The manuscript provides a very nice overview of the proof-of-concept of the wind direction measurement using DTS. It serves as a good basis for further studies and future application of this method in the field. I only have a few small questions/comments for clarification, mostly related to the DTS device/method.

Thank you for the comments! I hope I have responded to them in a satisfactory manner.

General comments: Was a longer time average of the DTS data used, or only the 1s resolution for the analysis? I did not see this clearly mentioned in section 2.2. It does come back in section but perhaps it could be expanded upon earlier, to make the relation between time averaging and uncertainty more clear for the reader (i.e., measurement uncertainty which decreases with the square root of the amount of samples).

While the Ultima is capable of very high temperature precision, these results can only be achieved over long time averages. At shorter time scales the DTS has substantial noise. As we want to use the shortest time integration possible for future deployments, we explored how the noise at the finest resolution interacts/interferes with our ability to discern the wind direction signal in the temperature difference. We used a ten-minute sampling interval as it was long enough to characterize the noise for a given experiment, but short enough that we could do a large number of experiments.

Is an estimate available for the response time of the FO cables (with the attached cones) used in this study? If the response time is (much) slower than the 1 second averaging time, it could be more logical to average over a longer time.

We do not address the response time of the cone/fiber/DTS system in this study due to the artifacts from using a wind tunnel. We only recorded data after the fiber reached an equilibrium temperature, which would take on the order of minutes. From previous studies with DTS, the time lag is not realistic behavior in an atmospheric deployment (wind speed time response is on the order of 10s, air temperature response is less than that). Based on observing the IR camera at the time, we suspect that we were measuring the time response of the entire wind tunnel and not just the fiber. To not leave you completely dissatisfied, initial tests with our wind direction approach in an environmental deployment shows a time lag between 10-15 seconds with the exact value depending on the meteorological conditions. These results are the subject of an upcoming publication that we are very excited for.

Specific comments: Page 5, line 25; Why does the DTS device have a temperature resolution of 0.01 K? The data resolution of the Stokes/anti-Stokes data (6 significant figures) results in a resolution of 0.001 K. It might be more clear to state the expected noise level of the device at a certain integration time.

Following our conversation on the topic, the relevant number here for this manuscript is the instrument noise at the finest temporal and spatial resolution. We removed the reference to the instrument resolution and streamlined the introduction of the DTS device as a result.

Page 5, line 26; The spatial resolution of Silixa's Ultima devices is 30-35 cm, sampled at an interval of 12.7 cm.

Number updated to 0.127m.

Page 5, line 28; I assume that a single-ended calibration is used?

We explicitly state this now. Thank you!

Page 6, line 1; The RMSE of the bath is mentioned, but not the bias. I assume the mean bias in your reference bath is really low, so it could be good to make a distinction between the measurement noise/uncertainty and bias.

We explicitly ignore the bias as we only compare the instrument to itself through the temperature difference.

Page 11, figure 4; the unlabelled y-axis of figure 4d is not aligned with figure c

Good catch. Fixed.

Page 16, line 20; Coenders-Gerrits is with capital G.

Fixed.