

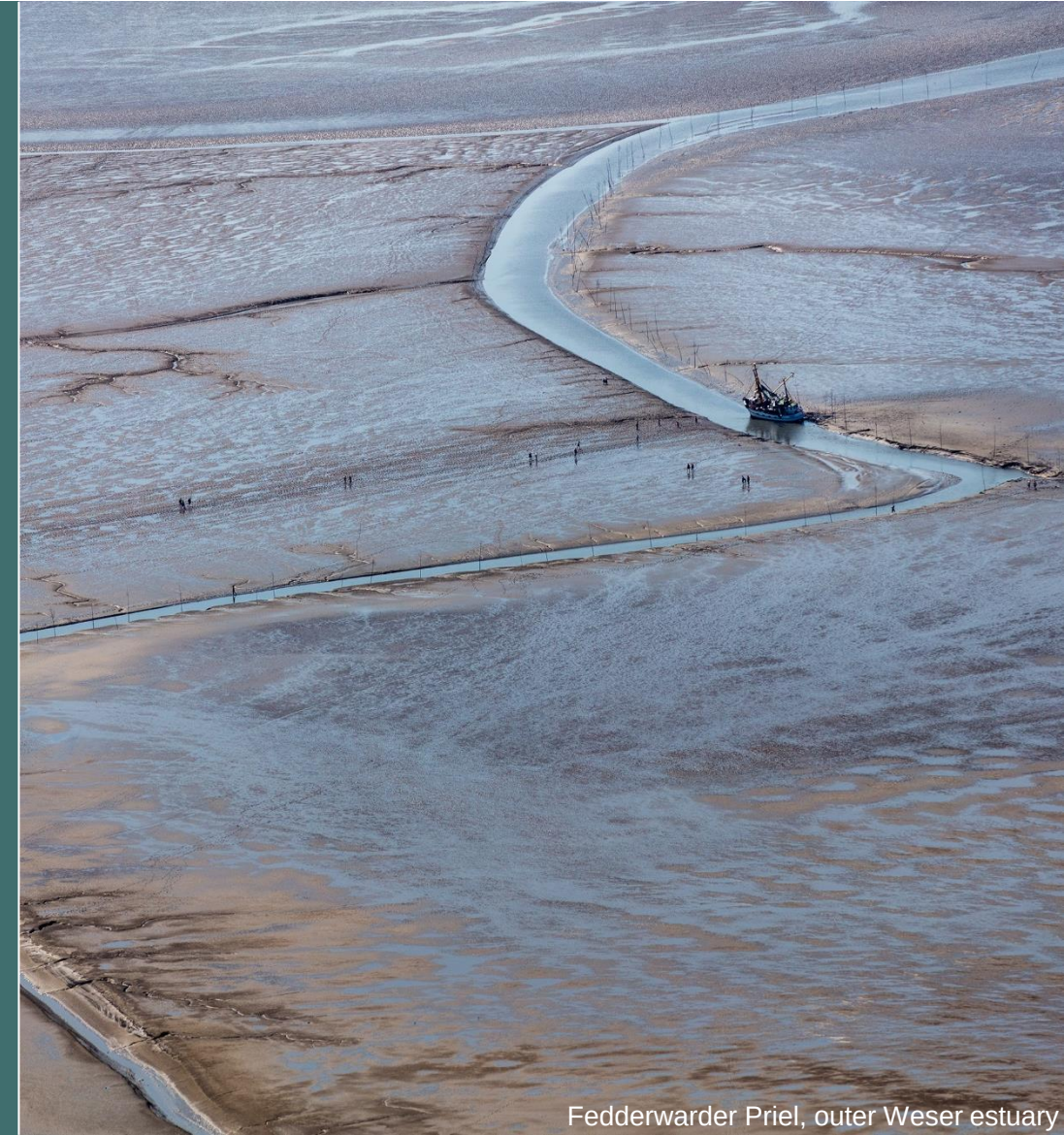
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Hydrodynamic Modeling

