



Forecasting wind power production under icing conditions

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The number of wind farms situated in cold climate regions increases, e.g. in Sweden the installation of 30 TWh is planned in areas where temperatures are low and frequent icing occurs. The wind potential in cold climate regions is high but especially icing is a limiting factor. Thus, better knowledge about icing climatologies and wind power forecasts considering icing would help to exploit the potential in these areas. It's not just that there is limited information about the occurrence of icing but also the impact of icing on power production is not well known. The aim of this study is to investigate the effect of icing on wind power production and to evaluate the potential to predict this effect.

Investigations are based on information from two wind turbines that are operating in Switzerland in a region with frequent icing. The turbines are heated in case of icing. In winter 2009/2010 several icing events of different strengths took place. Based on this data, the effect of icing on wind power production is studied. Additionally, wind power forecasts are calculated using the weather forecast model WRF coupled with a Kalman filter and an icing algorithm. The latter calculates ice load based on temperature, wind and cloud water content from the WRF results. The algorithm showed a good potential to forecast icing events. The ability of the model system to predict wind power under icing conditions is evaluated.