Referee Report:

Title: *Climatic extremes and their social impact in 17th-century Transylvania. A climatic historical reconstruction in the context of the Little Ice Age*

Authors: Gaceu et al.

Journal*: EGUsphere*

Please note that I deliberately did not read any of the possible postings of comments for this submission so as not to be influenced in my evaluation/opinion of this paper.

This paper presents a primarily documentary-based approach to examining the 17th century climate of Transylvania and compares these finding with some other proxy records for the region. The paper also places the findings within existing literature which cover the climate for this period in other parts of Europe in particular. I personally find this kind of work most interesting and valuable but also appreciate the enormous efforts (and time!) required to accumulate enough data (information) from which to present a meaningful contribution to the subject matter. This paper presents some valuable (new) information for a period and region, for which past weather and climate during the 17th century is still 'patchy' – to this end I would like to see some of this work published. However, there are several major concerns I have with the current manuscript, that would not make it suitable for publication in its current form. My aim here is to guide the authors toward revising their manuscript so that it would indeed make it a valuable publication for *EGUsphere*.

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.
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).

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.

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.

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'.

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.

4. General focus of discussion:
   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). 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. What about other ocean-atmospheric interactions that may have caused some of the observed temperature and hydro extremes? 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.

A few smaller technical matters:
Avoid vagueness: Line 23: 'Correlating historical sources' = very vague – what are these sources? I assume you mean 'Correlating documentary sources with other proxy data….'.

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.

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).

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

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

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.

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

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.

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.

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’.

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.

I hope my comments are constructive and will assist the authors to substantially improve their manuscript for possible publication in *EGUsphere*. I wish the authors well as they revise their work.