

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

Anonymous Referee #5

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Summary

The inversion of aerosol optical properties into the aerosol chemical composition is a ill posed problem. The authors use information theory techniques to estimate the amount of information contained in LIDAR observations. They present different methods to make use of it as contains in a 3DVAR algorithm. This is meant to avoid assimilating noise inherent to the observations. To evaluate their constrain methods, they create synthetic observations from CTM simulations and assimilate them back into the CTM.

Recommendation

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The paper is well written and should be published. The methodology proposed is novel and can be applied to different observations within the variational assimilation framework.

Main comments

The authors choose to place all equations and their derivations into different appendixes. This hindered slightly the reading of sections 2.4, 3.1 and 3.2. However, the overall readability of the manuscript is improved by the focus on the description and evaluation of the method in the main text.

Minor comments

Figure 1 is hard to read, specially the colour bar. Otherwise, the previous Referees have a number of valid suggestions for improvement, and I have nothing to add.

[Interactive comment on Atmos. Chem. Phys. Discuss.](#), doi:10.5194/acp-2016-914, 2016.

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