

Interactive comment on “Increased aeolian activity during climatic regime shifts as recorded in a raised bog in south-west Sweden during the past 1700 years” by R. de Jong et al.

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General Comments

The reconstruction of past extreme climatic events such as floods or storms is an extremely challenging task for palaeoclimatologists. Evidence for such climatic extremes in mountainous areas comes from debris flows, flood deposits, and snow-avalanche deposits preserved in bog or lake sediments. Evidence for climatic extremes in lowland areas is more difficult to obtain and de Jong et al. (2007) have provided an original and thoughtful contribution concerning increased aeolian activity during periods of climate change in the last 1700 years. The authors are to be congratulated on such an

interesting and thought-provoking contribution.

Specific Comments

1. Section 3, line 20 - What is the length of core samples? Why, if the interest is on the last 1700 years, was the upper metre of the core sliced into 2 cm segments, whereas the 'lower part' was cut into 1 cm slices? I would have thought that you would want the highest temporal resolution possible in the upper part of the core for this study.
2. Section 3, line 25 - If the upper 160 cm is the last 1700 years, I am surprised that testate amoebae analysis was only done at 29 levels (resolution of about 60 years), whereas ASI was done at all levels ($?50 + 60 = 110$ levels). If pollen analysis was done, it would be useful to show some relevant curves for the last 1700 years of, for example, major tree taxa, Calluna, Poaceae, Sphagnum, etc. It is difficult to see much detail for the last 1700 years from Figure 3 in de Jong et al. (2006 Journal of Quaternary Science 21, 905-919).
3. Section 3.1 line 5 - Were Lycopodium tablets added to obtain estimate testate amoebae concentrations and influx, or were they added to permit links with the pollen counts that were derived from different samples? As far as I can see, no use is made of any testate amoebae concentration estimates.
4. Section 3.3 - It is not clear how the age-depth model was derived. De Jong et al. (2006) provide an age-depth model for the entire core 'using a combination of a 7th and 10th degree polynomial' based on 14 calibrated radiocarbon dates to derive 'the most likely age-depth model'. Such a high order polynomial model runs the serious risk of being what is called an 'overfitted model' in statistics. 14 dates and 10 terms in the model do not leave many degrees of freedom and hence predictive power in the model. Telford et al. (2004 Quaternary Science Reviews 23, 1-5) show that all age-depth models are wrong but that some are more wrong than others. A basic principle in statistical modelling is the 'minimal adequate model', namely to use the simplest possible model that is statistically significant AND has the smallest number of fitted

parameters as possible, to give the maximum predictive power for the model. The model in de Jong et al. is certainly not a minimal adequate model, even it is the 'most likely' model. What criterion of 'likely' is used? In de Jong et al. (2006) a 2 standard deviation band is presented for the age-depth model but it is not explained how this band is derived. There is no mention of a 2 standard deviation band in the current paper. There is no mention about how the age-depth model for the top 160 cm was derived. A statistically optimal model for the top 160 cm may not be the same as the top 160 cm segment of the age-depth model for the total core because the total-core model based on polynomials is a global model for the entire core and is influenced the lower dates older than 1700 years.

5. Section 3.3, line 24 - Was the stratigraphical ordering of the radiocarbon dates taken into the account in the calibration of the dates using OxCal? Such Bayesian calibration often reduces the uncertainties in the calibrations.

6. Section 4.1 - It is strange that a testate amoebae transfer function (e.g. Charman et al. 2007 *Journal of Quaternary Science* 22, 209-221) was not used here to infer bog wetness quantitatively.

7. Section 4.1, line 17 - The amoebae curves are, of course, relative percentages and as a result with only three categories (wet, indifferent, and dry) they will tend to show apparent reciprocal stability and rapid changes. It would be interesting to see if a transfer function-based reconstruction based on all taxa shows the same stability and rapid changes.

8. Section 4.1, line 20 - Is the age-depth model really good enough to 'define the timing' of the LIA, MWA, etc. Do you mean the age-depth model is used to identify where the LIA is chronologically in your core?

9. Section 4.2, line 15 - If the bog surface is frozen and snow-covered, would not the dryland source of the ASI also be snow-covered and protected from aeolian activity?

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10. Figure 3d - Are the Store Mosse ASI results the work of the authors of this paper? It is not clear from the caption.

11. Section 4.3, lines 1-10 - It would be useful to have some of the pollen data presented as human land-use is a very obvious hypothesis for the cause of some of the ASI peaks.

12. Section 4.3, line 17 - Abandonment leading to grass-dominated vegetation seems unlikely. Abandonment usually leads to an expansion of shrubs and light-demanding trees.

13. Section 4.3, line 22 - There seems to be an inconsistency here about how grass pollen is interpreted - abandonment and reduced agricultural area or an increase in grassland and agricultural land?

14. Section 4.3 is difficult to evaluate. It is here under Results but the reader has none of the pollen results to evaluate Section 4.3.

15. Section 5.1 - I do not find the arguments that wet conditions can be equated with cool summers and high precipitation and dry conditions reflect warmer summers and low precipitation very convincing. Winter precipitation has certainly changed in the last 2000 years in southern and western Norway as shown by the work of Atle Nesje and colleagues.

16. Section 5.1, lines 25-31 - I wonder if the authors are here stepping beyond the temporal precision of their age-depth model and what their proxy data actually represent, namely ASI and bog wetness.

17. Section 5.2, lines 16-32 - Could the relatively long duration of the ASI peaks be a result not only of circulation changes but also a result of human activity, in part as a response to the atmospheric changes. Nature is rarely a or b, but likely a combination of a + b or an interaction of a with b.

18. Section 6, lines 25-28 - When discussing the LIA, it would be useful to give also

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the AD ages, as most of the LIA literature does not use BP ages.

19. Table 1 - Why are some taxa in italics and others are not?

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