

Dear Profs. John Plane, Jan Laštovička, reviewer#2, and Martin Mlynczak:

Thanks very much for taking your time to review our manuscript “*Trends of the high latitude mesosphere temperature and mesopause revealed by SABER (ID: egosphere-2024-396)*”. We thank the reviewers for the time, insight, and effort that they have put into reviewing our manuscript. Those comments are all valuable and very helpful for revising and improving our paper.

Accordingly, we have uploaded a copy of the original manuscript with all the changes highlighted by using the track changes mode in MS Word. Appended to this letter is our point-by-point response to the comments raised by the reviewers. The original comments by reviewers use black, and our response is located below the comments and uses [blue font](#).

Yours sincerely,

Xiao Liu, Jiyao Xu, Jia Yue, Yangkun Liu, and Vania F. Andrioli

Responses to the comments from Prof. Jan Laštovička (Reviewer#1)

The paper deals with SABER-derived long-term trends of mesospheric temperatures. This is very comprehensive and carefully done analysis. Authors use real (not constant) Yaw cycle lengths. They are making corrections of several factors, which can affect resulted trends, including reduction of seasonal variation effect using climatological NRLMSISE2.1 mean temperature. So many corrections may introduce some imperfection (e.g. couple of years ago NRLMSISE00 was used, now we are using version 2.1 and after some years again a new and more accurate version appears). However, authors made best corrections at the level of present-day knowledge. I require only very minor essentially technical corrections, so after making these corrections I recommend the paper to publication.

Response: We really appreciate your efforts in reviewing our manuscript and your clear and detailed feedback. Following your comments and suggestions, we have revised the manuscript accordingly. Please find the point-to-point responses below.

Comments:

1. Line 370: Cooling trend is becoming larger with increasing height, so “decrease” should be replaced by “increase”.

Response: Thanks for your suggestion. We have revised these descriptions throughout the manuscript. If cooling trends become more negative (i.e., having large absolute value), we state that “cooling trends increase”.

Wording and misprints:

1. Line 33: delete “and”

Response: It has been deleted. In the new version, this sentence is revised as “The corrected temperature without any waves is regarded as the mean temperature”.

2. Line 71: “of a cooling trend” should be “cooling trends”

Response: Following your suggestion, we have revised this sentence as “Garcia et al. (2019) showed that the global mean SABER temperature (52°S–52°N) cooling trends...”.

3. Line 72: “mesosphere, were” should be “mesosphere were”

Response: This sentence has been broken into two short sentences. The revised version is “...Garcia et al. (2019) showed that the global mean SABER temperature (52°S–52°N) had cooling trends of 0.4–0.5 K/decade during 2002–2018 in the stratosphere and mesosphere. These magnitudes

were smaller than those simulated by WACCM4 (0.6–0.9 K/decade) but within 2 times of the standard deviation”.

4. Line 323: “7(b)” should be “5(b)”

Response: We are sorry for the mistake. Now, it has been revised as “Figures 5(a) and 5(b) show the mean \bar{T}_{msp} and z_{msp} over 22 years...”.

5. Lines 403 and 480: “The peaks” should be better “The heights of peaks”

Response: Following your suggestion and the comments from reviewer#2. Now, it has been revised as “The altitudes of peaks of the warming trends vary from 4×10^{-3} hPa to 10^{-3} hPa in different months”.

6. Line 464: “excludling” should be “excluding”.

Response: Following your suggestion. Now, it has been revised as “Then we can obtain an accurate mean temperature excluding atmospheric waves”.