

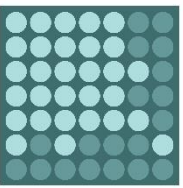
Gefördert durch:



Bundesministerium  
für Digitales  
und Verkehr

aufgrund eines Beschlusses  
des Deutschen Bundestages

**mFUND**  
Das Startkapital für die Mobilität 4.0  
19F2206B



**TrilaWatt**

Diego Pineda, smile consult GmbH

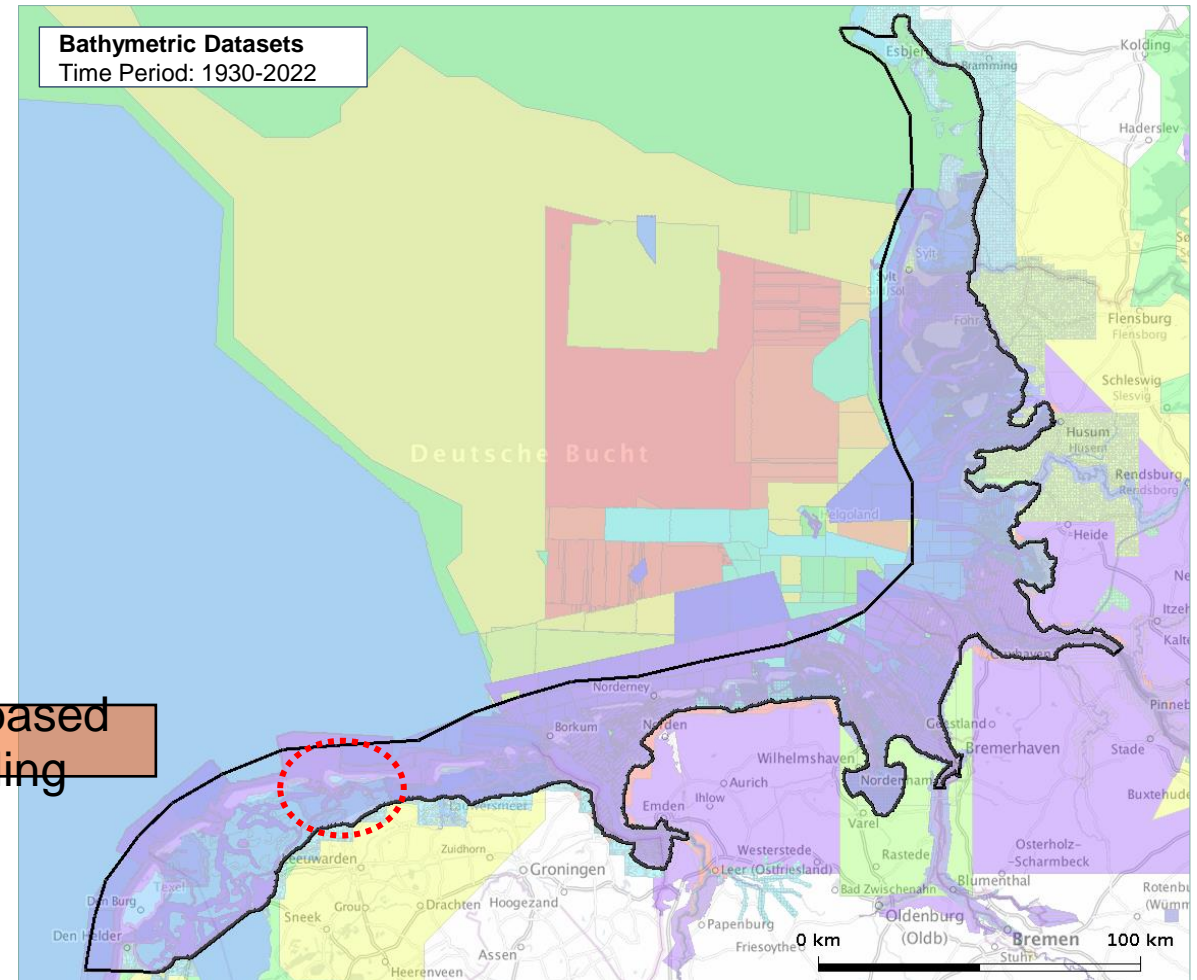
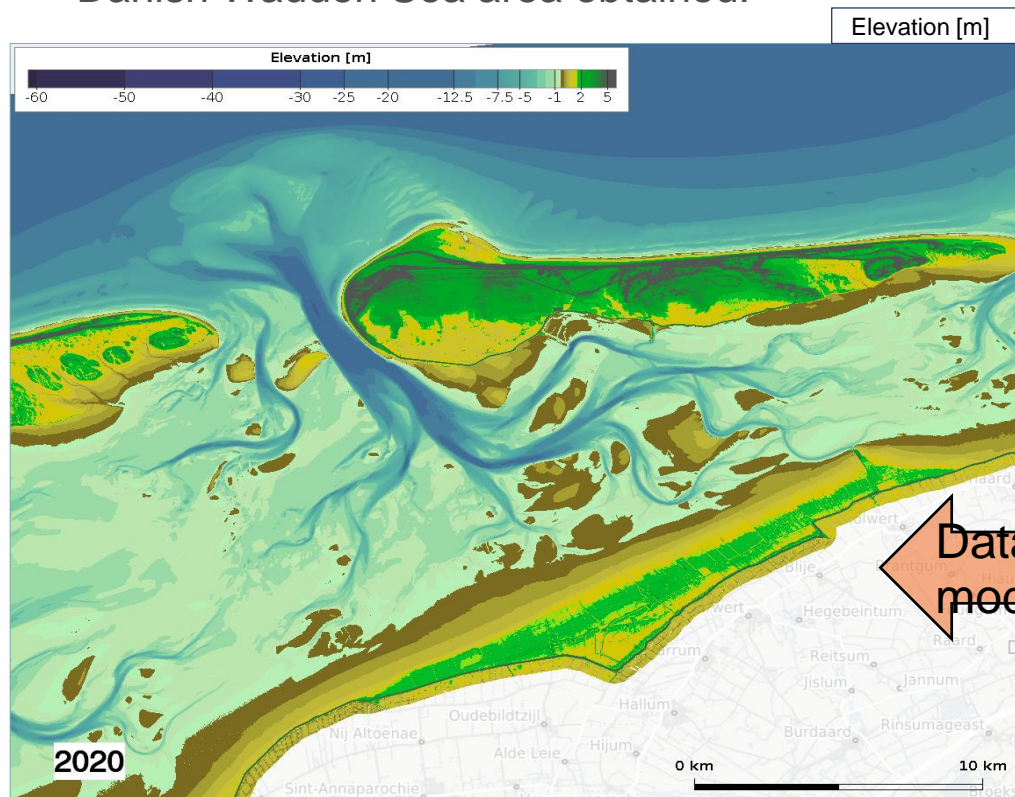
## TrilaWatt

Digital hydro-morphological twin of the Trilateral Wadden Sea  
Stakeholder Meeting

