

Assessment of soil functions in tidal soils along the sea cable track Manslagt – Borkum (North Sea, East Frisia, Germany)

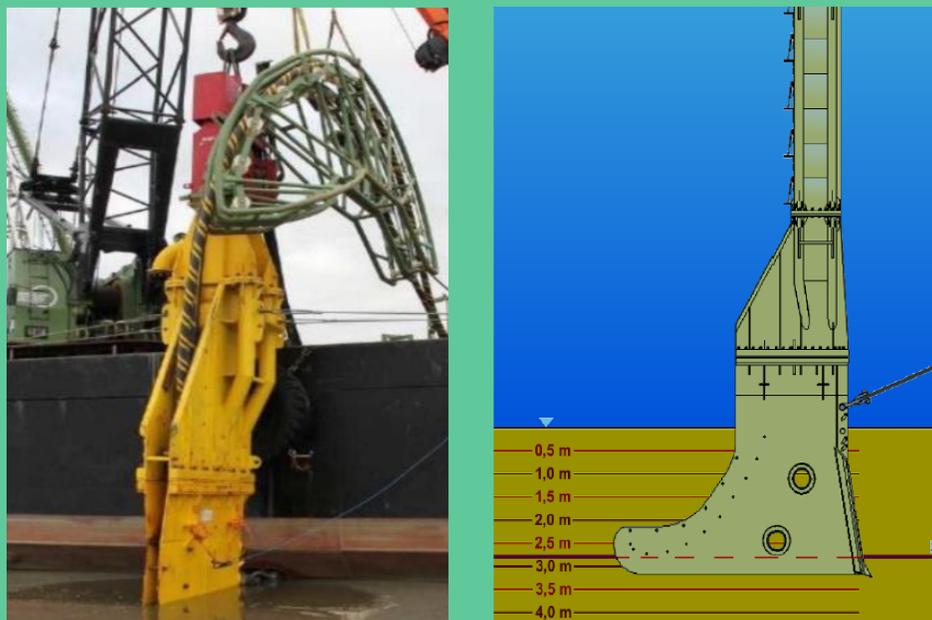
Introduction

The energy turnaround leads to an increasing number of offshore wind energy parks in the European North Sea. Since they have to be connected to the onland power grid, the number of cable tracks in the Wadden Sea increases, too. This may have an adverse effect on the soil functions (Tab. 1). In contrast to soil function assessment in the context of construction impacts on terrestrial soils, it is lacking for tidal soils. This fact proves the relevance to create a uniform guideline. The presented case study looks at the changes in tidal soil functions probably caused by cable trenching (Fig. 1). The cable track is located in East Frisia (German Wadden Sea, National Park) between the isle of Borkum and Manslagt (mainland).

Tab. 1: Considered soil functions and investigated soil parameters according to the German Soil Protection Act

Soil function	Parameter
Habitat and basis for life	Red List species, heavy metal content, closeness to nature of the soils
Decomposition, balance and restoration	pH-value, content of iron oxides and sulfides (→ redox potential, smell), texture, carbonates
Archive of natural and cultural history	Evidence of human life (settlement remains), rarity and closeness to nature of the soils

Fig. 1: Cable laying technique with vibration sword (Bohlen & Doyen GmbH)



annotation: This weak invasive tool was developed for working in sensitive areas like the National Park German Wadden Sea

Analytical statistical tests were performed in the following categories:

- "Cable trench/Reference area"
- "Year 2012"/"Year 2013"
- "Sampling depths" (0-2 cm/2-10 cm/10-30 cm/30-60 cm)

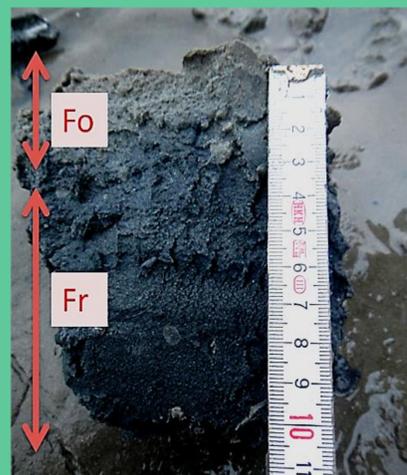


Fig. 2: Wadden soil profile with oxidized and reduced horizons

The typical sequence of horizons in wadden soils is Fo/Fr (Fig. 2). The upper, oxidative horizon (Fo) measures only a few centimetres and has a light brown colour. The reductive horizon (Fr) is characterized by a black colour caused by sulphides. Once they oxidate, a sulphuric odour develops.

Results

Three parameters in two categories showed significant changes:

- "Sampling depths": redox potential, aerobic (0-2 cm) to anaerobic (>2 cm) (Fig. 2)
- "Year 2012"/"Year 2013": particle size distribution and carbonate content



Fig. 3: Ditches left behind at the anchor sites of the cable laying vessel

Conclusions

Significant changes in the assessment of soil functions were not found in the presented case study. This reflects the high adaptability of tidal flats to sudden and serious changes in environmental conditions. All in all, the high dynamics of the Wadden Sea nearly cover the impact of the cable track installation on tidal soils in this case study (Fig. 3). This indicates that further investigations should seek for additional parameters and should cover more interfered sites to ensure validity. Also, cumulative effects have to be considered.

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