

# ***Interactive comment on “The adsorption of fungal ice-nucleating proteins on mineral dusts: a terrestrial reservoir of atmospheric ice-nucleating particles” by Daniel O’Sullivan et al.***

**Anonymous Referee #1**

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The Manuscript entitled “The adsorption of fungal ice-nucleating proteins on mineral dusts: a terrestrial reservoir of atmospheric ice-nucleating particles” deals with the potential of proteins to serve as cell free and available IN in soils. In detail, clay and cell free ice nuclei washed from the mycelial cell wall from *Fusarium avenaceum* are used in laboratory experiments as demonstration. Basically, the manuscript is very well written, and the background is precisely elaborated. Therefore I can easily give the manuscript the excellent for the form. The topic of organic and biological residues is of major interest in this field of science. As stated in the manuscript, most mineral particles are covered with carbonaceous matter originating from organic and/or biological sources. I agree here with the authors these might be of significant impact and

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also might have relevance in water cycling. Fusarium has spread to the whole World. Especially *Fusarium avenaceum* as generalist in plant pathogenicity commonly found to be IN active contribute a huge amount of biological particles on our Earth. However, there would be a gain for the data. It is obvious, that there is a chemical or biochemical modification of the clay upon incubation with *F.avenaceum* washing water. But there is no experiment showing it to be proteins. A protein extraction to recover proteins from the clay or incubated clay used in a protein assay (e.g. BCA or Bradford) could show proteins or proteinaceous compounds bound to the clay. Although it is known that proteins adsorb to minerals, this would fortify the interpretations, and could also be related to the impact of the different cations in either protein or proteinaceous IN adsorption to the clay. Because of the complex composition of biological samples, an experiment showing protein being enriched in the treated clay would be a gain. Anyhow, the results are related to the conclusion as well as I generally agree with the interpretation. The protein assay is not mandatory for the manuscript and the conclusions are concise. Therefore I recommend publication of the manuscript in ACP after the open discussion.

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