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Offshore Wind Site Assessment: reprocessing legacy seismic data or acquiring a new, dedicated dataset?

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Introduction

Although energy transition is already recognized as a need, the opportunities arisen from feature an ever-growing scenario worldwide. In Brazil this is by no means different, since the country is home to natural resources with potential to supply both clean and renewable energies. This is the case of wind, whose especially favorable conditions in offshore regions such as equatorial, southeast and southern Brazilian margins become an attractiveness for new ventures.

Geophysics, and especially Seismic, plays a relevant role in the choice, planning and site assessment initial phases of a typical wind farm project, being crucial to areally characterize shallow subsurface and its variability, both for geohazards identification and geotechnical behavior, from which the foundations design and safe/ derisked installation relies on.

Method and/or Theory

As a new wind farm project is planned, comprehensive work, regarding not only metocean, but also environmental and subsurface geoscientific data collection and analysis must be carried out as part of the site assessment phase. Amongst those, high resolution and densely sampled multichannel seismic data are especially relevant to characterize the shallowest section (upper 100 m below seabed) to a degree of detail typically required to detect subtle heterogeneities and maybe small size surface and subsurface features that might otherwise imply natural risks to the infrastructure to be installed.

When it comes to Seismic in shallow waters in Brazil, a dilemma emerges: should one *i*) acquire new, dedicated seismic data (as ultra-high resolution, which provide a superior level as compared to conventional data, meantime ensuring deeper penetration when compared to shallow seismic data such as SBP - Sub-bottom Profiler), or *ii*) reprocess legacy seismic data, which although a cheaper and faster solution, might, in practice, reveal ineffective, providing suboptimal resolution at target level? Discussion will focus on such a comparison, including examples, and their respective pros and cons.

Results and Conclusions

The choice between acquiring a new seismic dataset or reprocessing a previously acquired one for wind offshore projects relies on several factors which include economical/ business (such as budget, local logistics, general timeline until the turbines installation) and technical/ geophysical. The latter include the promptness to make the final dataset available (which would favor the single stepped reprocessing), the specific environmental concerns as well as the need for minimal direct impact (which would also favor reprocessing), the required resolution given the complexity and size of the relevant subsurface features foreseen and the feasibility of reprocessing legacy seismic data which were maybe acquired targeting deeper intervals (as it is the case of the Oil Industry) and employing sub-optimal field parameters. To properly choose between them would depend upon previous and careful technical analysis and comparison.