Summary Comments:

This study presents a nice comparison of observations from a temporary LiDAR buoy deployment off of the California coast, to the NREL 20-year Wind Resource Dataset (CA20-Ext), the 2023 National Offshore Wind Dataset (NOW-23), and the ERA5 reanalysis product. This work is important as we look forward to offshore wind development on the West Coast, as model errors in low-level jet (LLJ) representation can affect wind turbine energy generation. This study successful compares three different models to offshore lidar observations and identifies the strengths and weaknesses of each.

I do have a few minor comments that I believe will help the clarity and flow of the paper. Some general comments are that I do think that the figures could benefit from panel titles that have the lidar buoy location/model name. Even though it is explained in the figure caption, I think it would be nice to also add titles for quick referencing. I also noticed that the word "respectively" was very used often in the analysis sections (specifically sections 4.1 and 4.2), as well as a few long run-on sentences which made the paper more difficult to read. The rest of my comments are more specific and are listed below.

Overall, I think this is an excellent study and I am excited to see the results of another offshore lidar deployment. It is difficult to get profiler measurements offshore, and the field needs studies like this one, that can showcase the discrepancies between model predictions and observational data for wind energy applications. I really appreciated how the authors compared how the model bias in LLJ prediction could impact wind energy generation forecasts. I recommend this paper goes to publication.

Major Comments:

Lines 30-35: This paper is missing a figure that shows entire study region, including the location of the 2 lidar buoys (at Morro Bay and Humboldt) as well as the proposed 5 lease areas. I think this would be very helpful in providing some context for those that aren't familiar with the study area.

Lines 85-90, 188: Again, referencing a map of the study region here would help your discussion.

Lines 153-156: Why did you choose a 2 ms^{-1} windspeed drop off threshold in your LLJ identification? Is this based off a percentage of the mean wind speed that is typically seen in the region? I think explaining why the 2 ms^{-1} works well in this offshore environment will be helpful in making this study more applicable in other areas.

Lines 159-165: Did you consider any other variables when identifying the LLJs? You mention that there is no restriction set on the vertical distance of the 2ms^{-1} fall off, but did you set a minimum or maximum wind speed threshold? If not, why?
What is the mean windspeed at 140m at these buoy locations? Is the jet windspeed maximum generally higher than the mean windspeeds? I think in order to help make this LLJ identification

algorithm more relevant to other offshore locations, it would be helpful to explain your specific choices and thresholds in a little more detail.

Minor Comments:

Line 16: You mention that these cold season LLJs generally occur below 250m and that the warm season LLJs are generally higher. It might be nice to mention the height the warm season LLJs are observed at for context (e.g. higher altitude California coastal jet (typically at heights of 300–400 m) influenced by the North Pacific High).

Line 18: I think you could cut out a couple words in this sentence to simplify it (it is a long sentence). "The lidar buoy observations ~~also~~ support the validation of LLJ representation in atmospheric models ~~that are~~ essential for assessing the potential yield of offshore wind farms"

Line 25: It might be helpful for the reader to briefly define the term "false alarm" here.

Lines 38, 145-155: Another study you could take a look at is McCabe and Freedman 2023 (https://doi.org/10.1175/WAF-D-22-0119.1). That paper discusses another shear based approach to identifying LLJs that occur during sea breeze events on the east coast.

Lines 40-45: You mention the impact of the LLJ on wake effects and turbine fatigue, but you don't mention how the LLJ may be able to increase wind speeds across the rotor plane, therefore increasing potential energy production until the end of the paper. I think it might be helpful to add a sentence on that here.

Line 101: Just to clarify, here you mention the buoy being equipped with the Leosphere WindCube 866 lidars, and in the past section (line 81), you mention the AXYS WindSentinel buoys are have Leosphere WindCube v2 lidar systems. Are these lidars the same?

Lines 183-184: You refer to figure 3a and 3b, but figure 3 only has one panel.

Lines 190-194: The second half of this sentence is a little confusing for the reader. I would suggest re-phrasing the sentence (especially the part after "directions associated with ... ") for clarity.

Line 226: I would consider reminding the reader that L (Obukhov length) is defined in equation 1.

Lines 288-289: For ease of reading, it might help to break this sentence into two sentences. You could simply add a period after the word "phenomena".

Line 325 (Figure 10): I think you need some sort of legend, or just an explanation in the figure caption, that clarifies what the numbers on the plots represent.

Lines 340-345: How does the LLJ core wind speed bias vary with height? Is it more pronounced at certain LLJ core heights than others?

Line 378: I would suggest putting the abbreviations you are using as the subscript in equations 2 and 3 for lowest (*lo*) and highest (*hi*) in parenthesis.