**Biogeosciences
Discussions**

Interactive
Comment

Interactive comment on "Identifying urban sources as cause to elevated grass pollen concentrations using GIS and remote sensing" *by* C. A. Skjøth et al.

Anonymous Referee #1

Received and published: 12 November 2012

General Comments:

By comparing the correlation between sampled grass pollen counts in three city sites of Aarhus, Denmark and one 'background' site 60km away using potential source map and wind direction sector analysis, the authors of this research paper examine the hypothesis that during intense flowing, the dispersion of grass pollen is a local scale phenomenon, which mirror the local source distribution. A new methodology based on remote sensing and management information through GIS for local grass area is proposed to build high resolution urban scale grass pollen source inventory. This study has the implication for pollen exposure assessment efforts by emphasizing the impor-

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tance of the local dispersion behavior of grass pollen besides regional to long-range transport, especially during peak time.

This manuscript is generally well written with a clear logic flow. The overall structure is well arranged and the statements are supported by using proper figures and tables. The discussion part is insightful. The reviewer recommends publishing this study on Biogeoscience after the following specific comments are addressed satisfactorily.

Specific Comments:

1. Page 14220. Line 17-19. 'Grass pollen grains from wild grass species ... only about 20um in diameter.' Citations are needed for this statement.

2. Page 14221. Line 2. 'The source emits 1 mio. Pollen grains'. Better use the full name of 'mio.'

3. Page 14222. Line 8-9. 'This site also includes measured metrological variables.' Please specific the measured variables. At least in your Figure 6, you compared with temperature, precipitation and wind.

4. Page 14233. Line 1-18. The overall arrangement of the paragraphs. Part (b)-(e) are the detail procedures for land cover classification to identify potential grass pollen areas. The author should delete the numbering (a) and start the numbering from 'Every band of 2.4 m GSD . . .'.

5. Page 14233. Line 1-2. Please provide the citation for the 'dataset of six Quickbird satellite images'.

6. Page 14244-14245. Section 2.3. This section describe the methodology to indentify the grass management areas using GIS from different datasets (i.e. crop type from DGAR, parcel map of Denmark and public areas information in) and combine with NDVI map to constructed gridded inventory for grass pollen. Two questions may be need to addressed in more detail: (1) The different datasets have different resolutions, how to combine them with 0.6m resolution NDVI map to build a gridded emission in-

ventory 'with a resolution of about 14m'. (2) It seems to the reviewer that the criteria to determine managed or not-managed grass is a little bit arbitrary. For instance, roads above 6 m wide are considered not managed, public area with more than 12 cuts per year is assumed non-flowering. Can the authors give some discussion on how uncertain of the choice of those empirical criteria to impact the final picture of emission source (i.e. Figure 8)?

7. Page 14225. Line 21-22. 'Wind directions were obtained for all available grass pollen counts (n = 1,644) within the pollen season'. In here, the analysis use all the raw 30-min resolution instantaneous wind direction during flowering season i.e. May 25 – Jul 29 (65 days, based on Table 1) or any other special dealing?

8. Page 14225. Line 26-27. 'The threshold are further used ..., where a level of 50 grains m-3 daily average . . .'. In here, the threshold value for pollen forecast service is for grass pollen only or for the total pollen including trees and grass pollen? 9. Page 14226. Line 19-20. 'A secondary, . . . within a distance approximately 5 km . . .' should be 'with a distance radius approximately 5 km with the center in central Aarhus'. 10. Page 14227. Line 2. '(see Table 1)' should be '(see Table2)'.

11. Page 14229. Line 12-14. 'There was a high correlation . . . the three stations and operational trap in Viborg . . .'. Where is the geographic location of Viborg related with the city Aarhus? It should be marked in Demark map in Figure 2. It is helpful to understand the high correlation between Virborg and three urban sites based on wind direction sector analysis.

12. Page 14235. Line 20-24. 'The next step . . . develops a local scale dispersion model . . . explaining air movements transporting grass pollen on the local scale.' Just curious how to weight in other important meteorological factors besides wind information (temperature, precipitation) into local dispersion model. The urban scale grass emission source map developed in this study only gives the spatial distribution of grass pollen, but the day-by-day variation of pollen emission rate may also need in order to repeat

the observed pattern.

13. Page 14244. Table 1. Consider change the format of date from '25.5' to '25/05' , which is consistent with following Figures.

14. Page 14245. Table 2. (1) Need to adjust the position of the first column. Under the 'Classfication Data' should be the different land use type instead of black. (2) Need to give the full name of 'acc' as 'accuracy' or mark it as notation.

15. Page 14246. Figure 1. Remove the description title 'Release of 1 moi . . . near neutral weather conditions'. This is already covered in the caption of the Figure 1.

16. Page 14248. Figure 3. The legends for '1000m distance' (white box with bold grey line) and 'no grass' (white box with grey line) is too close. Consider to change to differentiate them from each other (e.g. dash line for the legends of '1000m distance').

17. Page 14250. Figure 5. The color of each site is not consistent with other figures, i.e. Figure 2-4, Figure 7-8. Site Rundhøjskolen should be blue, site TV2-Østjylland should be green while site Central Aarhus, NERI should be red.

18. Page 14251. Figure 6. The format of x-axis is not consistent. Some of them is '25-05', some of them is '25/05'.

19. Page 14253. Figure 8. The zoom-in figure for vicinity of Site Rundhøjskolen should be also highlighted with bold blue line.

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