

# Wind, current, wind power climate in a North Sea wind farm. The WindTwin case

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## Abstract

In the present work, the wind and current climate in an offshore wind farm in the North Sea is investigated. Together, the wind energy resource available in the area is assessed and analyzed. The analysis is based on 10 years of data (2015-2024) generated by means of the well-known atmospheric model WRF and the inhouse oceanographic model SINMOD. For the assessment, several statistical features have been used, such as seasonal variability, annual and inter-annual variability, quantiles of the probability distribution, directional distribution, to mention some of them.

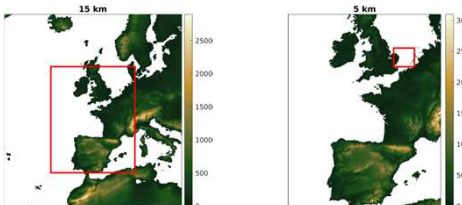
This is a work in connection with EU project WindTwin, which aims to develop and validate an offshore wind farm digital twin (DT) for highly accurate prediction of power production and energy demand of the end user. The DT will give users tailored access to high-quality information, services, models, scenarios, forecasts, and visualizations, as a central hub for offshore wind decision-makers. And will also serve as platform, offering users access to a comprehensive array of high-quality resources, services, models, scenarios, forecasts, and visualizations. WindTwin seeks to revolutionize the way industry professionals make informed choices. The WindTwin consortium consists of 13 organizations from 7 different Member States.

## Methods and models

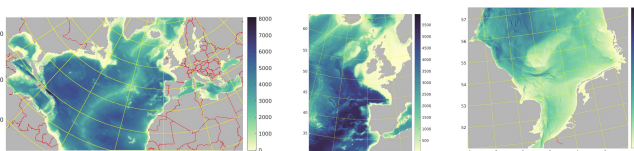
The metocean climate of the windfarm East Anglia One (EAO) is investigated on the basis of historical data. Input of metocean (wind, wave, oceanographic) data from the global database ERA5 of ECMWF was used as boundary conditions. Finer-scale, regional models have been implemented has been used to simulate 10 years for data analysis.



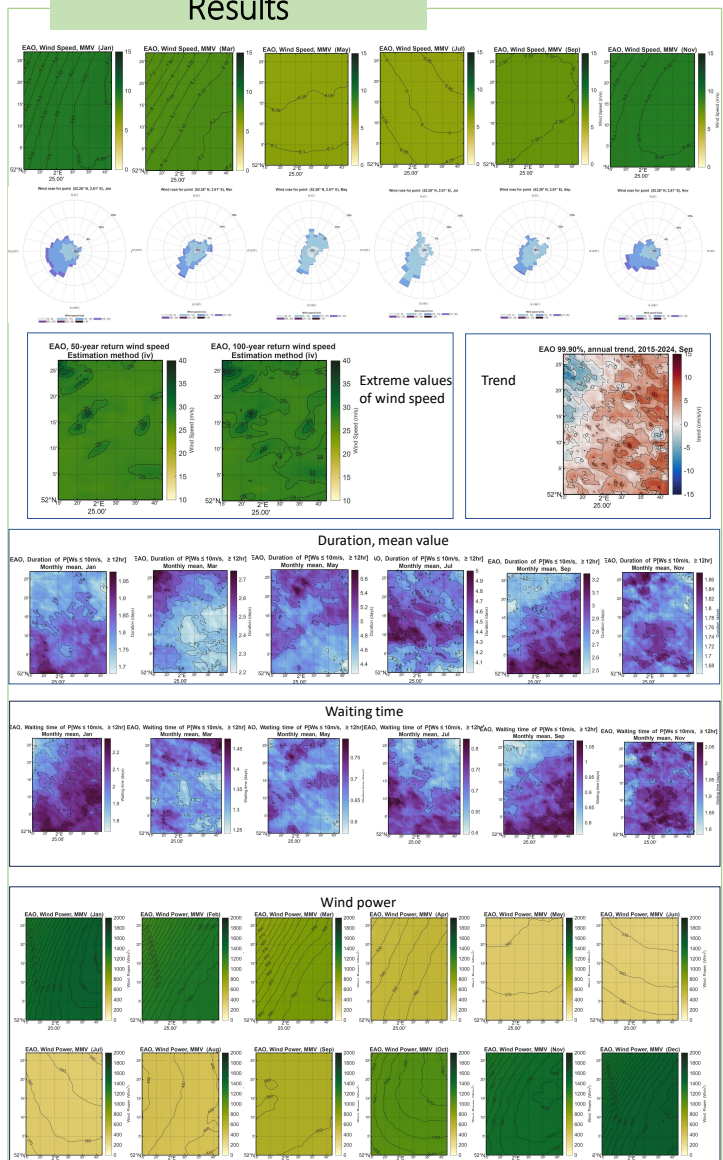
- WRF atmospheric model, 1 km resolution



- SINMOD ocean model, 800 m resolution



## Results



<https://windtwinproject.eu/>

