

Response to interactive comment on “Evaluation of three lidar scanning strategies for turbulence measurements”

The dataset of the three lidar with sonic data is worth publishing. However some aspects need clarification.

Atmospheric turbulence is a rather complex phenomena that covers several order of magnitude both in space and time scale. This article seems to focus on a large geometrical scale of turbulence and a time scale well above 1 second. The scales of interest should be mentioned explicit.

Response: The scales of turbulence that can be measured by lidars are now stated in Lines 45-47 in Section 1 of the revised manuscript. In addition, the time scales that are discussed in the paper are described in Lines 428-429 in Section 4.3 of the revised manuscript.

The different behavior of the w variance at the different sites may have its origin in the vertical wind profile. Especially here the “point” measurement of a sonic compared to the sensing volume of a lidar should be discussed more in detail.

Response: I’m not sure I understand what you are saying here. Could you please refer to figures or line numbers in the text?

With regards to the spectra plotted in Fig. 11, I agree that the different measurement heights at the two different sites (60 m at the ARM site and 100 m at the BAO) could contribute to the different w variance values, as the predominant scales of turbulence often change with height. Thus, both the 50- and 100-m sonic spectra from the BAO are now plotted in Fig. 11, in addition to the 60-m sonic spectra from the ARM site. It is shown that the peak in the w spectrum at the BAO does not change significantly from 50 to 100 m. Thus, although 60-m variance values were examined for the ARM site and 100-m variance values were examined for the BAO, the scales of turbulence at 60-m at the BAO are expected to be similar to those measured at 100 m during the study period. At most sites, turbulent scales would be expected to increase with height, particularly for the w component, but the BAO site is located in complex terrain and likely had a different turbulence profile than that experienced at the ARM site. This likely contributed to the different behavior of the w variance values at the different sites.

The different temporal resolutions of the three lidar in table 1 will have an effect on the estimates of mean wind respectively variance. This should be discussed more in detail.

Response: Section 5.5 was added to the revised manuscript to discuss the effects of temporal resolution on variance estimates.

In table 1 pulse length, pulse energy and repetition rate of the wind cube and Halo Streamline would be interesting.

Response: I did not have information on pulse energy available, but I have added the pulse duration and repetition rate to Table 1.