The paper is well written and easy to read. It considers an important topic for wind energy meteorology and better understanding of sea-breezes is a welcome addition to the field. However, I have a few comments considering the methodology. I believe that there are some critical aspects of methodology that have not been properly described.

Response: Thank you for your positive views on our paper. We sincerely appreciate the time you spent reviewing this work. In this revision, we have revised the paper substantially based on yours and other reviewer's comment. The key changes are

- The title of the paper has changed to *Detecting and Characterizing **Simulated** Sea Breezes Over the U.S. Northeast Coast with Implication for Offshore Wind Energy*.
- An additional analysis has been conducted to examine the variability of individual sea breeze cases.

Major comments.

- P3L84-L85. The simulations are one month long. Was there any kind of nudging performed during the simulations? If not, please explain why there was no nudging performed because one month is quite a long time and the model can "run away" from the real atmospheric conditions.

  Response: Thank you for your comment. Yes, atmospheric nudging is applied on the outer domain every 6 hours. Corresponding information has been added to the revised manuscript.

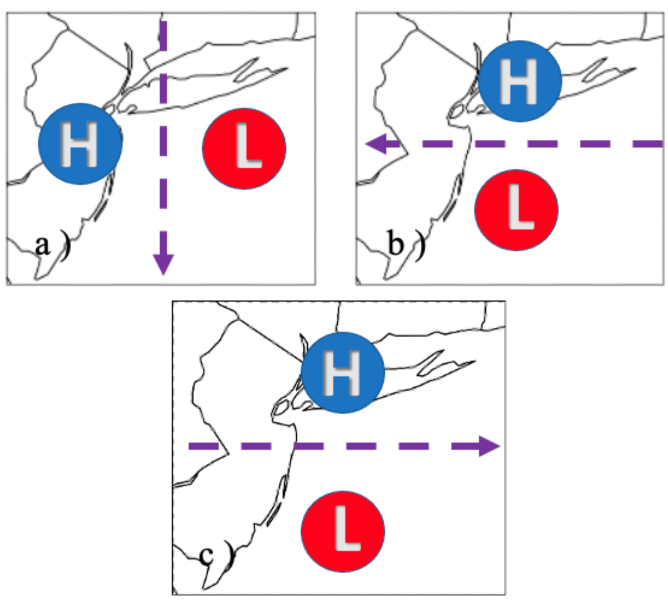
- P6L129. Mean wind direction at 10 m is calculated. Wind direction is a circular variable and therefore I find it hard to interpret "mean wind direction". Please explain in more detail how you calculated mean wind direction in complicated meteorological situations and why such an approach is feasible, especially, taking into account the fact that the averaging is done over coastal quadrants, where sea breeze front can be present and therefore opposite wind directions can be next to each other. For instance, the average of W and E direction is S wind.

  Response: Thank you for your comment. The mean wind direction is calculated for all the four quadrants by simply averaging all the points within the quadrant. Then, the wind regime over the targeted region is determined if the mean wind direction for at least 2 of the 4 quadrants fall under one of the five wind regime categories.

  We understand your concern *('the average of W and E direction is S wind')* which would be an issue if we did the averaging over just a few points. However, what we did is a regional average which will not be affected by a few outliers. For a spatial extent of a quadrant size domain defined in our study, very rarely, will you see wind direction changes drastically from 0° to 180 ° from one quadrant to the other. If that happens, that usually mean the region is influenced by cyclonic conditions and those cases are filtered out in the first place (Lines 129-130: *Days with cyclonic conditions over the targeted region are rejected, as sea breeze* *identification would be difficult due to rapid changes in wind direction in these cases*). In addition, I have checked all the selected days as well as all the unselected days to make sure our method works.

Figure 3. I do not understand Figure 3. It is supposed to demonstrate the differences in prevailing wind between different types of sea-breeze. But the classification is based on the relationship between the prevailing wind and the shoreline. In these schematics the shoreline is not indicated. The brown and blue color is especially confusing here, because it is reminiscent of land/sea border in maps. I also have a problem that authors haven't defined how they interpret the direction of shoreline in the actual map. Is the north wind supposed to be purely offshore (coast-perpendicular) wind in this study? But the coastline is not oriented W-E, it has a complicated shape. Authors should clearly describe how they interpret the shoreline direction in this study and which prevailing wind directions correspond to "pure", "corkscrew" and "backdoor" directions and why.

