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Forecasting the weather
- ensemble techniques
in probabilistic weather prediction

Comparing modelled wind profile with long-range wind lidar measurements at a flat coastal site

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Wind power assessments, as well as forecast for wind energy production, are key issues in the wind energy industry and grid related studies. Until recently, only instrumented masts were used for wind speed profile monitoring, but currently wind lidars are more robust instruments and can measure the wind profile much higher than the surface layer. Such heights are commonly studied through mesoscale weather forecasting models, as for example WRF-ARW, but their PBL parameterisations are often not able to predict the wind profile with sufficient accuracy for wind power assessment.

To study this issue, wind lidar measurements of mean wind speed profiles are compared to the WRF-ARW model simulations up to 600 meters above the surface at a flat coastal site, using 2 versions of the WRF-ARW model, 2 different configurations and 2 different planetary boundary layer (PBL) schemes. It is found that the WRF-ARW model is able to predict the mean wind profile rather well, but the model fails to predict the wind speed variability in response to changes in atmospheric stability. The disagreement at higher levels between model and measurements is discussed. Improving the representation of the PBL in WRF may provide improved basis for wind assessments.