Clim. Past Discuss.,
https://doi.org/10.5194/cp-2017-84-AC2, 2017

Climate of the Past Discussions
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Interactive comment on "The Climate of the Common Era off the Iberian Peninsula" *by* Fátima Abrantes et al.

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Received and published: 12 November 2017

Please consider reading the supplement for a more clear view of this response

This reviewer seconds the general opinion and concerns of reviewer 1 and prefers to present specific comments. We thank this valuable review and to not repeat ourselves, we invite the reviewer to please read our response to reviewer1. Specific comments are addressed below.

Specific comments: -page 1: Abstract, first sentence, is not convincing at all. Please remove it. -page 2: Lines 6-11, those lines are too complex and could not be properly understood without having a read over the modern climatology chapter. -page 2: Line 23, perhaps cite Guiot and Cramer, 2016, Science, for a more recent assessment. The

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new version of the paper takes into account all of Referee 2 requests and comments.

-page 3: Here the discussion would greatly benefit if the authors could add a series of very simple figures introducing the NAO, EA and SCAND modes of climate variability, in particular since the authors often refer to those modes later in the discussion. In order to reduce the size and focus of the introductory text, the explanations and discussion of the impact of these modes of atmospheric circulation on the climate of the Iberia Peninsula is now only considered in the discussion section. However, to clarify this important aspect, we have used the maps that show the regional effect of all three modes of atmospheric circulation (NAO, EA and SCAND) on the SST and precipitation for both winter and summer conditions over the Iberian Peninsula (Fig. 1), as proposed by Hernández et al., (2015) and presented in their figure 5 (Hernández et al., 2015). However, this work is published and we can only refer to the figure

-page 4: Here the reader is really lost, and could not remember any clear information at the end of the page. The Introduction was fully rewritten and reduced in length.

-page 6: Line 31, please check that ''standardized" and ''scaled" are not referred to ''normalized" and ''standardized" instead. We agree with the referee that there is some confusion over these terms, which are often interchanged. This is why for the purpose of clarity, we have added under brackets the mathematic operations that were actually carried out. Normalizing typically means to transform the observations such that they look normally distributed <http://en.wikipedia.org/wiki/Normal_distribution>. Some examples of transformations for normalizing data are power transformations <http://en.wikipedia.org/wiki/Power_transform> (e.g. log). Scaling simply means multiplying your observations by a constant c, which changes the scale (for example from nanometers to kilometers). Scaling is generally done for convenience, and does not imply any change in the distribution of the variable. Standardizing generally means subtracting the mean and dividing by the standard deviation. But there often the terms are interchanged through the processes, i.e. scaled is named when we normalized, etc. the concepts are nested within each other. For example, the function 'scale' in

R performs what is often named as standardizing the variables in a PCA, which corresponds to centering + scaling. Therefore, normalizing would be more transforming into a normal variable, which according to the bibliography it would not be applicable in this case. Either centering, scaling or standardizing would be ok for us if the referee considers so.

-page 8: Line 2, ''All age models : : : all accepted 14C dated levels" reads like you've discarded some of them. Please clarify the age model description. The chronology for the three new cores will be included as Supplementary material. A presentation of the used data and methods is included in the response to Reviewer1. Given that these comments are available on line we decided by not repeating that information and respectfully ask Reviewer 2 to please read that response to Reviewer 1.

-page 9: Lines 23-31, the discussion on the most recent SST shifts could be either discussed later, or more developed (what is the great salinity minimum?). It is difficult to see what happens over the last 50 years. We agree with reviewer 1 suggestion and a more detailed discussion on the SST variability within the Industrial Era section is now presented in the last point of the discussion of this new version of the paper.

-page 10: on the n-alcane concentrations, lines 1-10 please explain more how you calibrate the proxy. I would intuitively expect that dilution plays an important role, so that the more riverine runoff you get, the more alcanes would be diluted by terrigenous material, but it seems to be the contrary: : : The more terrigenous material the higher the [n-alc], or is it diluted by the terrigenous component? n-alkanes ([n-alk]) are long linear chain lipid molecules that mostly originate from cuticles of the vascular plants, and their concentration in oceanic sediments has been widely used as a proxy for river discharge (e.g. ((Elias et al., 1997; Grimalt et al., 1990)). Furthermore, previous work on Iberian Margin has shown a good agreement between [n-alk] and River flux (Abrantes et al., 2005; Rodrigues et al., 2009). The assessment of the value of this proxy at the regional scale, now included in the supplementary material, was done through the comparison of the [n-alk] data obtained for the most recent sediments of the Porto, Tejo and Algarve

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sites with the average river runoff for the Douro, Tejo and Guadiana Rivers during the NAO winter months (DJFM) for the years after 1991 and available at the Portuguese National Service for Hidric Resources (SNIRH) (http://snirh.inag.pt). The results reveal a significant (at $p>0.01$) Pearson correlation of 0.54 and $n=47$, confirming [n-alk] as a good proxy for evaluating the intensity of River runoff on the Iberian Peninsula. Most of the sediments in these depocenters are muds (silt and clay) that result from the deposition of fine particles of terrigenous origin that are transported into the ocean in suspension by the river plumes (e.g (Abrantes et al., 2005; Abrantes et al., 2011)). Furthermore, most of the organic matter is bonded to the fine fraction of the sediment, in particular the clay fraction (Mil-Homens et al., 2007). The high correlation of the [n-alk] to other proxies of continental origin, such as Fe, has been demonstrated in previous papers for the Tejo area (Abrantes et al., 2005; Rodrigues et al., 2009). If we consider the sediments Fe content (cps) not only for the Tejo area but also for the Porto site and compare it to the n-alkanes measured concentrations in the same cores, a significant (at $p>0.01$) Pearson correlation of 0.47 and $n=250$ is found, revealing a parallel increase on both components of continental origin.

