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Interactive comment on "Seasonal variation in diurnal atmospheric grass pollen concentration profiles" *by* R. G. Peel et al.

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We would like to thank the anonymous referee for his/her clear, constructive and detailed comments. Please find below a response to the specific suggestions made, including details of the revisions we propose implementing in the manuscript in order to address the issues raised.

This paper represents an important contribution on aerobiology; however, I only suggest some recommendations.

Introduction

14629. Line 16 and 17: to include references in parenthesis

> The following change will be made to paragraph 2 of Section 1 (page 14629, lines 16-17):
>
> ...two-peak profiles Rantio-Lehtimäki et al. (1991); Kosisky et al. (2010) and invariant profiles Gassmann et al. (2002) reported... / ...two-peak profiles (Rantio-Lehtimäki et al., 1991; Kosisky et al., 2010) and invariant profiles (Gassmann et al. 2002) reported.../

At the end of the introduction chapter, the four topics proposed have been defined not as the goals of the paper but following a protocol for working.

> The four areas covered in this study are presented as a protocol for work because the case for pursuing points 2 and 3 (and possibly also 4) depends upon the outcome of point 1, and we feel that as objectives they would read awkwardly. We therefore propose that they should remain as a protocol for work. The following minor change will however be made, which we hope will clarify things (to page 14630, lines 3-4):
>
> In this study, seasonal variation in the diurnal profile of grass pollen were investigated in the following manner: / The objective of this study was to investigate and explain seasonal variation in the diurnal atmospheric grass pollen profile. This was achieved in the following manner: /

Method and Results

I only suggest that probably it should be better to define a Material and Method chapter with different subchapters and the Result chapter with the same subchapters considered in the Material and Method.

This suggestion will be implemented. This will essentially involve cutting and pasting text following the instructions of the reviewer (see below), but will require some additional minor editorial changes in order to link sections and ensure that the text flows (we do not describe these minor changes). The text explaining why the method and results were originally combined (page 14630, lines 19-21) will become obsolete, and will be deleted.

Example:

2. Material and Method

2.1. Site description and data provenance (this subchapter correspond with only chapter 2). In this subchapter it is not necessary to explain the magnification under a light microscopy, in the same way that you have not explained the size of the microscope's field of view. The amount of magnification affect the area of the slide examined. I think that you should express the percentage of examined area under 12 transverse transects.

Subsection 2.1 will be moved to the new Material and methods section, as suggested by the reviewer. We propose retaining details of microscope magnification under which samples were counted, as it is conventional to state this within aerobiology. The reviewer is correct that the proportion of

the sample assayed is actually a more meaningful value. We will thus make the following change to paragraph 3 of Section 2.1 (page 14631, line 25 - page 14632, line 2):

For each daily slide, bi-hourly concentration data were obtained by counting the number of pollen grains deposited along 12 transverse transects at $\times$ 640 magnification under a light microscope, with counts converted into concentrations in grains m^{-3}. / For each daily slide, bi-hourly concentration data were obtained by counting the number of pollen grains deposited along 12 transverse transects at $\times$ 640 magnification (equating to 9.75% of each daily slide) under a light microscope, with counts converted into concentrations in grains m^{-3}. /

In this subchapter you have mentioned the figure 4 after cite figure 1. It is convenient to cite all figures in numerical order, i.e. figure 4 should be named as figure 2.

Please note that the Fig. 4 mentioned in the fifth paragraph of Section 2.1 (page 14632, line 11) corresponds to Fig. 4 in the journal article of Klepeis et al. (2001). The figures of this manuscript are all cited in numerical order, as suggested by the reviewer. It is in fact not necessary to indicate the figure number as there is only one figure showing a diurnal curve within the cited article and thus no scope for confusion. In order to avoid potential misunderstandings, we will therefore make the following change:

The daily dynamics of population activity were modelled using the time-activity diurnal curve for the population of the USA presented in Fig. 4 of Klepeis et al. (2001). / The daily dynamics of population activity were modelled using the time-activity diurnal curve for the population of the USA presented by Klepeis et al. (2001). /

2.2. Pollen data: data reduction and processing. Probably it should be better if authors mention “peaks in concentrations” as “peaks in the diurnal pollen curves”

> We thank the reviewer for this suggestion, which we feel clarifies things. We will implement the following change to the first paragraph of Section 2.2.1 (page 14633, line 5), satisfying this comment:
>
> ...peaks in concentration were identified according to the following criteria: / ...peaks in the diurnal pollen curve were identified according to the following criteria: /

In the second criteria it is not necessary to add (1) in the phrase, due to the phrase is well explained.

