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Climate of the Past Discussions

Interactive comment on "Last nine-thousand years of temperature variability in Northern Europe" *by* H. Seppä et al.

Anonymous Referee #2

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General comments

Thank you for the opportunity to review the manuscript: "Last nine-thousand years of temperature variability in Northern Europe", by Seppä, Bjune, Telford, Birks, and Veski. Overall this is a very good paper that I hope to see published in Climate of the Past. In light of the Manuscript Evaluation Criteria on the Climate of the Past website, I would rate the scientific significance of the paper as "good", and the scientific and presentation quality as "excellent". Regarding these latter two criteria, I found the overall approach to be valid and appropriate; the results are presented and discussed in a sufficient manner; appropriate references are provided, which cover both the recent and original literature; and the writing is clear, fluid, and concise. I rate the scientific significance of the paper as "good", rather than "excellent", if for no other reason than the

general approach was already published by this group (albeit for the last 2000 years) in the Arctic Lakes Special Issue of the Journal of Paleolimnology (Bjune et al., 2009), so it is therefore no longer "new". That being said, I do not want to imply that I don't rate this paper very highly; it's just that I see this as slightly more of a temporal and spatial extension of previous work, rather than something that is "substantially new".

Specific comments

I have no major scientific problems with the paper, but present a few items for consideration:

1) The introduction mentions the ∼1500-yr cycle postulated by Bond et al., (2001), and then provides a number of other references dealing with the issue of periodicity in the climate system of the North Atlantic and perhaps elsewhere. However, while the authors state that their dataset provides the opportunity to assess the potential occurrence of "cycles" in North-European continental climate history, there does not seem to be an attempt to undertake any sort of dedicated analysis (e.g., spectral or wavelet) to help them in this regard (although I do recognize that the C14/C12 curve upon which many "cycle-studies" are based is used as a point of comparison in the Discussion). I believe that it would be both interesting and fairly straight-forward to undertake a time-series analysis on a detrended version of one of the summary curves – especially since each is constructed from so many data points. I would guess that the 9000-year record is long enough to be able to detect a potential 1500- or 1000-year cycle, but there may even be higher-frequency periodicities as well. Alternatively, if the authors would prefer not to undertaken such an analysis at this stage, then I suggest they consider downplaying the specific issue of cyclicity in the introduction.
2) Regarding the generation of the transfer function: I certainly do not contest the use of summer temperature (Tjul) at the more northern and higher-altitude sites, and I understand the reasoning behind the use of mean annual temperature (Tann) for the Baltic sites. I am curious, however; would the method presented in Telford and Birks (2009) be of any use in assessing the predictive power of Tjul or Tann in either of the

two regions? (Or, in other words, would its use help strengthen the case for why Tann is better to use than Tjul for the Baltic sites)? I realize that in Telford and Birks (2009) the modern analogue technique (MAT), and not WAPLS, is used, although it's unclear to me if this would make a difference in this case. 3) The comparison between Fig 5a and 5d: I would be interested in seeing a couple of sentences discussing how Cl in GISP2 relates to atmospheric circulation (e.g., are they positively or negatively correlated?). I ask because it seems to me that when we consider the last 5000 years, the general patterns of Cl and Stacked Temperature appear positively correlated (at 5000 cal yr BP, high temperature, high Cl; at 2000 cal yr BP, lower temperature, low Cl; and at 0 cal yr BP, high temperature, high Cl), but when you look at the higher-frequency changes (which are highlighted by grey bars), there is more of a negative correlation (e.g., at 3500 cal yr BP, low temperature, somewhat higher Cl; at 150 cal yr BP, low temperature, with a little positive 'blip' in Cl). I think the authors were appropriately circumspect when discussing Cl, in that its relationship with atmospheric circulation is poorly constrained, but if this curve is to be added to their manuscript, a bit more explanation would help. 4) I agree that the correspondence between the pollen-based temperature record and the C14/C12 solar forcing proxy is not strong. Have the authors looked at other forcing proxies, such as volcanism (briefly mentioned in section 3.4), by comparing their data to the GISP2 volcanic SO4- record (Zielinski et al. 1994) or perhaps the Bryson et al. (2006) detrended record of volcanism from C14-dated ash deposits?

Technical corrections

1) Page 1526, line 23: extra period in reference. 2) What was the span for the LOESS smoothers in Fig. 2? 3) Several hyphens are missing from the caption for Table 2. 4) In Table 2, I assume FES stands for "Finland, Estonia, Sweden". If so, then does NFS stand for "Norway, Finland, Sweden"? And following from this, should this acronym not be NSS or NNS, based on what is listed section 2.1? What does the F stand for in NFS? 5) In Fig. 1, I suggest making the filled circles (those from the Baltic region and southern Sweden) completely black, and the others white. Maybe it is just me, but at

first I didn't realize that filled meant "with dots", which is how I would have described them. Perhaps I am being too picky here! 6) In the Fig. 1 caption, the second where should be were. 7) In Figure 2, the numbers obviously match with Table 1, telling us which are Tjul or Tann reconstructions. However, for ease of viewing, would it be possible to split this group of charts into two sections, each with a heading for Tjul and Tann?

References

Bjune, A.E., H., Seppä, and H. J. B. Birks (2009). Quantitative summer-temperature reconstructions for the last 2000 years based on pollen-stratigraphical data from northern Fennoscandia. Journal of Paleolimnology 41:43–56.

Bond, G., B. Kromer, J. Beer, R. Muscheler, M.N. Evans, W. Showers, S. Hoffman, R. Lotti-Bond, I. Hajdas, G. Bonani (2001). Persistent Solar Influence on North Atlantic Climate During the Holocene. Science 294: 2130-2136.

Bryson, R. U., R. A. Bryson and A. Ruter (2006). A Calibrated Radiocarbon Database of Late Quaternary Volcanic Eruptions. eEarth Discuss 1:123-134.

Telford, R.J., and H. J. B. Birks (2008). Evaluation of transfer functions in spatially structured environments. Quaternary Science Reviews 28: 1309-1316.

Zielinski, G.A., R. J. Fiacco, P. A. Mayewski, L. D. Meeker, S. Whitlow, M. S. Twickler, M. S. Germani, E. Endo and M. Yasui (1994). Climatic impact of the AD 1783 Asama (Japan) eruption was minimal: Evidence from the GISP2 ice core. Geophysical Research Letters 21: 2365-2368.

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