Referee 1:

General comments:

This manuscript by Gratzl et al. summarized the dataset of fluorescent primary bioaerosols using a WIBS, e.g. fluorescence pattern and particle size, based on the intensive observations in Finnish forest site. The dataset showed the significant differences of bioaerosols with seasonal variation, snow-covered or snow-free.

The manuscript is well structured, including descriptions of data quality control, and well written in English. The dataset is generally useful for the researcher and community to work with the biological particles and their impact on the climate. I recommend the publication after the following minor comments are considered.

We thank Referee 1 for their useful comments on our manuscript. Please see our point-by-point response below, with the points raised by the Referee in black, our responses in blue and the changes made to the manuscript in red.

Specific comments:

I understand that there is a difference in fluorescent particles (both normal and highly) between on the snow-free and snow-covered conditions, but is this limited by local emission or not?

I found a description that the site is largely affected by local emissions and surrounded by the biological forest conditions in section 2, but have any additional analysis to evaluate/categorize the local emission or outside contribution, i.e., air mass origin or emission sources? (need more detailed description in line 259 or other part)

We agree that deeper analysis and additional data is necessary to get a comprehensive understanding of the origin of the fluorescent particles. However, we feel that this is outside the scope of this data description paper. In the meantime, we submitted a research article following this paper to Atmospheric Chemistry and Physics that is available as a preprint, in which we address this very question (doi of the preprint: https://doi.org/10.5194/egusphere-2025-1599). We also added a recommendation in the summary, reading

For further analysis it is also recommended to categorize the local emissions or potential far range contributions to FAPs and HFAPs (Gratzl et at., 2025).

Also, do you think how large are contributions from the non-biological but fluorescent particles, as you mentioned in Table 1? Any suggestions?

Previous research has shown that B and BC particle concentrations correlate positively with black carbon concentrations in different environments. We now address this in the summary and added a sentence after the following sentence in the summary:

"Comparison with other aerosol data, for instance black carbon (see Backman et al., 2025) could give valuable information on interfering particles which are detected as fluorescent but not necessarily originate from the biosphere.":

For example, B and BC particle concentrations have been shown to correlate with black carbon concentrations in previous field studies (Gratzl et al., 2025; Beck et al., 2024; Gao et al., 2024;

Markey et al., 2024; Yue et al., 2022) and account for approximately 50 % of both FAPs and HFAPs in this data set.

Others:

L36-L49:

It would be useful to add if there is any methods of the detection and identification of bioaerosols as a general introduction, such as offline analysis (e.g. microscopic analysis or biological methods), as well as WIBS and UV-APS (online method).

We would like to kindly point out to the reviewer that we address this already in the introduction right before line 36 in line 28-35:

"Due to the interaction of PBAPs with human, animal and plant health (e.g. disease transmission, allergic reactions, crop diseases), especially fungal spores and pollen grains have been monitored for decades by aerobiologists using traditional methods like the Hirst trap, first introduced in 1952 (Hirst, 1952). This method relies on the capture of PBAPs on a slowly moving sticky microscope slide and subsequent analysis of pollen grains and fungal spores under an optical microscope. Other commonly used techniques involve examining PBAP concentrations with fluorescence microscopes after DNA staining of PBAPs on filters or by incubation on Agar plates (Després et al., 2012). However, these methods have limited time resolution, and require trained personnel, as well as a high expenditure of time to identify PBAPs. "

Since none of these offline techniques are part of this data set, we think this paragraph is sufficient to introduce offline techniques for bioaerosol measurements.

L163-176

Why not give one example and briefly summarize the remaining channels as well (likely described in lines 220-222)? I don't think it is necessary to write everything. Or move/associate with the description in the data files as an asset.

We agree that this paragraph is hard to read. Referee 2 suggested creating a table for representing the variables and we think this is also a good solution which will improve overall readability of the paragraph. We deleted the text where we explained each variable, and added the table (new Table 2, see below).

Table 2: Description of variables in the data set. Variables 2 – 47 are reported in cm^{-3}. Each size distribution variable (variables 25 – 47) consists of 15 values per time interval for the 15 size channels and is reported as dN/dlogDp. The size channels are indicated as "(lower limit_upper limit)" in µm in the data set.

Number	Name	Description	Threshold
1	Starttime	Starting date and time of the 30 min measuring interval in dd.MM.yyyy hh:mm (UTC)	-
2	N_TAP	Conc. of total particles	-
3	N_FAP_FL	Conc. of total fluorescent particles	3 σ
4	N_FAP_FL1	Conc. of fluorescent particles in FL1	3 σ
5	N_FAP_FL2	Conc. of fluorescent particles in FL2	3 σ
6	N_FAP_FL3	Conc. of fluorescent particles in FL3	3 σ
7	N_FAP_A	Conc. of fluorescent particles in A	3 σ
8	N_FAP_B	Conc. of fluorescent particles in B	3 σ
9	N_FAP_C	Conc. of fluorescent particles in C	3 σ
10	N_FAP_AB	Conc. of fluorescent particles in AB	3 σ
11	N_FAP_AC	Conc. of fluorescent particles in AC	3 σ
12	N_FAP_BC	Conc. of fluorescent particles in BC	3 σ
13	N_FAP_ABC	Conc. of fluorescent particles in ABC	3 σ
14 - 24	N_HFAP_...	Same sequence as variables 3 – 13*	9 σ
25	SD_TAP	Size distribution of total particles	3 σ
26	SD_FAP_FL	Size distribution of total fluorescent particles	3 σ
27	SD_FAP_FL1	Size distribution of fluorescent particles in FL1	3 σ
28	SD_FAP_FL2	Size distribution of fluorescent particles in FL2	3 σ
29	SD_FAP_FL3	Size distribution of fluorescent particles in FL3	3 σ
30	SD_FAP_A	Size distribution of fluorescent particles in A	3 σ
31	SD_FAP_B	Size distribution of fluorescent particles in B	3 σ
32	SD_FAP_C	Size distribution of fluorescent particles in C	3 σ
33	SD_FAP_AB	Size distribution of fluorescent particles in AB	3 σ
34	SD_FAP_AC	Size distribution of fluorescent particles in AC	3 σ
35	SD_FAP_BC	Size distribution of fluorescent particles in BC	3 σ
36	SD_FAP_ABC	Size distribution of fluorescent particles in ABC	3 σ
37 - 47	SD_HFAP_...	Same sequence as variables 26 – 36*	9 σ

*HFAP refers to particles exceeding the 9 σ threshold