Review to manuscript of Michael Kahnert and Emma Andersson

It is well known, that the problem of inversion of standard $3\beta+2\alpha$ lidar measurements to the particle microphysics is undetermined and to constrain it, numerous techniques were considered. The authors suggest an interesting approach to assimilation of lidar measurements into chemical transport model. It looks like a promising concept to extract the information about particle parameters from lidar measurements.

Paper is very well written and should be published. The structure may be questionable, because a half of material is put in appendices. These appendices are clearly written and are definitely useful for unprepared reader. I personally, had no problems with material structure. Additional references to the previous studies of lidar data inversion would be desirable, and other Referees have already suggested several.

Stability of retrieval strongly depends on aerosol type. It is more challenging for aerosols with dominant coarse mode and for particles with strong absorption. The authors consider only one example (not the most challenging) in their simulation, so it is not very clear how the approach will work for other aerosol types. But this may be a subject of separate study.

The Referees have already suggested numerous improvements and corrections so I have not much to add.