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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Representation of solar tides in the stratosphere and lower mesosphere in state-of-the-art reanalyses and in satellite observations" *by* Takatoshi Sakazaki et al.

Anonymous Referee #3

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The paper presents a comparison of tidal components in the USLM in five different reanalyses datasets. Overall the paper is very well written, adequately illustrated, the analysis methods are valid, the literature is properly cited, and the conclusions are sound. I recommend publication with only the following minor revisions.

Minor comments:

Abstract: 1) Are SABER tidal amplitudes larger than reanalyses (and MLS) due to increased vertical resolution?

2) Can guidance be given advising which (if any) reanalyses should be used for tidal studies (especially those spanning multiple decades)?

2.2.1 SABER: Why not use the latest version 2 data?

2.2.2 Aura/MLS: Why not use the latest version 4 data?

4.3 Nonmigrating tides (Figure 12 and 13) 1) "All data sets show clear gravity-wave patterns being excited and emanating from the two major continents, namely, Africa (10-40°E) and South America (80-40°W) and also indicate a somewhat weaker wave source from the Maritime Continent (90-150°E)" – This is not clear to me from this figure. Clarify or edit accordingly.

2) I am also confused why the authors are saying that longitudinal variations in the nonmigrating tides are gravity waves. I am skeptical that the term "gravity waves" is correct. In the discussion of Figures 12 and 13, please either remove reference to "gravity waves" or defend in more detail.

3) "Westward (eastward) tilting waves correspond to the westward (eastward) propagating waves which are clear in the western (eastern) hemisphere." – Why is this? Instead of the waves propagating in different directions in the Eastern vs. Western hemispheres, could it be that there is a weak temperature ridge (positive region) extending upward from ∼120E? Maybe this reflects trapped waves near the Asian monsoon? Either speculate a mechanism for different propagation directions or offer an alternative explanation.

5. Interannual Variations and Long-term Trends in Reanalysis representation of Tides Page 13, Paragraph 30: To be precise, Fujiwara et al. [2017] Figure 8 shows that the five reanalyses began assimilating AMSU-A in 1999. AMSU-B was assimilated in 1999 (MERRA and MERRA2), 2000 (CFSR), and 2001 (JRA-55 and ERA-I).

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