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Climate of the Past Discussions

Interactive comment on "Climate fluctuations during the Holocene in NW Iberia: high and low latitude linkages" *by* L. D. Pena et al.

Anonymous Referee #1

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Review : " Climate fluctuations during the Holocene in NW Iberia : High and Low Latitude linkages " by Pena et al.

General comments :

The data presented in this article are very important. Indeed Holocene high resolution records are missing at the lower latitude of the Atlantic ocean. I deeply encourage authors to publish these results, however numerous keypoints need to be improved, developped or re-written: - A sedimentological description of the core and information about sedimentation processes in the Ria de Muro are missing but essential. - Spectral analyses are not reproducible - The interpretation of spectral analyses is uncomplete and partially false. This is a major point that would imply a major changment. Bond

records should be avoided to use a more accurate serie see below. - The link with North Atlantic record is not strong enough and correlations between Iberic and North Atlantic core is only partially conclusive.

I propose a major review with numerous keypoints that need to be improved.

1°) Does the paper address relevant scientific questions within the scope of CP ? Yes 2°) Does the paper present novel concepts, idea, tools or data ? Yes 3°) Are substantial conclusion reached ? need more work 4°) Are the scientific methods and assumptions valid and clearly outlined ? need to be improved 5°) Are the results sufficient to support the interpretations and conclusions ? Y 6°) Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (Traceability of the results) ? No 7°) Do the authors give proper credit to related work and clearly indicate their own new/original contribution ? Need to be improved 8°) Does the title clearly reflect the contents of the paper ? Too ambishous I think for instance but with the following improvement it could be possible. 9°) Does the abstract provide a concise and completely summary ? Yes 10°) Is the overall presentation well structured and clear ? Yes but need to be re word with the following corrections. 11°) Is the language fluent and precise ?Yes 12°) Should any part of the paper be clarifed, reduced, combined or eliminated ? Yes see below. 13°)Are the number and quality of references appropriate ? No and are greatly lacking in the results part to creat the link with high latitude

Specific comments :

Abstract : Line 8 p1284 : “ two well established …records ” I agree for deMenocal time serie but Bond records is subject to numerous assumptions (St Onge et al., 2003, Giraudeau et al, 2000, Berger and von Rad, 2002), which underlines the complexity of this record. More recently, Debret et al, 2007 show in CP that such proxies would be subject to 2 forcings: internal and solar, with a major transition in the Middle Holocene. In this light, I do not think that the choice of Bond’s record is judicious.

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Introduction Ligne 12 p1285 : Bibliography is classic. There is nothing about the debats around this 1500 years oscillation.

Study area and regional oceanography Line 22 p 1286 : Alvare Salgado et al., 2001 should be 2000 ?

Materiel et methods

1. Sedimentology: It suffers from a severe lack of information on the sedimentology: the origin of the sediment inputs need to be clarified, is there a river that provides detrital material, or maybe just the OM, quantity? Are there several facies? Is it strongly bioturbated? Or not at all? What’s the effect on chronology and the error margin on the age model (important for a core of 4 m!)? Are there seismic profiles, data made on-board like MS, color, geotek measurements (Pwave velocity, density…) The reference : Lebreiro, The Holocene, 16, 1003–1015, 2006. is not sufficient because cover only the last two millenia and give no information on the sedimentological pattern. This need to be improved because has a strong impact on the chronology and all the interpretation. 2. Age Model: The age model require more explanation: the general trend in the sedimentation rate, in particular, seems to indicate sediment compaction, while the first 50 cm may be a reflection of the compaction of the piston core. This should be discussed. If bioturbation occured what’s the implication on error margin? Is the record continuous? During the first part of the Holocene, given the sharp rise in the sea level (20 m) and low waterdepth (38 m), slope destabilisation could occured. Those gravity events are very common during sea level change. If it’s not the case can you add some words to explain. In addition, the paper Somoza and Rey, 1991 proposes fan with specific morphology in Ria-type basin. Could the record be affected? Could the continuity of the record be altered by the effect of tide/wave? A sedimentological part of the paper is missing and should appear to answer to these questions.

3. Spectral Analyses: Spectral analysis is not enough described and do not permit

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the repeatability of the analysis. In addition, deMenocal and your series are unevenly sampled. How did you resolved this issue? Resampling? How? Cone of confidence for each scalogram are laking as well as statistical tests (50, 90, 95, 99. The wavelet analysis is a very powerful tool that allows you to settle unstationarity problems. But you never use this essential property in particular for the mid Holocene transition very clearly visible in deMenocal and Bond as well as numerous records of the North Atlantic area. This properties of the mathematical tool is to develop. The spectral analysis results require greater attention.

Results Minor Point: The record should be described as a function of depth in this part, ages appear only in the interpretation/discussion part.

Discussion

4. Origin of OM: What are the evidences to explain that organic matter in the first half of the Holocene (8000-5000) is not a mixture between land and ocean MO? In the abstract of the EGU in 2003 by the same authors XRF data are used. Are they published? They explain that fully marin conditions appear only 4000 years ago. For other periods you deals about river influence, what the impact on the record?

5. Connexion with North Atlantic: The transition around 5000 years appears to be a key point in the climate of the Holocene (Debret et al, 2007). There is only one sentence to document and explain this crucial issue in North Atlantic climate. This shift is an important argument to connect their record with those in the North Atlantic area. More discussion is needed at this level. The authors propose a link with the high latitudes, unfortunately, the bibliography is not sufficient for that and the comparison with Bond is not enough because of the controversy.

6. Chronology of the events: I would delete the discussion on the timing of the events because uncertainty on the age model do not permit this (see above). There is only one point 14C for the first 3400 years of the Holocene. There are no references indicating that climate variability is managed by the North Atlantic.

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7. Correlations: Authors have to refer to Debret et al, 2007 paper for the transition around 5000 years. Indeed correlations for the first 5000 years of the Holocene of the iberic core do not fit with the Bond signal. For example: the 4th event in Bond is centred around 5500 years, in the EUG core it's about 7000. This discrepancy (1500) can not be explain by a problem of age model. I think that the correlations 4 and 5 should be deleted and I think the third too. For D13C record : comparison with Bond’s record stops at the mid-Holocene, a period of transition between oceanic and solar forcing highligthed in North-Atlantic area (Bond et al, 2001, inclued) by Debret et al, 2007. This change of forcing seems to explain the inconsistencies for the events 4 and 5. This shows that discussion about the timing of the event is not possible here, and raised the issue of using the series of Bond as a reference. This problem of correlation is really important because it has a strong impact on forcing factor. If authors consider that the 13C record fits with Bond et al, 2001, their record should be influenced by the sloar activity. However if they take into account the work of Debret et al, 2007 their record is likely influenced by the ocean.

Minor Point: You say that you used the VM 29-191 but the unit is in %. So I think that it is the stack serie of Bond et al, 2001 between 4 cores in Atlantic area. Could you check, please ?

Minor Point: How do you explain the difference or similarity between Oppo et al, 2003 and your record ? This should appear in the text.

Conclusion

8. Conclusion:I’m not convinced by the conclusion of Pena et al, by the way they use. This work do not allow to conclue on the timing of the processes that trigger the climatic variability. In the conclusion you write that the signal is somewhat diluted as it approaches lower lattitudes. However this could be interpreted as a problem of sensitivity of the proxy used.

Bibliography

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Interactive comment on Clim. Past Discuss., 3, 1283, 2007.