Enhancing turbulent fluctuation measurement with tailored wind lidar profilers

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REVIEW

GENERAL COMMENTS

1. The title seems to suggest that a new lidar can achieve substantially better turbulence measurements, however, the abstract seems to suggest that the prototype tested fell short of expectations in many ways. I suggest rephrasing the title to better match the actual outcome of the analysis.
2. In the analysis of the sonic anemometer data, have you considered (and checked for) also wake effects from the met tower structure itself? Please mention it in Section 2.2.
3. Similar to the comment above: do you expect that the structure of the tower will have an impact on the comparison between the flow measured by the sonic anemometer and each given beam from each lidar? It's a bit hard to tell from the maps, but is there a case where a beam measures the flow upwind/downwind of the met tower, while the sonic measures the opposite?
4. I am a bit confused by the practical utility of the results. The along-wind variance, on which the analysis focuses, is only one of the quantities that are used by industry to calculate TI and/or academia to calculate TKE. How do the (limited) improvements you are finding can translate to practical advancements for the calculation of TI and/or TKE? And if I am missing something and TI and TKE are not meant to be the practical utility here, what is instead?

MINOR COMMENTS

1. All statements in the first and second paragraph of the introduction (while reasonable) are missing references to substantiate the claims being made.
2. Figure 1: what do all the black dots represent in the figure? They are not explained in the caption. Also, you use both the capitalized and not-capitalized symbol for the 28-deg angle – please pick one and be consistent.

3. L. 95-105: please specify which section talks about each of the things you are listing.
4. Fig. 3: “black lines” in the caption can also represent the contour lines. Either change the color of the contours or rephrase in the caption.
5. Fig. 5: in the axis label “db” should be “dB”.
6. Fig. 6: did you set the lidar such that one of its measurement heights is 97 m a.g.l.? Please specify in the paper.
7. L. 410: why do you think the % data availability may change over longer campaigns?
8. DOIs should be added to all references (whenever available) per WES standard.