to assess the validity of any of the results. For instance: how is the sliding window determined? What windows are in fact used? What is the purpose of the scaling factor? How is the vertical 'regularization' carried out? If these details are given in previous studies this should be clearly stated, if they are novel they should be justified. No specifics are given about how planetary-scale waves are accounted.

Details of the 'holographic reconstruction' methodology discussed in Fig. 12 should be given in this section.

Section 4: Results

Figure 1: What time periods have been used to create these figures?

My reading of the figures is that the summertime reversal of the zonal winds from easterly to westerly occurs at higher altitudes in NAVGEM analyses than in the radar data, and that the southward meridional winds are not as strong. Is this the bias that is reiterated in the conclusions? Has this bias been noted in previous work?

Figure 2: The warm anomalies in NAVGEM-HA near 95 km are plausibly a sponge layer effect - one would need to know details of the sponge layer to assess this claim.

Figs. 3 to 5: The structure of the discussion (which discusses first observations then NAVGEM-HA) does not match the structure of the figures. More importantly the tidal amplitudes and phases in NAVGEM-HA do not look like close matches to observations to my mind. This would be a useful place to make use of the error propagation capabilities of the ASF methodology that are claimed as a benefit in later discussion.

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Figs 4 to 6, 7 to 9: Again the structure of the figures and the discussion don't match up.

Section 5:

The merits of error propagation through the ASF methodology has not been demonstrated, nor has the benefits of the vertical resolution. I can see that these are both desirable features but no demonstration has been made of their value or correctness.

p22 lines 33-35: SSWs can perturb the middle atmosphere for months, as was the case in both the 2008-9 and 2012-3 events considered here.

Figure 12: What is the difference between the upper and lower panels? Also, the units for the period are wrong.

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