

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

**E. Branlard et al.**

jmsq@dtu.dk

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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:

#1 - page 1953 (l 21) : Comment to reviewer: The sentence has been modified to add more precision and justify the threshold. Changes: Periods where the radial velocity was below  $4 \text{ m s}^{-1}$  were ignored. Indeed, the precision of the lidar drops at low wind speeds because relative intensity noise (RIN) from the fibre laser and centred at around 1 MHz dominates the lidar spectrum at low frequencies [1]. This leads to a decrease in signal-to-noise ratio and makes it more difficult to assess the Doppler shift. The effect of RIN can be canceled by using balanced photo detectors in the lidar, or possibly a

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laser with active RIN suppression [2]. The threshold of  $4 \text{ m/s}$  was chosen to match the usual value of wind turbines cut-in wind speed.

[1] Cariou, J.-P., Augere, B., & Valla, M. (2006). Laser source requirements for coherent lidars based on fiber technology. *Comptes Rendus Physique*, 7(2), 213–223. doi:10.1016/j.crhy.2006.03.012

[2] Spiegelberg, C., Geng, J., Hu, Y., Kaneda, Y., Jiang, S., & Peyghambarian, N. (2004). Low-Noise Narrow-Linewidth Fiber Laser at 1550 nm. *Journal of Lightwave Technology*, 22(1), 57–62.

#2 - page 1957 (l 15) : Comment to reviewer : The figures were indeed for two different periods. The same period could have been shown with the shift in mean velocity, but it was preferred to use another period to illustrate the various shapes of the spectra. Changes: (caption of figure 3) Similar to Fig. 1, but for another 30min period. Sonic velocities have been multiplied with 0.993 in order to compensate for the imperfect calibration shown in Fig. 2.

#3- Figs 6-9 : Comment to reviewer: The comparison is indeed made easier by gathering the figures. This will be done in the final manuscript.

#4- page 1961 (l 17/18): Comment to reviewer: It was just convenient to set-up the one discussed in this paper using the closest met mast which had instrumentation at the hub height of this turbine. No other mast was available further away with instrumentation at this height. Convenience and available instrumentation were key factors. Changes: (adding at the end of paragraph after "[...]at relatively long focus distances.") For the current experiment this distance was constrained by the location of the wind turbine and the meteorological mast.

#5- page 1964 (l 28/29): Comment to reviewer: The reference has been condensed. Change: Sathe, A. and Mann, J.: Turbulence measurements using six lidar beams, in: Extended Abstracts of Presentations from the 16th International Symposium for the

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Advancement of Boundary-Layer Remote Sensing, Boulder, Colorado, USA, 302– 305,  
2012b. 1962 "

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