Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2018-427-RC2, 2018

Atmospheric Chemistry and Physics Discussions

Interactive comment on "An automatic observation-based typing method for EARLINET" *by* Nikolaos Papagiannopoulos et al.

Anonymous Referee #1

Received and published: 19 July 2018

The manuscript 'An automatic observation-based typing method for EARLINET' by Papagiannopoulos et al. presents a classification method to determine aerosol type from intensive optical properties derived by lidar measurement. The classification scheme shall be applied to standard EARLINET measurements to expand the EARLINET data base with the corresponding aerosol type or mixture. This additional information will further enhance the value of the EARLINET data base and is thus a valuable contribution. The paper is well structured and the method and its verification clearly presented. The paper is well in the focus of ACP; I have only some minor points that have to be clarified before the publication.

Section 2.2.1 to 2.2.5: You show an extensive overview of the intensive optical properties for the different aerosol types. However, it would be valuable if you could provide

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Discussion paper

further information if the different intensive properties have been derived from the same studies. For using those in the classification the influence of miss-classifications and mixtures should be minimized and the measurements providing a multitude of intensive optical properties should have a larger weight. Additionally you overview mainly focuses on the information presented by Burton et al. or from EARLINET measurements. It would be also valuable to include further measurements (e.g. closer to source regions or after long-range transport) to better differentiate between possible influences of transport or mixture.

Figure 2: Why do you show profiles below the full overlap of the lidar when you do not use them for your analysis? How trustworthy are the values in these height levels? What is meant by the statement 'the layers present the same behavior'? Looking at the profiles at different wavelengths I would suggest having different behaviors at different height levels, e.g. the wavelength dependence of the backscatter coefficient, the lidar ratio and the shape of the lidar ratio between 1.8 and 2 km is different to the height range between 2 and 3.6 km, above 3.6 km the Angstroem exponent of the extinction coefficient shows a different values than below.

Figure 3: Looking at the FLEXPART footprint, can you exclude a contribution from marine aerosols?

Figure 5: An additional Figure also including the information of the depolarization ratio for the different classes would be valuable.

Figure 7: The shape of the backscatter coefficient and the extinction coefficient at 355 and at 532 nm show different shapes, but the derived profile of the lidar ratio for both wavelengths shows the same shape. What is the vertical resolution of the different profiles? Did the extinction and backscatter coefficient have the same resolution for deriving the lidar ratio?

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