16. February 2023

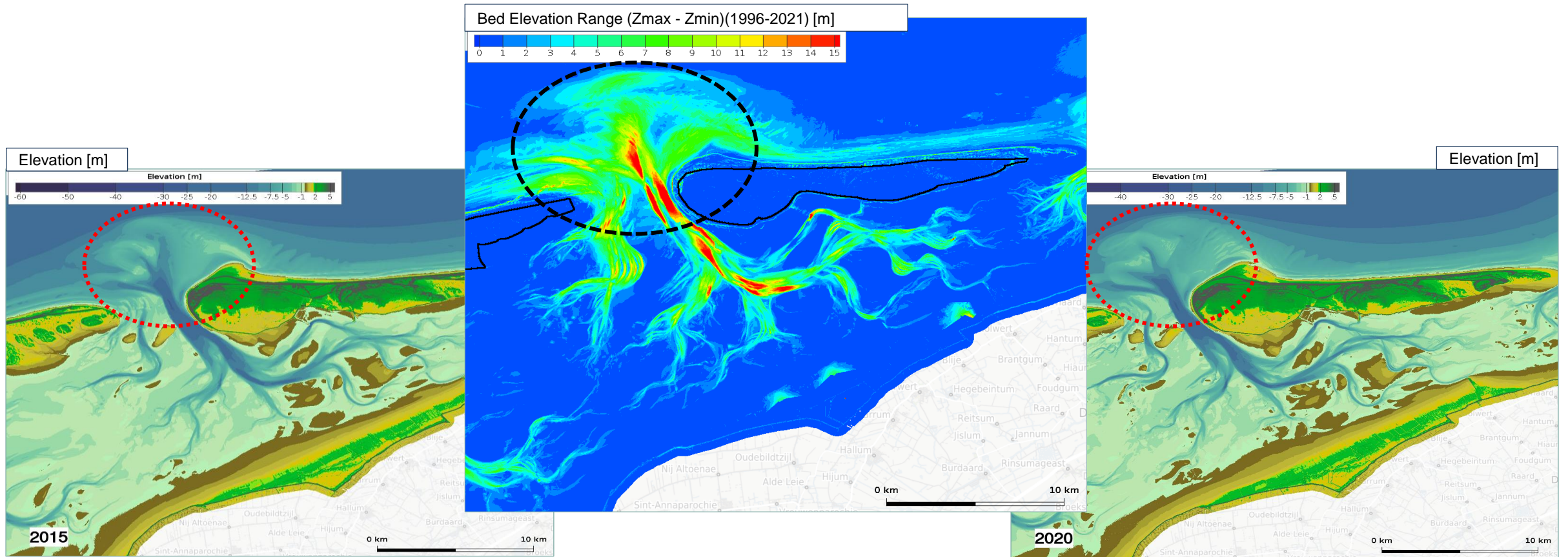
# Coverage of the bathymetric data collected up to date

- ~144.000 bathymetric surveys and Open-Source products intended as final product (~370 Billion points with elevation data)
- Up to date insufficient data covering the
- Danish Wadden Sea area obtained.



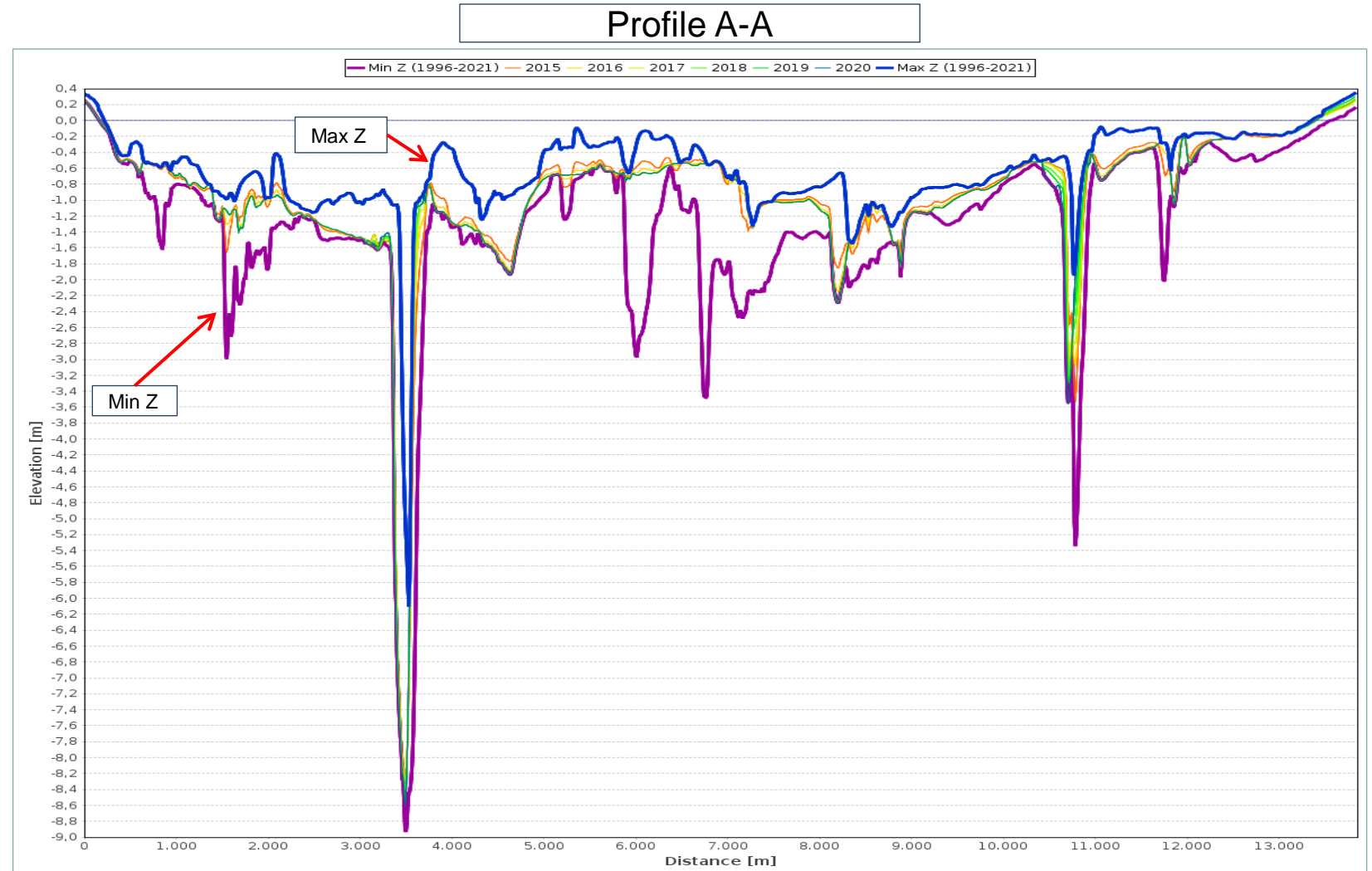
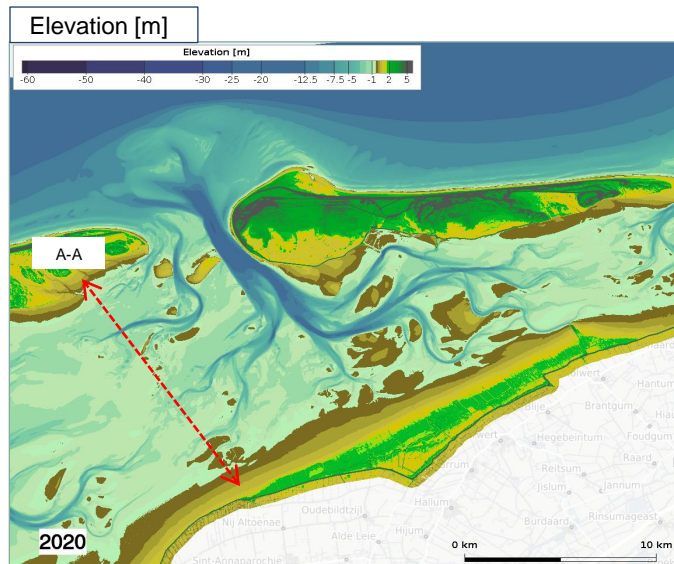
# Bathymetry: 10m Raster Elevation [m] for period 2015-2020

