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

D.-D. Rousseau et al.

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1) In the second paragraph, reviewer 1 indicates that the contribution is very small. This joins the comment by reviewer 2 questioning if it is worth having paper every time. We just want to precise that the paper published in 2003 in GRL addresses the first evidence of long distance transport to southern Greenland while the paper published in 2004 in JGR atmosphere addressed the evidence of long distance transport to North Pole. Does one could understand that then we know everything about this huge area? There is an evident lack of data to allow testing models and we are modestly proposing data for modelers to use.

2) Furthermore at the end of the second paragraph, reviewer 1 is saying, "They use the same method and give more or less similar results, the difference is JUST that some other Arctic pollen samples are used". This comment is not particularly fair and seems

to be very critical to observations. We evidence much more material transported, much more palynological taxa which implies different conditions than previously observed. This is true that these are pure observations but they have the interest of being true observations and not computations. This is what was measured and not expected or computed.

3) For the reply to paragraph 3, see the reply to reviewer 2.

4) To reply to paragraph 4, we have some problem with this statement. If reviewer1 found that the previous papers were questionable he should have contact us, at least the leading author to discuss this issue, or at least propose some comments when the papers were published as they were released in international journals and not hidden cryptic publications, which are not necessarily the worst.

5) First paragraph of the specific comments. Reviewer 1 starts criticizing "that upward vertical motion is necessary in the source region and downward in the region where the pollen is found". How can you criticize that? This is true for all particles transported over long distance, especially in our case when you cross an Ocean. Do you expect saltation in that case?

6) Same paragraph, reviewer1 provide an unfair statement that we "believe that pollen moves vertically". I would like he or she look carefully the paper by Helbig et al 2004, and especially the conclusions of this paper, which says, " As long as one-dimensional meteorological conditions were assumed, i.e. zero mean vertical wind speed, the pollen grains could travel short distances only. This is in contradiction with findings in literature, which clearly demonstrated that pollen grains can travel over hundreds of kilometres (Rousseau et al., 2003). When switching to a more realistic situation with inhomogeneous terrain and, hence, also spatial variability of the meteorological conditions, the distances that can be traveled by pollen grains increased tremendously. In this case, the pollen grains could be found throughout the whole boundary layer."

7) End of first paragraph, you seem to assume that air movements are constant or

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homogenous and that no lost of quantity would occur during the transport; Given a certain amount of emitted pollen in the atmosphere at the source, the quantity transported over long distance will vary according to conditions affecting the pollen production, the pollen emission but also the transport.

8) Second paragraph in the specific comments. Reviewer 1 states: "There is no scientific base for all these assumptions". We are not theorizing about the transport but using different available tools like HYSPLIT, to understand why we get these exotic pollen grains in Southern Greenland. We are aware that modeling pollen transport is not that easy and that several attempts or models exist yet. Helbig et al (2004) recently demonstrated how difficult it is at the regional scale indicating that modeling much more long distance would request more sophisticated parameterization. HYSPLIT model allows us to explain how pollen grains emitted in Northeastern America reached southern Greenland.Reviewer1 should acknowledge that we propose only the maps which are fitting with an air mass passing over the region where the plants are growing, when their was upward movement at the pollen emission location, downward movement at the trap location, everything fitting with the timing imposed by the exposure of the filters to the winds.

9) Still the same paragraph, reviewer 1 says, "Superimposed on this transport comes the gravitational settling. This latter factor will cause particles to be transported at lower altitudes than the air trajectories calculated". How can you assume this? If you us the backward trajectories computed with HYSPLIT, they show, and I have all the possible maps, that these lower altitudes masses I) do not pass over the growing area of the trees, and ii) then can not transport pollen grains they are not capturing. We honestly put different altitudes in our figures to show that, keeping the colors (red for ground, blue for 1000 m and green for 3000m). We could have provided only the "air mass" which was working well and that is all. Conversely we provided two others trajectories.

10) Still second paragraph. Discussing the settling velocity would be far from the purpose of the paper which is again not a paper addressing the modeling of pollen trans-

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port as nicely described in the paper by Helbig et al 2004. Same comment about the comment about "pollen sources are most effective during noon" we can add referring to Helbig et al (2004).

11) Reviewer1 keeps thinking that our aim is modeling long distance transport as he states, "they want to model the transport". Again this is not the purpose of this paper. We just want to demonstrate that we are aware of the problem exposed by Helbig et al (2004) who, on the contrary are able to model transport at regional scale but are not successful at a global scale as our data would request. Indeed these authors and Bernard Vogel personal communication indicate that modeling longer transport like those that we evidence is requesting much more sophisticated parameterization; And to help doing so, our colleagues modeling such transport must be also aware of the type of transport which is presently occurring in the field.

12) The last comment is unfair as some other. Reviewer1 is joking the citation used to acknowledge the use of HYSPLIT. If you go to the web page of HYSPLIT on the READY application from NOAA, this is exactly the sentence that is requested to cite. So why such comment which is completely free and out of any consideration.

Interactive comment on Biogeosciences Discussions, 2, 829, 2005.