



Geophysical and Geotechnical offshore studies: pioneering contribution to shape Portugal's wind farm strategy

Pedro Brito^{1,2}, Luís Batista^{1,2}, Rúben Borges¹, Pedro Costa^{1,2,3}, **Marta Neres**^{1,2}, João Noiva¹, Ângela Pereira¹, Carlos Ribeiro^{1,4,5}, Marcos Rosa¹, and Pedro Terrinha^{1,2}

¹IPMA, DivGM, Portugal (pedro.brito@ipma.pt)

²Instituto Dom Luiz, Faculdade de Ciências da Universidade de Lisboa, Portugal

³Department of Earth Sciences, University of Coimbra, Coimbra, Portugal

⁴MARE - Marine and Environmental Sciences Centre, Évora, Portugal

⁵ARNET – Aquatic Research Network, Évora, Portugal

The Instituto Português do Mar e da Atmosfera (IPMA) is undertaking extensive high-resolution geophysical and geotechnical studies over two areas proposed for the development of offshore windfarms in Portugal, surveying an area of circa 2000 km². Leixões and Figueira da Foz study areas are located off the Portuguese mainland west coast, at depths between 120m and 530m, distant 21nm to 35nm to the coastline.

The aim of this work, being conducted between February 2024 and June 2026, is to provide detailed data on the morphology, geology, geophysics and geotechnical properties of the seafloor to inform offshore wind farm developers towards engineering and financial strategies, therefore providing the basis for launching subsequent auctions for the offshore areas listed in the Portuguese National Maritime Spatial Planning Situation Plan.

An initial exploratory campaign, commissioned to the Portuguese Hydrographic Institute, collected the initial MBES data (bathymetry and backscatter) and surface sediment sampling. Furthermore, in August-September 2024, a geophysical survey took place on board IPMA's NI Mário Ruivo and retrieved over 2100 km of seismic data, from parametric sub bottom profiler (SBP) and multi-channel ultra-high resolution seismic reflection (UHRS). Preliminary results attest the scientific richness of the dataset already collected as well as the complexity and diversity of the seismostratigraphy present in the surveyed areas. Seabed morphology, sediment textural features, seismic horizons and geohazards have been identified which allow inference of a preliminary geomodel of the areas and the planning of subsequent surveys.

Between May and November 2025 a survey will take place expanding the resolution of data collected (> 20 000 km lines planned) but also adding additional methodologies (magnetometer, side scan sonar, vibrocorer and CPT's).

The data to retrieve over these 2 years will allow to produce a detailed Terrain model supporting a holistic data interpretation, essential for succeeding actions in the pioneering development of

floating wind farms offshore Portugal.

This comprehensive geophysical and geotechnical characterization represents a pioneering effort in Portugal's energy transition, providing crucial data for the sustainable development of offshore wind energy and potentially serving as a model for similar initiatives.

This research was funded by PRR funds - RP-C21-i07.01 - Technical studies for offshore energy potential. This work is also supported by the Portuguese Fundação para a Ciência e Tecnologia, FCT, I.P./MCTES through national funds (PIDDAC): UID/50019/2025, UIDB/50019/2020 (<https://doi.org/10.54499/UIDB/50019/2020>) and LA/P/0068/2020 (<https://doi.org/10.54499/LA/P/0068/2020>).