- Sample Area: Wadden Sea area between Terschelling and Ameland



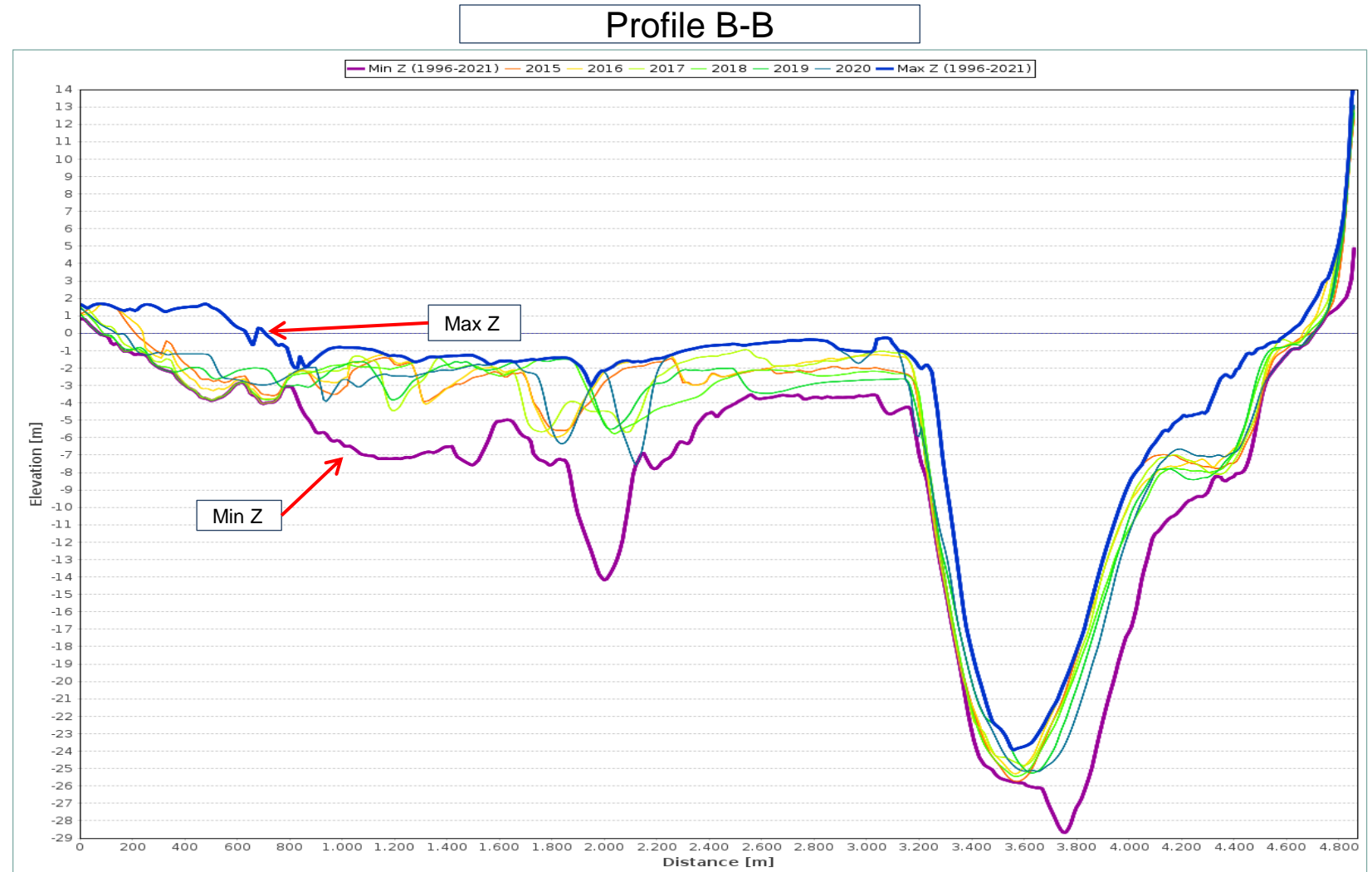
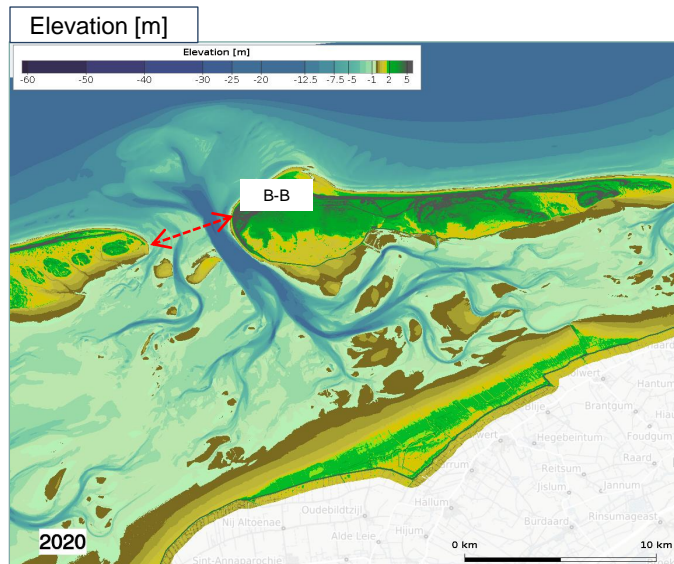
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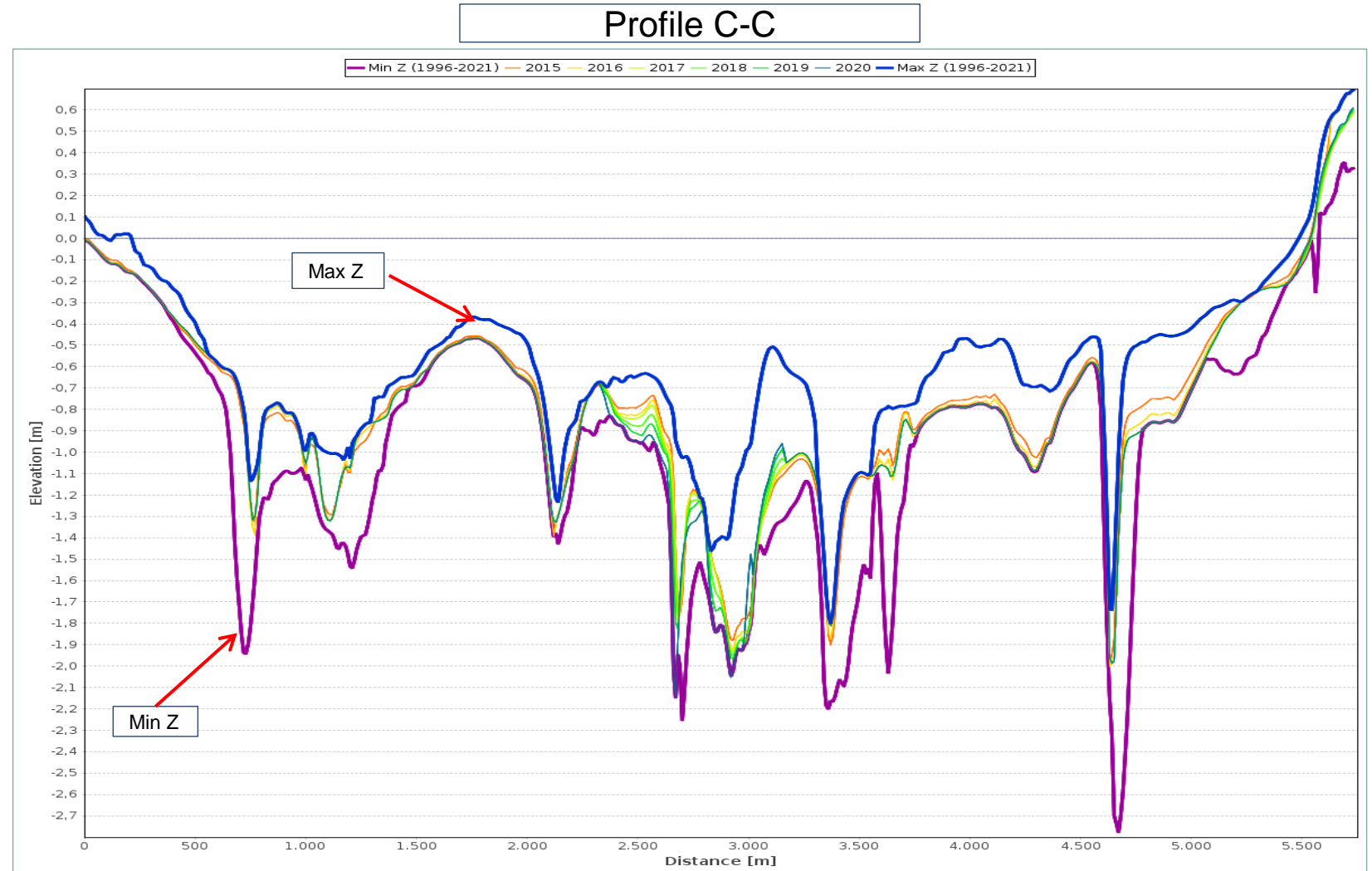
