NHESSD

Interactive
comment

Interactive comment on "Meteorological drought in the Miño-Limia-Sil hydrographic demarcation: The role of atmospheric drivers" *by* Rogert Sorí et al.

Anonymous Referee #1

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General comments:

In this paper, meteorological droughts affecting the Miño-Limia-Sil Hydrographic Demarcation during the period of 1980–2017 are identified and assessed using the one month SPEI index (and, in some cases, some other temporal scales). In this way, the problems associated with droughts, their origin and their impacts are analyzed at a regional level. It is shown that the driest/wettest conditions occur under some particular Circulation Weather Types. In addition, some teleconnection patterns seem to favor more/less frequent dry conditions with different temporal scales. Finally, soil moisture and river stream flows are also related to drier or wetter conditions in previous momths.

My general impression is that many of the presented results are not new, since most of the results shown in this document are in agreement with those presented in previous papers on droughts in the northwest of the Iberian Peninsula. Probably, the most original aspect of this paper is that it shows that the methods previously used in the NW Iberian Peninsula can be used successfully in a much smaller region, such as MLSHD. Anyhow, I think that this paper is acceptable for publication with some revisions and clarification.

Specific comments:

In general, the indices used in the paper are described very diffusely and only some random information about them is provided to the reader (of course, references are provided on how those indices are defined. But further explanations would help to better understand what is presented in the paper). I think more information has to be provided on how those indices are calculated and what they represent.

For example, why doesn't the 'materials and methods' section include a brief definition of SPEI and SSI and the way they are computed? Equations 1 and 2 define Eto (E1) and Rn2(S), but the text does not include the definition of some of the indices most frequently used in the paper (SPEI, SSI, severity...) or, for example, the way in which the statistical sifnificance of the wavelet coherence is calculated.

Some information about the data is missing as well. Are the Miño and Limia rivers discharge series affected by reservoirs or by any other human regulation activity? This information should be included in the description of the data and considered in the discussion of the results. In the conclusions section, it is explained that the classification of the CWTs is daily. I think this information should be included in the description of the data.

The Atlantic Multidecadal Oscillation is known to be characterized by a period that varies from approximately 40 to 80 years (even if a band of 20-30 years is accepted, the period studied in this paper does not even include two complete cycles of such

an AMO oscillation). Therefore, it is very difficult to assess the impact of AMO with a study period of less than 40 years. If the maximum coherence period between AMO and SPEI1 is 6 years (figure 11) then it is not addequate to describe it as multidecadal coherent oscillation. My opinion is that the analysis of the impact of the AMO is too noisy (and not multidecadal enough) and that it should not be included in this paper.

Other suggestions, corrections and typos:

Abstract: Is it acceptable to define acronyms in the abstract? If so, MLSHD is defined for the first time in the abstract and it is not needed to re-define it in the Introduction (P3-L6)

Abstract-line 19: 'The results showed that atmospheric circulation from the southwest, west, and northwest were directly related to dry and wet conditions': To both dry and wet conditions?

Abstract-line 22: 'the major teleconnection atmospheric patterns': change to "the major atmospheric teleconnection patterns"

Page 3-Line 15: Delete '(Figure 1)': the MLSHD and figure 1 are already referenced a few lines before.

P4-L15: define the variables in ec. 1

P4-L17: SPEI is said to be a multiscale index, but it is not clear what is the advantage of this multiscale character. In fact, most of the paper deals only with SPEI1. Please, describe those advantages.

P4-L21: 1954-2014: 61 years, thus about six decades, not five.

P5-L13: ERA-Interim reanalysis for the period 1979-2017. If not, the period 1980-2017 cannot be set for all the analysis in this study (P6-L13).

P5-L18 to L23: a better explanation of what 'pure' or hybrid' WTs are (and about the implications of WTs being 'pure' or 'hybrid') would be appreciated. A mathematical

definition based on poorly defined parameters is not enough. Any mention to those 16 'hybrid' circulations could be removed from the main text since they are not mentioned in any other section of the paper.

P7-L12: '...occurred between December and February...': ?

P8-L6: '...the length of these episodes increased after 2003': Not the length, it is the frequency of long episodes what is higher. Long episodes can be found in 1988-1993 & 1980-1983, but after 2003 they are more frequent.

P8-L16-20: the trends described in these lines are far from being statistically singificant (p values of 0.26, 0.52 and 0.26!!). Thus, it is difficult for me to understand why authors make so much emphasys in these trends.

P9-L4: What do the numbers included as 'severity' in table 3 mean? How are these 'severity' values calculated? Same comment is applicable in table 2 and P8-L18. The definition of 'severity' and how it is calculated should be included in section 2.

P11-L1: Pressure values in figure 4 are very small and difficult to read. The caption of this figure could include that reddish (blueish) isolines represent high (low) pressure values.

P11-L18: Figure 5 caption: what do 'X's in the figure mean? I guess they represent not significant correlations, but it should be stated in the caption. What does the size of the circles in this figure mean? Is it just proportional to the value of the corralation? That information should be in the caption.

P11-L22: moNths. The 'N' is missing

P12-L8-10: The description of what is shown in figure 7 included in the main text does not coincide with the caption of the figure. The caption seems to be wrong. Please, revise it.

P13-L3: Figure 7: Why are percentages negative? What WT is the one with a positive

percentage? Its color is not included in the WT color table. Please, revise the caption and the main text and include this information.

P13-L10: Both the main text and the caption of Figure 8 should explain what the authors mean when they talk about the onset, the peak and the termination of the drought episodes. I guess the "onset" is the month in which the episode begins, the "peak" is the month in which the episodes reach the highest value of SPEI1 and the 'termination' is the month after the month in which the episode ends. But these ideas are not clear in the main text or in the caption.

P19-Figure 10 caption: Correlations shown in figure 10a are obtained from monthly series? What are the 'X's in figure 10b? Confidence level? Figures 10 and 11 Captions: SPEI1 is enough, delete '...the 1-mo Standarised Precipitation-Evapotranspiration Index...' (idem in figure 11 caption)

P19-L25 to P20-L2: The interpretation of figure 11 is already included in the figure caption. It could be deleted from the main text.

P21-L19: Should it be '...increased with the TEMPORAL SCALE OF SPEI...'

P21-L20: 'Figure 12b and c...' should be a new paragraph

P21-L31: '...basin features and water REGULATION...' this point is very important in the interpretation of the results. Nowhere in the paper it is said wether the streams were regulated or natural. I guess they are regultaed and, thus, it is difficult to obtain clear interpretations from them.

P22-L13-14: I do not understand very well what authors mean with their sentence 'The results revealed the frequency of the WTs prone...' Please, revise.

P23-L3-8: As I already said, I do not think any conclusion can be obtained about the influence of AMO.

P23-L10-14: Conclusions about soil moisture are sound, but results about river stream-

flows are much more duvious since those flows are most probably regulated.

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