

Atmos. Meas. Tech. Discuss., author comment AC1
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Reply on RC1

Julian Steinheuer et al.

Author comment on "A new scanning scheme and flexible retrieval for mean winds and gusts from Doppler lidar measurements" by Julian Steinheuer et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2021-426-AC1>, 2022

We thank the reviewer for her helpful comments. Your suggestions are greatly appreciated and lead to improvement of the article. In the following, we respond (normal font) to your comments (**bold**) and provide the manuscript changes (*italic*).

The manuscript propose a novel algorithm for the retrieval of the mean wind and wind gusts from wind-lidars. It is an outstanding paper, clearly written in a good english. The proposed retrieval algorithm for wind speed and wind gusts has the potential to be applied and replace the existing systems in future wind-lidar systems. The proposed algorithm include an uncertainty estimation of the wind speed.

Thank you for the very positive feedback! We are pleased to hear that our retrieval can be valuable to the lidar community in the future. We will continue to work with retrieval and hope to show more results.

Some minor remarks:

Line 209. Use "elevation" or "zenith" angle throughout the manuscript – not a mix.

Zenith is now mostly omitted throughout the manuscript and replaced by elevation (as well as 'phi' is thereby replaced by 'alpha'). Further, to avoid double-use in Section 3.4, 'gamma' is used instead of 'alpha'.

Line 344-346: the sentence starting The outliers.....is not clear. How close is the lower range gate to the DWL????? And why is this a problem.

Changed: *For the 24beam in panel (b), some DWL outliers can be recognized, which can be explained by the relatively steep elevation angle. The outliers result from the fact that the linear interpolation of the Doppler velocities fails at 90.3 m because the involved Doppler velocities of the lowest range gate centers are too close to the DWL. Close to the DWL, transmitter and receiver field of view do not completely overlap. Therefore, the Doppler velocities originating from the lowest range gates should be discarded and those of the following ones are at least noisier. The amount of full overlap is instrument*

dependent, and the obvious outliers show that the Doppler velocities cannot always be considered reliable at 75 m radial distance from the DWL, i.e., at 72 m a.g.l. for 75° elevation, which corresponds to the distance to the third center of the range gate. In fact, a comparison with the results of range gates centered at 101 m a.g.l. (fourth center of range gates) would give a better result (not shown).

Figure 9. Explain the acronym SAN. The acronym should be explained in the main text or on every figure where it is used.

SAN stands for sonic anemometer. We now introduce the acronym in every figure captions if used.

Line 410. Should be -18.2 dB

Yes, thanks!

Conclusion: I suggest to include a small discussion on the use of CSM2 for turbulence measurements?

Thank you for this suggestion. The turbulence characteristics are currently under investigation in the framework of FESSTVaL. We add the following in the conclusion: *Here, the high-resolution time series of the wind vector generated with the retrieval offers the potential to study turbulence in detail. Thereby, it has to be shown whether the derived vertical wind is of comparable quality as measurements of a vertically pointing DWL.*