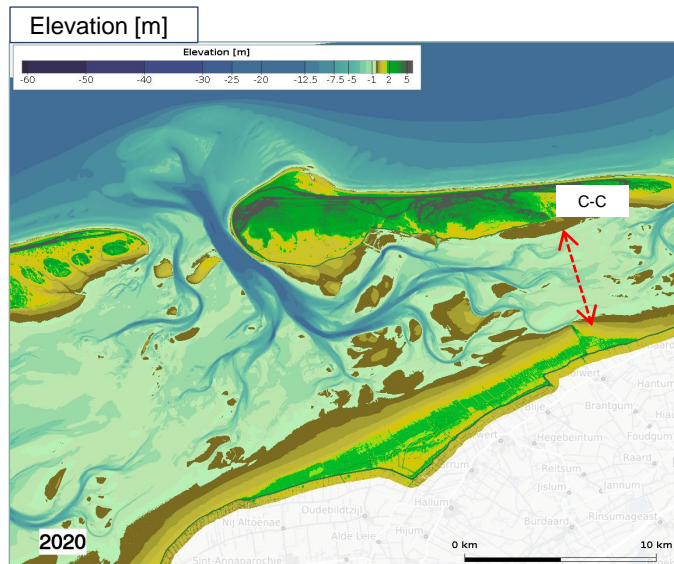
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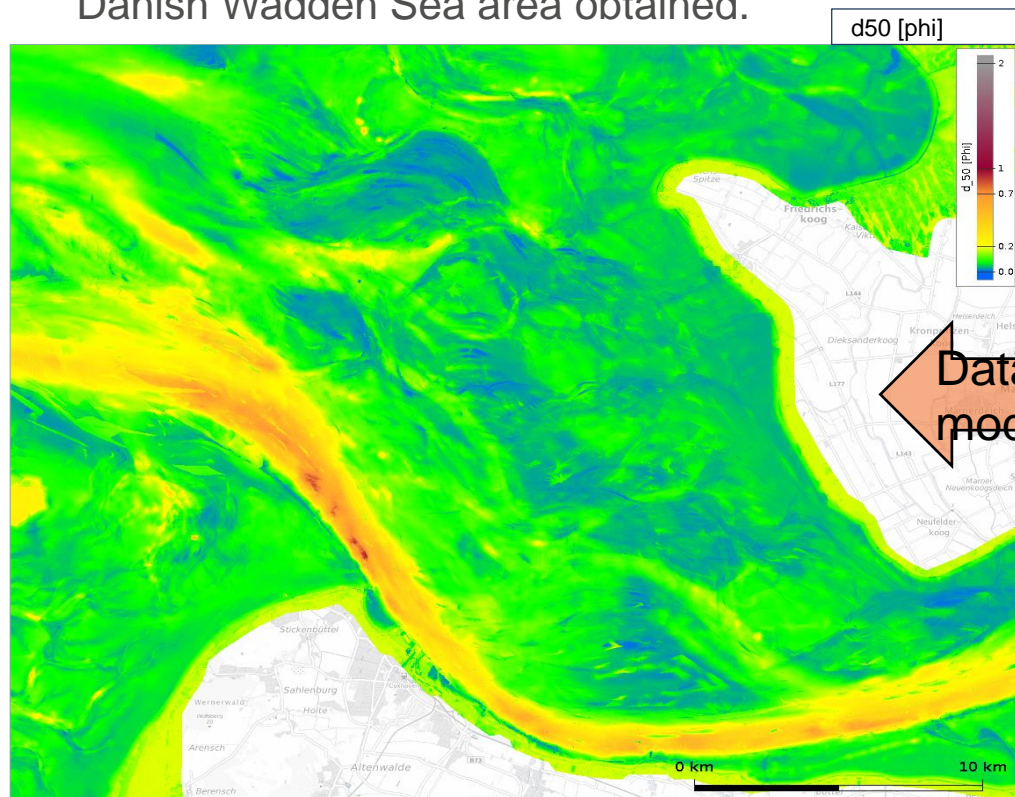
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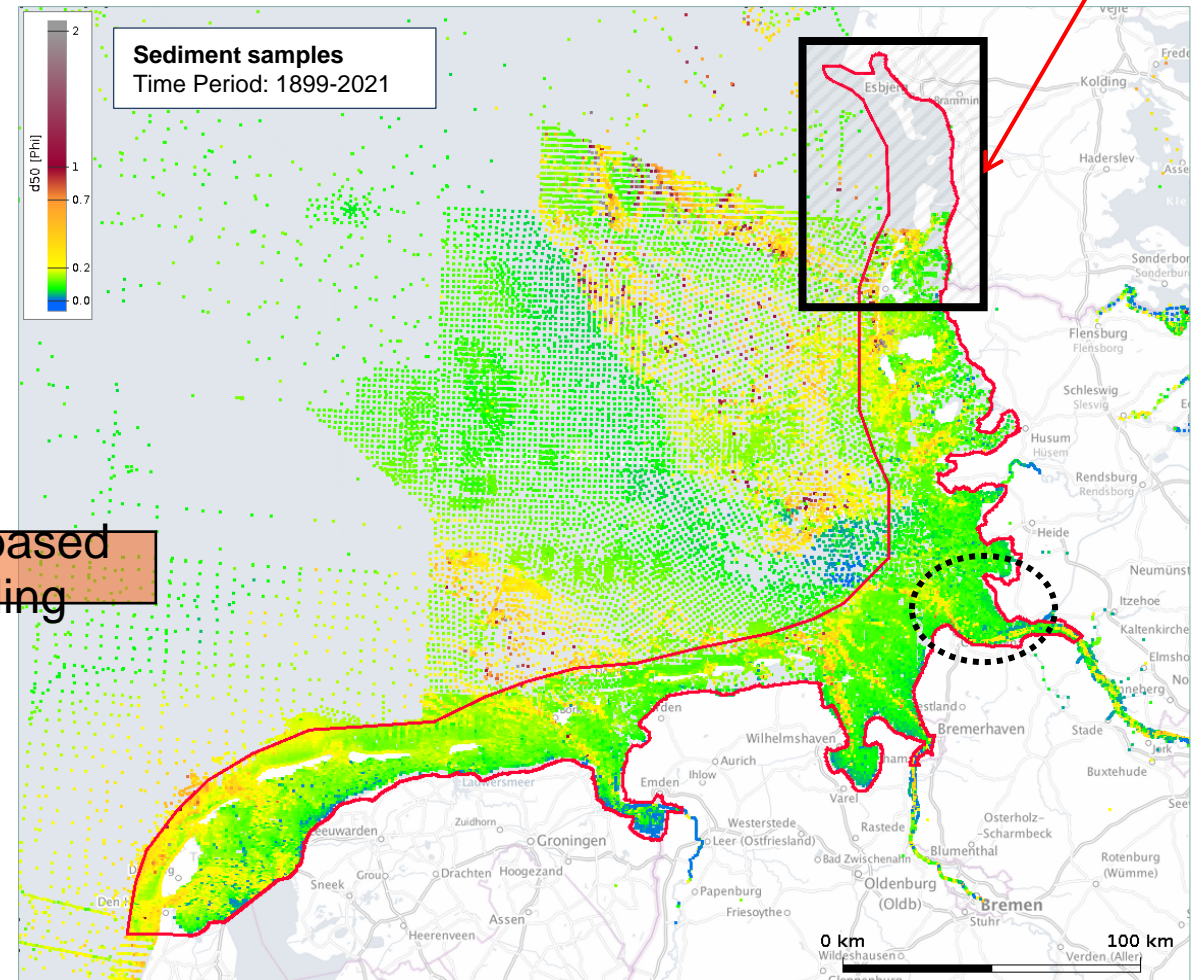