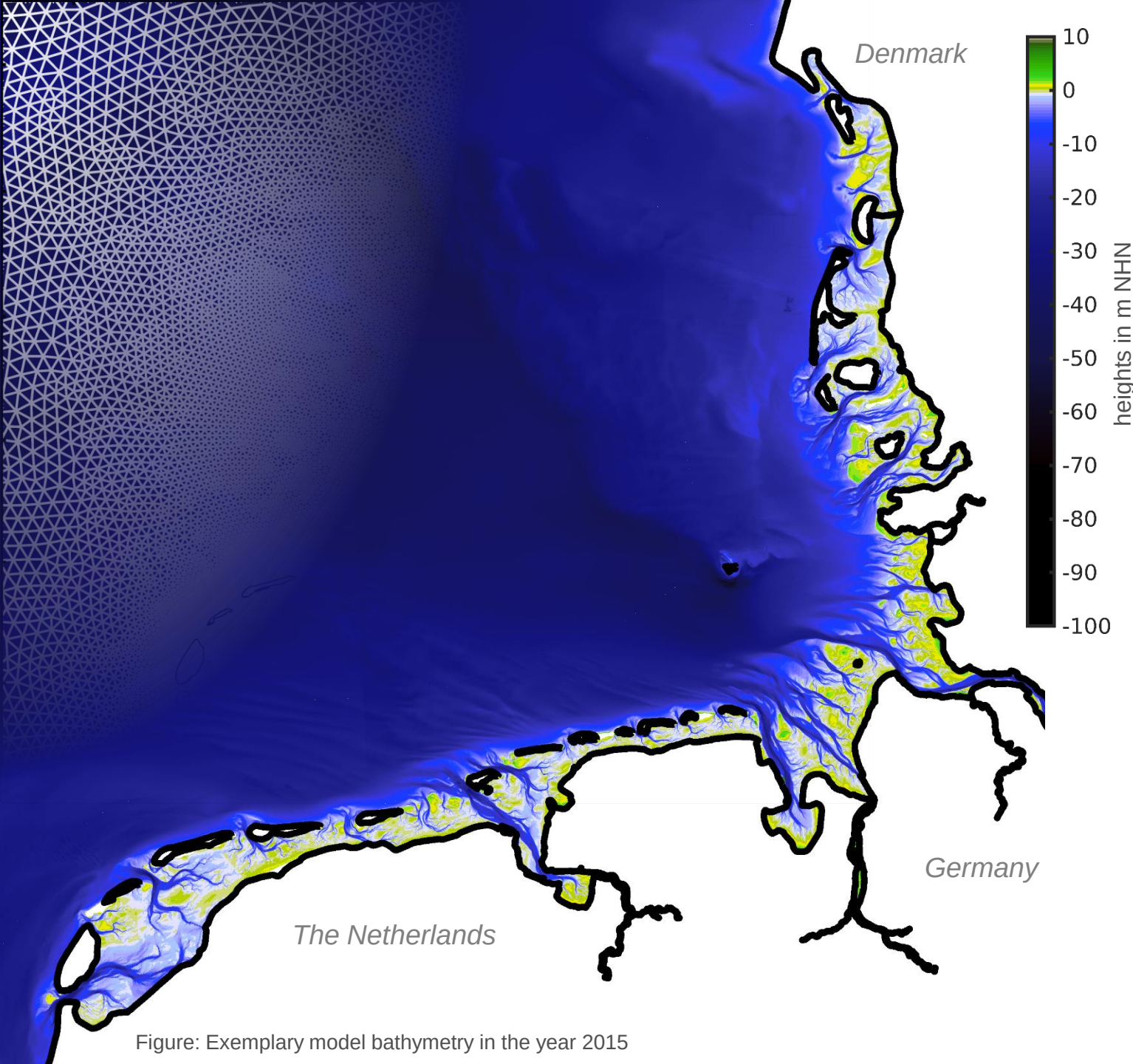
Tidal characteristics, suspended sediments and salinity

2nd TrilaWatt Workshop

Hamburg, 16th February 2023



Fedderwarder Priel, outer Weser estuary



Objective

Modeling the Wadden Sea

- Our novel bathymetry and surface sediment data will be implemented in a numerical model
- Product data is a full hydrodynamic survey
 - Tides (SSH, current velocity)
 - Salinity
 - Temperature
 - Suspended Sediments
 - Waves

