Atmos. Chem. Phys. Discuss., 13, C10768–C10770, 2014
www.atmos-chem-phys-discuss.net/13/C10768/2014/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Contribution of pollen to atmospheric ice nuclei concentrations" *by* J. D. Hader et al.

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Received and published: 9 January 2014

Although the paper deals specifically with pollen samples, the many procedural and conceptual factors that need to be considered in such work are well illustrated in this work and have broader applicabilities. Assessments of the background, and of the impacts of variations of the drop volumes have been done with care. Assumptions made in the analysis procedure and with respect to particle sizes are clearly stated.

The statement that pollen grains do not initiate freezing at temperatures warmer than -10C is, of course, relative to the concentration range observed. There is no indication of a significant change in the slope of the spectra at -10C so that more active ones can be expected to exist in yet lower numbers. Where would that extension stop is

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an interesting question. It is also a n open question whether the foregoing statement regarding extrapolation is really valid or not. All of the spectra in Fig. 6 of the paper show somewhat steeper spectra at the warm end of the range of observations. This is to some extent a consequence of limited sample sizes (1 or 2 drops per temperature interval) but may also be a true pattern.

Assessment of what concentrations of pollen grains would have atmospheric relevance due to their ice nucleating ability can only be approached through cloud models and will have rather different answers depending on the cloud conditions assumed. Similar problems are associated with the conversion of measured concentrations of ice nucleating particles to concentration in the air from which the rain fell. Neither the many possible pathways for particles to get inside raindrops, nor the breakup, aggregation or dissolution of particles in the rain, can be considered at this level of analysis. The many qualifying words (rough, approximate, etc.) in the text are indications of these problems and are, unfortunately, truly needed.

Keeping in mind the various limitations of measurements of atmospheric ice nucleation activity, the correlation cited with large particles also need to be taken with caution. So are comparisons between the measured values and 'typical' ones worldwide. The lack of increases during the pollen period in comparison with other times is a weak argument without the same technique being applied over extended time periods. Short-term correlations are also hard to validate or exclude with many other variables uncontrolled.

Comments in the Discussion about contact nucleation may need to be made more specific.

In all, the authors are on much more solid ground with respect to their measurements than in evaluating the atmospheric impacts of their results. This problem is not unique to this work and will only be improved with studies that are much more comprehensive, and go well beyond the likely possibilities of small groups. Within its limited scope, the paper is a good contribution and a useful contribution to the growing body of ice

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nucleation studies.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 31673, 2013.

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