Dear reviewer,

thank you for your comments and suggestions, which were very useful and helped us to draft a clearer, more scientifically sound and better graphically structured manuscript. We will do our best to implement all the proposed recommendations.

1. The manuscript is exceptionally long, written in a longwinded language style, and is also repetitive in style. For example, the lengthy *conclusion* (almost a full page of text) reads not as a conclusion but as a summary and merely repeats (summarizes) what had already been said in the paper. While a summary focuses on recapping information (which is what we have for this paper), a conclusion emphasizes the implications and deeper thoughts derived from the information presented (the current paper does not achieve this). Another illustration is perhaps with the title of the manuscript, which too is longwinded in style. It would read more concisely as: *Climatic extremes and their social implications in 17th-century Transylvania: An historical climate reconstruction*. There are many parts of the paper that could be cut out or substantially trimmed down.

   We acknowledge the reviewer's observation regarding the length of the manuscript, the sometimes redundant style, and the overly long title and conclusions section. We agree that a more concise and focused writing can improve the clarity and scientific impact of the paper and we are prepared to do so, but these changes should not compromise the meaning of the manuscript.

2. I appreciate that English would not be the authors' primary language. However, the many typological/grammatical errors throughout the manuscript and the longwinded language style as mentioned above, means that very heavy language editing is required and that the paper needs to be substantially trimmed down in length. There is also inconsistency with issues such as the use of upper- and lower-case lettering (for example western and Western Europe etc).

   To address this issues, the manuscript will be fully reviewed by a native English speaker with experience in academic writing before the revised version is resubmitted.

3. Methodology:

   a) I note the rather large data gaps for especially climate-related risk phenomena & temperature conditions, and to a lesser extent rainfall. I am concerned that the results presented have not fully taken these very large data gaps into consideration and the results are undoubtedly impacted by these. The data gaps may not only be due to an absence of extreme cold, heat, drought or flooding, but could of course also be a consequence of other societal-based reasons (e.g. times of war, conflict etc). I would deem it essential to provide a graph illustrating the annual number of sources from which weather/climate information was obtained, and then to more critically address the data quality/quality & gaps issues in a temporal context, and how this might impact on the results.

We fully acknowledge the presence of data gaps in our historical dataset, particularly regarding precipitation, temperature, and climate-related risk phenomena. However, it is important to note that the availability of historical climate information in the territory of present-day Romania is extremely limited compared to Western Europe, for example.

Unlike regions such as France, where detailed annual records (e.g., grape harvest dates and others) allow precise climatic reconstructions, historical documentation in Transylvania and the Romanian Principalities is scarce. Here, most of the population during the 17th century was illiterate, and even among the literate Romanian minority, writing and record-keeping were not common practices. As a result, most of the information we have comes from foreign observers, whose focus was not always on environmental conditions (foreign travellers, people documenting battles, etc.).

We agree that the lack of recorded climate phenomena does not necessarily imply their absence, and that data availability may be influenced by broader societal contexts such as war, instability, or cultural factors. In accordance with the reviewer's valuable suggestion, we will provide a more in-depth discussion regarding the temporal distribution, quality, and limitations of the data, and how these issues might influence the interpretation of results.

b) I appreciate the efforts taken to present the temporal network information presented in Figures 3, 5 & 8. However, these Figures (especially Figure 5 & 8) are very 'busy' and not at all easy to appreciate in terms of extracting something that is important and meaningful for what the paper aims to achieve. Neither do the authors engage much with these 'temporal networks' in the written text and demonstrate their importance for paper. I strongly advise these be removed from the paper.

We understand the concern that especially Figures 5 and 8 may appear visually overwhelming and difficult to interpret at first glance. However, we respectfully consider that these figures are essential for the core analytical structure of our study. They are not simply illustrative, but fundamental to understanding the complex correlations between climatic indicators and their associated social impacts, which form the backbone of our historical climate reconstruction.