Data products groups

- Modeling output
- Tidal characteristics

Time coverage

- 2005, 2010, 2015 to 2020

Figure: Exemplary model bathymetry in the year 2015

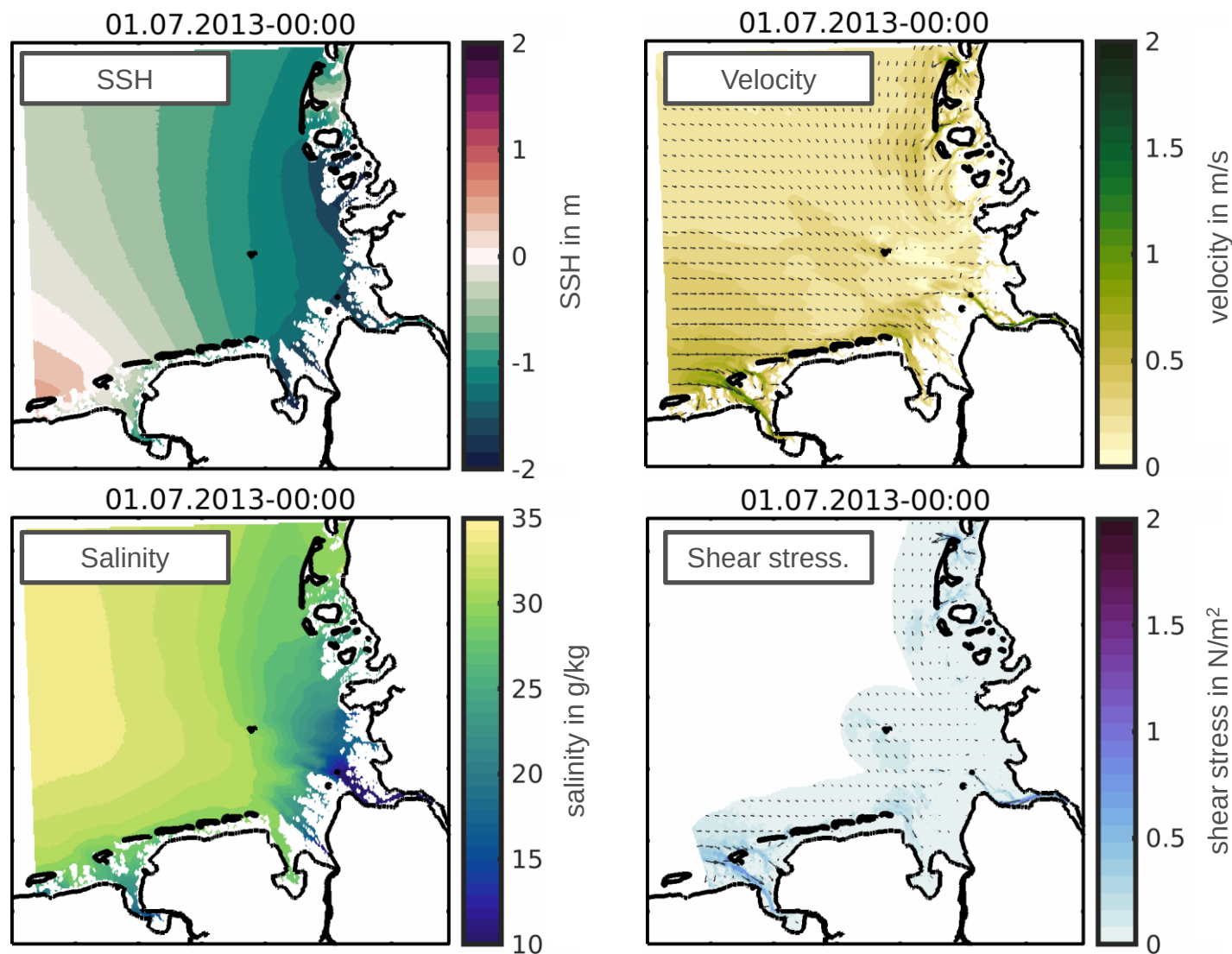
Full simulation output

Data products from numerical modeling

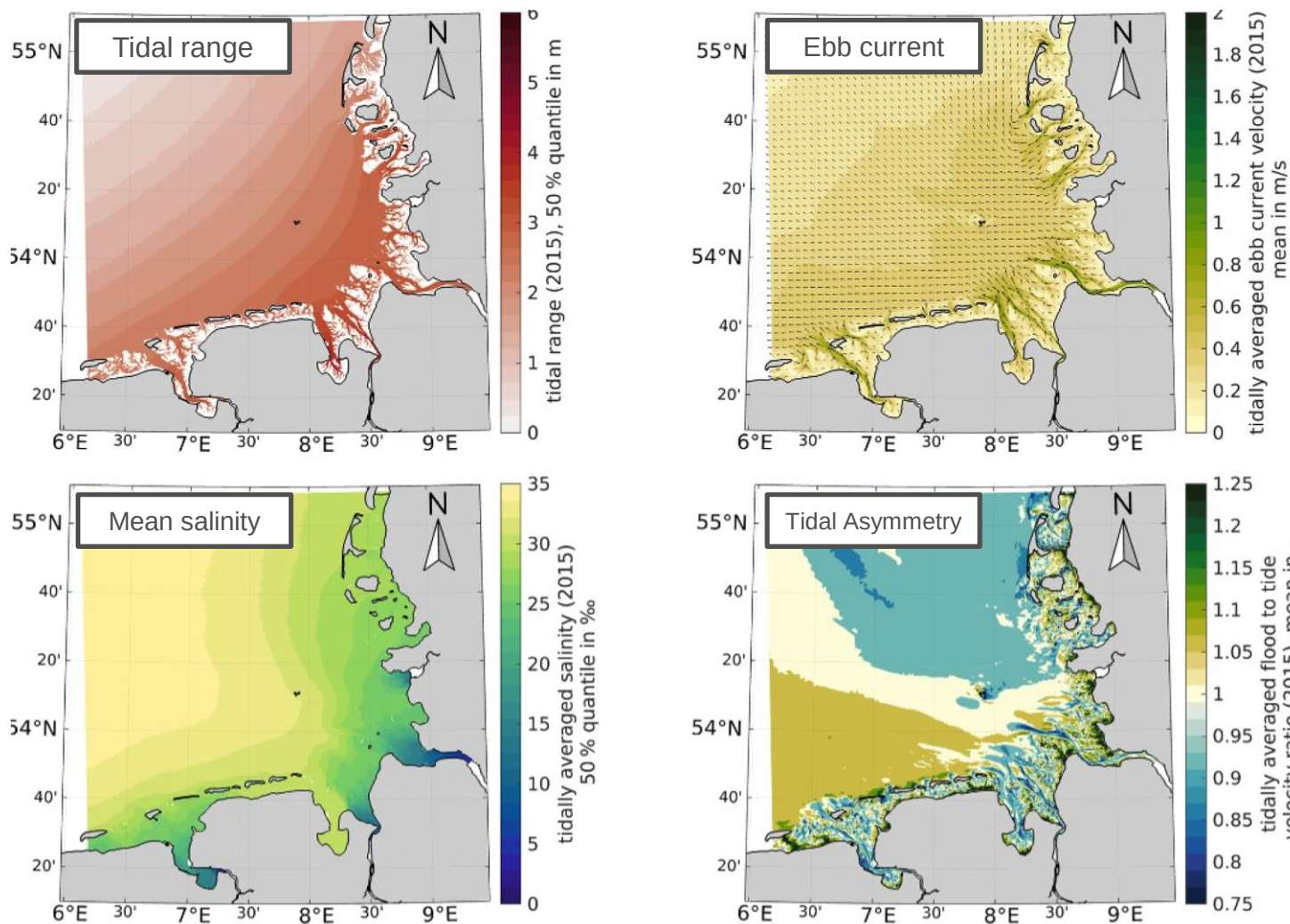
- sea surface height (SSH)
- current velocity
- salinity
- temperature
- bottom shear stress
- anorganic suspended sediments
- waves

Possible data properties

- Structured NetCDF files
- 20 minute intervals
- 1 km grid resolution



Tidal characteristic data



- Numerical modeling data are processed to tidal characteristics and statistics

Possible data products

- Mean annual tidal range
- Mean/peak annual tidal high water
- Mean annual flood duration
- Mean flood/ebb current velocity
- Tidal asymmetry
- ...

