General comments:
The manuscript " Comparison of two automated aerosol typing methods and their application on an EARLINET station" main goal is to compare the performance/ability of two algorithms devoted to identify the nature of aerosol layers from vertical distribution of aerosol optical intensive properties derived using LIDAR retrievals of spectral extinction and backscatter coefficients.

The Thessaloniki EARLINET station database is used to perform the test.

First, the algorithms performances are tested focusing on 3 reference cases studies of well characterized environmental scenarios, a dust transport event over Thessaloniki, a smoke dominated scenario relate to biomass burning and a multilayer scenario including different type of aerosols.

Afterward, the algorithms are tested using a larger database including 54 Lidar aerosol profiles taken from 2012 to 2015 over Thessaloniki.

The study major conclusions are:

1) The algorithms presented similar performance for the environmental scenario regarded as PollutedSmoke, which seems to be the dominant for Thessaloniki.

2) The agreement between the two algorithms is less effective for Dust and CleanContinental aerosol scenarios, which the authors related to differences between the algorithms associated with the definitions of the typical range of intensive optical properties

Regarding the 3 reference cases studies, I would say that there is a need for a better characterization. Backward trajectories alone are not a robust to support the presence of air mass carrying a certain type of aerosol. Being the aim of these cases analysis to test the algorithms when there is a recognized condition of a specific type or a combination of aerosols, I would expect additional support data(satellite aod map, even fire spot map mentioned in the text) to characterize these scenarios. I'm aware that in end the aim is to test the algorithms performance from operational perspective, but that seems to be the focus of the second part of the analysis, when a larger database is used.

A major challenge of the manuscript is to emphasize results beyond those related to predictable differences resulting from recognized aspects of both methods. First, the similar performance regarding the dominant type of aerosol observed over Thessaloniki would not be expected since both methods are based in similar intensive optical properties and the range of these optical properties for this type of aerosol is closer than that from other aerosol types?

Therefore, an interesting part of the analysis would be to discuss the mismatches between the methods, which the authors also show that most of them are related to the differences between threshold range previously defined to characterize aerosol type.

From my point of view, instead of (or along) the 3 reference cases studies previously selected and discussed, it would interesting to see further analysis of cases studies selected from those mismatches cases (Figure 7), for instance, those when NATALI classified aerosol layers as PollutedSmoke while EMD named the layers as dust.

As the authors highlighted in their conclusion, indeed a test with focus on high resolution limits would be a more fruitful test to discuss the algorithms performance.

I would recommend a careful english revision targeting in particular the use of propositions.

Summary: Two central points that I think would help to improve the manuscript:

1) Improve the aerosol scenarios characterization for the 3 reference cases studies

2) Include further analysis regarding the mismatch between the methods, and cases studies taken from mismatches events (Figure 7) may help in this.

Specific corrections/suggestions

Pag 1, Line 3: I suggest the author to name aerosol optical properties, at least few examples, used in the study (either intensive or extensive). Throughout the abstract the author have not mention a single optical properties used in the study.

Pag 1, Line 4: *"... on three distinct cases..."* Need to improve the case studies introduction/description, which cases are the authors mentioning, lidar profiles or environmental scenarios? I'm aware of the cases because I've read the manuscript, but a brief idea in the abstract about the nature of the cases that the authors are talking would be important.

Pag 5, Line 143: *"...Color ratios - CI.."* here Color ratio is shortened to CI afterward in the text the expression CR is used. Please verify.

Pag 6, Line 143: *"... and changes largely for aerosols with different chemical and physical properties…"* A brief practical description of the way that chemical and physical properties of aerosol drive Lidar Ratio magnitude would be really helpful here.

Pag 6, Line 164: "... for 3+2 lidars.." As far as I'm aware this terms(3+2) was not clearly defined previously

Pag 6, Line 182: *"...between acceptable limits…"* Does this acceptable limits vary geographically or with environment scenarios? Is it possible to contextualize this limits to Thessaloniki? Why the subsequent text only describe limits for Color Ratio and Lidar Ratio?

Pag 8, Line 249: *"... the 5 and 4 classes…"* I'm not aware in which part of manuscript the numeric denomination of the classes was introduced.
Pag 9, Line 255: *"... classes that tend to reflect the same optical properties values…"* Please, clarify. Which optical properties the authors are talking?

Pag 10, Line 294: *"... Table 2 lists the mean aerosol optical properties…"* Suggestion: replace "*mean aerosol optical*" to " typical range of aerosol optical".

Pag 11, Lines 328-329: Indeed, AE and Lidar ratio between the layer 1 and 2 are similar. However, from the point of view of BAEs, the differences between both layers are not negligible. Would you comment about the possible reasons.

Pag 13, Lines 391-390: *"...the algorithms take into consideration different combination of the intensive optical properties…"* I would suggest the authors to think about a way(table, flow chart, diagram) to summarize the major differences between the algorithms regarding intensive optical properties combination. It would make it easy to the manuscript reader.

Pag 13, Lines 391-395: This discussion is really important in a way that it helps to the understanding of the limitations and improvement potential for both methods. However, is to short. I wonder if the authors could add a little more on this matter.

Pag 14, Lines 438 - 440: The authors seems to provide a general discussion of challenges aspects of their results (*"the reasons for the differences"*) from point of view of others studies results. But it would be interesting if they can also explore the reasons for the differences in more specific way, focusing on their data.

Pag 14, Line 445: *"...uncertainties of the input measurements..."* Measurements uncertainties are mentioned throughout the text as an important aspect and yet it is barely discussed.

Pag 16, Line 505 - 525: I think that this discussion would fit better early in the manuscript when the differences between the algorithms(EMD and NATALI) are discussed. This content is not a consequence of the results of the present study, but an intrinsic part of the algorithms that clearly drive the results obtained.

Pag 17, Line 527: "...of the applied thresholds…" replace to "...of the range thresholds applied to the intensive optical properties applied…"