# Coverage of the sedimentological data collected up to date

- ~45.000 surface sediment samples collected for the project area.
- Up to date insufficient data covering the
- Danish Wadden Sea area obtained.

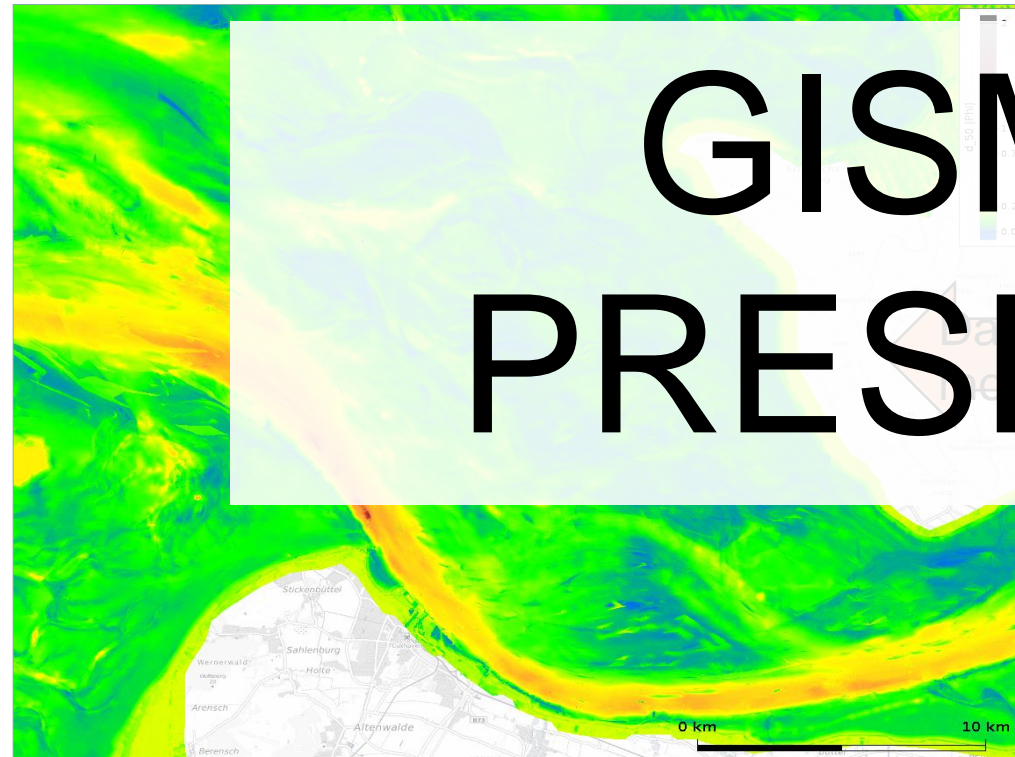


Data-based modelling

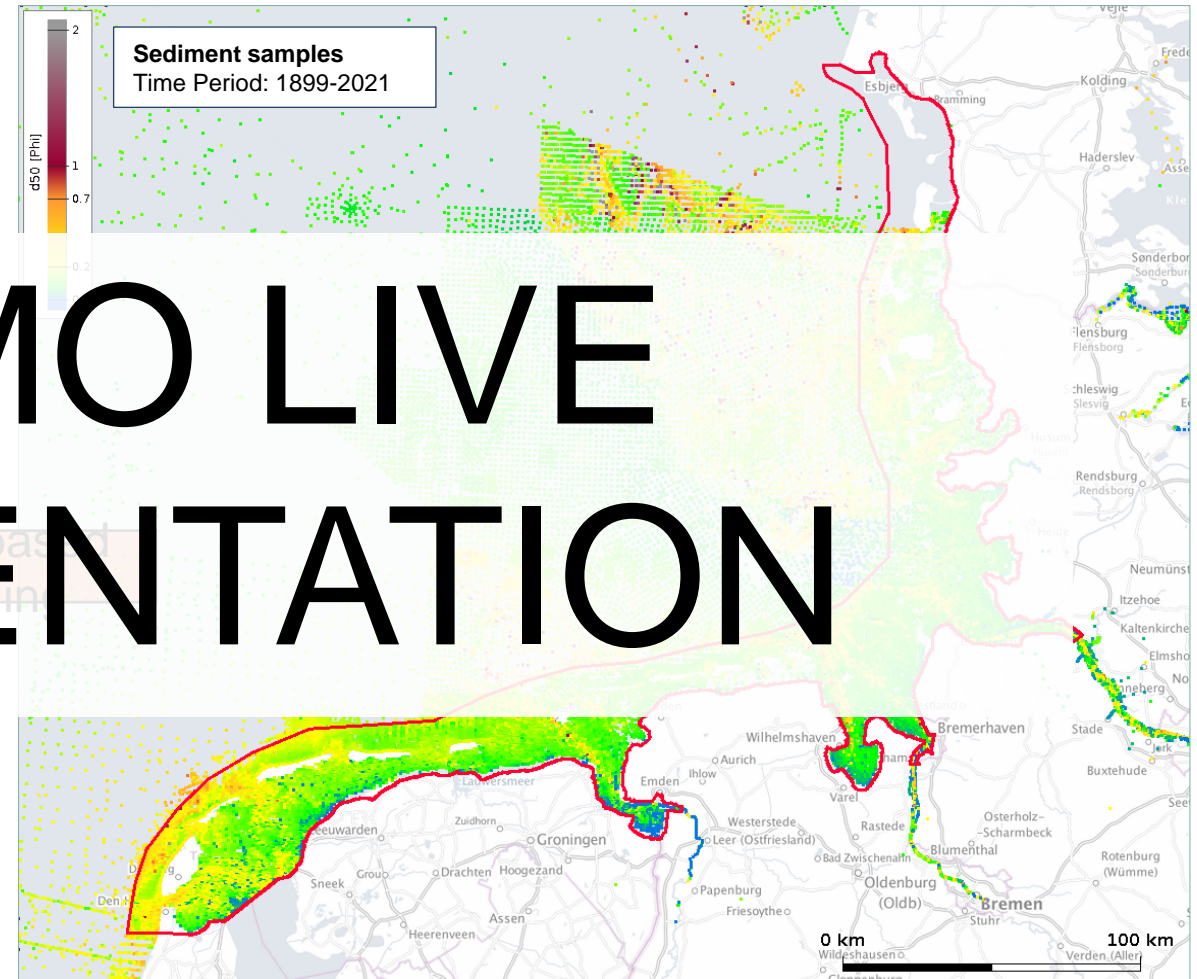


# Coverage of the sedimentological data collected up to date

- ~45.000 surface sediment samples collected for the project area.
