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Climate of the Past Discussions

Interactive comment on "Holocene climate variability in the North-Western Mediterranean Sea (Gulf of Lions)" *by* B. Jalali et al.

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This discussion paper presents new data for Holocene sea surface temperatures and terrestrial input to a marine core in the Gulf of Lions, NW Mediterranean. The novel contributions of the paper are the parallel study of the two organic geochemical proxies and the very high sampling resolution of the work. In my view this is a valuable contribution to the understanding of Holocene palaeoclimate in the NW Mediterranean sector. I would encourage the authors to take into consideration the following general comments and specific points.

General points

The chronology for the core seems quite robust, with good 210Pb and 14C age control.

I wonder if the authors have considered using a Bayesian approach to the age-model construction (seeing that the free online software OxCal was already used here for working with the 210Pb ages)? It would be really nice to present both the ages and uncertainties for the CR and high-TERR episodes, for example, and it would represent a valuable contribution to the literature concerning rapid Holocene changes in the Mediterranean.

As a general point, it would be interesting to see more discussion of the value of studying the two proxies in parallel, as shown in Figure 2. In general, the treatment of the two proxies is quite strongly separated (both in terms of discussion sections, and figures). It might be worthwhile to show the CRs and high terrestrial input phases on the same figure (for example in Figure 2) to allow the reader to visualise similarities between the two types of interval discussed in the paper - currently the high TERR phases are only shown in Figure 4 without the SSTs. Overall, the extent to which the two proxies are mutually beneficial/complementary could be discussed more explicitly.

As a third general point, I note that the paper does not use (or only very rarely) the term "centennial-scale", favouring "multi-decadal". While many of the insights gained from present climatology do relate to multi-decadal or higher frequency modes of variability, the episodes highlighted by grey or brown bars (CRs and high TERR input phases) are of multi-centennial-scale, as are some of the named historical climate intervals (e.g. Dark Ages, Medieval Climate Anomaly). Without detracting from the substantially sub-centennial-scale of the sampling resolution, I feel that the authors should consider using the term "centennial-scale" where appropriate. Not only does this seem more accurate for the episodes in question, but also highlights (at least implicitly) the recognition that there still remains a gap in timescale between documented annual to multi-decadal modes of variability (NAO, EA, AMV, etc) and Holocene events on longer Holocene timescales.

Specific comments

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Section 4.1 - There is a mismatch in the description of "three main phases" during the Holocene (P3193). The authors describe (1) a warm early Holocene, (2) cooling interval, and (3) last century warming. These do not map onto the Preboreal, Hypsithermal and Neoglacial as stated, but rather (1) the Hypsithermal, (2) Neoglacial, and (3) last century. The authors should correct this and any inferences derived from this correlation. In fact, there is not much discussion of the Preboreal, although this interval is apparent, for example, in many of the records shown in Figure 3.

Section 4.2 - The authors should specify the ages (and ideally also the age uncertainty, duration and amplitude) of the the "Six CRs of different duration and amplitude" in P3194 Line 9 or in an accompanying table. This can aid future comparison between records.

Section 4.2, Page 3195, line 19. "It is notable that M8 does not show much cooling in our record..." Unless I missed something, the authors have not indicated the "M-events" in core MD99-2343, and need to label (e.g. in Figure 2) or define them for the reader to be able to follow this statement.

Section 5, P3197, Line 19. The authors note that lack of impact of the 8.2 ka event, but might also mention other events for which terrestrial impacts have been detected in the western Mediterranean region, e.g. 9.3 ka event, Preboreal oscillations, etc. (e.g. Nebout et al., 2009; Fletcher et al., 2010). Overall, while the authors report the absence of an expected 8.2 event, the paper could go further in terms of developing the explanation for why conditions at the site location would not have been sensitive to this event, or other early Holocene fluctuations. Can other factors than the LIW formation hypothesis be explored, for example seasonal (summer vs winter) biases in the proxies?

Figure 3. I would recommend for clarity that the labels relating to the long-term warming or cooling amplitude be moved to the side of the figure, to avoid confusion with the grey bars showing the CRs

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Figures 2,3,4. Give axis label for the upper x-axes, also.

Language corrections - to aid the authors in preparing a revised version, I note the following necessary corrections (this may not be an exhaustive list): P3189, Line 11. Change "the alkenones" to "alkenones" Section 2 Change "Materiel" to "Material" P3190, Line 12. Change "storm tracks position" to "position of the storm tracks" P3192, Line 16. Change "were colder" to "colder", "superimposed to" to "superimposed on" P3194, Line 22. Change "cooling" to "coolings" P3196, Line 6. Change "precipitations occur" to "precipitation occurs"

Additional References

Combourieu Nebout, N., Peyron, O., Dormoy, I., Desprat, S., Beaudouin, C., Kotthoff, U., & Marret, F. (2009). Rapid climatic variability in the west Mediterranean during the last 25 000 years from high resolution pollen data. Climate of the Past, 5(3), 503-521. Fletcher, W. J., Sanchez Goñi, M. F., Peyron, O., & Dormoy, I. (2010). Abrupt climate changes of the last deglaciation detected in a Western Mediterranean forest record. Climate of the Past, 6(2), 245-264.

Interactive comment on Clim. Past Discuss., 11, 3187, 2015.