Offshore wind farm wakes in global circulation model MPAS compared with WRF and measurements

Marc Imberger, Xiaoli Guo Larsén, and Neil Davis
DTU Wind Energy Department, Technical University of Denmark, Roskilde, Denmark (maim@dtu.dk)

With the increasing amount of installed offshore wind farms worldwide and especially in the North Sea area, the question of how these wind farms influence the local meteorological characteristics (e.g. wind and temperature) becomes more and more relevant. Previously, wind farm studies based on global circulation models (GCMs) could not include wake models commonly used in regional models due to the low spatial resolution of the GCM. With the global Model for Prediction Across Scales (MPAS), local grid refinements down to the mesoscale range can be realized, which resolves this limitation. This study investigates the limits of regional area models in simulating wind farm wakes and demonstrates to what extent zooming grid models such as MPAS can be beneficial in those situations. In this presentation, an initial comparison of wake impacts between the global Model for Prediction Across Scales (MPAS) and the limited area model Weather Research and Forecast (WRF) is made for a ten-day period, characterized by stable atmospheric conditions, for two wind farms "Sandbank" and "DanTysk" (German Bight). Both models use the explicit wake parameterization wind farm wake model. The capabilities of MPAS and WRF are investigated by comparing the simulated wind farm characteristics and series of meteorological parameters. The results are compared with measurements from "Sandbank" and "DanTysk" and FINO 3.