# Author's Response to Interactive comment from Anonymous Reviewer #3

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*This study is a good idea, but it has an underlying logical flaw, in my view. We do need to know the magnitude of errors in profiling lidar measurements introduced by inhomogeneous flow, and this appears to be a creative way of addressing the topic. My question is, What is the uncertainty of the model? Clearly the extent to which the model accurately represents the flow behind a turbine can only be determined by measurements; a reference is provided to support the validity of the LES model (Churchfield et al. 2012b, a conference proceeding) which most likely utilized some kind of lidar measurement. So it appears that a model verified by lidar measurements is used to assess the uncertainty of lidar measurements. In my view the above doesn't undermine the basic idea of the paper. I just would like to see model results – whatever their source – presented with the explicit understanding that they, too, have inherent uncertainties.*

We thank the reviewer for pointing out that we had not explicitly acknowledged that the modeling study itself does incorporate some uncertainty as well. We have added such reminders to the Introduction, the beginning of section 2, and in the Discussion. The validation of the LES model at Lillgrund was in comparison to power production measurements of the turbines, not to lidar measurements at Lillgrund, so the problem of "*a model verified by lidar measurements is used to assess the uncertainty of lidar measurements"* is not at play here.

*Do averaging periods longer than 10 minutes further obviate the errors? It is true that the wind industry uses 10-minute averaging as a standard, but this is quite short compared to that*

*used by the boundary-layer met community. What happens if averaging is carried out to 30 minutes?*

The boundary-layer meteorology community uses 30-minute averaging times for calculating flux measurements, not velocity measurements. Nevertheless, we have explored any additional advantages of extending the sampling time to longer time periods and have found extending the averaging time to thirty minutes changes the error by a negligible amount.

*At least one lidar manufacturer is using vertical beam turbulence measurements to address inhomogeneous flow. Some mention of this would be helpful, although admittedly a) the details of the technique used are difficult or impossible to find in published reports and b) a turbine wake likely represents an extreme example of inhomogeneous flow, compared to that generated by complex terrain. The role of scanning lidars in addressing the issues raised here could be mentioned explicitly, as well.*

Indeed, we fully agree that scanning lidars can be very helpful: our initial text specifically refers to scanning lidars (reference to Smalikho et al. and Aitken et al. 2014a at the end of the Discussion). We have revised this discussion to explicitly mention scanning lidars.

Regarding the question of using a vertical beam turbulence measurement, the efficacy of this addition could be tested with a similar framework, and we have added a comment to this effect in the Discussion as well as well as a reference to a Danish Technical University technical report on a field validation of the fifth beam in complex terrain.