

Interactive comment on “Spatial structure of the 8200 cal yr BP event in Northern Europe” by H. Seppä et al.

Anonymous Referee #2

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This paper shows a compilation of pollen-based proxy records around Scandinavia over the 8.2 kyr event. The results indicate a robust cooling in the southern part of the domain, and a less robust result in higher latitudes. These results add to the growing database of 8.2kyr event-related results and serve a useful purpose in elucidating possible latitudinal gradients. Note I am not an expert in pollen diagram interpretation and so another reviewer should judge whether this part of the study is acceptable. The study should be publishable with only minor revisions.

Minor points:

abs. 'observations ... would challenge' - if what?

Intro: "Abrupt climate changes are typically non-linear, taking place when the climate

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system is forced over a critical threshold, followed by a rapid transition to a new state (Alley et al., 2003)." - Nice reference, but of limited utility here. The best guess for the cause of the 8200 yr event is an abrupt final drainage of Lake Agassiz - a forcing function that is much shorter than the resulting climate anomaly and indeed, one in which no thresholds appear to have been crossed, nor 'new states' initiated. So if this was an 'abrupt climate change' which I would with, the definition used does not encompass it.

p167. The study of Legrande et al, (PNAS, 2006) should be cited with the relevant modelling work.

p168. The peak duration of the 8.2kyr event is closer to 70 years derived from the Greenland ice cores (GRIP, GISP2, NGRIP, Dye3) (Thomas, Wolfe et al) rather than 200-300 years cited here. How would this effect the representation of the signal in the pollen record? Some of the lower resolution cores (Tibetanus, KP-2 and Dalmutladdo) may not have the resolution required...

p173. I would hesitate to directly link changes in the MOC and changes in the NAO. The NAO is defined from pressure changes and winds, which in the presence of a MOC change might simply carry less heat (causing cooling). Without additional evidence for a shift in the winds/SLP I don't see how it can be determined whether the NAO itself was different in these circumstances.

p177. Citation of Vellinga and Wood's paper in reference to the specific 8.2kyr event is not appropriate. The fluxes of freshwater used in those experiments were ~ 16 Sv yr, compared to best estimates of 2.5 to 5 Sv yr for the Agassiz lake drainage. Thus climate responses from V&W are likely to be large overestimates compared to the actual event.

p178. A worthwhile point to make might be that in areas with some amount of summer ice cover, temperature changes must be muted since energy fluxes go into melting/freezing rather than temperature changes. Thus one might expect a band of

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damped response near latitudes of the sea ice edge for instance. This does appear to be shown in models, though I think they still do produce a summer cooling in this region (which is nonetheless much less than during the winter).

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