Response to RC2.

General remarks The paper introduces an interesting concept to measure wind direction with Fiber Optics Distributed Sensing (FODS). The paper is well written. The experiments are well described and the results are carefully worded. This proof of concept is interesting

Thank you for your comments and review. We hope that we could adequately address them and strengthen the manuscript.

Major remarks

There are no serious flaws in the paper, as far as I can discern. The only thing I would like to see some remark is the effect of buoyancy at (very?) low windspeeds. The heated cable will set up its own convection at low windspeeds. It should not be difficult to say something about this. Has this been taken into account by the OpenFOAM simulation? Normally, the effect would be small due to the small diameter of the cable but with the cones, the effective diameter may be large, especially when the cones are narrowly spaced at 2cm.

We used a solver in OpenFOAM that does not include heat transfer, which is why we only show turbulent kinetic energy in Figure 5d-f as a proxy for the sensible heat flux. Part of our motivation is that the approach only requires the temperature difference between fibers, not the absolute value of their temperatures. The coned fibers were always relatively close to each other in temperature (e.g. < 3.5K) so the difference in the buoyancy driven flux of heat should not be significant. As the wind speed approaches zero, the temperature difference between the fibers should also shrink as the difference in the convective heat flux away from each fiber should disappear. We noted this behavior when the wind tunnel was off. If the temperature difference is close to 0K than the difference in the buoyancy heat flux between the fibers should be vanishingly small. Further, a numerical study using similar triangular shapes but with much larger temperature differences demonstrates no discernible buoyancy effects, further justifying neglecting this term. We remark on these details in section 2.4.

Minor remarks

I think there may be a confusion on which version was reviewed. The page/line numbers indicated line up with the initial submission and not the corrected submission posted for discussion. We hope that we were able to correctly address your comments.

P1 L20: Petrides et al (doi:10.1029/2010WR009482) is probably the earliest published atmospheric application of FODS.

Citation added

P3 L2: First use of FOC, please write out acronym.

Fixed.

Fig1: Where in the tunnel was the sonic anemometer placed?

We clarify in section 2.2 that the sonic anemometer was only used to characterize the wind tunnel. The CSAT is large enough to create flow distortions near itself that affected are initial tests using this device. This is why we opt to use the one-dimension hot wire anemometer for the tests with the fiber, as depicted in Figure 1.

P3 L15: What is U?

U should now be defined.

P4 L17: "to" missing after "used"

Fixed.

P4 L21: Does everyone know what "turbulent intensity" means?

Added a short description to turbulent intensity and a citation to a study describing turbulent intensity for a variety of atmospheric conditions.

P4 L26: Perhaps it is stated somewhere but please state here (and in caption Fig2) over how long the windspeed is being averaged.

Added the time scale to this part of the text as well as in Figure 2.

P4 L29: What one really would like to know is how well the cable is captured at this resolution. With field of view and distance from cable, this is easy to calculate.

Each pixel is approximately 0.24mm in width/length so each fiber has a little over 4 pixels width. From this we arrived at our decision to use the three warmest pixels for each y location, as this choice assures that we only sample fiber pixels.

P5 L15: 0.127m is the sampling resolution. The actual resolution is about 0.27m.

Fixed.

P7 L6: Capital delta.

Fixed.

P14 L8: Dangling modifier: Who/what reviews?

Fixed in the general revision to the scope of the discussion.