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Natural Hazards and Earth System Sciences
Discussions
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Interactive comment on "A high-resolution spatial ass essment of the impacts of drought variability on vegetation activity in Spain from 1981 to 2015" *by* S. M. Vicente-Serrano et al.

Anonymous Referee #1

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This manuscript aims to assess the sensitivity of vegetation types to drought across Spain, using a high-resolution (1.1 km) spatial dataset of the Normalized Difference Vegetation Index (NDVI) and the Standardized Precipitation Evapotranspiration Index (SPEI) for Spain for the period from 1981 to 2015. In particular, an analysis of the drought time scales at which vegetation activity aims to show the highest response to drought severity at different moments of the year. The study is exhaustive, taking advantage of the two high resolution datasets computed by the authors, the methods are adequate and the results are in accordance with previous works and are discussed in a detailed way. The overall context of the subject is very important in Mediterranean and Iberian context, taking in account the importance of drought subject for the region

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Discussion paper

within the context of warming tendency. Therefore, the work seems to be appropriate for this journal. However, some aspects could be improved in order to increase the intelligibility and readability of the paper.

MAJOR

As I said the subject and results of this manuscript are of great interest for a wide range of readers. However, the reading of the paper is very tiring, the number of figures in the manuscript and supplementary information is 'astronomic', the figures are really small, the axis information and titles are unreadable and the results and discussion is really hard to follow. Nevertheless, I recognize that present these results is a very hard task. Therefore, my next comments are suggestion that may increase the readability and increase the number or interested readers that should be attracted to the important results of the manuscript. âĂć The semi-monthly analysis is interesting and aimed to take advantage of the higher temporal resolution of the datasets. However, the temporal changes in correlation are slow and I do not see the add-value of presenting 24 graphs instead of 12. As a matter of fact, the graphs for each month are very similar and if you increase the size of the figures (taking in account that you may present only one figure for each month, e.g., 2nd January, 2nd Feb,. . .) the analysis will be much more easy. âĂć Another issue related with the 12 new bigger figures is the possibility of presenting all the land cover inside each graph, maybe with different colours. This allows a better comparison between land covers and reduce drastically the number of figures in supplementary information. âĂć The result section is very exhaustive and hard to follow. Please consider to resume. âĂć The discussion and conclusions section is very long and also hard to follow, although with a huge amount of very interesting points. I would suggest to separate discussion from conclusion and introduce sub sections in discussion in order to organized the main findings. I also would suggest to add in conclusion section some paragraphs highlighting the new insights of this work in comparison with previous ones and the usefulness and need of this type of analysis.

Furthermore, some methodological issues are not very clear.

1) (Lines 189-193) The authors said “computed the atmospheric evaporative demand (AED), reference evapotranspiration (ETo), and the Standardized Precipitation Evapotranspiration Index (SPEI).” Please explain the advantage of using AED AND ET0. Which is used to computed SPEI? SPEI in Vicente-Serrano eta al., 2010 is computed using PET. What is the difference between AED and ET0? Which method is used to compute AED? Maybe the readers of the journal are not very familiarized with these differences and should understand the biophysical add value of using AED. Please clarify the innovation of this new approach and the need of this innovation. Additionally, in several figures (e.g. Figure 8) the author mentioned AED in figure caption and ET0 is written in axis. Please try make it more consistent. 2) (Lines 170-172): Please clarify which variable is really used for the correlation assessment: is it the standardized NDVI (sNDVI) or NDVI magnitude with residuals? Figure captions mentioned sNDVI. I am confused with these definitions. Please clarify and justify those options with more clarity and detail. 3) (Lines 220-223): Why CLC2000 and not the most recent version? The land cover is not static, are always changing. The classification of 2000 does not represent the average state of land cover during the period, Please, justify this choice taking in account this changeable character of land cover. As the authors have removed the pixels that they say are corresponding to land cover change, I would suggest to use the versions of CLC for 1990, 2000, 2006 and 2012 and considered only the pixels that are corresponding to unchangeable land covers, as coded using CLC. 4) (Lines 159-166): What means strong changes in NDVI? The author said “the annual NDVI higher than 0.05 units or an increase higher than 0.15 units between 1981 and 2015”, but what does it means in terms of variability (in terms of std). Why do you choose this value? Please fundament the choice. 5) Please clarify what means the time-scales between 1- and 48-semi-months? Did you compute SPEI with a bi-monthly accumulation? In line 202 you said that "the SPEI was calculated for the common 1- to 24-month time scales". please explain the difference between both computation approaches and the advantage of the last one (bi-monthly accumulation). What is the advantage of doing this instead of computing the monthly mean of NDVI? I do not see the add value of this

approach 6) Figures: For the majority of the figures in the manuscript and supplementary information is not possible to read the axis of the figures. The axis number, the axis titles and the titles of figures are not readable at all. Please increase the font size (probably only for the bottom and left figures in order to save space). Supp Figure 5: provide a title for each graph Figure 12: the tile of previous figures should be like the ones in this figure (e.g., 1st Jan, 2nd Jan,...). This will increase significantly the readability of figures. 7) (Lines 454-458): Difficult to follow. Please consider to rephrase. 8) (Lines 505-507): Difficult to follow. Please consider to rephrase. 9) (Lines 555): When? in spring and autumn. Please consider to rephrase, clarifying and detailing. 10) (Lines 585-589): Very good point! 11) (Lines 607-609): Another important finding of this work!

MINOR 1) (Line 22): rephrase 'a another newly developed. . .' 2) (Line 57): move the data of access to the reference list 3) (Line 157): rephrase 'In out attemp' 4) (Line 158): NDVI or sNDVI 5) (Line 353): make the sentence consistent with the figure caption. Is it P-AED or P-ET0 6) (Line 359): "July to August" or July to September??? 7) (Line 388): "March to April" or March to May???

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