The purpose of these temporal network visualizations is to allow a synthetic interpretation of nearly one thousand historical testimonies, to identify how one variable influences another in a given temporal context. For example, outbreaks of plague are frequently correlated with periods of cold and wet weather, suggesting that these harsh climatic conditions may have contributed, directly or indirectly, to the deterioration of public health. Similarly, numerous episodes of excess precipitation are temporally associated with cold winters, indicating that during the Little Ice Age and especially the Maunder Minimum, winters in this region of Europe were not only colder but also wetter. Furthermore, episodes of food shortages and famines occur predominantly in years or seasons marked by severe cold...these examples can go on.

These diagrams serve as indispensable tools for detecting and visualizing such relationships in a systematic manner, which would be virtually impossible to present using only narrative text or traditional tables. Without them, it would be extremely difficult to interpret the dataset holistically or to derive meaningful conclusions about climate evolution and its socio-economic consequences in 17th-century Transylvania.

That being said, we acknowledge that these figures require a more accessible and focused explanation in the manuscript, but we cannot give up on them altogether. In response to the reviewer's concern, we will revise the manuscript to provide clearer, more coherent textual support that highlights the most relevant insights from each figure and guides the reader in interpreting the data. We are confident that, through these improvements, the role and value of the temporal network figures will become more evident and better aligned with the overall aims of the paper.

c) Figure 7 can also be cut out as again it is not easy to appreciate. I suggest that the cold and heat waves section be trimmed down and creatively incorporated into the section on 'cold and warm years and seasons' – this would help avoid some element of repetition and help make it less 'lengthy'.

We respectfully disagree with the suggestion to remove Figure 7. While we understand the reviewer's concern regarding visual complexity and textual repetition, Figure 7 plays a critical role in presenting the data in a comprehensive, synthetic, and accessible format.

This figure summarizes a total of approximately 400 distinct climate-related events, including 116 cold and heat wave episodes, 170 events linked to excess and deficit precipitation, and 102 climate risk phenomena. These events vary significantly in duration, from just a few days to several weeks or even an entire month. Integrating this volume of detailed information purely into the main text would result in a manuscript that is not only excessively long, but also difficult to follow and overwhelming for the reader. On the other hand, eliminating these events altogether would significantly weaken the scientific value and integrity of the study, as it would mean presenting only a partial and fragmented view of the climate variability documented in 17th-century Transylvania. Our aim is to provide a full picture of the diversity, frequency, and distribution of short-term extreme events, which are essential for understanding the complexity of the historical climate.

Therefore, we consider Figure 7 essential for presenting this body of data in a manageable visual format. That said, we fully acknowledge the need for clearer guidance to help the reader interpret the figure. In the revised version of the manuscript, we will improve the accompanying text by more explicitly explaining how to read and use the figure, highlighting key findings, and connecting the visual data to specific narrative insights.

d) Perhaps my biggest frustration with this paper is the extensive use of code language. Excluding the well-known acronyms such as LIA, NAO etc (which are widely

known and most acceptable to use as acronyms), the reader must become familiar with no fewer than 36 codes (acronyms) specifically designed for this paper only (these are explained in the lengthy 3.2 section of the manuscript). From there, on one must then remember all these codes. This makes the reading task very heavy and tiresome. Such a code language style must be avoided.

We fully agree with the reviewer's concern regarding the excessive use of internally defined abbreviations. To improve readability, we have removed all such abbreviations from the main text. They will be used only within figures, where necessary for space, and will be clearly explained in each figure legend. We believe this change will make the manuscript much easier to follow and appreciate the reviewer's helpful suggestion.

General focus of discussion:

4. The paper places much of its focus on the fact that we are dealing with the Maunder Minimum (MM) and that broadly the results through the 17th century reflect the solar forcing (sunspot) influence – i.e. that with fewer sunspots as the century progresses there is a general cooling & associated changes with precipitation. The paper illustrates the agreement with other proxies and findings from other parts of Europe. So, the investigation takes a rather broad (general) approach and essentially does not make any novel new findings that might expand knowledge for the 17th century northern hemisphere (Europe).