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# GISMO LIVE PRESENTATION





# Catalog of Products

## Base Product

### Bathymetry

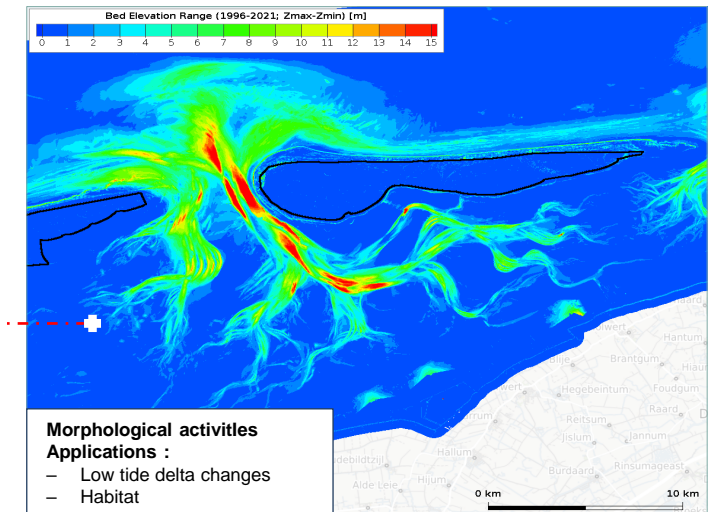
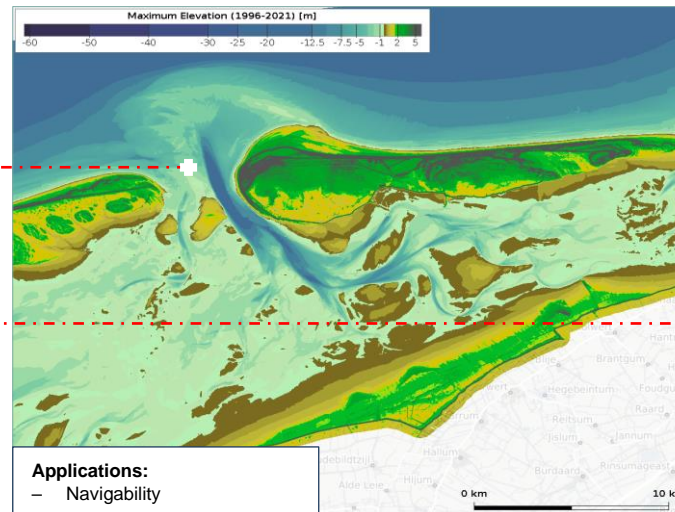
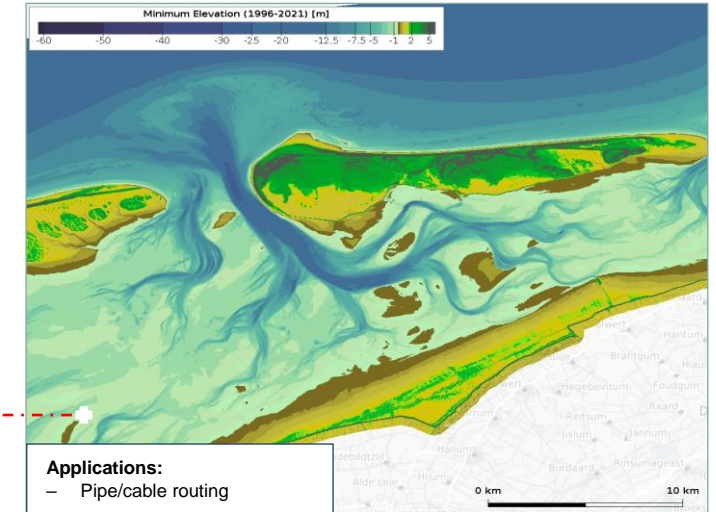
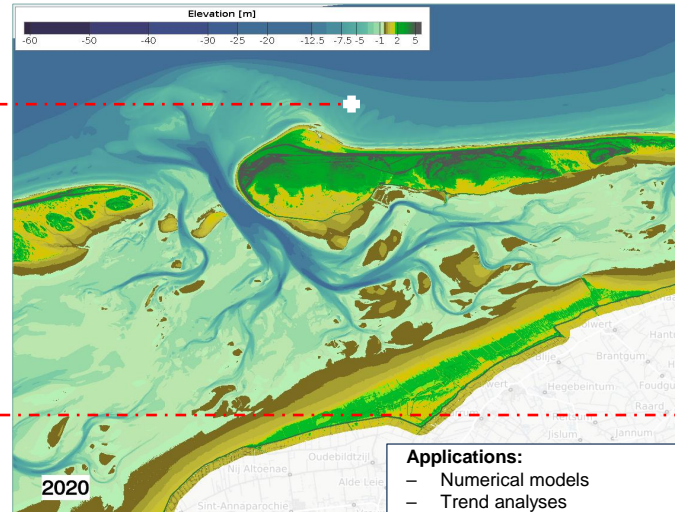
Yearly elevation ( $Z_{01-Jul}$ )

