Observations of the atmospheric flow integrating real climate conditions at offshore, coastal, high altitude, complex and subtropical sites

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AIRE observations datasets will be open access

AIRE is short for

"**A**dvanced study of the atmospheric flow **I**ntegrating **RE**al climate conditions to enhance wind farm and wind turbine power production and increase components durability".

MEASUREMENTS

We collect observations at offshore, coastal, high altitude, complex and sub-tropical sites in order to deliver the measurements necessary to progress beyond state of the art. The sites are indicated in Figure 1.

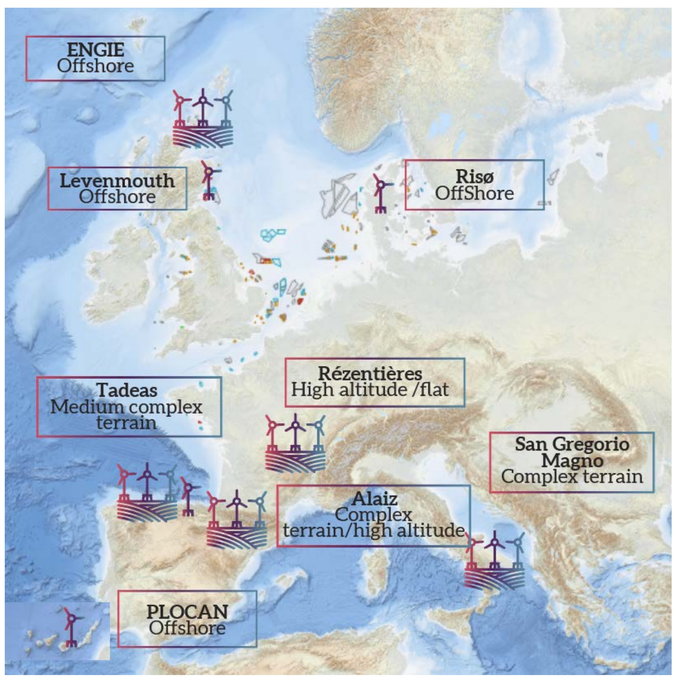

Figure 1. AIRE sites – EU representative locations for wind energy production.

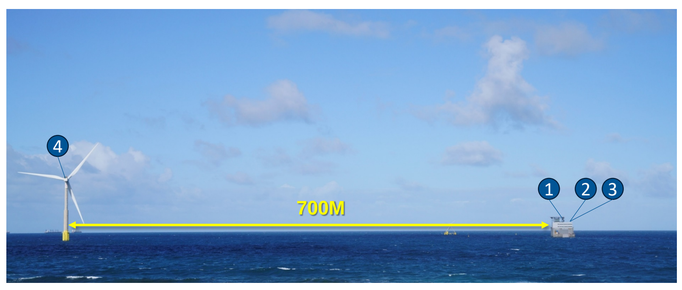

Figure 2. PLOCAN site with floating turbine (4), air quality (1), wind lidar (2), and meteorological station (3) sensors.

METHOD

We observe wind, precipitation and suspended dust potentially hitting the operating turbines and causing erosion at the leading edge of blades. Furthermore, SCADA data and auxiliary data are recorded to study their effect on production.
The sites vary from offshore such as PLOCAN , see Figure 2 to high-altitude complex such as ALAIZ , see Figure 3.

DATA ANALYSIS

Quality control of data and applied use for modelling is on-going. The data will be used in various models including mesoscale model, wake models, erosion damage models and airfoil performance model.
The database is being established. Collaboration with Horizon Europe funded projects FLOW and MERIDIONAL is on-going to enable wider benefit of the data.

Figure 3. ALAIZ site with micro rain radar (1) and disdrometer (2).

NEXT STEPS

The potential risk of leading-edge erosion will be assessed at various sites based on the observations and modelling. Wind farm wake studies will compare to wind lidar data and SCADA data. Uncertainties in the wind farm annual energy production will be in focus.

Get to know more about AIRE activities at www.aire-project.eu

ACKNOWLEDGEMENTS

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