Review Comment

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Title: Wind dataset assessment and energy estimation for potential future offshore wind farm development areas on the Scotian Shelf

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General comment

This manuscript validated several reanalysis data against measurement data and calculated/discussed wake effect due to turbine spacing at Scotian Shelf offshore site in Canada. In introduction part, there are many paper reviews and well summarized. Although there are some uncertainties of measurement data remain, general trend of each reanalysis data is well presented in validation part. Then, authors calculated wake effect in wind farm for both high dense layout, which could be maximize total power production in wind farm, and low dense layout, which minimize wake loss, and considered and modelled optimal spacing to maximize total power production of wind farm. Also, seasonal differences of these two topics are compared and well presented. Although the result of this manuscript itself may site specific, the methodology will be good reference in future project and there are some scientific interests.

In conclusion, a reviewer consider that this manuscript can be accepted with MINOR REVISION.

Specific comment

Clause/ Subclause	Line number	Comments
1.2	63-64	ERA 5 is explained as mean percentage for all stations, while JRA-55 and MERRA-2 are explained as its ranges. Although it is not a part of your research, it should be explained by faire criteria.
2.1	Table 1	It is suggested show station height above sea level and mounted height of measurement devices in the table.

2.1	Overall	Authors have to explain how Quality level flag (if exist) is handled. Also, explanations about measurement devices, and its consistency in validation period, definition of wind direction (i.e. true north or magnetic north) are missing. It is also suggested to add a table about monthly data availability.
2.4	174-175	Although authors assume neutral stratification and alpha = 1/7, which is international standard, it is not clear if this assumption is correct in Scotian Shelf, and if not how big impact is given on validation result. Authors have to explain in this section or discussion section.
	177	Need explanations about symbols “U” and “z”.
2.4	178-179	ERA5 has UV component 100m above ground and it reduces vertical extrapolation uncertainty. Authors need to explain the reasons why 10m height data is used, if there is.
2.5	197	Need explanation about symbol “$\bar{O}$”.
	198	“measured at 10m” should be ”at 10m”
3.1	248-249	higher -> lower? The sentence is bit difficult to understand.
	248-250	CFSv2 is better than ERA5 at Site 2. It is better to add the explanation.
	258-260	“RMSE values tended to increase during winter months…”, This just may be because magnitude of wind speed is high. Use of normalized RMSE may help further understanding.
3.2	388	The use of the word “overestimated” toward wind direction is weird. It is suggested to use “shifted (anti)clockwise”.
	390	“April to December in 2022” Need to explain that this explanation is about Site 5. It also

		seems that July 2020 to July 2021 at Site 6 shows different trend, compared to other years on the site. Need a comment that how authors think this about this period. Also, explanation that how authors handle these measurement errors when calculate aggregate metrics mentioned in text, Figure 8, Table 4 etc. in this sub section is needed.
4.1	Table 5	It is better to add text that "x_t"and "x_m" will be explained later in section 4.2, like as Figure 9.
	438	Explanation about data period used for "spatial and seasonal mean" is needed. This may the same as line 478 but should be mentioned here.
	438-439, Figure 9	"These values were determined as the spatial and seasonal mean for each PFDA." I understand wind speeds and wind directions shown in Table 5 are used in this section to reduce computational cost. Is my understanding correct? If so, why P_{unit} in Figure 9 reaches 15MW? All wind speeds in Table 5 are lower than 10.6m/s, which is rated wind speed of IEA 15MW turbine.
	456	"P_{unit} revealed the average turbine efficiency" I understand P_{unit} is average of "all wind turbine" in a PFDA. If so, the authors need to explain that (i.e. what consist of average). Also, it is not "efficiency" but "power output", isn't it?
4.2	Figure 11-(a)	It is suggested to write brief explanation (e.g. Summer, 9.6D) in each figure.
4.3	603	"10 additional time series" It is difficult to understand why 10? It is suggested to add brief explanation (e.g. 5 yeas data and ±).

5.1	Overall	Discussion regarding uncertainty of measurement data is needed.
5.2	663	Wind frame -> wind farm?