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Specialization Area: Energy
Research Area: 4.11 Alternative energies



PhD project: Analysis of the present and future offshore energy resource

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Summary: The main purpose of the project is to determine the viability of marine energy farms (wind and wave energy) in Galicia in the future through the analysis of the electrical power that can be extracted from different wave and wind energy capture devices. To do this, first of all, the CMIP6 global climate models that best reproduce the future wind will be selected and their spatial resolution will be increased with a downscaling using the WRF model. The wind data obtained will be used to extract the wave pattern in the same period under three Shared Socioeconomic Paths (SSP) with the WaveWatch III model. Next, the wave data will be downscaled using the SWAN model. The outputs of all simulations will be subjected to a validation process. From these data, the wind and wave energy resource on the Galician coast will be calculated. The electrical power generated by different wind turbine models and different wave energy capture devices will also be obtained and their performance will be calculated. The study of the feasibility of future marine farms will be carried out according to the electrical power generated and the performance of the devices, but it will also be based on factors such as the risk of damage to the devices due to extreme wind and/or wave phenomena, where the DualSPHysics Lagrangian method will be used. In addition, economic aspects linked to characteristics such as the installation area depth or the distance to the coast will be considered, as well as purely economic factors such as the price of the devices.

