

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

**Marie Nicolle et al.**

nicollemarie@hotmail.fr

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The authors and I would like to thank Reviewer #1 for their comments on our submitted manuscript.

Here, I would like to respond to and provide additional details on the Reviewer comments concerning the grouping into three regions (comments #1, #2 and #3). Since the publication of the Arctic 2k database (McKay and Kaufman, 2014), reconstructions of climate variability obtained from the database was also published at the global Arctic scale or for the Scandinavia region (Linderholm et al., 2015). At this spatial scale, it is difficult to take into account the role of climatic processes on Arctic climate that are known to have regional climatic impacts (e.g. climatic oscillations as AMO or PDO).

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We choose a regional approach to refine the comprehension of climate variability in the Arctic area and the three group was determined based on the regional impact of climatic oscillation found in the literature. We agree that using an EOF analysis will be a good way to find the major patterns existing into the database. However, one of the main objectives of the paper is to determine the ability of the Arctic 2k database series to reproduce climate variability recorded in the observations data, especially during their common period. So that's why we choose to determine our regions based on the regional effects of internal atmosphere/ocean oscillations on climate that are currently recorded in instrumental data and not based on variability recorded in the palaeoclimate series. Regional effect of internal atmosphere/ocean oscillations on climate are described in the manuscript (p4. L2-13).

Reviewer #1 also suggests developing the part concerning the internal climate variability (comment #4). In fact, one of the most important results of our study is the highlighting of variabilities occurring at multidecadal scales record in paleoclimate data and linked to regional internal climate variability observed in instrumental data. We agree that the use of the recent observations allows us to determine the pattern of influence of PDO and AMO on climate in our study area but also including the role of the sea-ice cover variability. Using recent observations also allow us the compare it with our three regional mean records in order to determine the ability of them to reproduce the climate variability observed.

## References

Linderholm H.W., Björklund J., Seftigen K., Gunnarson B.E. and Fuentes M.: Fennoscandia revisited: a spatially improved tree ring reconstruction of summer temperatures for the last 900 years, *Climate Dynamics*, 45(3), 933-947, doi:10.1007/s00382-014-2328-9 2015.

McKay, N.P. and Kaufman, D.S.: An extended Arctic proxy temperature database for the past 2,000 years, *Sci. Data* 1:140026, doi: 10.1038/sdata.2014.26, 2014.

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