We respectfully argue that, while the paper may appear to take a broad approach, its main contribution lies in filling a significant regional knowledge gap. While the evolution of weather and climate during the 17th century is well-documented for much of Western and Central Europe through historical sources, very little is known about this period in the territories of the former Romanian principalities. This is largely due to the scarcity of studies and the fragmentary nature of available sources, which have previously made it difficult to construct a coherent scientific narrative without over-reliance on extrapolation.

Moreover, we emphasize in the manuscript that the Little Ice Age (LIA) and the Maunder Minimum (MM) did not manifest uniformly across the globe, or even across Europe (this is a widely recognized fact in the scientific world). Thus, our study contributes to understanding regional climatic variability during this period and offers a new dataset based on a wide range of documentary evidence that has not been systematically analyzed before for the area of Transilvania.

At the same time, although there are several proxy-based reconstructions targeting various climatic parameters for 17th-century Transylvania, historical documentary data provide an essential complementary perspective, as they not only reflect environmental variability, but also capture how such changes were perceived, interpreted, and experienced by contemporary societies. This human dimension, absent from most natural proxies, is crucial for understanding the broader societal impacts of climate fluctuations.

5. There is much more to it than merely solar forcing, as many papers have demonstrated for 17th century Europe. The inability for the current paper to address smaller temporal scale (inter-annual) variability through their time of investigation, is a major limitation. For

example, volcanic forcing in both the first 50 years and second 50 years of the 17th century is well known through several publications, yet the current paper makes no mention of such. I would deem it essential to more carefully consider volcanic forcing, especially given the fact that this paper is most concerned with 'climatic extremes', which we know often follow the shorter-term (~1-4 years) climatic impacts of volcanic eruptions, rather than the longer term (decades) effects of solar forcing changes.

Thank you for this important remark. We fully acknowledge that volcanic forcing had the potential to influence climate variability in 17th-century Europe, including the region of our study. We will revise the manuscript to explicitly mention this factor and its relevance in the broader paleoclimatic context.

However, we did not include a detailed analysis of volcanic impacts in our study for two main reasons:

(1) There is a lack of regional-scale quantitative data that would allow us to assess the magnitude and specific influence of individual volcanic eruptions on the local climate of Transylvania.

(2) Even if such data were available, it would be methodologically difficult to establish direct causal links between individual eruptions and the observed climate-related events in our historical dataset, particularly given the complex atmospheric circulation patterns and delayed or regionally variable impacts that volcanic events can have.

Nonetheless, we agree that volcanic forcing should be recognized as an important short-term climate driver, especially in relation to extreme events, and we will integrate this perspective into the revised discussion.

6. What about other ocean-atmospheric interactions that may have caused some of the observed temperature and hydro extremes?

We agree that large-scale ocean-atmospheric interactions play a key role in shaping regional climate variability. In the manuscript, we have included a dedicated discussion of the North Atlantic Oscillation (NAO) and its phases, emphasizing its potential influence on both temperature and precipitation extremes in Transylvania during the 17th century.

7. It is also well documented that the MM did indeed experience colder than normal winters but also at times rather unusually warm summers in Europe– this is not something new and so the authors really need a stronger connect with the literature that has addressed some of these things.

We agree that the alternation between colder winters and unusually warm summers during the Maunder Minimum is well documented at the European scale. However, the novelty of our study lies in the regional focus on Eastern Europe, specifically Transylvania, where the climatic expression of both the Little Ice Age and the Maunder Minimum remains far less understood.

Moreover, the study contributes original insights by exploring how people experienced and interpreted climate variability during this period, through a systematic analysis of historical documentary sources. This human dimension, combined with the underexplored geographical focus, provides new perspectives that complement existing literature.

A few smaller technical matters:

8. Avoid vagueness: Line 23: ‘Correlating historical sources’ = very vague – what are these sources? I assume you mean ‘Correlating documentary sources with other proxy data….’.

