

The authors have provided a detailed response to the review comments, and I have no additional recommendations. However, I would like to offer suggestions below in reference to Figure 2 as my previous comments were not clear or explicit. Maybe these suggestions can be used make the terminology a bit a clearer.

Previous Comments:

Figure 2 and discussion therein:

a) Care should be taken with the terms backscatter, backscatter ratio, and backscatter coefficient. For example, Rayleigh backscatter profile is used but not actually defined. Care should also be taken when comparing backscatter coefficient attenuated products with unattenuated products. For example, all of the Reyleigh products are attenuated as shown.

We agree that care should be taken here. Thus, we went through the text carefully. We introduced the term backscatter ratio where used the for the first time to clearly distinguish between backscatter coefficient and backscatter ratio. We also changed the phrasing from e.g. Rayleigh backscatter profile to Rayleigh backscatter coefficient to have no inconstancies between the figure and the description. However, we do not quantitatively compare the attenuated products to unattenuated products. The time-height cross-sections from WALES and ATLID are shown to give some context of the scene and confirm its stability.

b) Labels in upper panel have label of unpolarized – caption states this to be co-polarized and should be changed.

We had a critical look again at figure label and figure caption and confirm, that the caption and the labels of the time-height cross-section is correct as given. The timeheight cross-sections show the unpolarized (attenuated) backscatter coefficient for both instruments to give the context of the observed scene. In the profile comparisons we look at Mie, Rayleigh and cross-polar backscatter coefficient. Please be aware, that this is not the same variables as shown in the time-height cross-sections.

Additional Comments:

Thanks for reviewing the terminology in Figure 2. I should have been more explicit in my comments. Below is an attempt to better explain where I had confusion when reading the manuscript if the authors want reconsider some of the labeling or notation.

1. **We had a critical look again at figure label and figure caption and confirm, that the caption and the labels of the time-height cross-section is correct as given. The timeheight cross-sections show the unpolarized (attenuated) backscatter coefficient for both instruments to give the context of the observed scene. In the profile comparisons we look at Mie, Rayleigh and cross-polar backscatter coefficient. Please be aware, that this is not the same variables as shown in the time-height cross-sections.**
 - a. Figure 2 (Top panels). You refer to ‘unpolarized’ and my interpretation of unpolarized is the backscattered light that is randomly polarized as defined in Gimmestad APPLIED OPTICS / Vol. 47, No. 21 / 20 July 2008. Is this the same meaning/definition in the plot? Or rather, is this the combined co- and cross polarized (attenuated for ATLID)

backscatter coefficient? I think that it is the latter due to the magnitude of the data plotted. If that is the case, then I would not use 'unpolarized' but rather use something like total (co-polar + cross-polar) backscatter coefficient. If it is truly the unpolarized backscatter coefficient then it would be helpful to define this in the text.

- b. Figure 2 (lower left panel). Here the legend uses 'ATLID raw' for the blue line. I interpret this to be the co-polar **attenuated** backscatter coefficient [355nm]. Note that 'Raw' has a specific meaning, as provided in Table 1. (e.g. Raw instrument data, with duplicates removed and quality flags. For expert users only.). So I asked if this was really just the raw signals (LO). I would suggest changing this to something else other than 'raw' such as 'ATLID attenuated [355nm]' as Co-Polar is already denoted in the figure title. The second ATLID profile is labeled 'corr' and is stated in the caption (and text) to include an extinction correction. Changes made in the text better explain this by noting that this is done by the 'HSRL method' as it was not clear what extinction correction meant in the original text. Since this is not attenuated, one can simply use 'ATLID [355nm]' in the legend for the purple line. Similarly for the WALES measurements it could be WALES [532nm] profile as it is also unattenuated. In summary, these are at different wavelengths and one of them is attenuated backscatter coefficient and the other two are not attenuated (true backscatter coefficients) which could be simply captured in the legend.
2. **The middle lower panel shows the Rayleigh backscatter from ATLID (solid blue line), the expected pure Rayleigh backscatter signal calculated from an atmospheric density profile (dashed blue line) and the pure Rayleigh signal at 355 nm with additional aerosol extinction derived from the WALES measurements (dark green line).**
 - a. Figure 2 (lower middle panel). I believe that this is **attenuated** molecular (Rayleigh) backscatter coefficient although it is labeled as Backscatter Coefficient without mention of them being attenuated. Looking at the caption, one line is labeled 'Rayleigh backscatter from ATLID' which could be interpreted as unattenuated. Then there is the pure Rayleigh backscatter **signal** which is also attenuated (by molecular attenuation) as evident by the fact that it decreases near the surface. Since, it appears that all these profiles are attenuated (by molecules only in the pure Rayleigh case and by molecules and aerosols in the others), it is logical to label them as **attenuated** backscatter coefficient or to at least denote them as **attenuated** in the legend.
 - b. For the last line plot in the middle figure, the caption states that this is the pure Rayleigh **signal** at 355nm **with additional** aerosol extinction derived from the WALES measurements. In the original version, I got hung up on what the additional aerosol extinction meant. The new text provides a better explanation of this profile, but it would be worth mentioning that **both** the backscatter coefficient and the molecular attenuation is scaled from 532nm to 355nm using the density profile, however the particulate attenuation is still that for 532nm. I do not have a simple suggestion for the label for this profile, maybe 'WALES converted with reference to the text in the caption.
 - c. Also, for the last curve, 'WALES **align**', I recommend using '*normalized*' or '*scaled*' rather than 'aligned' which could be interpreted as shifted or offset. I note the description and reasoning in the text is clear on what is being done with this line plot.

Given that these plots are important for ATLID comparisons, the intent of these comments is to help distinguish the different line plots as there are both attenuated and unattenuated by both

Mie (particulate) and Rayleigh (molecular) scattering or in some cases just Rayleigh (molecular), and different terms like backscatter ratios, signals and coefficients are used, all which make it challenging for the reader to fully understand without carefully reading the details. In addition and importantly, one of the plots includes a conversion from 532nm to 355nm which adds complexity.