

re-review of the revised version amt-2020-202-manuscript-version3.pdf

In my first review, I had addressed a couple of issues. The authors responded to all of them adequately in their present revised version. In particular, they have recomputed their results by using the recent satellite and instrument parameters reported in the ATBD issue 4.4, 20.04.2018, by O. Reitebuch et al. In this way, the usefulness of the investigations and results reported by the authors has been substantially increased. Thus it is proposed to publish the paper in AMT. Before doing so, some spelling errors should be corrected.

Additionally, I would like to comment on the author's reply to my former item (7):

Of course, the Mie channel is used to detect winds in the PBL. In their original paper however, the authors showed also the required laser pulse energy down to the PBL, based on their investigations in the Rayleigh channel. So it was interesting for me to get the author's opinion on the observed behaviour of the required laser pulse energy in the PBL. In their reply now, the authors do not want to speculate about this behaviour and mention that the accuracy of the Rayleigh channel winds in the PBL is not considered in the paper. I accept their point of view. To my opinion, backscattered signals of aerosols and clouds, present in the PBL, are also measured in the Rayleigh channel (cross talk from the Mie channel) due to an imperfect filtering. This leads to a larger signal level in the Rayleigh channel than it would be case without any clouds and aerosols. Thus the signal to noise ratio is also better, the wind uncertainties decrease, and the required laser pulse energy to meet a specified accuracy criterion decreases.

Furthermore, the authors raised the question why the wind observation accuracy in the Mie channel is higher than that of the Rayleigh channel, in the PBL. In the PBL, the aerosol and cloud particles produce strong backscattered signals which can be seen as sharp peaks in the spectrum. The corresponding Doppler shifts can be determined more accurately than those of the broader molecular spectra. Consequently, the Mie channel wind uncertainties are smaller than those of the Rayleigh channel.