

## Review BG-2021-187

Tang et al. present a paper that describes the biodiversity of samples collected in Cyprus during the INUIT 2016 campaign and its variations during or after rain events. They also measured the Ice Nucleation activity in these samples, and particularly related to a biological origin.

This work represents a rather large set of data, in general the experimental section is well detailed, the figures are numerous and informative, the paper is well presented and written. The description of bio-aerosol communities is still sparse in the literature, particularly in the Mediterranean region, the data reported here are thus valuable for the scientific community and is certainly worth publishing.

However, I have a few comments.

### **Aerosol sampling:** (P3 lines 61-75)

Aerosols were collected on filters every day, this means that filters were exposed to dry air or to rain drops when rain events eventually occurred. My question is the following: do you consider that samples collected during rain events can be considered as air samples or as rain samples (or a mixture of both)? This is quite important as it can modulate the final discussion. For instance, the biodiversity or IN activity of the specific samples impacted by the rain events should be compared with those of rain rather than air samples described in the literature.

Could the authors comment on these points?

### **Bacterial communities** (P12 Fig 5)

In general, whatever are the atmospheric samples (rain, snow, cloud, air) the main described phyla are Proteobacteria, Fimicutes, Actinobacteria and Bacteroidetes, with usually a prevalence of Proteobacteria (and particularly Alpha- and Gamma-Proteobacteria) ( see for review A.-M. Delort, P. Amato, Editors Microbiology of Aerosols, 2017, Wiley, (ISBN: 9781119132288).

In this work, Proteobacteria are not the most abundant

In addition, a number of papers report an increase the presence of some genera such as *Pseudomonas* (belonging to Gamma-Proteobacteria) in rain samples, again this is not observed in CY20 and CY23 samples that experienced rain events. (Monteil et al. Features of air masses associated with the deposition of *Pseudomonas syringae* and *Botrytis cinerea* by rain and snowfall, The ISME Journal 8, 2290–2304, 2014, <https://doi.org/10.1038/ismej.2014.55> )

Could the authors discuss these results in more details?

### **IN activity** (P13)

Although the IN activity measurement is correct, including experiments where heating and filtering are used, I have a concern regarding the lack of data related to the number of cells present in the sample. The IN activities of the different samples are compared but we have no information about the total number of cells, the number of bacteria or fungi. Could the authors add this important information?

In the absence of these data is it very difficult to compare the biodiversity (which is just a qualitative aspect) and the IN activity values.

**Discussion:**

Some papers are well documented on the comparison of biodiversity or IN activity of air, rain and other atmospheric samples. I suggest that the authors should compare their results with those of these paper (see references below). Also if the authors do not identify major microorganisms known as efficient ice nucleators, they propose some unidentified organisms or other types of molecules responsible for the IN activity measured in their sample. However this is highly speculative there is no the strong evidence for that. In addition due to my concern about the IN section (see above), I suggest that the authors highly modulate these conclusions,

Rachel A. Moore, Regina Hanlon, Craig Powers, David G. Schmale, III and Brent C. Christner  
Scavenging of Sub-Micron to Micron-Sized Microbial Aerosols during Simulated Rainfall  
*Atmosphere* 2020, 11, 80; doi:10.3390/atmos11010080

## References of interest:

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