

Standardized Assessment of Marine Meteorological Data from Offshore Platforms

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In order to investigate conditions for offshore wind power generation in the German coastal areas, three research platforms were constructed in the North Sea (FINO1 and 3) and the Baltic Sea (FINO₂). The observations from these masts are shown to be a valuable source of multi-level and sub-hourly maritime atmospheric data in an otherwise data-sparse region which may be used for the evaluation of fine-scale modelling and assimilation. The measurement masts at the offshore platforms are equipped with a range of meteorological sensors at heights of 30 to 100 m above sea level. The research project “FINO-Wind” focusses on defining standards for the quality control, analysis and interpretation of the data which is necessary to make the results of the different platforms comparable and more useful for users.

Standards for wind turbines given in the IEC (International Electrotechnical Commission) can only be partly applied as some requirements are not applicable to offshore masts. Therefore, a standardization method for data quality checking is developed by introducing a consecutive checking scheme. The sequence of steps consists of formal checks, followed by climatological, temporal, repetition and consistency checks. After successful completion of each part of this sequence, the data are assigned standardized quality flags. As a default, 10-minute data are processed. The quality criteria are either derived from existing meteorological standards or carefully chosen from several years of experience with the analysis of measurements and data from the three FINO platforms. The core procedure of the routine was originally developed and tested in the observations network operated by the National German Meteorological Service Deutscher Wetterdienst (DWD). It was adapted to the specific requirements of the meteorological data in a marine environment and the application for measurements at different heights.

The question how mast effects on the flow affect the wind measurements, observations at all three masts are intensively investigated in comparison to LiDAR, Computational Fluid Dynamics (CFD) calculations, the Uniform Ambient Mast flow (UAM) method and wind tunnel measurements. A thorough evaluation of these analyses yielded an optimized correction method for wind measurements which will be included in the final data set. Over the last few years offshore wind farms were built in the vicinity of FINO1, 2 and 3 and further wind farms are expected to be added in the coming years. In a later phase of the “FINO-Wind” project, wake effects at the three masts from existing and planned wind farms will be investigated and analyzed with regard to wind speed reduction and turbulence intensity increase.

The project provides a range of new quality standards of high-resolution meteorological data as well as consistent data storage and ease of access to the data base. Best practices and procedures will be described.

The authors acknowledge funding for this research project on atmospheric conditions for renewable energy generation through the ‘Wind Energy Initiative’ of the German Federal Ministry for Economic Affairs and Energy and Projektträger Jülich for the period 2013 to 2016. DWD implements this project as a federal government-business enterprise in collaboration with the Federal Maritime and Hydrographic Agency (BSH), UL International GmbH - DEWI, Fraunhofer IWES, DNV GL, and Wind-consult GmbH.

FINO-Wind project webpage: www.dwd.de/fino-wind.