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Interactive comment on "Exploring the complexities associated with full-scale wind plant wake mitigation control experiments" *by* James B. Duncan Jr. et al.

Anonymous Referee #2

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Thank you for this paper. It is very useful to receive experimental results, and it is always a major undertaking to gather such data. In general the paper is well written with good and useful figures.

My major criticism/suggestion is that the results presented in sections 3/4 are of too little data, and with too many "black box" issues to be used to draw conclusions from. Section 5 on the other hand provides results which are useful, line up with physical interpretation, and show show statistical significance. I would therefore propose to condense (or remove?) sections 3/4, and perhaps expand a bit on section 5.

Specific comments:

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Wake centerline analysis: I might propose this analysis is not necessarily the most interesting. For one thing, this would really only apply to the averaged wake, and I don't believe you have enough data obtained (the dynamic wake can look very different from the average). Further, considering that much recent research implies that wake steering changes the structure of the wake, in addition to deflecting it, (c.f. Howland, Michael F., et al. "Wake structure in actuator disk models of wind turbines in yaw under uniform inflow conditions." Journal of Renewable and Sustainable Energy 8.4 (2016): 043301.) or (Martínez-Tossas, et al. The aerodynamics of the curled wake: a simplified model in view of flow control. United States: N. p., 2019. Web. doi:10.5194/wes-4-127-2019.) These suggest that defining the centerline can become very challenging, also given the presence of cross-flows generated in steering. A more straightforward calculation could be the speed of the flow behind the turbine in the direction of the expected wake direction, looking for variation there.

P 2 "operate below their peak capacity to decrease wake effect..." this describes well static induction control, but less well wake steering and dynamic induction control

Fig 1: It's explained later, but the legend is unclear in meaning, perhaps explain more in caption

P6: RD?

Bottom p9: Could alternatively define wind direction as the average yaw position of non-changed turbines?

Fig 8: Believe these wake directions are convex in the wrong direction, the wake deflection appears to be accelerating as heading downstream, whereas expectation would be recovery to main direction (cf fig 1 in Jiménez, Ángel, Antonio Crespo, and Emilio Migoya. "Application of a LES Technique to Characterize the Wake Deflection of a Wind Turbine in Yaw." Wind Energy, 2010. https://doi.org/10.1002/we.) this might also impact analysis in fig 10

P 19 "simply implementing yaw error might not be enough to ensure effective wake steering" not clear this result can be drawn from these results

Fig 17 and Fig 20: Great figures and really interesting!! Text analysis also interesting

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