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*Climate variability in Andalusia (southern Spain) during the period 1701–1850 AD from documentary sources: evaluation and comparison with climate model simulations*

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This is an interesting paper. The authors apply a relatively new method of temperature and precipitation reconstruction (presented by one of the authors in 2008). Effectively most of the documentary data available consist of information on “extreme events” and it seems a good idea to infer the average and standard deviation of the distribution from the frequency of extreme events (p.2306). This method avoids the difficulty of assigning indices to quantify documentary data (and the ambiguity of the “0” index as it may indicate either normal conditions or lack of data); furthermore, it does not need a calibration period (with overlapping instrumental and documentary data). The study refers to Andalusia, as did the 2008 paper. The author should make clear what are the progresses made in the present paper.

There are parts of the text that should be synthesised and clarified and the text should be reviewed by an English native-speaking person.

My opinion is that this paper will be of use for the scientific community and that it should be published after revision.

Major remarks

The authors are making a regional reconstruction based on data referring to different meteorological stations; the instrumental data do not all refer to the same period, as you have used “the longest available series in Anadalusia” (p. 2304, l.9). If so, you should justify why a common period has not been used (too short?) and if the present procedure do not substantially bias the results. You are aware of this problem when you state that “a complementary explanation for these biases is the presence of deficiencies also in the instrumental data employed in this study” (p. 2316, line 7-8).

The authors are ignoring the spatial variation of temperature and precipitation in Andalusia, which may be important. If the yearly and seasonal averages are not always calculated with data from the same meteorological stations, some further bias may be introduced in the results. The authors are aware of this fact as they write “In this case it must be in mind that instrumental values correspond mainly to Gibraltar, that it is noticeably wetter than nearby sites in mainland Spain (Wheeler, 2007)”. It should be shown somewhere (or referred to the literature) that although those differences occur, the signal of temporal variability is the same (or similar) in the whole studied area.

When reconstruction criteria of winter temperature, you write: p.2302, l,15-17: “When news refers to cold (warm) weather in winter (summer), they were considered as normal”. With this criteria it looks as you have not considered documentary evidence of very cold winters and very hot summers. If so, how did you study winter

temperature when instrumental data are not available? Will you please explain, please?

In other locations, some winter months have been considered very cold based on documentary sources. For instance in January 1709 , rivers froze in Catalonia (manuscript from Constans), there was very cold weather in Sevilla (Palomo, 1984), and snow in Lisbon (Alcoforado et al., 2000). The descriptions of the documentary sources refer to weather unusually cold weather.

**Palomo, Francisco de B.** 1984: *Historia Critica de las riadas ygrandes avenidas del Guadalquivir*. Colegio Oficial de Aparejadores y Arquitectos Técnicos, Sevilla. (supplied by M. Barriendos)

**Constans, L.G.:** *Una cronica inedita*, p. 85, Archivo Historico, Municipal de Girona. (supplied by M. Barriendos)

## Abstract

The abstract should be more concise and should adequately describe the research and be more clear about the results.

p.2298, l.13-19. Be more concise in the following sentence “Results show that the reconstructions are influenced by the reference period chosen and the threshold values used to define extreme values. This creates uncertainties which are assesed within the context of the climate simulation. An ensemble of reconstructions was obtained using two different reference periods and two pairs of percentiles as threshold values”.

## Minor points

p.2299, l.4. estimates?

l15 Replace Alcoforado by Alcoforado

l.23 Replace placing by location

l.24 until p.2300,line 4: rewrite. The paragraph is not clear. The sentences are too long. Which is the influence of the Mediterranean?

p.2300 l.1 Replace provoked by caused

l.10 Replace *because include* by *because it includes*

l.20-22- *the* sentence is not clear

l.21 Replace *of reconstruction* by *the reconstruction*

p.2301, l.13 Replace *faults* by *errors*

l.11-14 *In the sentence “The advantage of using different kind of sources lies in the fact that allows for an adequate cross-comparison of news collected, assists in eliminating faults and in comparing information from different documents” you are including the same idea twice*

p.2302, l. 7 Replace *the 15%* by *15%* (same thing for 17%)

p.2303, l.4 Replace *forwards* by *onwards*

l.9. reservation? What do you mean?

p.2304, l.5 - Replace rainfalls by rainfall

L.19-21 - rewrite more clearly the sentence from line 19 to line 21

p.2305, l.12 replace volcane by volcanic

L.13 – These factors “evolve” What do you mean?

L.22 – Replace that avoids by that it avoids

p.2305, l.15 Replace Crowley by Crowley

p.2306, l.24 – Replace amounts tends by amounts tend

p.2307, l.2 Replace transform by transformed

p.2309 l.3 and 4 – replace one of the words “sample” to avoid repetition

l.19 – replace *no a clear relationship* by *no clear relationship*

p.2310, l.19 – Replace is by are

p.2313, l.13 – Replace has not used by has not been used

p.2314, l.2 – replace from 1820 to 1701 by from 1701 to 1820

p. 2314, l.10 and following. It may be interesting to compare also with indices obtained for southern Portugal for the 18<sup>th</sup> century by Taborda et al., 2004

Common positive values in winter: 1708, 1784 (beginning of a very rainy period of 4 years),

Common positive values in spring- 1736 and 1786

Common droughts in winter: 1737 and 1753

P.2320, l.23, replace Alcaforado by Alcoforado

## References

p.2320 l.23 Replace Alcaforado by Alcoforado

p.2322, l.15, Format paragraph of the Lettenmaier reference.

p.2323, l. 8 – Replace o Jesuit order by of the Jesuit order

p.2323, l. 22 - Replace Alcaforado by Alcoforado

Confirm journal abbreviations

### **Figures and Tables**

Figure 1 –

Huelva is missing.

Include limits of Andalusia in the map of Europe. Include graphic scales in both maps

Indicate clearly in the legend which cities possess instrumental and documentary data. You say in the text that they are more or less the same (cities with documentary data and cities with instrumental data), but you should be more precise. Some city names are written in uppercase, others in lower case. Has this a particular meaning?

There should be more information in fig.1 and table 1 on documentary data.

Figure 3 and Figure 4: Include legend of the black line.

Fig.9 caption- Replace rogations by rogation

Table 3, line 6 replace black by bold