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Interactive comment on "EMPOL 1.0: a new parameterization of pollen emission in numerical weather prediction models" *by* K. Zink et al.

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Dear all,
we have found two small errors in our previous author comment:

- The citation Ziska et al. (2000) should be Ziska and Caulfield (2000).
- The answer to one of the referee's questions was not complete.

The following two paragraphs of the previous author comment have been changed. Changed/added text is printed in bold letters.

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It was shown that in herbaceous annuals (e.g., ragweed) the production (including pollen production) positively correlates to the amount of available CO_2 in the atmosphere (Rogers et al., 2006; Ziska et al., 2000). As a result, the given function would have different outcomes for plants living in urban and those living in rural areas. Similarly, atmospheric CO_2 would have different effects at increased distances from roads.

Thank you very much for this interesting remark. In the present parameterization, adapted for birch pollen, this has not been considered. However, for a future version of EMPOL, this could well be one of the improvements. We have added the following text to the *Summary and conclusions* summarizing possible improvements including the ones suggested by the referee:
"For the future development of EMPOL, the following paragraph lists some of the possible improvements.

- *Conducting field or laboratory experiments to deduce better functions relating meteorological conditions to the different steps of pollen emission.*
- *Introducing a mechanism that hinders pollen release and/or entrainment for a certain time period after a precipitation event.*
- *Introducing the influence of rising CO_2 on the pollen production (e.g., **Ziska and Caulfield 2000**, Rogers et al. 2006). With respect to the present parameterization this could be done in several ways: (1) $Q_{pollen,day}$ could be transformed into a variable field (right now, its value is fixed for the entire domain), (2) a new input field could be introduced that reflects the influence of CO_2, $e.g.$,f_{Q,CO_2}, (3) the influence of CO_2 could even be calculated within the model if COSMO-ART is run in a 'full mode' including reactive trace gases."*

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"Φ_{plant} combines the plant-specific variables that define the potential amount of pollen that could be emitted under perfect meteorological conditions". For potential amount of pollen per m3, I also suppose that you use pollen production per plant and land cover.

The use of the term 'potential' was a bit confusing here. The pollen production per plant and land cover is only part of this factor. It also includes influences of the state of the season and the altitude. We have therefore changed the text to:
"The factor Φ_{plant} combines the plant-specific variables that define the amount of pollen that could be released per time step under perfect meteorological conditions at a given grid point. ***It consists of the figure $Q_{pollen,\Delta t}$ (calculated from $Q_{pollen,day}$) describing the maximum amount of pollen that could be released per time step and per square meter if the grid box was totally covered with the specific plant in the perfect growing state. This maximum number is reduced by factors describing the percentage of ground actually covered with the specific plant ($f_{Q,cov}[0,1]$), the course of the pollen season using a mathematical description $f_{Q,seas}[0,1]$ (see Sect. 3.1), and the influence of the altitude on the productivity of the plants $f_{Q,alt}[0,1]$ (see Sect. 3.3):"***

Interactive comment on Geosci. Model Dev. Discuss., 6, 3137, 2013.