In situ airborne measurements of atmospheric parameters and airborne sea surface properties related to offshore wind parks in the German Bight during the project X-Wakes

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Answers to the Referees

The authors would like to thank the referee Tobias Gerken for the valuable comments.

In the following, the comments of the reviewer are answered point by point. The comments are given in *italic*, while the answers are provided in normal letters. Quotations from the new text are given in quotation marks.

Reviewer 2 (Tobias Gerken)

To move the review process along, I have assigned myself as a reviewer following journal policy.

Overall, I find that the manuscript is well-written and that data and data description are useful to the community.

We would like to thank the reviewer for the positive evaluation.

I recommend to consider the following issues:

The points were taken into account as indicated below.

1. I am not sure I missed this, but could you make sure that you clarify in the text what the reference for above sea level is and how (if at all) this might be different from the actual height above the surface).

We added in Sect. 3: „The altitude refers to height above mean sea level (WGS84 data from the Global Navigation Satellite System minus geoid height), and the radar altitude provides the height above the surface."

L 80: Please provide additional calibration and correction information about the instruments. Either here or in other suitable locations

We added in Sect. 3: „The temperature, pressure and humidity sensors were calibrated before and after each campaign. The temperature sensors are calibrated using a high-precision resistance decade. All static pressure and differential pressure sensors are calibrated over the respective specified pressure range using two Weston Aerospace DPM7885 absolute pressure transducers as reference. For calibrating the Vaisala Humicap humidity sensor, the sensor head is inserted into a salt chamber containing one of four different saturated salt solutions. The reading given by the probe or

transmitter is then adjusted to the humidity value that the specific salt solution generates at that particular temperature. The calibrations described above were carried out on 9 March 2020, 26 March 2021 and 19 June 2021."

L131: "The accuracy of the three wind speed components is better than 0.2 m s−1" > Please expand on how this is known.

We changed the text to: „The accuracy of the horizontal wind speed components of the D-IBUF is better than 0.5 m/s and of the vertical wind speed component better than 0.1 m/s (Corsmeier et al., 2001). As pressure measurements are the bottle-neck for wind measurement accuracy, and the D-ILAB deploying the same pressure sensor types as the D-IBUF, no differences in wind speed accuracy between the two aircraft is expected, which was also the observation during calibration flights."

Table 2 and 3: I suggest o provide measures of variation during flight legs on altitude, wind speed, and wind direction.

We added in the text: „As a first orientation, the approximate wind direction and wind speed at hub height are provided, which are highly variable in time, in horizontal direction and with altitude."

Also, specify that satellite overpass time is UTC for completion.

We added UTC in the tables.

Figure 4a: Are all of these data from the same altitude or does this include profiles? Please provide additional information in figure legends (or filter for constant altitude). Also, it appears that the large marker size obscures some spatial patterns. I am unsure how this can be avoided practically, but a smaller marker or data gridding might help.

We changed the marker size as suggested. All data plotted in Figure 4a) is measured around hub height – we clarified this in the caption.

We added in the caption of Figure 4: "The main pattern was flown at hub height, and only data measured at hub height are included in the figures."
We added in the caption of Figure 5: "In contrast to Figure 4, data of the whole flight are included, not only data obtained at hub height."

Figure 5. Same comments about the turns. It would be good to establish, why wind speeds at the turns appear different than within the legs. Altitude changes or profiles would be a simple explanation.

We included in the figure caption: „The turns were used to perform vertical profiles, which means that the wind speed was generally higher than during flight legs at constant altitude."

Figures 6, 7, 8, 10. I am not sure that the histograms in the back are helpful. They certainly should have an associated legend if kept. I would recommend either performing a more meaningful binning

or presenting a smaller number of histograms from representative heights in separate subplots. One should also consider conversion to potential temperature.

The plots should provide a qualitative impression of the atmospheric conditions encountered during the flight to serve as orientation for deploying the data. Future analyses will be based on the PANGAEA data set, and not on such plots. We would therefore prefer to leave the histograms as they are. Potential temperature, or the lapse rate as a derivative of potential temperature, as an important indicator of atmospheric stability, is provided separately in Fig. 7.

Figure 7: I am a bit confused about the lapse rate. A zero lapse rate in potential temperature would mean neutral. T would be a confusing variable name choice for potential temperature. I suggest clarifying this in the text and also within the figure legend.

Yes, the lapse rate close to zero indicates neutral conditions. We already state in the text: „Figure 7 shows the distribution of the lapse rate as an indicator of stability for all flights. Values near zero indicate neutral conditions. Most measurements were performed for neutral and slightly stable conditions.“ As suggested, we changed the variable to theta instead of T.