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Interactive comment on "How much information do extinction and backscattering measurements contain about the chemical composition of atmospheric aerosol?" *by* Michael Kahnert and Emma Andersson

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May be you can check the papers of Wang at al. in ACP (2013, 2014a and b), where lidar assimilation is tested.

We thank Patrick Chazette for bringing these three papers, which he co-authored, to our attention. The results reported in these articles are very interesting. The paper by Wang, Sartelet, Bocquet, and Chazette (2013) is particularly impressive. It investigated assimilation of lidar and ground observations of PM10 and performed an observing system simulation experiment. The results demonstrate that a relatively small lidar

network can give analyses and forecasts of similar, and in some cases even higher accuracy than corresponding results obtained with an extensive network of ground stations, such as AirBase. This clearly demonstrates the potential of lidar observations. However, this study is only marginally relevant in the context of our paper, because it considers assimilation of lidar measurements for determining PM10, not for determining the concentrations of each aerosol component. It does not discuss the question of how to constrain the assimilation algorithm in order not to assimilate noise. For this reason, we do not feel compelled to add a citation to this article.

The paper by Wang, Sartelet, Bocquet, and Chazette (2014) presents a comparison of modelled and measured backscattering profiles, where the measurements were taken by a mobile lidar in the vicinity of Paris. The results of this comparison are highly encouraging. They also describe their assimilation methodology. If we understand it correctly, they set up the assimilation to correct PM10, and they distribute the analysis increment back to the various aerosol components in each size class according to the a priori distribution. In the context of our study, this is the most relevant fact in this paper, since it describes an ad hoc method for specifying constraints. Essentially, this approach seems to be based on the same idea as that described in Benedetti et al. (2009). However, we found that the explanations in the paper by Wang et al. (2014) were more detailed than in the paper by Benedetti et al. (2009). For this reason, we will add a citation to this paper.

Finally, the paper by Wang, Sartelet, Bocquet, Chazette, et al. (2014) presents a very impressive and comprehensive evaluation work of the potential of assimilating lidar measurements from the EARLINET network into an aerosol transport model. Since it is an application rather than methodology paper, we will not cite it here; but we will be sure to cite it when we have come that far and submit a paper on the operational evaluation of our lidar assimilation system.

References

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