

Review of the paper “Impact of inflow conditions and turbine placement on the performance of offshore wind turbines exceeding 7 MW”.

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Recommendation: Minor revision.

Summary:

This paper provides an insightful and detailed analysis of wind turbine performance in a large offshore wind farm, focusing on the influence of inflow parameters such as turbulence intensity (TI), wind shear, and wind veer on power production across different turbine rows. The topic is of considerable interest, and the methodology is robust. This paper makes a contributions to the field of wind energy by detailing how specific atmospheric conditions affect power generation in different sections of a wind farm and challenging the adequacy of current standard measures. However, several issues must be addressed before the manuscript can be recommended for publication. My comments are categorized as either ‘Major concerns’ or ‘Minor concerns’, with the former focusing on conceptual technical critiques, and the latter highlighting grammatical and spelling errors.

Major concerns:

- (1): In the manuscript, on page 7, line 160, there is a mention of “ P_{sim} ”, which refers to the simulated average power output. However, the document does not provide any information on how this simulated power is calculated. For clarity and to maintain the integrity of the study’s methodology, it is essential to include a detailed description of the process used to calculate the simulated power output.
- (2): Figure 1. “Wind farm layout showing the LiDAR system and the designated study sections for southwest wind conditions. Gray dots represent other wind farms within the same cluster.”. However, the figure includes two shades of gray dots—light and dark—and there is no explanation provided in the figure caption or the accompanying text regarding their distinct meanings.
- (3): Figure 3 “The raw dataset is shown: green indicates the accepted data used in this study, and red denotes the rejected data. The region II is referring to torque control region and region III to pitch control”. However, the actual figure does not contain these colors, which could lead to confusion for readers attempting to interpret the data.
- (4): Figures 15, 16, and 17 mention “...before and after applying corrections...”. However, the figures currently only display three lines representing TI, shear, and veer without clearly differentiating the data before and after the application of corrections.
- (5): It needs to clearly define how “free-stream TI” and “free stream TI” are calculated.
- (6): In the conclusion section, it mentions “our study underscores the limitations of current flow characterization methods to accurately assess power performance in large-scale offshore wind farms”, however, there is limited discussion on “current flow characterization methods” in the introduction section.

References