

Interactive comment on “Climate variability in subarctic area for the last two millennia” by Marie Nicolle et al.

Anonymous Referee #2

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Summary

The manuscript by M. Nicolle and others focuses on the climatic covariability in the Arctic, based on the updated Arctic database for proxy records for temperature. The records are examined for temperature trends and the expression of the "Little Ice Age" cold period is presented by referring to the original publications. The records are averaged over three regions, and the resulting composites are analyzed for trends and wavelet coherence with climatic indices. Significant trends, and significant covariabilities are determined. At present, the manuscript requires quite some improvement for language, and, more importantly, a better rigorous treatment of uncertainty to put the trends, and claimed covariabilities, in perspective.

General comments

C1

- The manuscript is generally interesting and relevant.
- There are a lot of spelling problems which, at times, make it hard to understand the meaning of the text.
- There are a lot of literature references throughout the text which, although very interesting, impede the flow. Some of these may be better incorporated in the introduction.
- The manuscript proposes statistical linkages, but does not present them with any form of uncertainty - therefore the claims cannot be validated.

Specific comments

- p1L18: "on many sort" - "on many" or "on multiple proxy types"
- p1L24: "show _a_ relationship"
- p1L25: omit "with"
- p1L31: "temperatures have" or "temperature has".
- p2L5: "lake sediments"
- p2L7: "temperatures"
- p2L16: "by an important spatial and temporal variability expression" - maybe "is expressed spatially and temporally"
- p2L26: "led to"-> "were made to"
- p2L32: "over a large spatial scale"
- p3L2 "based on a regional data set".
- p3L2: "A special attention" - omit A
- p3L8&following - be clear that climatic here means temperature - better replace climatic by temperature where appropriate

C2

- p3l17: assuming that the proxy record climate variability, and that the archiving process does not induce a bias in the multi-annual to centennial frequencies analyzed.
- p4l15- this grouping is, to some extent, arbitrary
- p4l21- regionally
- p4l23- standardizing assumes Gaussianity - is this valid? This may also be problematic when the coverage is not given for the full period
- Do the records that are averaged have, on average, nonzero correlation?
- p5l5 trending tests were done; and what is a "specific" alpha significance level?
- p5l8: with->which
- p6l1 indicate
- p6l6 allows conservation of
- p6l14 decomposes
- Which software packages were used?
- Comment: Figures alongside with the text would be much preferred.
- Fig2: the figure axes labels are on the small side (difficult to read/print)
- p7l21: Consider the possibility that trends can be due to biases in the proxy e.g. (summer/seasonal bias - Liu et al., PNAS, Rehfeld et al., 2016)
- p8l3 by a OR by decreasing temperatures
- p9l8 remove "date" or say "the earliest start date is "
- p9l11 it does not appear to
- p9l14 from northern Greenland

C3

- p9l21 I'm assuming you mean "it is difficult to identify it in the Arctic...". But then - how is it defined for other proxies, if not as a cold period - a change? a significant decrease?
- p9l28: issue for
- p9l29 in all regions or in the whole region
- p10l1-5 - Figure 3 – Without uncertainties around these records it is impossible to judge the significance of the trends. Same for Fig. 5
- p9/10: these p-values appear quite low. Are they taking into account autocorrelation and the uncertainty of the composite?
- Fig.6: a,b - uncertainties? What is the assumption on the significance test for the wavelet cross-spectrum? White noise? Red noise?
- p10l23-25: Please provide appropriate uncertainty estimates for the wavelet analyses.
- p10l25-33 - possibly dedicate a paragraph to sea-ice cover earlier on and show the similarity of the trends.
- p11- please have a native speaker correct this manuscript- there are too many mistakes in the final paragraph to correct them in this review.

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C4