Dear Referee #3,
We are grateful for you friendly and constructive review. Based on your comments and suggestions the manuscript is now improved. In the following point-by-point responses the reviewer comments are in italics, our responses are in blue.

I have two particular requests for changes before the paper can be accepted for publication. My first request is that the authors expand on their explanations of the SABER measurements. In particular, there should be a more expansive description of the technique and its limitations. At present the measurements are simply described as being of "absolute GW momentum fluxes" and the reader is provided with references for more
substantive explanation of the technique. However, the SABER measurements are a central part of the paper and there should be

- *i) a paragraph of explanation describing the technique at the point where it is introduced and*
- *ii) some discussion of the limitations of the technique.*

In respect of the latter, I believe that these GW momentum flux measurements actually yield a lower bound rather than a fully-constrained value, since the estimates of horizontal wavelength depend on the angle between the satellite's orbit and the phase fronts of particular gravity waves.

The reviewer is right. The limitation of the GW drag calculation using SABER data should be mentioned and discussed in the paper. The limitation of the GW drag calculation using SABER data are that SABER "sees" only a part of the GW spectrum, namely the inertia GWs (the larger ones) and the known low bias of the observable GW drag as discussed in Ern (2004). We added appropriate text passages in the "Instruments and methods" part on page 6 line 3-6 and in section 6 on page 16 line 20 -23 where the results are discussed.
We also expanded our explanation of the GW drag calculation from the SABER measurements in section 2 starting on page 5 line 27 and ending on page 6 line 13 .

The arguments on p14 in paragraph 2 about the longitude-altitude cross section of wavenumber 1 filtered winds and the non-uniform GW drag at 50N with a wavenumber 1 structure refers to figures "not shown" – these figures would confirm the arguments being made by the authors so they should be included.

We included a figure on the wavenumber 1 filtered zonal wind from MLS for the polar latitudes and for the zonal wind and GW drag from SABER for 40°-50°N to strengthen our arguments. Additionally we put a figure of the unfiltered longitudinally non-uniform GW drag at 40°-50°N into the Supplements (see Fig. S3).

The arguments about the wavenumber 2 component of gravity-wave drag associated with Fig 7 would be strengthened by some explanation of the total drag and its other component wavenumbers. There does seem to be a wavenumber 2 component as shown, but how big is it compared to the zonal-mean value and the other wavenumbers?

Since reviewer #2 has a very similar request we added the non-filtered GW drag for the different latitude band as well as the, for wavenumber 1 and 2, filtered version in the Supplements (see Fig. S4). In Period II the GW drag filtered for wavenumber 2 is stronger and in a more robust phase relation with the zonal wind compared to the wavenumber 1 filtered GW drag and zonal wind in 60° to 70°N. We added a comment on this issue on page 16 line 11-13.

My second request is that some of the figure be made larger. As presented, some of the contours in Figs 2c, 3c, 4 and 7 are very faint, hard to read and/or close together. I think that just making the figures larger would solve this problem. Done

MINOR POINTS

P1, l15, suggest ". . . show that all three mechanisms. . ." Done

Figure 1 caption, suggest ". . .from MLS temperature. . ." Done

P3, l21, the final sentence "The vertical propagation of. . . (Lin, 1982)" would make much more sense if put at the start of that paragraph. Done

P4, l17, should be ". . .winds are needed". Done

P4, l20, should this be aˆ(-1) @/(@â´LEˇ) ? Done

P5, l5, suggest ". . .which results in a westerly wind. . ." Done

P5, l9, suggest ". . .and following it up into. . ." Done

P5, l14, suggest ". . .TIMED satellite and measures temperatures. . ." Done

P5, l16, suggest ". . .geometries about every 60 days. For the period of. . ." Done

P8, l2, suggest ". . .Period I, as is the areas of. . ." Done

P11, Fig 5, what causes the missing data at days -2 to 0? The missing data are caused by a data gap in the MLS raw data which is not visible in the other figures due to averaging over the 15 days period.

P14, l3, suggest ". . .not able to investigate whether wave (d). . ." Done