-chapter 5.3: please try to be more concise through sorting out the results and discussion separately. Why are you not discussing the LIA? Also, I find the wavelet analysis neither convincing nor useful to the discussion, and I don't see how you could extract significant periodicities longer than a century over time windows shorter than two centuries. We do refer and discussed the LIA pattern found in our records, however, the fact that they can be explained by previously highly discussed and published climate processes lead us to concentrate on the discussion of the periods that reveal marked differences, the MWP and the last 500 years.

-figures: please check the captions. In general, there are too many panels. We have looked into this aspect in detail, but still feel the need to maintain most of the panels. However, we have been very careful in referring to the figure's panel identification, every time one of them is mentioned in the text. We hope that this has made it easier to read previous figures, 5, 6 and 6 and will in the new version be figures 2, 3 and 4.

List of Figures

Figure 1 (Figure 5 of Hernandéz et al., (2015)). NAO, EA and SCAND modes effect on the mean precipitation, temperature and wind speed. 1 month lag time winter months (NDJF avg), and summer months (AMJJA avg).

References Abrantes, F., Lebreiro, S., Rodrigues, T., Gil, I., Bartels-Jónsdóttir, H., Oliveira, P., Kissel, C., and Grimalt, J. O.: Shallow-marine sediment cores record climate variability and earthquake activity off Lisbon (Portugal) for the last 2,000 years., Quaternary Science Reviews, doi: 10.1016/j.quascirev.2004.04.009, 2005. 2005. Abrantes, F., Rodrigues, T., Montanari, B., Santos, C., Witt, L., Lopes, C., and Voelker, A. H. L.: Climate of the last millennium at the southern pole of the North Atlantic Oscillation: an inner-shelf sediment record of flooding and upwelling, Climate Research, 48, 261-280, 2011. Elias, V., Simoneit, B., and Cardoso, J. N.: Even N-Alkane Predominances on the Amazon Shelf and A Northeast Pacific Hydrothermal System, J. Naturwissenschaften 84, 1997. Grimalt, J. O., P. Fernández, J. Bayona, and Albaige′s, J.: Assessment of fecal sterols and ketones as indicators of urban sewage input to coastal waters„ Environ. Sci. Technol., 24, 357-363, 1990. Hernández, A., Trigo, R. M., Pla-Rabes, S., Valero-Garcés, B. L., Jerez, S., Rico-Herrero, M., Vega, J. C., Jambrina-Enríquez, M., and Giralt, S.: Sensitivity of two Iberian lakes to North Atlantic atmospheric circulation modes, Climate Dynamics, 45, 3403-3417, 2015. Mil-Homens, M., Stevens, R. L., Cato, I., and Abrantes, F.: Regional geochemical baselines for Portuguese shelf sediments, Environmental Pollution, 148, 418-427, 2007. Rodrigues, T., Grimalt, J. O., Abrantes, F. G., Flores, J. A., and Lebreiro, S. M.: Holocene interdependences of changes in sea surface temperature, productivity, and fluvial inputs in the Iberian continental shelf (Tagus mud patch), Geochemistry, Geophysics, Geosystems, 10, n/a-n/a, 2009.

Please also note the supplement to this comment:

https://www.clim-past-discuss.net/cp-2017-84/cp-2017-84-AC2-supplement.pdf

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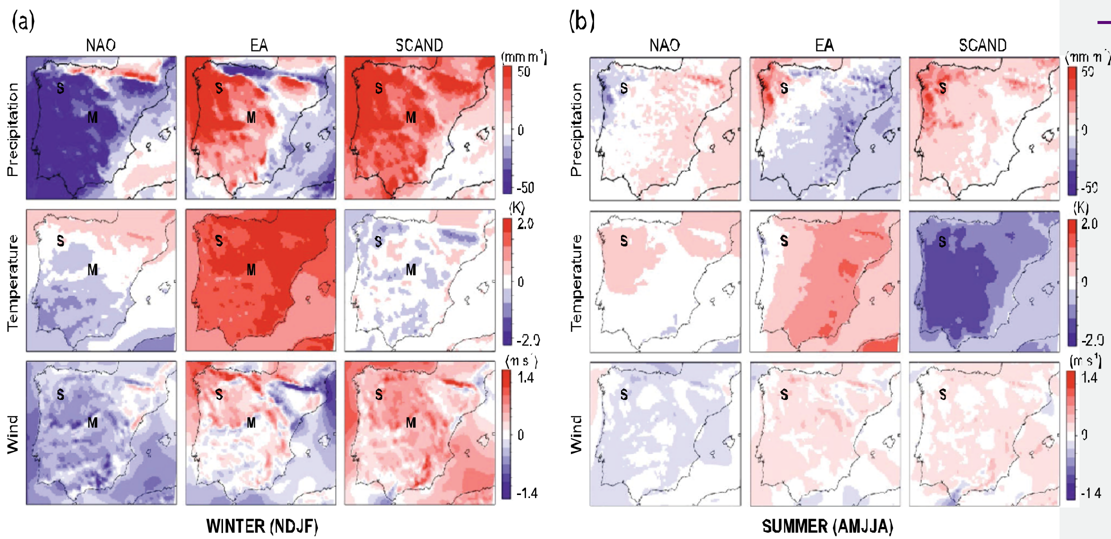

Figure 1 (Figure 5 of Hernandéz et al., (2015)). NAO, EA and SCAND modes effect on the mean precipitation, temperature and wind speed. 1 month lag time winter months (NDJF avg), and summer months (AMJJA avg).