> We thank the reviewer for this complimentary comment - however, we feel that the (1) should remain. In a very few cases daily maximum concentrations were below the 50 grains m^{-3} threshold and thus not classified as ‘peaks’, and in its present formulation the second criteria makes this absolutely clear to the reader. We therefore propose making no change.

All different criteria and defined periods can be considered as Material and Methods. From line 11 to end: dates transition between period: : : can be included in Result chapters following the criteria and the periods defined in M&M.

> Lines 15-21 of page 14634 will be moved to the ’Pollen data’ subsection of the new results section, as suggested by the reviewer. Lines 12-14 will however be moved to the ’Pollen data’ subsection of the new Methods and Materials section since they describe the data processing method.

2.3. Population exposure calculation. Only to explain the method you have used and why this decision

> Lines 15-19 of page 14635 will be moved to the new subsection named above, in the new Materials and methods section as suggested by the reviewer. Lines 1-2 of page 14636 will also be moved to this section, as they relate to the method. The section title will be ‘Population exposure’, slightly different to that suggested by the reviewer.

2.4. Meteorological data: Express the meteorological data used and how they have been defined and presented.

> Lines 10-16 of page 14636 will be moved to the above named subsection in the new materials and methods section, in line with the reviewers comments.

2.5. Inventory of grass species. If you have express in introduction that you have compiled an inventory, you need to explain the origin of the data, etc.

> Lines 5-12 of page 14637 will be moved to the above named subsection in the new materials and methods section, as suggested by the reviewer.

3. Results

3.1. Pollen data and peak time distributions for defined periods To include results of 2.2.1 subchapter and to complete with all text of 2.2.2.

Lines 15-21 of page 14634 and lines 6-13 of page 14635 will be moved to a new subsection named 'Pollen data' in the new results section.

3.2. Population exposure: To explain results with figure 3 and 4

Lines 19-25 of page 14635 and lines 2-8 of page 14636 will be moved to the above named subsection in the new results section, as suggested by the reviewer.

3.3. Meteorological data: To explain results with figure 5 and 6.

Lines 16-28 of page 14636 and lines 1-2 of page 14637 will be moved to the above named subsection in the new results section, in line with the reviewers suggestion.

3.4. Inventory of grass species: If you have express in introduction that you have compiled an inventory, you need to explain the results.

Lines 4-5 and 12-28 of page 14637 will be moved to the above named subsection in the new results section, in line with the reviewer's suggestion. However, we propose re-naming this section 'Grass species inventory'.

4. Discussion

Subchapter 3.3. offer some results not mentioned in the other chapters, i.e. those related to Inventory of grass species. On the other hand, when authors express that 7

species coincide with the peak in the pollen curve, they should express the reference if it has not been a result of this paper and not introduce it as an objective of this paper.

We confirm that the results on grass species discussed in this section were derived from the grass species inventory (Table 2). We will cite Table 2 at the end of the first paragraph of Section 3.3 (line 2 of page 14641) as detailed below, which we think will clarify this point for future readers:

...of these seven species, at least three are thought to be relatively prolific pollen producers. / ...of these seven species, at least three are thought to be relatively prolific pollen producers (see Table 2). /

The authors should define the pollen season start in material and method. They have mentioned it only in discussion chapter.

We will add the following text to the beginning of Section 2.2.1 (line 17, page 14632), satisfying this request and also that made in Comment 1 of the Karl-Christian Bergmann, the second referee:

The Aarhus grass pollen season ran from 20 May - 29 July in 2009, from 6 June - 8 August in 2010, and from 21 May - 27 July in 2011. Here we define the start of the season as the first day and the end of the season as the last day that a daily average of $\geq$ 10 grains m^{-3} was recorded at one of the three monitoring stations.

Interactive comment on Biogeosciences Discuss., 10, 14627, 2013.