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Atmospheric Chemistry and Physics Discussions

# *Interactive comment on* "High concentrations of biological aerosol particles and ice nuclei during and after rain" *by* J. A. Huffman et al.

**Anonymous Referee #3**

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The authors have presented a very detailed study concerning biological aerosols in a forest ecosystem. They showed that biological particles increase dramatically during rain and are closely correlated with atmospheric ice nucleation. Additionally, they found two new species of ice nucleation active fungi. This research is new and highly interesting for the readership of ACP and should be published after some very minor changes.

General remarks:

Many biological particles probe fluorophores (i.e. NAD(P)H, riboflavin, tryptophan etc.). This is particular true for bacteria and fungal spores. However, only few bacteria are good ice nuclei and most fungal spores do not even show any ice nucleation activity. So it would be very interesting to know the fraction of fluorescent particles emitted



during or after rain which really show an enhanced ice nucleation activity. Additionally, it would be interesting to know the exact numbers by species which have been identified as active nuclei.

Probably there are a lot of biological particles which do not probe fluorophores but which are excellent ice nuclei. This could be leaf litter, starch particles and fragments from pollen, polysaccharides, humic-like substances, etc. Particularly after rain fall these particles increase due to wash out effects or biological reproduction processes triggered by the enhanced humidity. Can you quantify these non-fluorescent particles? Can you assign them?

Specific remarks:

Explain all abbreviations when first time used in the text (e.g. m.a.g.l., DAPI, FBP, PCR, RH, etc.). Does "IN" mean "ice nucleation" or "ice nuclei"? Please, look for clearness. Avoid introducing abbreviation in tables. It is much better to establish them in the text. When possible use regular units and not codes, e.g. LPM (L min-1).

Page 1773, 2nd paragraph: This text is extremely difficult to read for a non-biologist. Since most readers are chemists or physicists you might rewrite this paragraph.

When quoting Pummer et al. 2012 you might also quote their latest work in Augustin et al. Atmos. Chem. Phys. Discuss., 12, 32911-32943, 2012.

You might also quote the model and the conclusions of Sesartic et al. Environ. Res. Lett. 8 (2013) 014029 (8pp).

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Interactive comment on Atmos. Chem. Phys. Discuss., 13, 1767, 2013.