



Interactive comment on “Pollen transport to southern Greenland: new evidences of a late spring long distance transport” by D.-D. Rousseau et al.

Anonymous Referee #2

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General comments

This article addresses a question which falls suitably within the scope of BG. The data presented (long distance transport of pollen deposited in the Arctic) refer to a new deposition occasion although, as the authors themselves well appreciate, evidence of this type of long distance transport and deposition of pollen is not, in itself, new. These results are part of the ongoing EPILOBE project and, as this project proceeds, a series of publications (like the present one) are appearing each recording a short event at just one site. This poses the question of whether we are to expect a new publication each time there is some tree pollen in the air? It might be more interesting to produce a manuscript which deals with all the sites or a whole series of events. I appreciate, however, that with long term monitoring it is not always possible to predict events worthy

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of publication, neither is it practical to delay publication of interesting events once they occur.

I see as the new contribution of this article the approach that takes into account atmospheric transportation at different altitudes and indicates that different air masses are involved. The main significance of the article lies in using the backward trajectories to locate source and the demonstration that there is no significant downward trajectory between the source and the final point of deposition. This is useful for tracing the origin of pollution, although the authors do not mention this possibility. Pollen grains are relatively large particles in the atmosphere and can potentially act as transporters of chemicals and heavy metals and so detailed knowledge of how they are transported has relevance for pollution studies particularly where final deposition is in the Arctic, an area which is especially sensitive to pollution. The authors see their work as a contribution to palaeoclimatology. This is true but in order to reconstruct past climate it would be essential to know the frequency, timing and regularity of such events, and that is not established in this publication. It would appear (although on first reading this point is not clear) that this was the only event in the whole year, i.e. something that is rather rare. Alternatively such trajectories may be common but it is only when pollen emission is occurring at source that they can be traced! The comparison between these results and those given in earlier publications also suggests that there is very little regularity in that the pattern of the trajectories is different from one week to the next and different between years.

Specific comments

1. The authors mention (p.2. line 19) that continuous (all year long) monitoring is in progress at several sites. If this is the case it would be interesting to know whether there was deposition of long distance transported pollen (timing? taxa?) at one of the other sites. This is relevant for the question posed on p.3 line 15 as to the regularity of pollen transport to southern Greenland.

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2. Is anything else other than pollen being analysed from the filters? — charcoal, flyash? The latter could add to the pollution question. It could also be a 'marker' at times in the year when no pollen is being emitted at source.

3. The total number of pollen counted p. 5 lines 8,13 and 20 is huge. I would be interested to know what the other taxa identified were — those originating from the 'local tundra vegetation'. Are these high pollen counts the count for the whole year or for just the period during which the tree taxa were recorded? This is not clear.

4. In the conclusions (p. 10 lines 4-6) it is suggested that these results can help evaluate models of climate patterns over the past 20 000 years and future climate that will affect the distribution of temperate trees in north America. This is somewhat far fetched in that only one very short event is presented here so that extrapolation back over 20 000 years is unrealistic. Moreveover the transport of pollen from source cannot have any influence on the distribution of trees at source.

Technical corrections

1. In the title, evidence should be without the final 's'. A more appropriate title could be 'A late spring long distance pollen transport event to southern Greenland: using backward trajectories to locate the source'.

2. Is it necessary to have the English names for the pollen types - the Latin would be sufficient.

3. Figure 2 needs a scale otherwise the illustrations are misleading, implying that a *Picea* grain is the same size as one of *Pinus* and the the grains of *Ulmus* and *Fraxinus* are incredibly small etc.

4. P.5. line 28. This sentence need to be rephrased so that it is clear that it is only *Carya* and *Tsuga* that are solely North American taxa. In general the language should be checked by a native English speaker.

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