Authors' response on referee comments on « Aerodynamic Performance of the NREL S826 Airfoil in Icing Conditions» by Julie Krøgenes et al.

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We thank the referees for their critical and appropriate comments. We were asked to answer all referee comments at this stage of the review process, while a revised manuscript should not be prepared at this stage yet. In the following, we will therefore engage with all the comments and propose improvements for the final manuscript.

Reply to Anonymous Referee #1 (RC1):

Comment RC1-1:
Similar studies were already performed and published in the past such as: C1 WESD Interactive comment Printer-friendly version Discussion paper W. J. Jasinski, S.c. Noe, M.S. Selig and M. B. Bragg., Wind Turbine Performance Under Icing Conditions, Journal of Solar Engineering, Vol.120, pp. 60-65, Feb 1998. Bragg, M.B, Broeren, A.P., Andy H.E., Potapczuk, M.G., Guffond D. and Montreuil E., Airfoil Ice-Accretion Aerodynamics Simulation, NASA/TMâA˘T2008-214830, Jan 2008 ˇ The current state of the art in research on icing of airfoils is more on 3D unsteady flow simulations and accurate predictions of ice accretion, and power losses.

The authors' reply to RC1-1:
We acknowledge that similar work has been performed in the past such as listed by the reviewer. However, there is a significant difference in the Reynolds-number regime. In the current literature, all wind tunnel experiments are performed at Re>1e6, whereas this study focuses on the low-Re regime Re<5e5. At such low Reynolds number transitional effects of the boundary layer add additional complexity to the problem. Therefore, icing experiment at these low Re numbers is important to extend the validity of the icing tools as well as for special applications such as small wind turbines or UAVs.

Comment RC1-2:
The study employs commercial or well-known open source tools which are developed in 1980s, and do not need validation. It does not help the objective of the study.

The authors' reply to RC1-2:
As stated on page 3, line 3 of the manuscript (Ref Wright, 1999), LEWICE is not validated for Reynolds numbers below 2.26e6.

Comment RC1-3:
It is stated that "for the sake of simplicity, LEWICE was used for the ice generation and FENSAP only as a flow field solver.." FENSAP-ICE is a newer and more advanced approach to icing. It is not clear how such a choice serves the main objective of the study: "to obtain more knowledge about the effects of different ice accretions.."

The authors' reply to RC1-3:
Generating complex ice shapes with FENSAP-ICE is a very time-consuming and labor-intensive effort. The idea of this paper was to find representative ice shapes for different icing cases. In order to obtain these, several hundred of parameter combinations (LWC, MVD, Temp, icing duration, velocity) have been studied. For investigating such a large number of cases, LEWICE is the tool of choice as FENSAP calculations would take unreasonably long

time. Furthermore, the main objective has been refocused on the topic of obtaining more knowledge about the effects of different ice accretions *at low Reynolds numbers*.

Comment RC1-4:
The ice shapes given in Fig 1 are all mixed-up. The horn-ice shape in red should be the glaze ice, the smooth one in green is the rime ice and the blue is the mixed type.

The authors' reply to RC1-4:
The ice shapes were generated using LEWICE, and these are the ice shapes predicted for the temperature ranges characterizing rime-, glaze- and mixed ice.

Comment RC1-5:
"airfoil coefficients" used throughout the manuscript is a misnomer. It should be properly addressed as "aerodynamic force coefficients"..

The authors' reply to RC1-5:
The suggested formulation is more precise and will be changed accordingly.

In general:
In conclusions, we thank the reviewer for his/her comments. The reviewer highlighted some wording issues and wrong figure labels. More generally his/her comments helped us realize that the objective of the paper needs to be more specific. Following the reviewer's argumentation, we will specify in the introduction how these experiments have been performed for low Reynold numbers which have not been previously covered by the literature. To emphasize the objective of the paper the authors would like to propose a change in the title to "Low-Reynolds Aerodynamic Performance of the NREL S826 Airfoil in Icing Conditions".