

Intervento realizzato da



Politecnico
di Torino



In consideration of the determination of the Regione Piemonte – Direzione Istruzione, formazione e lavoro No. 218 of 2022, May 3 and s.m.i. which listed the higher institutions authorized to activate PhD positions in the apprenticeship format for the years 2022-2024 in the framework of a specific regional call for proposals (Apprendistato di Alta Formazione e Ricerca - Avviso Pubblico 2022-2026 per l'individuazione e la gestione dell'offerta formativa pubblica approvato con Determinazione 114 del 3/3/2022, modificato con D.D. n. 451 del 17/08/2022 e prorogato con D.D. n. 807 del 24/12/2024)

MECHANICAL ENGINEERING

Mespac Srl - Remote sensing of metocean processes

Company	MESPAC SRL [Piva/CF:12704170013]
----------------	----------------------------------

Supervisor	MATTIAZZO GIULIANA - giuliana.mattiazzo@polito.it
-------------------	---

Contact	GULISANO ANDREA - a.gulisano@waveforenergy.com
----------------	--

Context of the research activity	<p>The global expansion of offshore wind energy relies heavily on accurate and reliable data concerning the marine environment. This PhD project focuses on leveraging vast datasets from different satellite remote sensing platforms to monitor crucial metocean and environmental variables of both the ocean and the atmosphere, with a particular focus on wave and wind conditions. The research will analyze the performance and accuracy of various satellite payloads under diverse measuring conditions. The activity also includes the analysis of complementary in-situ measuring devices, such as wave riders and floating lidars, to provide essential ground truth and contextual validation for the satellite data. The outcomes will directly support critical decision-making across the entire lifecycle of offshore plants, primarily offshore wind farms, from initial site selection to installation and subsequent Operation and Maintenance (O&M) phases. The Company MESPAC S.r.l. has planned for the winner of this position a collaboration within a contract of high apprenticeship according to the Italian Legislative Decree 81/2015, art. 45.</p>
---	--

	<p>The primary objective of this research is to create advanced data processing methodologies that enhance the reliability and practical utility of satellite-derived metocean data for the offshore wind industry, such that they can provide actionable insight from an engineering perspective.</p> <p>Initially, the project requires a comprehensive analysis of various satellite datasets to monitor key metocean and environmental variables, specifically</p>
--	--

<p>Objectives</p>	<p>focusing on wave and wind conditions. This analysis will systematically define and discriminate the accuracy of different satellite payloads under diverse measuring conditions, such as distance from shore, the presence of clouds or rain, atmospheric pressure, and sea roughness. Novel triple and quadruple collocation techniques will be investigated.</p> <p>The core of the work involves developing site-specific correction techniques to mitigate identified measurement biases stemming from these environmental influences. These refined corrections will then be integrated into advanced interpolation algorithms to generate high-resolution, dependable metocean maps. Furthermore, the accuracy and reliability of these satellite-derived data products must be rigorously validated through the analysis of data collected from various in-situ measuring devices, including wave riders and floating lidars.</p> <p>Finally, the corrected and interpolated data will be demonstrably applied across the entire lifecycle of offshore wind parks and/or wave energy farms and/or aquaculture plants, ensuring improved resource assessment during site selection, optimizing logistics during installation, and enhancing predictive models for Operation and Maintenance (O&M).</p>
--------------------------	---

<p>Skills and competencies for the development of the activity</p>	<p>The candidate shall be less than 30 years old at the moment of the hiring from the company.</p> <p>The ideal candidate should have a background in Mechanical, Aerospace, or Environmental Engineering, and/or in Oceanography, with specific skills in:</p> <ul style="list-style-type: none"> - Remote Sensing and Data Analysis: Solid foundation in processing and analyzing large, complex datasets, particularly from satellite or environmental monitoring sources. - Metocean Modeling: Knowledge of metocean variables (wind, wave, current) and the physics governing their measurement and modeling. - Programming & Scripting: Proficiency in ArcGIS and in programming languages (e.g., Python, MATLAB) for data manipulation, statistical analysis, and algorithm development. - Statistical Techniques: Experience in statistical methods, uncertainty quantification, and the development of correction/calibration algorithms. - Offshore Engineering Context: Basic understanding of the lifecycle and operational requirements of offshore structures, especially offshore wind farms, is highly desirable.
---	--