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Atmospheric Chemistry and Physics Discussions

Interactive comment on "MACC regional multi-model ensemble simulations of birch pollen dispersion in Europe" *by* M. Sofiev et al.

Anonymous Referee #2

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Common remarks:

Definitely, fully agreed with authors, that this manuscript presents first-ever ensemble modelling experiment applied for the birch pollen. It had employed 7 models (as a part of MACC ENS) run in test mode for 2010 and then over season of 2013 including comparison with available observations (from 11 countries) with a focus on Europe. Used ensemble approach is modern state-of-the-art approach for both numerical weather prediction and atmospheric chemical transport modelling, as it allows

better evaluate uncertainties of the models used. For pollen (as biological) particles it is especially important due to large spatio-temporal variability in both emissions and concentrations. The manuscript is well structured and in general well written; it has good balance of presented material and illustrations well supported by the results obtained. The manuscript can be recommended for publication after minor revisions (see these listed below).

Specific remarks to text of the manuscript:

1. L60: may be better "tree" instead of "plant" 2. L69: replace "transportation" to "atmospheric transport" 3. L71: may be better to use "XX century" instead of "previous century" 4. L81: replace "Mikhail Sofiev et al" to " Sofiev et al" & replace "Yli-panula" to "Yli-Panula" 5. L95: replace "M. Sofiev et al" to "Sofiev et al" 6. L94: may be make a web-link to the model (SILAM) here or on L166; can be it also done for other 6 models used 7. L110: replace "to present the results" to "to present and evaluate the results" 8. L112-L116: may be this paragraph can be omitted 9. L124: replace "pollen transport" to "pollen atmospheric transport" 10. L126, L134, L141, L150, L154, L159, L166: it will be better if all model names will be spell-out in complete as it is done for the SILAM model in lines 94-95 11. L146: replace "An Eddy diffusion" to "An eddy diffusion" 12. L156: replace "treaded" to "treated" 13. L160: replace "semi-lagrangian" to "semi-Lagrangian" 14. L172: make similar writing for 3D & 4D-VAR for L143 15. L176: may be add in title of 3.2 word "pollen" 16. L183: replace "temperature sum" to "air temperature sum" 17. L189: may be better to use "accumulated to-date" instead of "accumulated to-day" 18. L190: replace "humidity" to "relative humidity (RH)" 19. L194: may be better to use "calm conditions" instead of "still conditions" 20. L202: replace "following members" to "following 11 members" 21. L215: "from March to September" vs. "from March till September" (e.g. location/to vs. time/till) 22. L226: is it necessary to mention "GMD MACC special issue" -> omit?; or it is enough to use the reference + add it to the section 8 "References"; + same on L123 23. L227 vs. L231: identical values for domains; write only once, just mentioning in words the same boundaries 24. L234-

235: use/write only once “m” for vertical levels (fx. . . .3000 and 5000m) 25. L239: may be better “were used” instead of “were picked” 26. L253: replace “The season was” to “The duration of the season was” 27. L261: clarify: “tens of times” vs. “ten time” vs. “ten-fold” 28. L271: may be replace “pollen index” to “SPI” (defined in L258) 29. L280: replace “four time moments” to “four episodes” 30. L287: re-write “southern blow shown” 31. L292: replace “all relying” to “all are relying” 32. L297: may be re-write in passive voice instead of “we” 33. L297-298: replace “features of the pollen season” to “features of the 2013 birch pollen season”; and then exclude “of the 2013 birch pollen season” from title of section 5.1 (L301-302) 34. L304: re-write “Comparison of . . . Figure 7 demonstrates that” to “Analysis showed (see Figs. 6-7) that” 35. L310: replace “largely decided” to “largely influenced” 36. L311: replace “affecting or passing” to “affecting or pollen cloud/plume passing” 37. L313: may be better “large-scale” instead of “continental-scale” 38. L317: replace “over the continent” to “over the European continent” 39. L323: may be better “Central Russia” instead of “Moscow”; see L443 40. L348: replace “plumes from” to “pollen plumes from” 41. L349: replace “exacerbated by” to “influenced by” 42. L358: replace “is largely” to “was largely” 43. L370: replace “thevertical wind” to “the vertical wind” 44. L384: replace “by the long-range transport” to “by possible long-range transport” 45. L399: replace “doubts” to “concerns” 46. L403: replace “has proven beneficial” to “has proven to be beneficial” 47. L405: may be better “shortest shifts” instead of “smallest shifts” 48. L407: may be better “new area” instead of “young area” 49. L432: replace “is created” to “was created” 50. L433: replace “European chemistry transport” to “European atmospheric chemistry transport” 51. L444: replace “was jeopardized” to “was influenced”

Extra general comments:

it might good to include also reference(s) to publication(s)/ guidelines for ensemble model comparison statistics (in section 4.2; L290+). Clearly specify for which period (exactly: start-end of pollen season, number of days) statistical evaluation is performed/ done in this study. Clarify that/if results are statistically significant (in particular, fx: for

estimated correlation coefficients). In section 3.2, although there are useful references which are listed in Sofiev et al. (2012) paper, but may be some of those can be added in this section too, where it is applicable. Recheck all references to publications throughout the text comparing with section “References” as well as recheck places where links to Figures are pointed. Make an extra check for English language throughout the text.

Comments to illustrations:

1. Table 1: as main birch pollen sources are placed within the lowest layer, include also information on how many (vertical) levels are included within the atmospheric boundary layer 2. Fig 3: is it also possible to include a difference plot between 2010 & 2013 3. Fig 4: may be this figure can be omitted 4. Fig 6: may be better to use/ replot colorbars at the same scale 5. Fig 9: may be better to use the logarithmic-scale for the left figure

Extra general comment for figures:

may be better to write for figures — a), b), c), d) instead of – left-top, low-right, etc.; enlarge individual figures (in Figs. 5,6,7) by excluding empty-white areas between; where it is possible (e.g. when all 4 colorbars are on same scale) keep only one legend/colorbar; note - all captions/ text for each figure should be self-explanatory

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 8243, 2015.