Atmospheric Measurement Techniques Discussions

Atmos. Meas. Tech. Discuss., referee comment RC2
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Comment on amt-2021-279

Anonymous Referee #2

Referee comment on "Wind speed and direction estimation from wave spectra using deep learning" by Haoyu Jiang, Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2021-279-RC2, 2021

The author assume that the referenced power law adequately describes the impact of boundary-layer stability, whereas the authors of the power law point out that it applies only to near neutral conditions. Such an assumption will often be valid for strong winds ($U10 > 15$ ms^{-1}), however for wind speeds <7 ms^{-1} the departures from neutral conditions are likely to be substantial. Furthermore, buoys measure winds relative to the fixed Earth where as stress, which drives waves, is dependent on surface relative currents. For lower wind speed cases the impact of currents could be substantial. While this is mentioned later in the manuscript, it would be wiser to address it earlier and perhaps in the quality control of the input data.

What (if any) quality control was applied to the data? Frankly, a paper should not be submitted without this information. If any quality control was applied, why was it applied and why is it likely to be sufficient? If it was not applied, then why is it not needed?

The Fourier characteristics of waves are poorly described and need to be much more clearly explained.

Does the lack of approximately uniform distribution over the parameter space impact the quality of the results, particularly for conditions that are poorly sampled? Normally there is a very large impact, with the results only applying to the conditions near the peak of the probability distribution.

Are the different Fourier components combined to produce a better result? I assume so, but the math suggests otherwise.

Can the one hour delay be better demonstrated with statistics and an appropriate graphic?

It should be possible to show this result in a manner than much more clearly illustrates the width of the peak correlation or a time offset in the DNN.

Errors in the results are attributed to strong currents, but these errors are far larger than expected due to currents (at least in Figure 3a, and unlikely in 3b). Buoys don't survive long in such strong currents. Please consider alternative explanations or find evidence that the currents do exist.

In summary, the methodology needs to be greatly improved. The accuracy assessment should not be presented as an overall single value for the dataset, but rather as a function of wind speed. The explanation for the cause of large errors is highly unlikely to be correct, although I appreciate the authors efforts to provide an explanation. The lack of check the quality of the input data, the physics of the adjustment to a 10m wind, and poor assessment of the quality of data should be addressed.