Minimum elevation ( $Z_{min}$ )

Maximum elevation ( $Z_{max}$ )

Bed elevation range ( $Z_{max}-Z_{min}$ )

### Sedimentology



# Catalog of Products

## Base Product

Bathymetry

Sedimentology

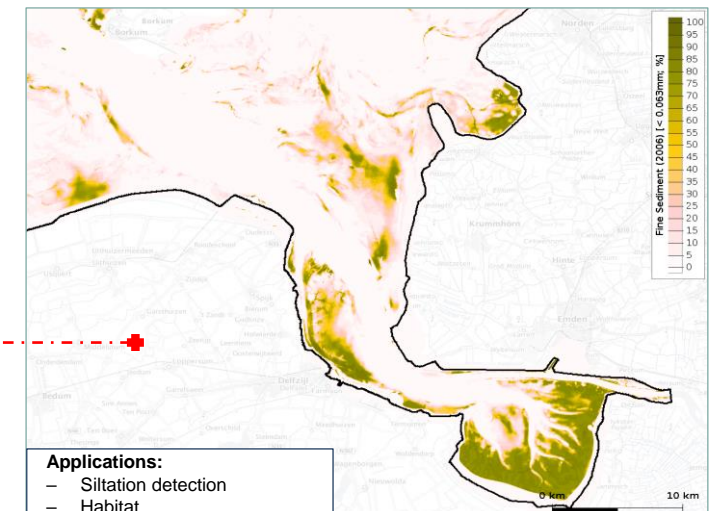
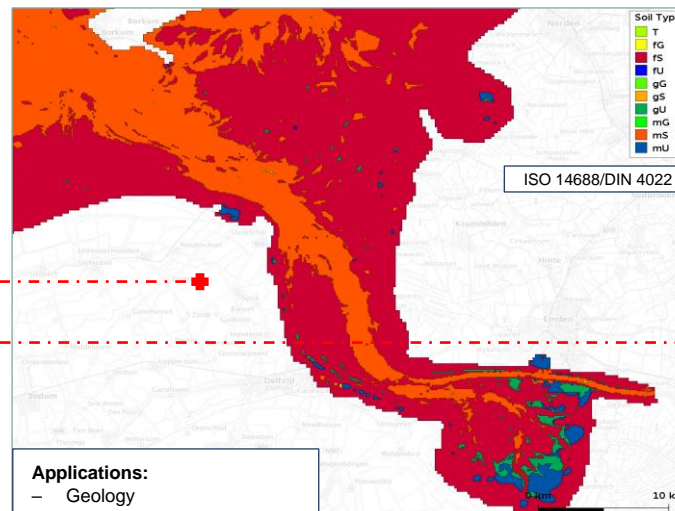
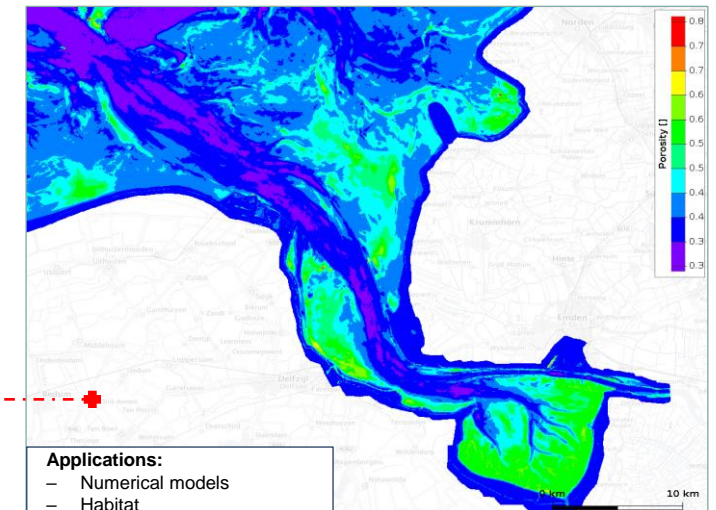
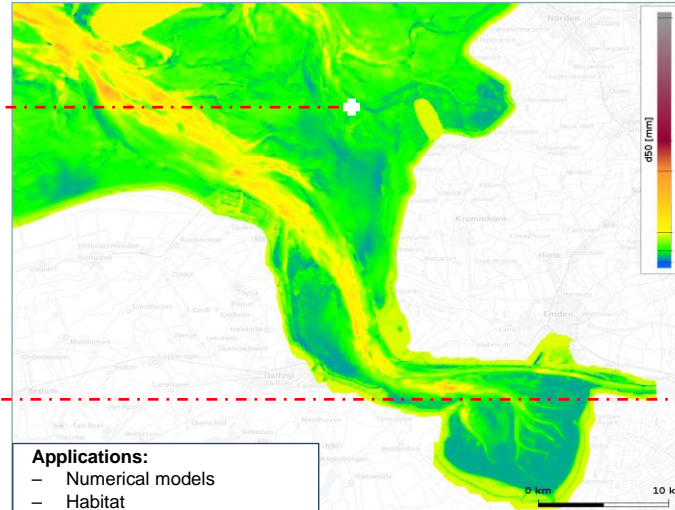
Yearly grain size cumulative distribution curve

Median grain size (d50)

Porosity

Petrographic Maps [i.e. Folks]

Grain classification [i.e. <math><65\mu\text{m}</math>, fine sand, etc.]



