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Interactive comment on "Three-Dimensional Structure of Wind Turbine Wakes as Measured by Scanning Lidar" *by* Nicola Bodini et al.

Anonymous Referee #3

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The manuscript entitled "Three-dimensional structure of wind turbine wakes as measured by scanning lidar" deals with the analysis of field measurements performed during stable atmospheric conditions on the velocity field downstream of a group of four wind turbines, captured by a scanning LiDAR.

The study is of great interest for the wind energy community since it can contribute to better quantify the wind turbine wake properties and so, to validate some wake models and numerical simulations.

The experimental set-up is well detailed, the method to detect the wake locations of multiple wakes on each snapshot is well described and the content is well structured. On the other hand, the discussion is rather poor: several results, which are not intuitively expected, are mentioned but not justified. For instance:

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Discussion paper

- The reason why the velocity deficit is smaller for outer wakes than for inner wakes. Is it possible to give an explanation without having information about the wind turbine operating conditions? The velocity deficit is also primarily related to the power coefficient of the wind turbine.

- The reason why the wake width is dependent on the relative position between the wake and the scanning lidar. Please elaborate an explanation.

- The correlation between the veer and the wake stretching angle is rather poor (figure 11), the data present a very high scatter, with no linear trend. It is hazardous to make some interpretation with this plot. Parallel to the previous remark on the dependence of wake widths to lidar beam orientation, could the measurement set-up and the scanning lidar limitations be responsible of this wake stretching, instead of the veer? Again, the conclusion that the inner and outer wakes behave differently with the veer effect must be justified.

Minor comments:

- Page 4, line 12: 30-min cycle: do you mean that, during 30 minutes, several PPI and RHI are collected? If yes, please indicate the duration to collect one PPI and one RHI. It will give an idea of the temporal resolution of the obtained velocity field.

- Give the range of azimuth angles that have been scanned during PPI and RHI. A table with all these information would be appropriate.

- Page 5, figure 5: the y-axis legend indicates “detected wakes [% scans]” but the maximum value is 1, and not 100.

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