

Master Thesis: “Validation of LES of wind farm flows by comparison with data from LIDAR measurements”

Master Arbeit: „Validierung der LES von Windparkströmung durch Vergleich mit LIDAR-Messungen.“

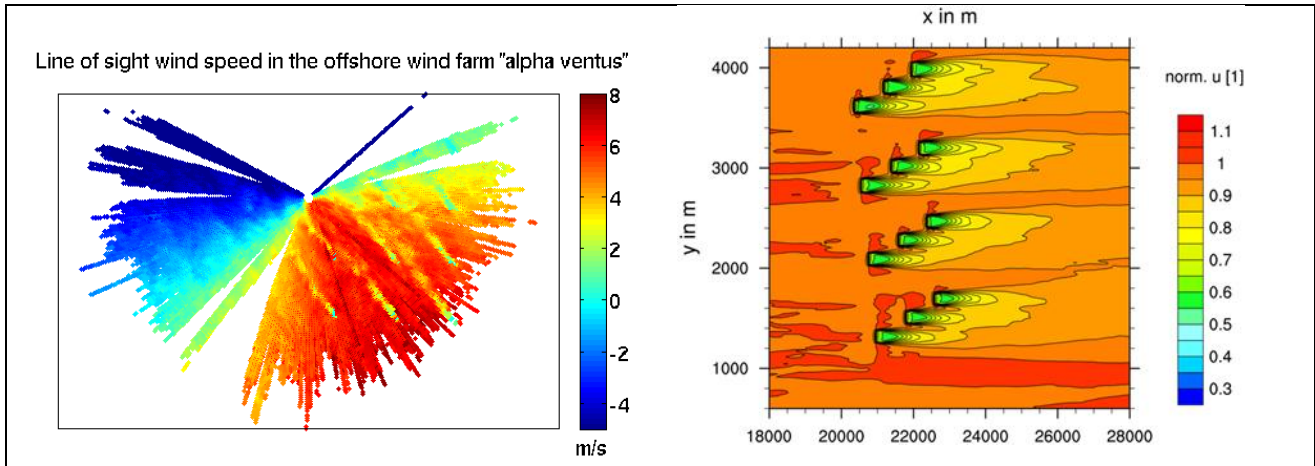


Figure 1: Left: Visualization of lidar measurements in the wind farm »alpha ventus«. Right: Normalized wind speed in the wind farm »alpha ventus«calculated by means of Large Eddy Simulation.

Scope

Wind turbines situated in the wake of others are expected to have a lower efficiency as well as a reduced life time compared to wind turbines that are situated in undisturbed flow. Large-eddy simulation (LES) models are expected to be able to support gaining a better under-standing of the complex flow conditions within wind farms and their dependency on atmospheric boundary conditions such as atmospheric stratification. Recently, three wind turbine parametrisations of different complexity have been implemented into the LES model PALM by the Energy Meteorology group of ForWind. Within several research projects wind speed data from LiDAR-campaigns within off-shore wind farms have been collected.

The objective of this master thesis is to compare data from the LIDAR measurement campaigns with LES results for a range of atmospheric conditions. A key issue will be the implementation of a LIDAR simulator into the LES model, which will help to increase the comparability of the LES and (volume averaged) LiDAR data. The work will comprise the analysis of measured data, model development as well as simulations with the LES model PALM.

Work steps

- Familiarization with lidar measurement and LES models
- Implementation of an interface between the LES software and a lidar simulator
- Classification of lidar measurements
- Validation of LES models based on the suitable datasets

Requirements

- Programming experience
- Interest in data analysis
- Solid knowledge on fluid mechanics
- Basic knowledge on wind turbines
- Ability to work independently

Place	University of Oldenburg
Begin	As soon as possible
Duration	6 to 8 months
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