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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Multi-model ensemble simulations of olive pollen distribution in Europe in 2014" *by* Mikhail Sofiev et al.

Anonymous Referee #3

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Review of The study "Multi-model ensemble simulation of olive pollen distribution in Europe in 2014" By

Sofiev et al This study is a multi-author manuscript that address the quality of the European Ensemble of air Quality Models for pollen dispersion Sofiev et al (2015) when it is applied on olive pollen. Below there is a point-by-point assessment of the manuscript using the review criteria given by ACP: http://www.atmospheric-chemistry-and-physics.net/peer_review/review_criteria.html

Model evaluations like this are very important in order to advance science. However, the study - in its current form - seems to be mainly of technical nature caused presenting a status of ongoing model development caused by a number of limitations – please see below.

1. The topic of the manuscript is atmospheric modelling and as such within the scope of atmospheric chemistry and physics

2. The paper presents an existing concept – the MACC pollen dispersion modelling ensemble published by Sofiev et al (2015). As such the idea and the concept has already been published. The ensemble is applied on a new pollen type. The model manuscript use observations, but there is no station list and no accurate numerical or accurate description of observations.

3. There are substantial conclusions in the manuscript. However these conclusions do not appear to be founded with data presented in the study. One example is the systematic bias in surface temperatures as a cause of model uncertainties. However the manuscript does not contain data (Figures or tables) concerning surface temperatures. Another example is the conclusion that the model calculations represent large scale transport fairly well. However the results do not seem to agree with previous observations of olive pollen in Europe (Sofiev and Bergmann, 2013). This conclusion there needs better support in the manuscript. The maps in figure 3 show that both the ensemble mean and ensemble median calculates a relevant seasonal pollen index in Northern France, UK, Germany, Poland. For individual models this is extended even to Norway. To my knowledge, olive pollen are rarely or have never been reported from those regions. This shows that the ensemble overestimate the large scale atmospheric transport. The authors clearly write that the sources in France, presented in the source map, are unrealistic low. Adding the missing sources in France must be expected to increase the calculated pollen index in nearby regions such as Germany, UK, Poland, Netherlands etc even more. How much is naturally not known. Nevertheless, the arguments described above, disagrees with the conclusion that the ensemble represent large scale transport fairly well by using the available material in the manuscript.

4. The scientific methods and assumptions are generally both valid and clearly outlined? However, when they filter the observational record, then they exclude stations with low amounts of pollen. The threshold is 25 pollen day m-3. This is not appropriate.

Stations with both high and low numbers should be included in the evaluation of the model simulations.

5. The results are not sufficient to support the interpretations and conclusions? This is partly caused by the design of figures. As an example, Figure 3 shows simulated (maps) and observed (dots) pollen index. The maps are good for a broad picture, but the accuracy at the sites cannot be assessed with the maps. Ideally this should be combined with a table that demonstrate model results vs observations. Figure 5 shows maps with observed start dates and the corresponding calculations. The chosen color scale makes it almost impossible to see any variations. A difference between 114 and 126 is from on type of green to another, but cover almost 14 days. This means that differences and agreements between observations cannot be assessed to an accuracy of less than 14 days. A table would make this much more clear. Same arguments on accuracy assessments are relevant for Figure 6. This would also have been better in a table. As the manuscript hardly uses the spatial representation of the maps with the dots (Fig 3,5,6), then there is limited argument for showing these comparisons on a map. Using tables instead of figures would therefore improve transparency substantially. The authors claim a strong forecasting skill in the summary. However Figure 7 clearly shows very low correlations (from below 0.1 to less that 0.4) and the RMSE (also figure 7) ranges from about 80 grains/m3 to 120 grains/m3. As far as I know this level is the typical level for severe warnings of tree pollen. If the typical error is of the same level as the warning level and the correlations generally low, then I do not find sufficient support for the statement concerning a strong forecasting skill.

6. The results cannot be reproduced by fellow scientists. The model simulations can be reproduced, but the accuracy assessment cannot be done as there is no description of the observational record.

7. The authors give credit to related work but it is my impression that they have not conducted a sufficient literature review, in particular in relation to other modelling approaches that simulates the start and the strength of the pollen season. This puts

limitations to the scientific discussion of the work and the assessment of the quality of the model simulations. A quick search on Google identified studies by Orlandi et al (2006) and Rojo et al (2016). These studies in combination with papers written by the co-authors of this manuscript (e.g. Galan et al, 2005) present methods that seem to have similar or higher accuracy than this study with respect to start of the pollen season as well as the spatial modelling of the season index. This indicates that a deeper literature review is needed in order to position the findings in this manuscript against existing knowledge. The authors claim a strong forecasting skill in the summary. However, all of the models (Figure 7), except SILAM, seem to have a larger error with respect to predicting the start of the season than other multi-site methods presented in scientific literature. It can therefore be questioned if there is a strong forecasting skill of the models and the ensemble with respect to the start of the season.

8. The title clearly reflects the contents of the paper

9. The abstract provides a concise summary of the study. However as described in the previous sections, then there is not sufficient material in the manuscript to support the findings that are presented in the abstract

10. The overall presentation is well structured and clear.

11. The language is fluent and precise

12. Equation 1 and 2 are defined. However the scaling factors σ and β are only partly described as their values could not be identified.

13. The figures 3,5,6 are almost impossible to read causing that the findings presented in the conclusion and abstract rely on unclear material

14. There is about 75 references. Most of these are peer reviewed literature. However a substantial amount of the cited literature appear to be written (as lead or co-author) of the authors to this manuscript. The comments under point number 7 and the large number of references indicates that the authors of this manuscript had put too much

weight on own publications and to little weight on publications by other authors.

15. Supplementary material has not been included

References: Galan et al (2005) Heat requirement for the onset of the Olea europaea L. pollen season in several sites in Andalusia and the effect of the expected future climate change

Orlandi et al (2006) New model to predict the timing of olive (Olea europaea) flowering: A case study in central Italy, New Zealand Journal of Crop and Horticultural Science, 34:1, 93-99, Rojo et al (2016) Modeling olive pollen intensity in the Mediterranean region through analysis of emission sources, Science of the Total Environment 551–552 (2016) 73–82

Sofiev and Bergmann (2013), Allergenic Pollen, A Review of the Production, Release, Distribution and Health Impacts, Springer, 247pp, DOI 10.1007/978-94-007-4881-1

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