

## ***Interactive comment on “Effective resolution concepts for lidar observations” by M. Iarlori et al.***

### **Anonymous Referee #1**

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Review of “Effective Resolution concepts for Lidar Observations” by Marco Iarlori, Fabio Madonna, Vincenzo Rizi, Thomas Trickl and Aldo Amodeo Paper ID: amt-2015-89

This paper reviews the application of various filters to the processing of lidar data, with a focus on the impacts of these filters on the resolution of the lidar data products. The paper focuses on some particular filters such as the Savitzky-Golay (SG), Gaussian, etc. and discusses the impacts of these filters on the resolution.

The paper goes into great detail into the impacts of these filters on the results and tries to present some advantages and disadvantages of these filters. This is certainly a worthwhile exercise. However, there is excessive detail presented in the discussion of these filters which makes this paper difficult to read and too long. Rather than focus on the details of the SG and Gaussian filters for example, the authors could instead focus on the methodologies and recommendations for determining the effective resolution

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of the filters applied to lidar data processing. I would expect that the majority of AMT readers would appreciate a more condensed version of this paper with a more concise description of how to determine effective resolution of these filters, and the attributes of these filters, and would have less interest in detailed descriptions of these filters and all of their attributes. The authors could direct the readers to relevant literature to learn more details of these filters.

It would be beneficial to lidar researchers if the paper would provide references to other papers in this area that have examined the retrieval of aerosol extinction from such lidars and the errors associated with these retrievals. It would be worth discussing for example the papers of Whiteman (1999), Shcherbakov (2007), Pornsawad et al., etc. (2012) in the context of vertical resolution. The paper would benefit from a discussion of cases where the lidar data are processed such that the vertical resolution varies with range or altitude. In this case, the smoothing filter properties would have to change with altitude.

The paper is not particularly well written and so was difficult to read. The grammar, sentence, and paragraph construction needs to be improved. Many of these sentences are very long and difficult to follow.

I recommend a major revision whereby the paper focuses less on the details of the particular filters, and more on the methodology of what filters to apply and how to apply these filters.

Godin et al., Ozone differential absorption lidar algorithm intercomparison, Appl. Optics, 38, p. 6225, 1999

Pornsarp, P., G. D’Amico, C. Bockmann, A. Amodeo, G. Pappalardo, Retrieval of aerosol extinction coefficient profiles from Raman lidar data by inversion method, Appl. Optics, 51, p. 2035, 2012

Shcherbakov, V., Regularized algorithm for Raman lidar data processing, Appl. Optics,

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46, p. 4879, 2007

Whiteman, D. Application of statistical methods to the determination of slope in lidar data, *Appl. Optics*, 38, p. 3360, 1999

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