   It means ‘Correlating documentary sources with other proxy data….’, indeed. We will correct the sentence.

9. You refer to ‘social archive’ and ‘society’s archives’ in some places….I think what you mean to say is ‘archives of society’ as the former two terms do not make sense.

   Indeed. We will correct the expression.

10. You refer to ‘altitude’ – this is not correct when dealing with land above a certain height above sea level – for which it is not ‘altitude’ but ‘elevation’. Altitude refers to the height in the atmosphere above the land surface (for example the flight altitude of an airplane).
    Indeed. We will correct the expression.

11. ‘What are ‘fohn movements’? = vague. Is this the same as what is more commonly referred to as ‘föhn’ – which is a warm wind?

    We want to refer to this wind, yes. We will correct the expression.

12. I note the excessive use of the term ‘database’ – in most such cases it should be ‘data’. A database is an organized collection of data that are filed nowadays in an electronic system of sorts. There seems a lot of confusion with such terms – for example you refer to disadvantages of ‘databases’ in line 158 – in this case what you are really dealing with is the disadvantage of ‘data source types’ and not

    Indeed. We will correct the expression.

13. databases. You also discuss what you refer to as ‘true databases’ and ‘primary databases’ etc, which again are all terminologically incorrect for the context of discussion. This terminological confusion is widespread through the manuscript.

    Thank you for this important observation. We acknowledge the inappropriate and confusing use of terms such as "true databases" and "primary databases." We will carefully revise the manuscript to correct all incorrect terminology and ensure consistency and accuracy throughout the text.

14. Please double check spelling – I note at least one error in Figure 2 (‘regim’ should be ‘regime’).

    The correction will be implemented!

15. Lines 190 to 195 you write about the shortcoming of the 'methodology' when in fact the shortcoming has to do with the 'source type', rather than the methods. If you know that there are limitations with the source type, then you can explain how the methods have creatively dealt with such a limitation.

    It will be implemented!

16. As mentioned already, I do not like the code language used for reasons already explained. But apart from that, some of the allocated acronyms (codes) do also not make much sense as there is inconsistency in the lettering allocation system you use. For example: for **c**old **y**ears you use (CY), yet for **w**arm years you use (HY)…why is it not WY? Yet in other places you then also use the code HY for **h**ot year. So, this means you have both warm years and hot years …yet I do not see these distinctions in the results as there you only have hot years with warm seasons. Also, how do you differentiate between a hot year and a warm year? What qualifies a year as 'hot'? Do warm multiple seasons in a given year then make that year a hot year?...or should it not rather simply be a warm year? I pose all these questions because I can see there is a lot of confusion and mix-up in the paper with regards all this.

    We acknowledge these typo issues. However, since we have decided to remove all internally defined acronyms from the main text, we believe this will greatly improve the clarity and fluency of the manuscript. The terms will now be fully written out, and such confusion will be avoided.

17. Figure 4: there is again some terminological confusion or mix-up here. I have always understood season to be summer, autumn, winter, spring. Here the Figure separates two of the seasons i.e. a = 'summer season' and b = 'winter season'. You then use the dark colour to indicate 'cold season' (i.e. winter) and 'hot season' (i.e. summer). So, I think you are really referring to the **mean condition** of a given season, so for the colour boxes it should read as 'colder than normal conditions' and 'warmer than normal conditions'.

    The figure refers to temperature anomalies relative to expected seasonal conditions. We will revise the figure caption and legend to clearly specify that the shading indicates "colder than normal conditions" and "warmer than normal conditions" for the respective seasons.

18. Line 337: 'The trend of winters becoming colder and more frequent was…..'. It is impossible for there to be a trend in winter frequency. There is always only one winter season per annum and so what you say here is technically impossible. There may indeed be trends for the thermal conditions of winters, or also the length of abnormally cold conditions making the winters *feel* either shorter or longer each year.

    This is a mistake, which will be corrected in the revised version of the article.

    Thank you very much once again, and we are looking forward to your answer!

    All the best!