

Review of the revised manuscript « Synchronised WindScanner Field Measurements of the Induction Zone Between Two Closely Spaced Wind Turbines »

Summary: The study presents measurements of the flow between two closely spaced wind turbines using a ground-based dual Doppler lidar setup. Four data sets for a fully waked inflow (with wake steering), a partially waked inflow, and an undisturbed inflow are described and discussed in detail. Additionally, a detailed error study is presented including a LES simulation of the setup to investigate the dual-Doppler lidar reconstruction errors. The case study is quite interesting, because the near wake and the induction zone have seen much less attention in literature than the far wake – especially from field measurements.

General comments

I have not detected any major flaws with the manuscript. My specific comments below mostly concern a more precise description of the methods. I also noticed several instances of missing words, wrong sentence structures, or one-sentence paragraphs and I recommend that the authors iterate the manuscript more to improve this aspect.

The replies of the authors to the comments of the reviewers are mostly satisfactorily in my opinion.

Specific Comments

Line 50-51: A sentence introducing Doppler lidars could be added here.

Line 172: If the x-axis is the connecting line between the two turbines and only wind directions approximately parallel to it are considered, then the y-axis should be pointing in the lateral direction and not the longitudinal direction.

Line 187: “met mast hub height” is not quite clear.

Line 259: The filtering method for hard targets is not described in the manuscript, but data at the rotor plane is used later (e.g. Figure 12). How were the measurements affected by hard-targets identified and discarded?

Table 3: Caption does not mention the +/- term for the wind direction. I assume it is the standard deviation?

Line 305: Is it the gradient of the temperature or the potential temperature?

Figure 7 / Reply to Reviewer 2, Comment 2: Normalizing the statistical uncertainty of the v-component with the longitudinal wind speed might be misleading, because the resulting percentage values are not useful as a relative error of the lateral velocity. Showing the non-normalized uncertainty should be considered for the lateral velocity.

Line 442: Please specify to which fit is referred here.

Line 492: For consistency of language, using “lateral velocity” instead of “spanwise velocity” would be better (I believe all previous instances used lateral velocity for v).

Line 502-506: Aside from the yaw difference between Case 3 and Case 4, there is also a 10° wind direction difference. For Case 3, the average wind direction is 217° and a wake that is offset to the left from the WT1-WT2 line would be expected from this as well. Is the found difference in wake

deflection between the two cases larger than what would be expected for “straight wakes” for a 10° difference in wind direction alone?

Line 506-507: Along the same line as above, I wonder what the impact of different wind directions is on lateral velocity component. Because the coordinate system was defined along the WT1-WT2 line and not parallel to the wind direction, the wind direction offset from the x-axis will be projected into the lateral velocity. Can this be quantified and is it smaller than the observed difference in lateral velocity between the two cases?

The reply to Reviewer 1, Comment 4 seems to support that an assumed line-of-sight velocity accuracy of 0.1% is too low. Would the results hold for the more realistic 2% error? Or can a threshold be provided until which the results hold?

Technical Comments

Line 127: I believe “scanner head” is more common than “scan head”.

Eq. (1): Comma instead of full stop.

Line 145: The u and v variables were already introduced in line 140.

Line 204: Insert “it” in “as is”.

Line 211-212: Sentence structure (remove first and).

Line 220: Remove “a” in “until a multiple scans”.

Line 290: Either plural for performance or replace “were” with “was”.

Line 360: No new paragraph here.

Figure 9: Longitudinal error should e_u not e_v in the caption.

Line 500: No new paragraph.