

The editorial support team
Atmospheric Chemistry and Physics
January 15th, 2023
Subject: Revision of manuscript egosphere-2023-1608

Dear Editors

Thank you for your letter and for giving us the opportunity to revise our manuscript on “Identification of stratospheric disturbance information in China based on round-trip intelligent sounding system” [Paper # egosphere-2023-1608]. We have carefully reviewed the comments and have revised the manuscript accordingly. Our responses are given in a point-by-point manner below. Changes to the manuscript are shown in the revised manuscript with “track changes”.

Sincerely,

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Response to Reviewer #1:

General comments:

The authors answered the comments carefully and used the discussion to improve the manuscript from both the scientific and technical point of view. Even though some argumentation seems to be a bit weak to me (see section Specific comments), it might be just a question of personal perspective and the answers generally give impression that the methods were verified. I fully understand that processing of observations must contain some approximations and that the authors have to work with limited amount of data. However, the manuscript still needs to be checked for technical problems, some of which are listed in the section Technical corrections.

Response: Thank you for your understanding and recognition of our revised work. Without your help and advice, the manuscript would not have been significantly improved. Thank you again for your time and effort in the evaluation of our work. We have carefully reviewed the comments and have revised the manuscript accordingly. Our responses are given in a point-by-point manner below. Changes to the manuscript are shown in the revised manuscript with “track changes”.

Specific comments:

1) If the results/time series properties should be, due to the smoothing, used only for the internal comparison in the manuscript, I think this should be mentioned in the text (at least I did not find it there).

Response: Thank you for pointing out this detail, and according to your suggestion, we have added this expression in the corresponding part of the manuscript:

L114:

Added “It should be noted that different smoothing points may cause some difference in

the quantization results of SGWs. However, if all data sets are smoothed in the same way, the internal comparison will not be affected by this.”

2) I appreciate the effort put to the testing of the different (fitted) separation direction. However, it is not completely what I meant. I do not really see reason to subset the data after doing the linear regression. Of course, the data are not linear so the direction would not follow the trajectory for all the times. I understood the fitted direction just as a natural direction of the x axis. From my point of view, it was just to ensure that there will be no methodology difference between the trajectories that head mostly in the zonal direction and the trajectories heading in other directions. And when taking the zonal separation direction, the trajectories parts that change to another direction are also not removed. Or is there some methodology problem I am missing? Considering this, I cannot agree with the argumentation that the linear fitting method does not lead to the correct result since only part of the data can be used. On the other hand, I like the supplemented information about the physical flow regions.

Response:

Thank you very much for your understanding and recognition of my supplementary work. At the same time, your understanding is very correct. We mainly treat the fitted direction just as a natural direction of the x/y axis to process the original trajectory, and retain the trajectories parts that change to another direction. This processing method can include more detection of multi-physical flow regions. When these trajectories (the wind direction changes greatly over time) are fitted linearly, it is difficult to satisfy the term “fitting”, that is, the fitted straight line fits the actual trajectory ideally. Based on this, we propose a single physical flow region, that is, we selected examples with a relatively single direction of the trajectory, and perform linear fitting along the trajectory direction.

Therefore, the linear fitting method can actually get more accurate results. However, the problem is that because many curved trajectories are rounded out after screening, the results obtained are not suitable for internal comparison. And irregularly curved trajectories may also contain important disturbance information. Compared with the best linear fitting of the single-physical flow region, the zonal or meridional projection in the multi-physical flow region can be said to be a compromise method. Not only can more samples be retained, but also the disturbance information behind the curved/irregular trajectories can be retained.

Thank you very much for your valuable comments. If you could understand that I would like to keep both methods, but focus more on the comparison of the results of the multi-physical flow regions, I would be very grateful. Of course, regarding the analysis of the single physical flow region (a more ideal situation), we will continue to follow up in future research. When the number of samples is large enough, even if all fits are unified in one direction, there are still a sufficient number of perfectly fitted samples (the fitted straight line is ideally in line with the actual trajectory), which can ensure the robustness of the statistical results.

According to your suggestion, we make the following changes to the expression:

Changed “After this treatment (linear fitting), the omitted part may correspond to the large fluctuation region of the wind field, which will also cause the loss of atmospheric disturbance information”

To “If the trajectory direction is relatively single (single-physical flow region), the linear fitting method can actually get more accurate results. However, the problem is that because many curved trajectories are rounded out after screening, the results obtained are not suitable for internal comparison. And irregularly curved trajectories may also contain important disturbance information. Compared with the best linear fitting of the single-physical flow region, the zonal or meridional projection in the multi-physical flow zone can be said to be a compromise method. Not only can more samples be retained, but also the disturbance information behind the curved/irregular trajectories can be retained.”

3) I am confused about the Figure A5: If it shows statistically significant relationship, why not show it in the main text instead of the insignificant results?

Response: Because in Figure 9, the selected E_k+E_p represents the total energy of the inertial gravity wave, the purpose is to first give the reader a preliminary intuitive understanding of the trend of the total energy with C1. This selection is similar to the momentum flux that includes the zonal and meridian directions, which is aimed to first show whether there is a connection between the total energy characteristics of IGW and the C1 changes of SGW. It is equivalent to a logic from overall to local characteristics, so Figure 9 is shown first, and Figure A5 is discussed later.

Technical corrections:

1) L46: “Stephen A et al., 2015” – check if the citation is correct.

Response: Thank you for pointing out this detail, we have corrected the citation information.

Changed “Stephen A et al., 2015” to “Cohn et al., 2013”

2) L82: Remove quotation mark.

Response: According to your suggestion, we have made corresponding modifications.

3) L96: “The three-stage detection process by RITSS described in Figure 2.” – missing verb.

Response: According to your suggestion, we have made corresponding modifications: Changed “The three-stage detection process by RITSS described in Figure 2” to “The three-stage detection process by RITSS is described in Figure 2”.

4) L137, L155, L165, L167, L170, L172: Please correct signs after equations.

Response: According to your suggestion, we have made corresponding modifications.

5) L148, L153, L163: Capital letter in the middle of sentence.

Response: According to your suggestion, we have made corresponding modifications.

6) L142, 157: Missing space before bracket.

Response: According to your suggestion, we have made corresponding modifications.

7) L156: Two commas.

Response: According to your suggestion, we have made corresponding modifications.

8) e.g., L269: Some plot captions end with dot, some not.

Response: We uniformly corrected it to all without dots at the end.

9) L287: Units should not be in italic.

Response: We checked the entire manuscript and corrected all the units to non-italics.

10) L325: Two dots.

Response: According to your suggestion, we have made corresponding modifications.

11) L426: Equation 1 should be capitalised.

Response: According to your suggestion, we have made corresponding modifications. Changed “equation 1” to “Eq. 1”.

12) L436: Section 5 should start on a new line.

Response: According to your suggestion, we have made corresponding modifications.

13) L463: “regardless of whether it has been linearly fitted or not” The object “it” is not so clear, please reformulate.

Response: According to your suggestion, we have made corresponding modifications. Changed “it” to “the flat-floating trajectory”.

At the end, Authors are grateful to the anonymous reviewer for providing valuable comments to improve the manuscript up to this level. We greatly appreciate the time and effort you put into improving the quality of my manuscript, and we have benefited immensely from your selfless comments and suggestions. **Besides, if you have more suggestions or comments about my manuscript or the content of the reply, I will always be pleased to make timely replies and revisions and benefit from communicating with you.** Finally, thank you again from the bottom of my heart.