

Interactive comment on “Retrieving wind statistics from average spectrum of continuous-wave lidar” by E. Branlard et al.

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Thanks for the constructive comment on our manuscript. Here are the intended changes to the manuscript based on the requests of the referee:

Sampling rate Comment: The sampling rate is 100 MHz in both systems, 512pt FFT, which leads to velocity resolution (bin width) of roughly 0.15m/s. The ~80m/s speed range is achieved by applying 2 hardware bandpass filters to isolate 0-50 MHz (0-40m/s) and 50-100 MHz (40-80m/s) (approximately). Measurement of wind speeds from 39-78 m/s is achieved by changing the pass band of the analogue electrical filter and utilizing the aliasing effect of the DFT.

Change: Some of these details will be added to the Manuscript. Also: "The determi-
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nation of the median was not restricted to bin values, intermediate values using linear interpolation were allowed."

FFT-Windowing - page 1961 Comment: FFT-windows does have an effect, as see from Fig 11, when the pdf is extremely narrow. The wind tunnel was run with a laminar flow. For the general case of turbulence in the atmosphere and for the specific purpose of using turbulence measurements as an input for load calculations this is of no concern. Change: A sentence was added in the discussion: "Though present for the laminar case of the wind tunnel experiment, the effect of FFT-windowing is not significant for the general case of turbulence in the atmosphere."

256 bins comment - Section 3.2 Comment: Thank you for your comment. This is related to the quantization noise discussed in Kristensen, L., and P. Kirkegaard, 1987: Digitization noise in power spectral analysis. J. Atmos. Oceanic Technolog. , 4 , 328–335, but is not quite the same. We cannot argue rigorously, but we believe that a quantization in 256 level up to the peak of the Doppler spectrum will not influence the average spectrum significantly.

Measurement length scales Comment: It is correct that turbulence statistics is biased if the length of the time series analyzed does not encompass all length scales. That has been analyzed in detail in Lenschow, Mann and Kristensen, "How long is long enough when measuring fluxes and other turbulence statistics" J. Atm. Oc. Tech.(1994) vol 11 p 661. In this paper we are in the fortunate position that for all comparison the two instruments are covering exactly the same time interval and the measurement volumes are almost co-located. Therefore, the concern of the referee is not an issue here. Change: A sentence was added in the description of the field campaign to precise this : "The two instruments were covering exactly the same time interval and the measurement volumes were almost co-located which facilitates the comparison of turbulence statistics between the instruments."

page 1951 l3 : number of backscattering targets Change: Removing the sen-

tence:"The aerosols do not necessarily pass through the focus point, and it is not guaranteed that only one aerosol passes the volume during each spectral calculation."

page 1955 l19 Comment: Your comment is correct and the method suggested should be preferred. If times allows this method will be used.

Page 1944 l5: Change: Remove precise

Page 1944 l. 13: This sentence should be changed: "Doppler lidars cannot precisely estimate the wind velocity fluctuation statistics because of the large averaging volume." Change: "Doppler lidars cannot precisely estimate the wind velocity fluctuation statistics in comparison to ordinary sonic anemometers because of the relatively large averaging volume."

Page 1944 l. 23: Change: use LOS instead of los

Page 1945 l9-15: Thank you for your comment. This is not surprising indeed. We just describe there what component variances are mis-estimated and how that depends on atmospheric stability.

Page 1946 l17: Change: added Doppler

Page 1947, l16: Change: precise lidar variables

Page 1954 l16 Change: 1 inch (2.54cm) ## Page 1955 l17 Change: 2-inch (5.08cm)

Figures 6-9: Change: gathered together. Distinction between lidar pdfs added in caption.

Figures 4: Change: More details on the distinction between lidar pdfs added in caption.

Interactive comment on Atmos. Meas. Tech. Discuss., 6, 1943, 2013.

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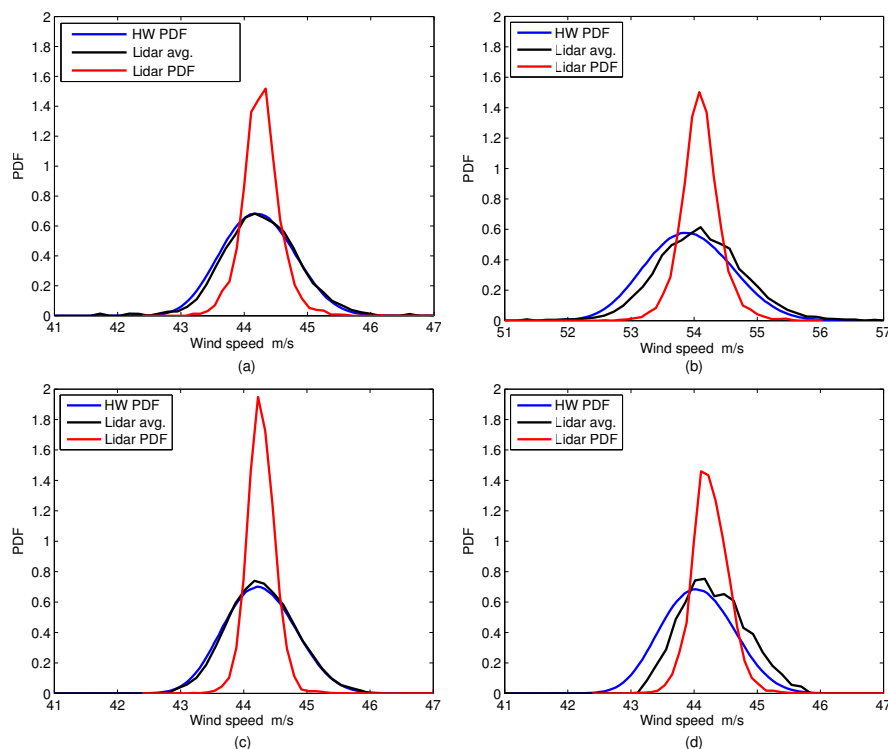


Fig. 1.

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