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Short-range predictions for wind power in eastern Austria using artificial neural networks

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Reliable short-range predictions of wind speed and wind power are vital for balancing the electricity network. Within the last two decades the amount of energy stemming from renewable sources increased substantially relying heavily on the prevailing synoptic conditions. Especially for regions with complex terrain and forested surfaces providing reliable predictions is a challenging task. Forecasts and their uncertainty in the nowcasting as well as in the (two) day-ahead range are essential for the network balancing.
In this study an artificial neural network (ANN) is used to provide forecasts for the nowcasting and medium-range with sub-hourly to hourly predictions for different Austrian sites, including high alpine sites as well as low-land and hilly sites. The ANN will use deterministic NWP data as input and a combination of different deterministic NWP models, such as the ALARO, the AROME and the AROME-Nowcasting model, including observations to provide a most-likely and best-forecast deterministic prediction. Furthermore, an uncertainty estimation will be provided using the raw and the calibrated LAEF-ensemble and a combination of the calibrated LAEF with deterministic NWP data.
Wind farm data of sites in eastern Austria, close to Vienna, will be used for forecasting of wind power at hub height. Performance of the ANN will be estimated using cross-validation and observations as well as wind farm data.