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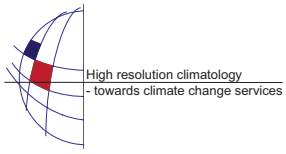

Atmospheric Boundary Layer wind profile at a flat coastal site – wind speed lidar measurements and mesoscale modeling results during a summer period

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The wind profile above the surface layer up to 1 kilometer is presently a challenge for wind energy assessment studies and air pollution applications, as instruments for high resolution (in time and space) measurements were rarely available until recently and mesoscale meteorological models have difficulties to predict it, due to complex phenomena taking place in nature and not accounted for in the ABL parameterizations currently used.
Worldwide an effort is going on to emphasize the important role of boundary layer research in various direct applications (as wind energy and air pollution) and in weather forecast models. Contributing to this effort are the Danish Research Agency Strategic Research Council (Sagsnr. 2104-08-0025) “Tall wind project” and the EU FP7-People-IEF VSABLA (PIEF-GA-2009-237471).
The data analyzed here are presenting a summer period of wind lidar (WSL70) measurements at a site at the West coast of Jutland, Denmark, situated approximately 2 km inland. Therefore over water conditions are defining the structure of the boundary layer at westerly winds, while the land surface is felt only within the internal boundary layer estimated in previous studies as about 80 – 100 m deep at the site. Patterns of the wind field and wind profiles over the North Sea up to 1 km height are studied based on observations and mesoscale modelling results.
Simultaneously, the height of the atmospheric boundary layer is estimated from aerosol lidars backscatter analysis and thus providing a rich data set for testing and development of new parametrizations for the wind profile within the entire atmospheric boundary layer over different surfaces.