WEATHER WINDOWS PREDICTION AND THE IMPACT ON THE MARINE RENEWABLE PROJECTS

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A significant part of the research is focused on the marine resources in the coastal areas facing the ocean environment, since the wind and wave resources are more consistent in these regions. Nevertheless, most of the enclosed basins are very dynamic regions, being well known for the shipping activities and more recently for the renewable projects. This is also the case of the Black Sea, where various offshore wind projects may be implemented in the near future. The energy future represents a permanent point of debate, especially in the European Union countries, which constantly establish objectives and performance criteria that are currently stipulated in the European Green Deal focused on the near future (present - 2050). In general, the discussions are carried out around the same topics that involve global warming, energy security strategy, or the dependency on fossil fuel energy consumption. One way to support these measures is to identify and use new renewable sources of energy, such as the ones from the marine environment, where it is possible to develop large-scale projects. One of the most affordable sources of energy seems to be the offshore wind, where new technical solutions have already been proposed, such as the emerging floating platforms able to be deployed in deep water areas. The investments and the technological innovations accounted by this sector are also visible in the price of the energy produced. Thus, it is estimated that, for the first time, the offshore wind power is now cheaper than the nuclear power.

Compared to the onshore sites, the marine areas present particular environmental conditions that significantly influence the successful development of any offshore/nearhore project. More precisely, the available weather windows represent an important element that needs to be considered, since around these intervals are concentrated an entire supply chain that involves economical or logistical aspects. The climate change is a reality, being expected to deteriorate the current situation on a fast rate, as the energy demand will significantly increase in the future. This problem is not new, since it is already known from 1966, with the mention that at that moment only the natural fluctuations of energy and mass were considered, without mentioning the human intervention. The marine environment is more sensitive to these natural changes, and an increase of the wave action combined with the sea-level rise would significantly influence the dynamic of the coastal areas. Some well-known weather patterns are already associated to the marine areas, this being the case of El Nino, La Nina or the Southern Oscillations. From this perspective, it is important to provide a clear image of the wind and wave impact on the activities developed or proposed to be implemented (renewable projects) in some enclosed seas, such as the Black Sea, by taking also into account also the climatic changes.

The research group of the DREAM project has already performed some preliminary studies concerning the assessment of the expected adverse weather windows that may be occur in the coastal

areas of the Black Sea, considering some historical data reported between the interval 1987 and 2016. This type of study is suitable for the DREAM project, considering that several RCP scenarios will be processed for the NF (near future, the interval 2021-2060) and DF (distant future, the interval 2061-2100), respectively. In this way, a complete picture of the environmental conditions from the Black Sea will be provide by considering joint distributions of various parameters (ex: wind and wave), that play an important role in the successful planning and operation of a marine renewable project.

Keywords: coastal areas, wind and wave conditions, Black Sea, marine renewables, adverse weather.

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