# Catalog of Products

## Analyses

Eulittoral development of tidal flats

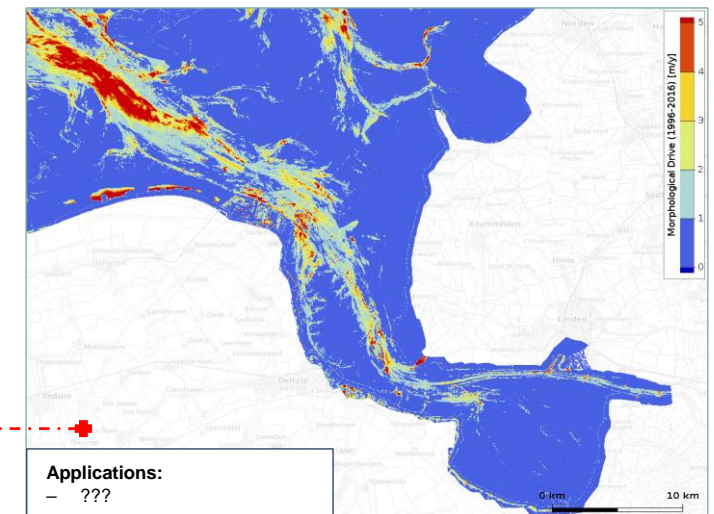
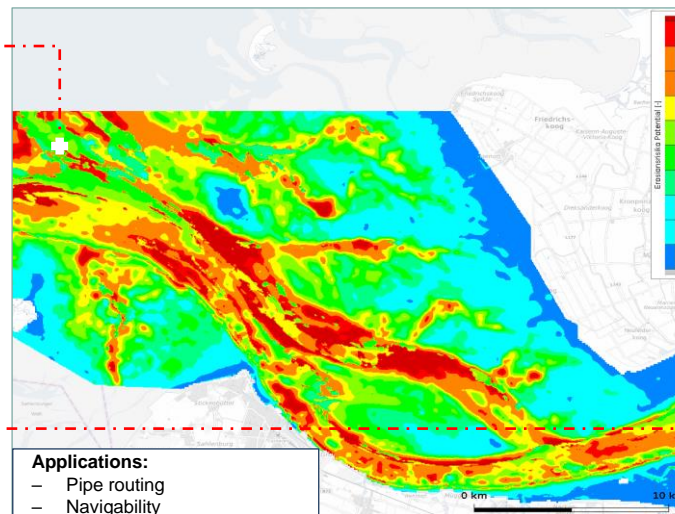
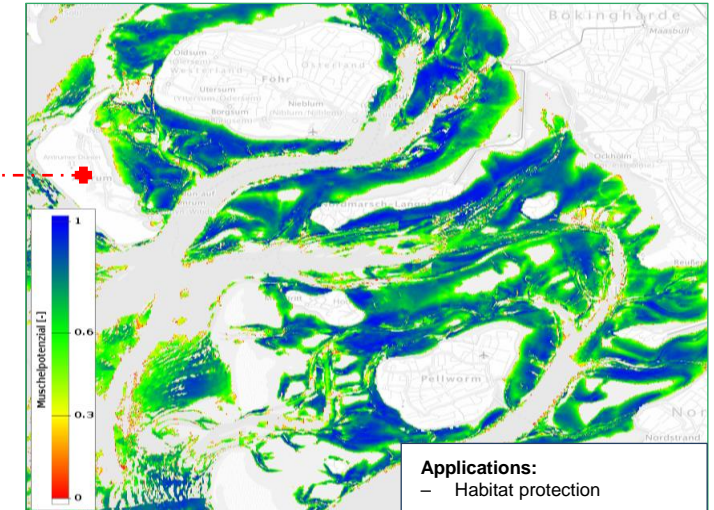
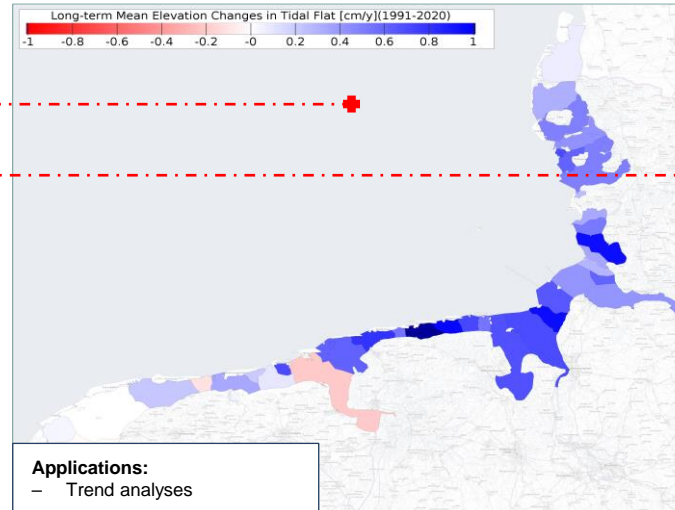
Time series of changes in tidal flat area and elevation

Potential and Risk Maps

Mussels habitat potential

Erosion risk

Morphological Drive



# Catalog of Products

## Analyses

Eulittoral development of tidal basins

Time series of changes in tidal flat area and elevation

Potential and Risk Maps

Report components

Monitoring Report Sheets

Figures/Illustrations

Files (.csv, .shp, .xlsx, etc.)


Services & maintenance

**Monitoring Report Sheet**

Tidal flat development  
Changes in mean elevation  
(1991-2020)

I. Source	
1. Author	Diego Pineda
2. Organization	smile consult GmbH
3. Address	Schiffgraben 11 30159 Hanover, Germany

II. Classification	
1. Area	Netherlands
2. Measuring station/area	Borndiep tidal flat



Tidal flat catchment area © OpenStreetMap

3. Subarea/profile	-
4. Reference system	EPSG: 28992 / NAP
5. Time reference	1991-2020
6. Parameter	Tidal flat development
7. Description	Changes in mean elevation

III. Input Data	
1. Profile/Area Dataset	Borndiep_Wattgebiet.shp
2. Elevation model database	waddensee_####.grd (###: 1991-2020)
3. Elevation interval	-2 m to 2 m NAP

IV. Main indicator	
1. Definition	Long term and Short term mean tidal flat elevation changes per year (cm/yr).
2. Method description	Difference analysis carried throughout long term (30 years) and short term period (10 years) for yearly elevation changes within the elevation interval.

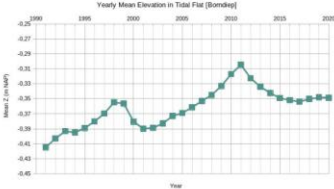
1 10. January 2023

**Monitoring Report Sheet**

Tidal flat development  
Changes in mean elevation  
(1991-2020)

3. Evaluation	Long term mean change	Short term mean change
	0,22 cm/yr	-0,44 cm/yr

4. Visualization



Borndiep tidal flat yearly mean elevation [-2 m, 2 m NAP] for the period 1991-2020.

V. Secondary indicators		
Definition	Value	Unit
Tidal flat mean elevation 1991	-0,41478	m NAP
Tidal flat mean elevation 1992	-0,40304	m NAP
Tidal flat mean elevation 1993	-0,39325	m NAP
Tidal flat mean elevation 1994	-0,39503	m NAP
Tidal flat mean elevation 1995	-0,38900	m NAP
Tidal flat mean elevation 1996	-0,38027	m NAP
Tidal flat mean elevation 1997	-0,36970	m NAP
Tidal flat mean elevation 1998	-0,35468	m NAP
Tidal flat mean elevation 1999	-0,35632	m NAP
Tidal flat mean elevation 2000	-0,38050	m NAP
Tidal flat mean elevation 2001	-0,39000	m NAP
Tidal flat mean elevation 2002	-0,38875	m NAP
Tidal flat mean elevation 2003	-0,38292	m NAP
Tidal flat mean elevation 2004	-0,37294	m NAP

2 10. January 2023

