

Interactive comment on “Highly active and stable fungal ice nuclei are widespread among *Fusarium* species” by Anna T. Kunert et al.

Anonymous Referee #3

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This is a very well-written manuscript concerning ice nucleation active fungal species. The paper highlights the high ice nucleation activity of *Fusarium* which compares to the best ice nucleating particles known so far. A main finding of this study is that filtration experiments suggest that the single cell-free *Fusarium* is smaller than 100 kDa. This is indeed very interesting and I wonder that the authors do not use the nomenclature of their own paper (Pummer et al., 2015) i.e. ice nucleating macromolecules (INM). Indeed, water-soluble INMs have also been observed on many other primary biological aerosol particles (PABP) such as leaves, bark, pollen (Felgitsch et al., 2018), algae (Tesson et al., 2018), and bacteria (Failor et al., 2017). The sizes of these INM should be compared among each other, e.g. in a table. The same is true for the chemical composition and for the stability against oxidation. Also for other PBAPs, proteins

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and polysaccharides have been found as main components of INM and their stability is extraordinary as well. I also wonder if the authors have carried out heating experiments in order to destroy the ice nucleation activity of the proteins. Eventually, the heating was not successful due to the stability of INMs which would be important information since many colleagues use heating experiments to prove or unprove the presence of PBAP-INPs. Altogether, this is a very valuable manuscript which should be published after some minor corrections.

Comment

The abbreviation “IN” has been used in a confusing way. In the text it means “ice nuclei” but also means “ice nucleation” and “ice nucleating”. I recommend using “INP” for “ice nucleating particles” and write the full words in all other cases.

References

Failor, K.C., Schmale III, D.G., Vinatzer, B.A., Monteil C.L.: Ice nucleation active bacteria in precipitation are genetically diverse and nucleate ice by employing different mechanisms, *The ISME journal* 11, 12, 2740 – 2753, 2017.

Felgitsch, L., Baloh, P., Burkart, J., Mayr, M., Momken, M. E., Seifried, T. M., Winkler, P., Schmale III, D. G., and Grothe, H.: Birch leaves and branches as a source of ice-nucleating macromolecules, *Atmospheric Chemistry and Physics*, 18, 16063 – 16079, 2018.

Pummer, B. G., Budke, C., Augustin-Bauditz, S., Niedermeier, D., Felgitsch, L., Kampf, C., Huber, R., Liedl, K., Loerting, T., Moschen, T., Schauperl, M., Tollinger, M., Morris, C., Wex, H., Grothe, H., Pöschl, U., Koop, T., Fröhlich-Nowoisky, J.: Ice nucleation by water-soluble macromolecules, *Atmospheric Chemistry and Physics*, 15, 4077 – 4091, 2015.

Tesson, S. V. M., Šantl-Temkiv, T.: Ice Nucleation Activity and Aeolian Dispersal Success in Airborne and Aquatic Microalgae, *Frontiers in Microbiology*, 9, 2681, 2018,

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