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Atmospheric Measurement Techniques Discussions

Interactive comment on "EARLINET Single Calculus Chain – general presentation methodology and strategy" *by* G. D'Amico et al.

Anonymous Referee #2

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General: The manuscript "EARLINET Single Calculus Chain - general presentation methodology and strategy" by D'Amico et al. provides an overview of a centralized aerosol lidar data processing software, referred to as "EARLINET Single Calculus Chain", or "SCC". This article appears to be one of three that will describe the SCC. As of today, the other two manuscripts (referred in the present manuscript as D'Amico et al., 2015, and Mattis et al., 2015) have not yet appeared in AMTD, and it is indeed an important element in the consideration for revisions and publication of the manuscript. Overall, the manuscript is well-organized and well-written, though the English syntax requires some attention at times (see details below). The content is presently very qualitative, and revisions must include the addition of quantitative details, as suggested below. Going back to the fact that the other two manuscripts have not yet appeared in

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AMTD, and in the absence of any other posted comment in the AMTD open discussion, my main recommendation is to hold on the revisions, and furthermore hold on publication, until the other two manuscripts are available for review. Meanwhile, the authors can consider the present suggestions and refine this manuscript as well as the other two manuscripts accordingly. Many of my comments and suggestions for revisions in fact depend on the content of the other two manuscripts.

Main comments: Generally speaking, the current content is much too qualitative, not quantitative enough. I am anticipating that the other two manuscripts on SCC will focus on the specifics of the data processing, and will therefore not produce much of an overall evaluation, which is the anticipated purpose of the present manuscript. We should therefore expect to see in the present manuscript a comprehensive review of the SCC performance with respect to the products of all relevant "manual" (as it is referred to in the manuscript) retrievals, or at least all of the retrievals currently producing publicly available profiles. The uncertainty budget must as well include quantitative information. My second major comment is the lack of discussion on the actual purpose and use of the SCC. Who currently uses it, and for what purpose? Is there a long-term plan for centralized processing? Is it going to be an official product of EARLINET or ACTRIS? How many stations/instruments have indeed released e and b profiles produced by the SCC? What time period do these data cover? Etc. These questions need to be addressed in the SCC overview manuscript.

Specifics:

Introduction: The introduction is often repetitive, but most importantly, is out of focus, i.e., it is used as a discussion rather than a simple introduction to the subject. Its content until P4975/L25 can be kept unchanged, however, most of the material included after that should be shortened into one or two paragraphs, and the more detailed content should be redistributed among the remaining sections, as appropriate.

P49976/L6: Real-time and NRT lidar products are not needed for climate change mod-

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els. A standard validated lidar product is typically enough.

Figure 1: The use of the term “user” is confusing here. It is not clear if the “user” is the end-user of the optical product or the raw data provider. I think “raw data provider” would be more appropriate in this case in order to distinguish from the data user (i.e., the end-user).

P4985/L6, use of standard models vs. radiosonde profiles: Some details should be given here and/or later in sections 4.1 and 4.2 (see comment on reference density profile). How and for which instrument is the choice of sonde vs. model made?

P4985/L8: Statistical uncertainty propagation is mentioned, but what about other sources of uncertainty? (e.g., associated with ancillary measurements, Rayleigh cross-section, iterative methods, etc.). At least a summary of how uncertainty is treated should be in the present manuscript. The Mattis et al., 2015, and D’Amico et al., 2015 articles should be referred if uncertainty is treated in details in those articles.

P4985/L24: There is no details on vertical resolution. Just like uncertainty, a summary of how vertical resolution is reported together with the SCC products should be in the present article. The Mattis et al. 2015, and D’Amico et al. 2015 articles should be referenced if vertical resolution is treated in details in those articles.

P4991/L19-26: What reference density profiles were used for figure 3? Were they the same for all instruments, and were they the same for “manual” and “scc” retrievals? Differences observed on figures 3-7 need to be discussed more quantitatively, otherwise these figures lose their purpose. Considering that the scales are currently unreadable, a simple “good agreement” statement in the text is not sufficient.

Most figures need major cosmetic revisions: 1- Scales and axis legends are much too small and unreadable 2- Which instrument is where? It should be mentioned on the figure, or in the caption 3- The x-axis scale of the difference plots should be stretched in order to identify more easily the numerical values of the calculated differences. 4-

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For a clearer picture of the differences vs. uncertainties, I would suggest to add +/- uncertainty curves for both products on the right plots (difference plots).

Section 4.1: The entire section lacks quantitative details, and considering that the scales of figures 3-7 are unreadable, it is very difficult to extract any objective assessment from these figures. I recommend a big "shake-up" with clearer demonstration that the "scc" and "man" retrievals "agree well", and clear interpretations of the observed discrepancies. Also, this critical assessment must point at the specific instrument/algorithm being tested. The authors should not use this section 4.1 to convey a general message, but instead should use it to point out quantitatively the elements of agreement and discrepancy. This is the type of information the end-user needs if he chooses to use the SCC.

Section 4.2: The benefits of a centralized automated processing software for a large number of instruments within the network are emphasized throughout the manuscript, yet the validation results from only two instruments/stations are shown. This is insufficient, and this is where the overview paper should provide a more comprehensive validation evidence that the SCC is a powerful tool. If currently more than two instruments provide publicly available SCC products, then the validation results of all these instruments/stations should be presented. If only two instruments provide publicly available SCC products, then the reasons for such a low number must be discussed (add a "discussion" section). This section once again lacks quantitative results. Numerical values are given in Tables 2 and 3. However, there is no quick access to the actual differences between "man" and "scc". In particular, the authors state early in section 4 that the comparisons of section 4.2 aim at identifying possible systematic differences, but there is almost no discussion of this here, and it is very difficult to characterize possible biases without showing plots of the differences.

P4995/L7 and caption of Tables 2 and 3): "standard errors" I am not sure what the authors mean by "standard errors". Are the authors referring to the standard deviation of the measurements, to the measurements" standard uncertainty, or to the standard

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deviation of the estimated mean? Please clarify. If it does not refer to the standard deviation of the estimated mean, it should not be called “standard error”. If it does refer to the standard deviation of the estimated mean, the authors should explain how they estimate it. If it refers to the standard deviation of the measurements used to compute the mean, they should use “standard deviation”.

Typos and language: - Please reformulate sentence P4975/L7 - Please reformulate sentence P4975/L28 In general, there are several systematic English syntax errors appearing throughout the paper. I recommend that co-authors with the best knowledge of English language read through and correct them.

Interactive comment on Atmos. Meas. Tech. Discuss., 8, 4973, 2015.