

Boulder detection – Application of hydro-acoustic methods for the detection of buried objects in the sea floor in the course of the planning of offshore wind farms

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Summary

The project seeks to address the challenge of detecting buried objects in sediment from a survey vessel using geophysical methods. Rapid local changes in the soil conditions (soft lenses, boulders) need to be considered carefully in the installation process of wind turbines as well as cable routes. Hard layers and in particular boulder-bearing layers provide massive risks when installing thin-walled piles and constructing cable routes and should therefore be identified and mapped.

1. Introduction

Fraunhofer IWES, together with its project partners University of Bremen and Fraunhofer ITWM, meets the challenge of developing ship-based acoustic techniques for identifying spatial objects below the seafloor. Following the experience of years of high resolution seismic imaging, we understand the technical challenges behind the detection of small bodies within the sediment. Seismic imaging is, in practice, bounded to a trade-off between penetration and resolution. We opt for the development of a solid approach, in which different seismo-acoustic techniques are evaluated and integrated in terms of their suitability for each particular case. Additional systematic investigation on known buried object in test areas as well as numerical simulation will be used to pinpoint the optimal processing-interpretation workflow.

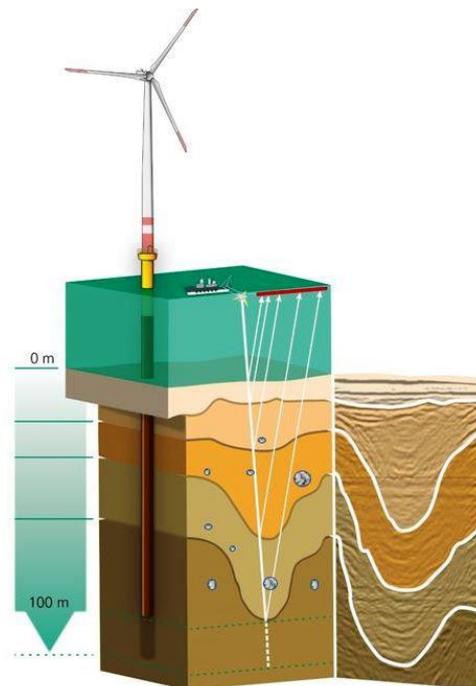
2. Methodology

There are two branches in the methodologies planned for this project. One of them seeks to extract the presence of boulders from traditional seismic data (diffraction separation). The other one aims at the implementation of a new system of seismic data acquisition designed for the detection of buried objects (beamforming). Both will be accompanied by theoretical studies and numerical simulation experiments with the purpose of determining the advantages and limitations of seismic surveys as a tool for boulder detection. For instance, what can be said about the size and location of boulders to be detected and how can our inferences be improved. In general, the topic of the interpretation of diffracted events has been addressed.

3. Data

Existing and newly acquired data has been examined. The new data is acquired in seismic

cruises, both for the beamforming experiments and for traditional seismic (2D/3D). It is intended to target locations where boulders are known to exist in the surface or in the sediment for the validation of the developed techniques.



4. Application

A report about first successful applications of the developed methods in a wind farm will be given.

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Topic: Geology, waves & current measurements

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