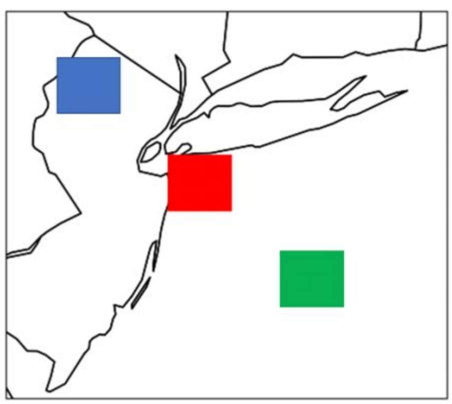
Response: Thank you for your comment and sorry for the confusion. First of all, we did not re-define shoreline. The shoreline is the coastline of our targeted region (See figure below). As you also stated, the shoreline in our case has a complicated shape. Therefore, the three schematics show the *idealized* sea level pressure conditions and their associated prevailing conditions based on the shoreline of the targeted region. Because of the complicated shape of the shoreline, we have to separate the wind regimes into five categories to better facilitate the identification of sea breeze type in the second step. For each day, the SLP condition from the four quadrants is first used to determine the potential background prevailing wind (see figure) before the rigorous classification of wind regime takes place.



- Figure 6. I am not sure if showing the composites here is the best way how to represent the findings. Authors admit it themselves: “Even though the composite 10 wind speed over the calm zone is between 2 and 4 m/s, it falls primarily between 0 and 1 m/s for each individual case”. I am wondering if showing a representative single case would not be better to illustrate the properties of sea breeze. I am wondering whether the problem is the fact that the evolution of sea-breeze depends less on the “absolute” timing and more on the hours elapsed after sunrise. Maybe if the composite was done by averaging timeframes relative to the time after sunrise, the composites would be better. I imagine that sunrise time changes quite a lot during the year at those latitudes.

Response: Thank you for your comment. I agree with your concern about using the composites to represent the finding (Other reviewers have mentioned this as well). However, I also don’t think using a single case is a good idea because it is difficult to objectively choose which case to present in the paper and I am sure there will be people questioning that as well. I think the best way is to describe the variability of the identified sea breeze events from the model simulations.

In this revision, we have conducted additional analysis to examine the variability of simulated sea breeze events to address your concern. Our results suggest that the temporal development of the calm zone for the pure sea breeze and the positioning of the coastal jet for the corkscrew sea breeze is rather consistent across their identified cases respectively.



To do that, we have defined three regions to quantify the variability of the identified sea breeze cases (as shown in the figure). They are located on land (blue), over the coast (red) and over the ocean (green). The size of region is about 3 % of the entire regional domain. For each sea breeze type, we calculate the standard deviation of WS10 and WD10 from the identified sea breeze events over all three regions from 08 LT to 20 LT, and the results are shown in the tables below.

Table1 : Variability of simulated pure sea breeze cases over land, coast region and ocean

Standard Deviation of WS10(m/s) for the Identified Pure Sea Breeze Cases													
	08 LT	09 LT	10 LT	11 LT	12 LT	13 LT	14 LT	15 LT	16 LT	17 LT	18 LT	19 LT	20 LT

Inland	1.4	1.3	1.2	1.1	1.2	1.3	1.4	1.3	1.1	0.9	1.0	0.8	0.8
Coast	2.3	2.0	1.8	1.6	1.5	1.4	1.3	1.4	1.4	1.4	1.3	1.2	1.4
Ocean	3.0	2.8	2.5	2.1	1.8	1.7	1.7	1.6	1.5	1.6	1.7	1.8	1.8

Standard Deviation of WD10 (degree) for the Identified Pure Sea Breeze Cases													
	08 LT	09 LT	10 LT	11 LT	12 LT	13 LT	14 LT	15 LT	16 LT	17 LT	18 LT	19 LT	20 LT
Inland	119	111	94	77	62	58	58	62	63	63	56	51	55
Coast	102	119	114	105	92	78	65	60	55	54	53	62	51
Ocean	118	129	112	108	107	116	115	110	106	97	85	78	76

For the pure sea breeze cases (Table1), the variability of WS10 is largest during the morning hours and decreases after that. Overall, the variable of WS10 is greater over the ocean than that on land. As for WD10, the variability is large during the morning hours. Note that, based on our methodology and the shape of the coastline, the pure sea breeze is identified from potential days of three different wind regimes (Northwesterly, Northly and Westly). Therefore, it is not a surprise that variability of WD10 is large during the morning hour. However, variability of WD10 drastically decreases after the morning hour due to the influence of sea breeze development. Note that the standard deviation of WD10 over the ocean is relatively large until late afternoon. This is mainly due to the development of the calm zone (Figure 6 of the manuscript). After the calm zone moved away from the coast, standard deviation of WD10 reduces significantly (16 LT to 20 LT).

