Summary: 'On the laminar-turbulent transition mechanism on Multi-Megawatt wind turbine blades operating in atmospheric flow' examines the role of inflow conditions and turbine operation on the blade boundary layer transition from laminar to turbulent flow. The authors consider studies across the fidelity spectrum including wind tunnel experiments and field campaigns as well as RANS, URANS, and LES simulations. They identify the turbulent transition point in response to various conditions in each study and provide two main mechanisms for boundary layer transition.

Key Points: The authors summarize the key findings from multiple studies on blade boundary layer transition and discuss the impact of ambient turbulence intensity and turbine operation on promoting either natural or bypass transition across the blade. The authors use multiple quantities of interest to support their findings and provide direct comparison between experimental and simulated results where possible. Linking boundary layer behavior to inflow turbulence intensity is an important result for wind turbine operation and the design of wind plants. Additionally, the relationship between blade azimuth and transition point is an interesting finding. Overall this paper has potential to become an authoritative reference on blade boundary layer transition but is held back by inconsistent writing and presentation styles.

Recommendation: I recommend publication in *Wind Energy Science* provided the authors successfully address the suggestions detailed below.

General Suggestions:

1. I strongly recommend general language editing to achieve a consistent writing style. The content is sound but the tone and writing change abruptly throughout the manuscript. It would benefit the article to have a unified presentation.

2. Figure formatting varies dramatically between sections. I understand several figures are referenced from prior works but where possible, a cohesive presentation style would assist the reader.

3. Section transitions are abrupt, not only is the writing style different but the focus of discussion changes as well. Reported quantities also differ with each section. While each quantity is related to transition, the manuscript feels disjointed. Transitory paragraphs between the various sections and methodologies would be a welcome addition.

4. I appreciate the direct comparison between experimental observations and simulated flows in Figures 13 and 15.

5. The summary in Section 4 is excellent.

Specific Suggestions:

1. A major finding is how transition is affected by inflow turbulence. The authors observe different transition points in Section 2.1 and briefly mention this difference in Section 4. However, turbulence produced by an upstream turbine, as was the case in the DAN-AERO experiments, will have a different structure than that of an active grid or synthetic turbulence generated in simulation. Can the authors comment on how this might impact their findings, particularly in relation to the PSD presented in Sections 2.1 and 3.3?

2. Consider placing the diagram in Figure 4 ahead of Figure 2 since this result also considers different wake overlap scenarios.

3. Revise Figure 11. The legend is obscured and the title is unclear.

4. It is not immediately apparent why some quantities are presented i.e. vorticity in Section 3.2.

5. Are x/c in Figure 5 and X_{tr} in Figure 13 the same? Where is X_{tr} defined?