WIND ENERGY SCIENCE DISCUSSIONS

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Interactive comment on "More accurate aeroelastic wind-turbine load simulations using detailed inflow information" *by* Mads Mølgaard Pedersen et al.

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Thank you very much for your review, comments and suggestions.

We will expand the list of references in the reviewed manuscript.

It is not possible to say how much the accuracy of the measurements is improved by using the blade-mounted pitot tube instead of a mast-based flow sensor, as the sensors do not measure the same information. At the current stage, it is therefore more a question about the value of the information that can be measured than the accuracy. A met-mast-based sonic may be highly accurate but it provides only information

from a single point, some distance from the turbine while a blade-mounted flow sensor provides information from multiple positions at the rotor plane with some uncertainty, see Pedersen (2018) for more details about the uncertainty. In this study the value of the measured information is evaluated in terms of the accuracy of the simulated loads and the use of information from a blade-mounted flow sensor is found to improve the accuracy of these loads.

The demonstrated application of blade-mounted flow sensors does not improve AEP, LCoE or the blade design. The instrument is, however, able to characterize some of the conditions that results in high loads and may help to predict future loads with higher accuracy. In addition, the demonstrated one-to-one approach may decrease the measurement period that is required for load validation as the aeroelastic model can be validated based on single time series instead of the average of a large measurement dataset. At the current stage, it is therefore only a research instrument, and only time can tell the industrial value. Measurements from blade-mounted flow sensors may, however, potentially be used as input to control of cyclic or individual pitch or active trailing edge flaps to increase power or reduce loads and noise (Larsen et al., 2005; Barlas et al., 2012; Kragh and Hansen, 2012; Kragh et al., 2012; Madsen, 2014). The expected load reduction and component life-time extension potential is highly dependent on the strategy and the actuator technology and specifications.

To our knowledge no wind-turbine or pitot-tube manufactures offers a ready-to-use pitot-tube sensor system for wind turbines. Swiss Air-Data (www.swiss-airdata.com) sells a five-hole air data boom that provides calibrated and aerodynamically corrected air data for 11,200 Euro. This system, however, does not include data acquisition, power supply or blade-mounting solutions.

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