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Very uncertain observations - Exploring the impact of observational uncertainty on the skill of icing forecasts

Lukas Strauss (1), Stefano Serafin (2), and Manfred Dorninger (1)

(1) University of Vienna, Department of Meteorology and Geophysics, Wien, Austria (lukas.strauss@univie.ac.at, manfred.dorninger@univie.ac.at), (2) University of Innsbruck, Department of Atmospheric and Cryospheric Sciences, Innsbruck, Austria (stefano.serafin@uibk.ac.at)

Observation errors are usually neglected when it comes to verification, arguing that they are small compared to forecast errors. For observations of icing of buildings and structures, such as wind turbines, this is by far not fulfilled. Icing forecasts are created by a model chain running a numerical weather prediction (NWP) model and using temperature, wind and liquid water content forecasts as input for an icing model. Whereas temperature and wind are standard parameters measured with satisfactory accuracy, accurate measurements of meteorological icing (rate of ice growth) and instrumental icing (ice load) are a big challenge.
Different sensors measuring icing parameters and a manual analysis of camera images were used at two different sites (Ellern in Germany and Krystofovy Hamry in Czech Republic) during the winters 2016/2017 and 2017/2018. They allow to quantify the influence of uncertain icing observations on verification results. Results from the Makkonen (icing) model driven by WRF deterministic as well as ensemble runs are verified
Before using the measurements for verification they have to be harmonized, since sensors are measuring different icing parameters and the observations have to fit the modelled parameters as well. This can be achieved by deriving Boolean (yes/no) icing events by thresholding the measurements as well as the modelled ice rates.
Several thresholds have been tested and the results are verified using ROC curves and potential economic value (PEV) curves from a cost-loss model. These represent the uncertainty in the added value of icing forecasts originating from uncertain measurements. Other aspects are the correct timing of events, both observed and modelled, as well as the role of short, low-confidence events. Results will be discussed at the conference.