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# Representation of the atmospheric boundary layer in the WRF mesoscale meteorological model over the North Sea

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As awareness about the role of atmospheric stability, low-level jets and other meteorological phenomena grows, mesoscale meteorological models become increasingly important in the wind energy sector. Microscale flow models that are used for load assessment and wake simulations will benefit from more realistic inflow fields. The traditional bottom-up approach, in which winds are sampled at the turbine scale and furnished with basic shear and turbulence features, will gradually shift towards a top-down approach, in which sampling occurs at the synoptic scale and realistic inflow fields are obtained through a downscaling procedure.

For a successful and cost-effective downscaling procedure, it is important that all models and datasets are thoroughly verified, validated and uncertainties are quantified. In that context, we perform a large number of case studies with the weather research and forecasting (WRF) model, focusing on the Southern North Sea. Care was taken to select representative cases, covering a wide range of weather conditions. Our objectives are to enhance our understanding of the marine atmospheric boundary layer, and to verify that the WRF results are physically consistent and in agreement with available observations from the 100m IJmuiden mast and remote sensing observations up to 300m, as well as routine observations.

By performing case studies rather than a multi-year climatology, we are able to perform many sensitivity experiments, and to zoom in on individual circulation patterns. Additionally, a representative set of wind fields facilitates further downscaling to the microscale. However, it is important that the cases are selected in a systematic way. Therefore, in addition to presenting the preliminary results of the case studies, we will elaborate on the case selection strategy.