

Dear Editor

We sincerely thank you for your careful evaluation of our revised manuscript and for returning it to the reviewers for further assessment. We greatly appreciate the additional comments and suggestions, which have helped us improve the scientific interpretation and clarity of the manuscript. We have carefully addressed all of the comments and have revised the manuscript accordingly. Our detailed responses to each comment are provided below.

Editorial comments

Editor comment: -

A greater attempt at the physical interpretation of the results in Section 3.2 needs to be provided. Currently, the text mainly describes what is shown in the figures. Discussing the physical processes responsible for the patterns of co-variability among the climatic parameters would greatly aid readers in understanding the results.

Answer: -

We thank the editor for this important and constructive suggestion. We agree that the previous version of Section 3.2 was largely descriptive and that a more detailed physical interpretation of the observed co-variability was needed. Accordingly, we have substantially revised Section 3.2 to provide a more physically based interpretation of the results. The revised text discusses the potential mechanisms underlying the observed spatial and temporal co-variability, including the influence of large-scale atmospheric circulation, land–sea thermal contrasts, tropospheric thermal structure, precipitation variability, atmospheric evaporative demand, and regional-scale processes. The revised and newly added text has been highlighted in the revised manuscript.

Editor comment: -

Line 25: In the abstract, please define which “climatic parameters” are examined in the paper.

Answer: -

We thank the editor for pointing this out. We agree that the term “climatic parameters” was insufficiently specific. We have revised Line 25 of the abstract to explicitly identify the climatic variables examined in this study. We have revised and modified the text to be *[In addition, the two TEL definitions exhibit consistent correlation patterns with surface temperature (Ts), lower tropospheric temperature (Trp-1), upper tropospheric temperature (Trp-2), precipitation, and the Standardized Precipitation Evapotranspiration Index (SPEI).]*

Editor comment: -

Lines 60-62: Since you’re referring to both hemispheres here, I would say northward during JJA and southward during DJF.

Answer: -

We thank the editor for this helpful clarification. We have revised Lines 60–62 accordingly.

Revised manuscript text:

[They migrate northward during the summer (JJA) and southward during the winter (DJF) (Davis and Birner, 2013).]

Editor comment: -

Figure 3a: Please double check this figure and result. It’s very curious that the surface temperature and lower tropospheric temperature would have such a different correlation pattern, especially given that the SVD patterns between these tropopause metrics and surface temperature (Figures 4–7) are close to being identical.

Answer: -

We sincerely thank the editor for drawing our attention to this issue. We carefully rechecked the data processing and correlation analysis underlying Figure 3a and

identified the need for revision of the corresponding result. Following this re-examination, we have corrected and updated Figure 3a accordingly. The revised Figure 3a now presents the recalculated correlation pattern between surface temperature (T_s) and the TPD TEL, using the same preprocessing and analysis procedure applied to the other climatic parameters. We have also updated the corresponding description and interpretation in the abstract, results, and conclusion sections.

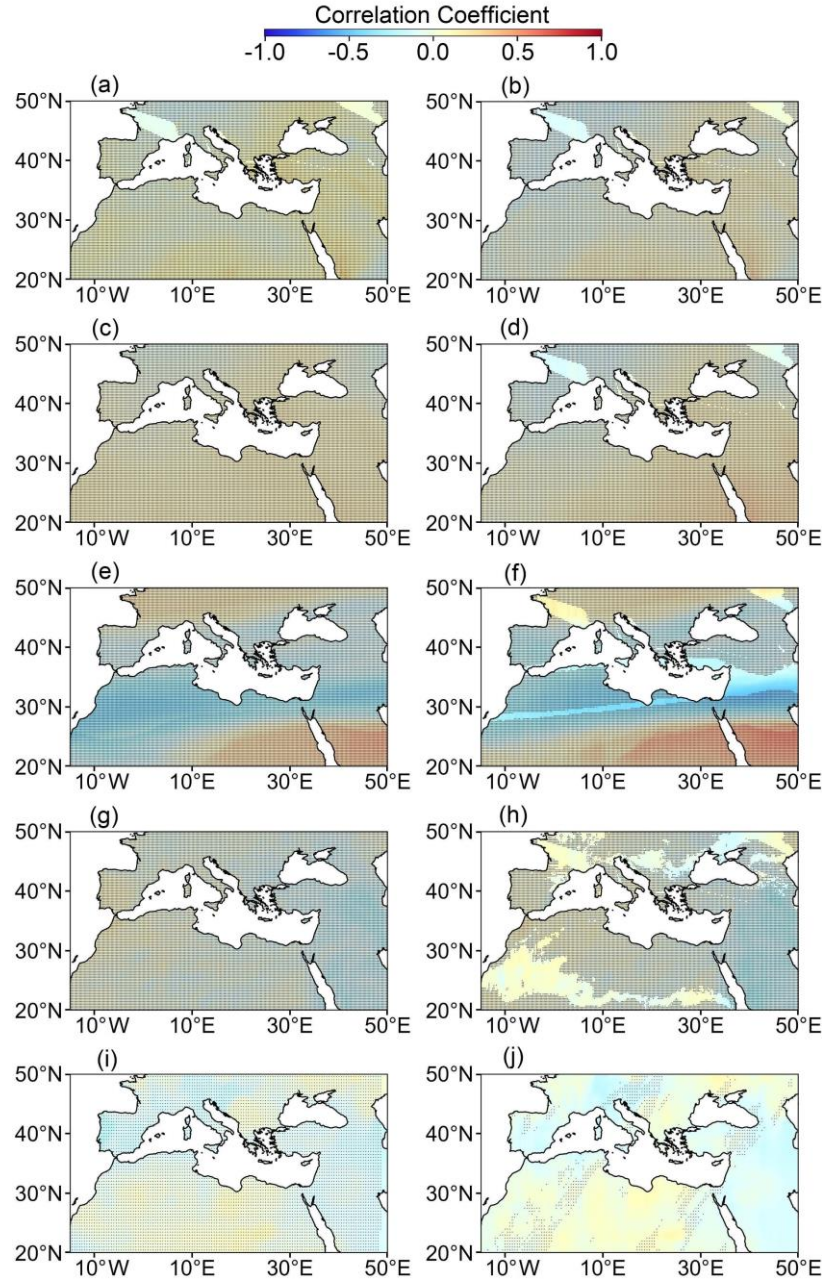


Figure 3. Correlation maps of TPD TEL (left) and TPG TEL (right) with climatic parameters, where the Pearson correlation coefficient was computed independently at each grid point. T_s (a, b), Trp-1 (c, d), Trp-2 (e, f), precipitation (g, h), and SPEI (i, j). Black stippling indicates grid points where the correlation coefficients are statistically significant at $p < 0.05$.