**Response to Short Comment by Dr. Mikhail Sofiev**

We thank Dr. Sofiev for his interest in our manuscript and his valuable comments. We have revised the manuscript based on the comments of Dr. Sofiev and the other reviewers. In this response, we address the specific concerns raised by Dr. Sofiev.

*I have read the paper with great interest despite the model validation appeared quite thin and not very impressive.*

> In this study, we took advantage of the ambient data collected at nine sites during March - June 2010 as part of the University of Southern California's Children's Health Study (CHS). The overall model agreement in terms of daily mean and maximum for each sites as well as the spatial distribution of pollen concentration for each genus were discussed in Section 3.3. As we stated in the second paragraph in Section 3.3, our observational database is quite limited. Outside the March - June 2010 intensive data collection period, the only ambient data for southern California that we have access are the data collected in Pasadena, CA by our co-authors. Other than the above, the only ambient data available that we are aware of are those of the National Allergy Bureau (NAB) of the American Academy of Allergy, Asthma, and Immunology (http://www.aaaai.org/global/nab-pollen-counts.aspx). We tried to obtain the NAB data, without success.
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> We agree with Dr. Sofiev that more extensive model evaluation is desirable. Model improvement is a continuous process, and we will continue to seek more data for model evaluation and improvement. We have added a sentence to the end of the next to last paragraph of the Summary section: "Also for future work, public release of the historical ambient data from the National Allergy Bureau would allow for a far more extensive evaluation of the modeling framework, should that data ever become more widely available."

*But I have to point out that nearly every reference to SILAM model contains wrong information.*
*1. For already several years, SILAM is not "Finnish Emergency Modelling Framework" as you quoted it in p.3981. As stated in our last-year paper Sofiev et al, 2012, its name is "System for Integrated modeLling of Atmospheric coMposition".*

> Thank you for pointing out the error. We have made the correction to the model name in our revised manuscript. We have also added Sofiev et al (2013) to the citation for SILAM.

*2. Efstathiou et al., 2011 has used the major elements of SILAM and COSMO-Art emission terms while making their module. This may be worth mentioning too.*

> Thank you for the suggestion. We have rewritten the relevant sentence to read: "In North America, a combined MM5-CMAQ-Pollen model merges the Mesoscale Meteorological Model (MM5; Grell et al., 1994), components of the Biogenic Emissions Inventory System (BEIS) *and major elements of SILAM and COSMO-ART* [emphasis added] for pollen emissions, and the Community Multiscale Air Quality (CMAQ, Byun and Schere,

2006) modeling system for pollen transport; the combined model was used to simulate birch and ragweed pollen dispersion behaviors during their peak pollination periods in 2002 for the northeastern US (Efstathiou et al., 2011)."

*3. In p.3984 you suggested that we used w* instead of u*. Well, it is as far from reality as it can be. We made a combination of 10m wind speed with w*-based correction to accommodate the effects of both mean wind and convection. We never thought to skip u*, just used the related parameter - 10m wind speed. The relation is not 1:1 but it is still sufficiently strong for forests. The 10m wind was taken instead of u* because there is no need to use much energy to lift pollen in air, it falls out of catkins freely; you just have to slightly shake them. The analogy with wind tunnel studies does not work. In those studies the momentum flux was used for lifting the sand out of the floor, while birch pollen just needs a bit of air motion to be picked up after it falls out of catkins.*

Thank you for pointing out the misstatement in our manuscript regarding the use of $w_*$ instead of *u** by Sofiev et al. (2013). We have revised the relevant sentences to read:

> A recent paper by Sofiev et al. (2013) reported a new birch pollen emission scheme based on a temperature-dependent parameterization (Linkosalo et al., 2010) and used the convective velocity scale *w** together with the 10-m wind speed to represent the influence of both mean wind and convection on pollen emission. The authors suggested that this was a more realistic approach for free convection and low mean wind conditions.

We followed the parameterization scheme proposed by Helbig et al. (2004) to use the friction velocity *u** to represent the impact of wind on pollen emission. This parameterization is based on wind tunnel results for sand erosion. Also following Helbig et al. (2004), a resistance factor is used to distinguish the different natures of sand erosion on the ground and the pollen release above the canopy height. For surface-layer dynamics, *u** is the best measure of the force of the wind on the surface. *u** and the 10-m horizontal wind are very closely related because logarithmic profile is assumed. *w** is a mixed layer scaling velocity and does not really reflect surface-layer dynamics. Also note that *w** is not defined for nighttime or neutral conditions. The threshold friction velocity for different pollen species released from the catkins to the atmosphere varies and should be related to the pollen density and aerodynamic diameter. To our knowledge, there is no systematic study to quantify the relations between pollen physical properties and threshold wind speed.

To address the concerns regarding the analogy between pollen release and sand erosion with wind tunnel studies, we have added a sentence at the end paragraph of the second to last paragraph in the Summary section:

Finally, direct wind tunnel laboratory measurements on pollen emission under different wind conditions are also needed to better quantify the different threshold friction velocity for different pollen species.

**Reference:**

Efstathiou, C., Isukapalli, S., and Georgopoulos, P.: A mechanistic modeling system for estimating large-scale emissions and transport of pollen and co-allergens, Atmos. Environ., 45, 2260-2276, 2011.

Helbig, N., Vogel, B., Vogel, H., and Fiedler, F.: Numerical modeling of pollen dispersion on the regional scale, Aerobiologia, 3, 3-19, 2004.

Sofiev, M., Siljamo, P., Ranta, H., Linkosalo, T., Jaeger, S., Rasmussen, A., Rantio-Lehtimäki, A, Severova, E., and Kukkonen, J.: A numerical model of birch pollen emission and dispersion in the atmosphere: Descrption of the emission module, Int. J. Biometeorol., 57, 45-58, doi:10.1007/s00484-012-0532-z, 2013.