

## ***Interactive comment on “Detection and characterization of birch pollen in the atmosphere using multi-wavelength Raman lidar in Finland” by Stephanie Bohmann et al.***

### **Anonymous Referee #2**

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General comments: The authors presented lidar detection and classification of pollen species (birch and spruce) mainly based on depolarization ratio of them. The data together with backscatter coefficient, extinction coefficient, lidar ratio and Angstrom exponent of pollen that they measured are very basic and useful parameters for lidar studies. However, more focused discussion on the local aerosol except for pollen is required for the paper to be accepted. Comments are given below.

Specific comments: 1 Title: "multi-wavelength Raman lidar" should be better to be changed to (for example) "multi-wavelength scattering lidar with several lidar parameters", because Raman data was only used to derive water vapor mixing ratio (is this

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correct?) that is not main point of the content.

2 Introduction: Please survey and show other methods/techniques of pollen detection such as CCD detection with imaging analysis, fluorescence lidars and others, so that authors can appeal features of their lidar to readers who are not only lidar researchers but also the wide range of them.

3 Two cases: I want to know the reason why you selected only the two cases, the first period on 6 May 2016 between 23:00 and 01:00 and the second period on 15 May 2016 between 19:00 and 21:00. During 5-9 May, most of observations showed much higher concentration of birch pollen than that of first period you selected. And also, it seems better to discuss the influence of spruce pollen by using data in the morning on 13 May (13/05/16, Fig. 1) as spruce pollen concentration was higher than that in the second period.

4 Aerosols: There are several descriptions for the possible existence of local aerosols other than pollen, p. 4 line 13, p. 5 line 22, p. 8, line 17 and others. Nevertheless, the content of the paper seems to insist too much on the influence of pollen alone.

5 Hirst-type volumetric air sampler: Relating to #3, please describe the detailed results about solid particles, except for pollens, found/collected with the air sampler. There may be much amount of particles generated from the ground around the local area where the lidar measurements were done. Couldn't you find any particles which showed depolarization? I think these particles are more important to understand the lidar results than air mass derived with backward trajectories.

6 Range: The line 4 in page 5 describes "we only consider the lowest layer in the following analysis". It was at around 1 km. But Fig. 3 showing range up to 2.5 -3 km makes readers confused. Authors also described that data can be retrieved down to around 500 m. That data is important for comparison with the sampler data.

Technical comments: Technical word and its prefix, such as particle depolarization ratio

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and PDR, lidar ratio and PDR, frequently appears at random to each other, please unify them through the whole paper.

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