Table2 : Variability of simulated corkscrew sea breeze cases over land, coast region and ocean

Standard Deviation of WS10(m/s) for the Identified Pure Sea Breeze Cases													
	08 LT	09 LT	10 LT	11 LT	12 LT	13 LT	14 LT	15 LT	16 LT	17 LT	18 LT	19 LT	20 LT
Inland	1.1	1.0	1.1	1.1	1.1	1.0	0.9	0.8	0.6	0.8	1.0	0.6	0.7
Coast	1.8	1.7	1.6	1.7	1.9	1.7	1.8	1.7	1.8	1.8	1.7	1.6	1.8
Ocean	2.4	2.3	2.1	1.9	1.8	1.9	2.1	2.2	2.3	2.5	2.4	2.4	2.2
Standard Deviation of WD10 (degree) for the Identified Pure Sea Breeze Cases													
	08 LT	09 LT	10 LT	11 LT	12 LT	13 LT	14 LT	15 LT	16 LT	17 LT	18 LT	19 LT	20 LT
Inland	68	67	58	48	42	43	44	43	43	44	40	46	40
Coast	79	80	69	55	45	36	32	35	28	28	28	35	31
Ocean	67	78	85	75	75	78	66	62	60	57	48	36	31

Table 2 shows the results from the corkscrew sea breezes. In general, the characteristics are similar to that from the pure sea breeze cases. One important aspect is that the small variability of WD10 over the coast region during the late afternoon hours. This suggests that the position of the simulated jet core (Figure 7 of the manuscript) over this region is rather stable, which would have significant offshore wind energy implication in terms of wind turbine positioning.

Table3 : Variability of simulated backdoor sea breeze cases over land, coast region and ocean

Standard Deviation of WS10(m/s) for the Identified Pure Sea Breeze Cases													
	08 LT	09 LT	10 LT	11 LT	12 LT	13 LT	14 LT	15 LT	16 LT	17 LT	18 LT	19 LT	20 LT
Inland	0.9	1.1	1.6	1.7	1.6	1.7	1.7	1.7	1.8	1.4	0.8	0.4	0.3

Coast	2.4	2.3	2.2	2.4	2.5	2.4	2.3	2.3	2.3	2.3	2.2	2.3	2.4
Ocean	3.5	3.7	3.6	3.5	3.4	3.0	2.9	3.0	3.0	3.0	2.9	2.8	2.7
Standard Deviation of WD10 (degree) for the Identified Pure Sea Breeze Cases													
	08 LT	09 LT	10 LT	11 LT	12 LT	13 LT	14 LT	15 LT	16 LT	17 LT	18 LT	19 LT	20 LT
Inland	16	17	20	29	34	37	35	31	31	27	27	29	31
Coast	13	14	17	18	16	16	17	16	18	22	22	28	26
Ocean	107	94	42	37	58	65	78	62	36	24	17	22	29

Table 3 shows the results from the backdoor sea breezes. Because of low occurrence rate, It has the smallest variability, which also indicates that the development of the individual backdoor sea breeze does not differ much from the mean condition (Figure 8 of the manuscript).

Corresponding texts and tables have been added to the manuscript. Note that we have changed the alignment of three regions in other attempts, such as horizontal and vertical. However, that does not change the table results significantly.

- P9L200-202 " This could be partially associated with the increase in the land-sea thermal contrast. As the land-sea temperature difference becomes more strongly positive, there is greater potential for corkscrew sea breeze development over pure sea breeze development along the U.S. Northeast coast." I am confused about such an assertion. If the difference between pure and corkscrew sea breezes comes from the difference in prevailing wind direction (some authors use "geostrophic wind" here), how does the sea-land temperature difference influence prevailing wind direction?

Response: Thank you for your comment. I certainly agree with you that the prevailing wind direction is the dominant factor in differentiating the pure and corkscrew sea breeze. In addition, the prevailing wind direction is mostly determined by the large-scale forcing, rather than the sea-land temperature difference. However, the sea-land temperature difference does provide the forcing for sea breeze formation. In general, the greater the temperature difference, the stronger the sea breeze. This will lead to stronger onshore wind. As the strong onshore wind is the distinct feature associated with the corkscrew sea breeze, we hypothesize that the stronger sea-land temperature difference might help generate the strong onshore wind which increases the likelihood of forming corkscrew sea breeze, rather than pure sea breeze, during the summer months. Nevertheless, this hypothesis needs to be further proven and is beyond the scope of this study. That is why we use "*partially associated*" in our sentence to acknowledge the uncertainty.

Minor comments:

- Figure 2. It would be easier to understand Figure 2 if the explanations for the abbreviations, such as WR: ”Wind regime” would be explained in the figure caption.

Response: Thank you for your comment. Corresponding changes have been made.

- Line 152. “SW-WR” – I assume that “CS-WR” is meant here.

Response: Thank you for your comment. Corresponding changes have been made.