Response to Reviewer #3's Comments

The wind profile has significant scientific and practical applications for weather forecasting research and the development of the wind energy industry. This study attempts to evaluate hub height wind speed using the random forest (RF) algorithm based on radar wind profiler and surface synoptic observations at the Qingdao station. The results demonstrate that the hub height wind speed retrieved by the RF model is closer to the radiosonde observation. Additionally, the study analyzes the impact of hub height wind speed retrieved by different algorithms on wind energy assessment. Overall, this manuscript is of great interest to researchers in the atmospheric sciences, but some minor issues need to be addressed before publishing.

Response: We thank the anonymous reviewer for his/her comprehensive evaluation and thoughtful comments, which greatly improve the quality of our manuscript. We have made efforts to adequately address the reviewers' concern one by one. For clarity purpose, here we have listed the reviewer' comments in plain font, followed by our response in bold italics.

1. In section 4.1, the author highlights that the performance of the RF model is better at night than during the day. However, the fitting results of PLM and RF at 2000 LST are similar to those at 0800 LST. Please provide an explanation.

Response: Good question! This is because the wind profile also depends on the atmospheric stratification (Gryning et al., 2007). The surface layer is in an unstable stratification due to heat transfer caused by solar radiation during daytime, while the surface layer tends to stable stratification due to surface radiation cools during nighttime (Yu et al., 2022; Solanki et al., 2022). The hub height wind speeds are more vulnerable to the surface turbulence due to the unstable stratification during daytime. Therefore, the performance of PLM and RF at nighttime is better than that at daytime.

2. Given the numerous input variables in the model, it is recommended to include a table that explains each variable.

Response: Good suggestion! We add a table in supplementary to explain the inputs.

Table S1. Summary of the parameters used for machine learning algorithms.

Type of parameters	Name of parameters	Acronyms	Data sources
Input	Charnock coefficient	Char	ERA5
	Forecast surface roughness	FSR	ERA5
	Friction velocity	FV	ERA5
	Dew point	DP	ERA5

	Temperature	Temp	ERA5
	Pressure	Pres	ERA5
	Net solar radiation	Rn	ERA5
	Latent heat flux	LHF	ERA5
	Sensible heat flux	SHF	ERA5
	Surface wind speed	WS_{10}	Anemometer
	Surface wind direction	WD_{10}	Anemometer
	Wind speed at 300 m	WS_{300}	RWP
	Wind direction at 300 m	WD_{300}	RWP
	Wind speed at 120 m	WS_{120}	RS
Reference	Wind speed at 160 m	WS_{160}	RS
	Wind speed at 200 m	WS_{200}	RS

3. In section 2, all the data download links should be moved to the section on data availability.

Response: Amended as suggested.

4. The text contains a few grammatical and spelling errors that need to be corrected.

Response: Thanks for pointing these issues out. We tried our best to correct spelling and grammatical errors in the revised manuscript.

5. Please confirm if the photos in Figure 1 and Figure 2 involve any copyright issues.

Response: We add the copyright statement in titles of Figure1 and Figure 2.