

Interactive comment on “Perdigão 2015: methodology for atmospheric multi-Doppler lidar experiments” by Nikola Vasiljević et al.

Nikola Vasiljević et al.

niva@dtu.dk

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Note: The structure of the replies to the reviewer comments is as following: (1) the original unchanged reviewer comments are given with regular text formatting, (2) the comments are enumerated and type of comment is indicated (general comment or specific comment), (3) following each comment a response to the comment and description of associated changes in the revised manuscript are provided while the text is formatted *italic*.

General comment 1: The manuscript presents a methodology for deriving wind speeds over large and small scales from a combination of windscanners. Recognizing the enormous effort this takes, the methodology is clearly explained here. Perhaps a point that is slightly less clear is the complexity of analysing and presenting data from

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these large datasets. I don't think there is room for this also in this manuscript and hope it will be discussed in later work by these authors. The novel aspects of the paper are in the detailed methodology.

Dear Reviewer,

We appreciate the time you dedicated for reviewing the manuscript and for providing constructive comments. Especially we would like to thank you for recognizing the efforts that have been put to produce the presented results (methodology and experiment). Our replies follow.

We agree that we did not show in many details the complexity of analyzing and presenting data from the acquired datasets. We did touch this topic in Section 4.10. We could only add to the reviewer comment that the lidar data topic is rarely presented in publications. We are in the preparation of a manuscript specifically addressing the lidar data topic wherein more details we will present the lidar data complexity.

Specific comment 1: A major omission lies in the discussion of the retrieval of wind field from the short and long-range scanners and the issues associated with each in complex terrain (pulse vs cw). This might just need a citation but it is an important issue.

We revised our manuscript in accordance with the referee's comment. In the revised manuscript Section 1 is extended and includes a discussion and references on single lidar errors in complex terrain and historical overview of multi-Doppler efforts. Furthermore, we extended Section 2 which now includes clearer motivations for developing a hybrid WindScanner system.

Specific comment 2: Another point that is not completely clear is how good or otherwise the agreement is between the wind fields derived from two scanners? Understanding this was only possible for a few hours – is it possible to plot the two

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locations/wind speeds together? This would show a major step forward in the coupling both in terms of the physical (where did the scanners overlap and with what frequency) and the data comparison (i.e. do the two derived wind speeds agree in space).

The manuscript has been updated with a figure displaying simultaneous measurements (short- and long- range) of the wind turbine inflow conditions for one 10-minute period. Also we have provided a plot showing the intercomparison of the short- and long- range WindScanner measurements during this period. At the coinciding measurement points the retrieved horizontal wind speed by the long- and short- range WindScanner system show a good agreement (averaged difference 0.2 m/s). Detailed analysis of the simultaneous observation periods, particularly respect to the positions and dimensions of the intersecting probe volumes will be addressed in a separate publications, since the current publication is already lengthy and generally speaking more focused on the methodology how to do a multi-lidar experiment.

Specific comment 3: : Did I miss the discussion of the issues of lidar operation in high temperatures? – these might be really useful operationally.

The issues with high temperatures have been briefly discussed at Page 17 Line 18-20 in the reviewed manuscript. In the revised manuscript, a reference has been added indicating possible issues with the cooling system of the long-range WindScanner system and potential solutions for the future use of the long-range WindScanner system in warm climates.

Specific comment 4: Figure 3. Please indicate the purpose of the shading. Figure 4. Please indicate the meaning of the thick lines. Please give a reference for the coordinate system (p4, l73). There are a few minor typos please check for those. Otherwise it is a useful contribution on a major innovation that can be published subject to these minor issues.

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In the revised manuscript, the shading in Figure 3 has been removed from the plots as it does not add any additional information to the figure. The thick lines in Figure 4 represent the South ridge, valley and North ridge line. These lines are now denoted in the revised version of Figure 4. We updated the manuscript with the reference for the ETRS89 coordinate system. Furthermore, the revised manuscript has been proofread and corrected by a native English speaker.

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