Atmospheric Measurement Techniques Discussions

Atmos. Meas. Tech. Discuss., community comment CC1
https://doi.org/10.5194/amt-2022-73-CC1, 2022

Comment on amt-2022-73

Andrew Black

Community comment on "Behavior and mechanisms of Doppler wind lidar error in varying stability regimes" by Rachel Robey and Julie K. Lundquist, Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2022-73-CC1, 2022

What interesting research, and seemingly powerful tools to use for years to come!

Figures 12 and 14 really bring the simulation data and lidar error to life. Could these be presented earlier in the paper? Perhaps swapping sections 2.1 and 2.2, and showing the 2D cross section of LES data with lidar beam overaly in the beginning to allow the reader to visualize the dataset.

The ridgeline plots are very compelling. Could you add one that includes the all of the 10-minute averaged data? This would illustrate the reduction in errors through time averaging you describe.

In figures showing statistical moments by height, the x-axes are scaled to the data. In some cases, this highlights interesting trends, and they should remain, but I wonder if auto-scalaing obscures a conclusion: the errors are small. Deciding when errors are significant, and when they are insignificant is a key part of this paper.

p15, L351 "inflection point"

p176, L374 "will converge"

In Section 4, did you consider illustrating some of the error trends as functions of atmospheric parameters like instantaneous (or 10-minute) wind shear, turbulence, etc? Perhaps you could pick only one measurement height to do this instead of the full profile, and then illustrate various errors as functions of upstream errors.

In Fig 14, add color-coded trendlines for each stability class (instead of only the dashed white line). The positive bias in the low speed Strong CBL seems to be a key finding. Highlight it as best you can. Could you show the same graph but perhaps for the most and least biased heights?

Section 4.5 illustrate the rapid decay of error with time averaging, it's very steep and interesting for wind energy folks who only ever think of 10-minute averages.

How can your illustrations complement your conclusions most strongly? In some cases you might want to clearly focus on one height instead of showing the whole profile.

Forgive me if any of my comments are addressed elsewhere in the paper. There is a lot to digest. This paper is so thorough and really excellent.