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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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First of all let us acknowledge and thank reviewer 1 for his first sentence, which places the discussion on a good level. This discussion is very interesting and this is the great interest of such publication like Biogeosciences, which allows effective interaction even if we sincerely would like to discuss much more and even cooperate with reviewer1 who seems interested by what we are presently performing in Greenland.

About Point a) Reviewer 1 is totally right and again this is nicely demonstrated in the paper published by Helbig et al (2004). You will however acknowledge that if subsidence exits, then it will foster the process. Now we are discussing in our study about pollen grains, which are thousands of kilometers from their emission area. Of course gravity will play an important role in their sedimentation, but depositing at that particular place, thousands of kilometers far from their source, after crossing an ocean, there is

a need for particular conditions favoring such phenomenon.

Point b) OK "So it would be completely sufficient to look at the height of the trajectory along its path" Indeed this is exactly what we are doing when selecting the different backward trajectories, from the whole set computed, with our station as the target, from HYSPLIT for the time interval corresponding to the filter exposition to the air. If the trajectories passing over the growing area are much too high according to the study by Barry et al. (1981), they are rejected. Then "Why do you add the vertical profile of vertical velocity?". We add the vertical velocity because we were aware of criticisms from potential reviewers or colleagues who could question the selection itself of the backward trajectories. We thought that first showing maps of trajectories and the height of the trajectories along the pass, as the basic output of HYSLIT yields and suggested by reviewer 1, would not be enough, or at least not enough convincing. Thus we thought that adding the vertical velocity profile would complement the argumentation and help to understand why we can get the observed amounts of "exotic" pollen grains.

Ad 7 We agree

Ad 8. Ok the fact that the number of pollen grains varies from one week to another can be related to so many conditions including phenology, source but also capture conditions. Subsidence can be a conditions requested to have the deposition of the grains see in point "a" above. Rain is also another element responsible for washing out the grains. We don't question modeling, as again we don't claim doing so.

Add 9 and 10. We are worrying that there is a misunderstanding. Reviewer 1 seems to have very strong arguments about HYSPLIT, and even more about our use of HYSPLIT. As we are claiming since the very beginning, we are not modelers, and we certainly don't pretend to be so. What have we done: we have exotic pollen grains captures in southern Greenland. We know, because of knowing both the Greenland and North American vegetation that these exotic pollen grains originate solely, especially Carya and Tsuga, from Northeast America. We try to propose how this long distance across

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the NW Atlantic Ocean can occur.

Add 11. We are observing a long distance transport over thousands of kilometers. If we are not proposing some interpretation about how and why these particular pollen grains reached southern Greenland, there will be strong comments about that. We are using some tools, i.e. HYSPLIT, available to interpret our data: we know where the pollen comes from, where it arrived and when, and that this is corresponding to a very long distance. HYSPLIT allows determining backward trajectories and we are just using it. Let us also add one results provided by Helbig et al (2004) when simulating the pollen grain distribution with a three-dimensional meteorology: "It is demonstrated that in the case of the three-dimensional wind field, pollen grains can reach much larger distances fromthe source regions. This is mainly caused by positive vertical wind speeds which suppress the sedimentation of the pollen grains. Therefore, the atmospheric lifetime of the pollen grains increases remarkably". We are aware that having these data, it would be particularly interesting to model this transport, may be using the adapted KAMM/DRAIS model system as suggested by Helbig et al (2004) in their conclusion. Reviewer 1 should refer to the paper by Helbig et al (2004) who address the settling velocity of pollen grains to model their distribution. The only reference mentioned concerns a study of corn pollen grains which are much bigger than those concerned in this study. However the model should then be tested with different scenarios, for example the two different situations observed in 2002 and 2003.

Add 12. concerning the citation criticized by reviewer 1, here is what NOAA indicates when starting HYSPLIT: "Citation: The recipient shall provide a citation to the NOAA Air Resources Laboratory in any publications, presentations, or other derivative works that result from the use of HYSPLIT. Examples of such a citation are available on the online HYSPLIT web page" and the web page says: "The authors gratefully acknowledge the NOAA Air Resources Laboratory (ARL) for the provision of the HYSPLIT transport and dispersion model and/or READY website (http://www.arl.noaa.gov/ready.html) used in this publication." And we wrote: The authors gratefully acknowledge the NOAA

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Air resources laboratory (ARL) for the provision of the HYSPLIT transport and dispersion model and/or READY web site (http://www.arl.noaa.gov/ready.html) used in this publication.

About the concluding remark, again we present new data and submit them to the community for any useful use, even to possibly test models.

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