Possible data properties

- Structured GeoTIFF files
- 100 m resolution

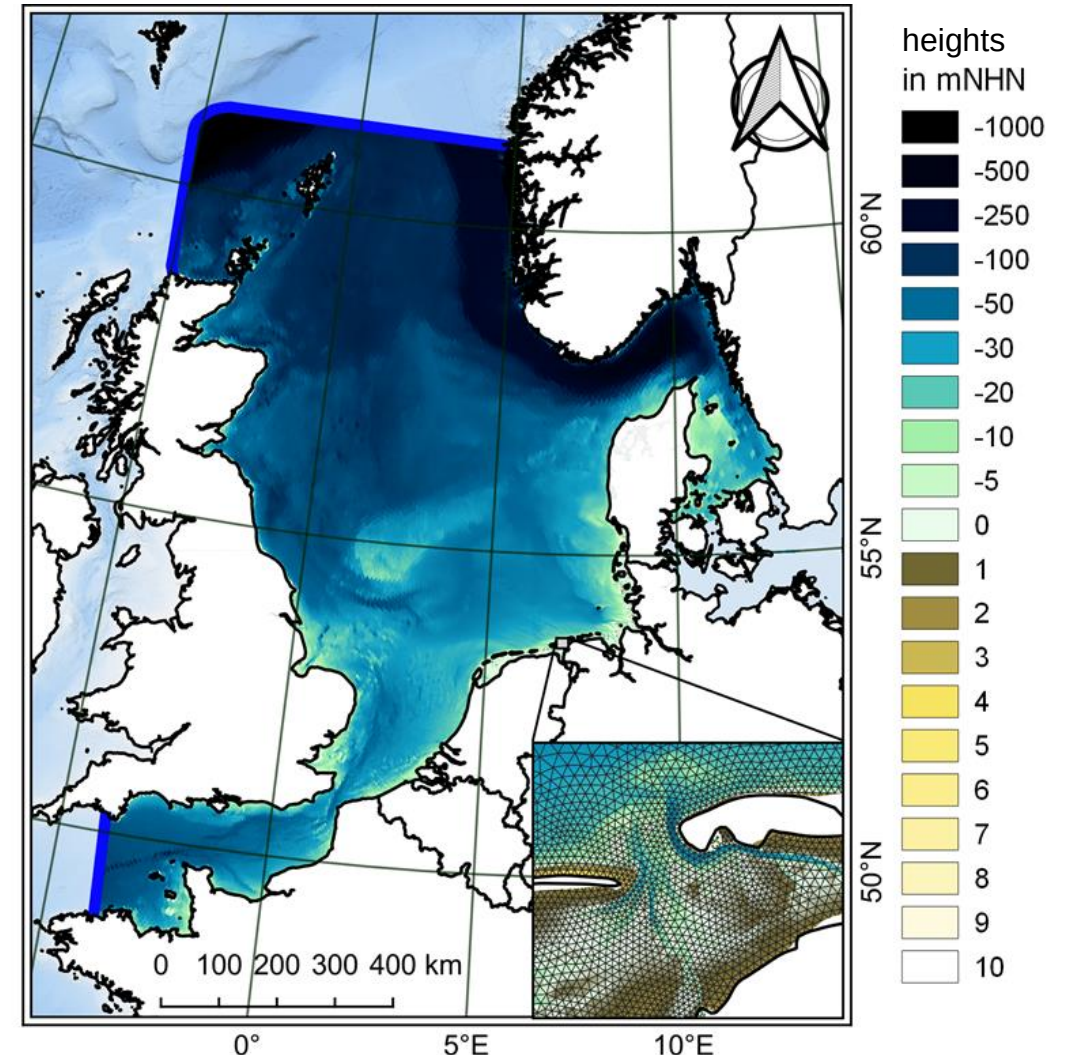
Model Set-Up

Grid resolution

- 350.000 unstructured grid cells
 - With more than 15.000.000 refining subgrid cells
- Horizontal resolution in the Wadden Sea: 200 m
- Vertical resolution until -10 mNHN: 0.5 m

Model Forcing

- Sea surface heights (SSH):
 - Tidal constituents from FES2014b & MSL / surge assimilation
- Open boundary temperature and salinity
 - 3D data from Copernicus (CMEMS)
- Atmospheric forcing
 - COSMO-REA6 / ICON-EU from DWD
- River Runoff (observations)
- Bathymetry and surface sediments from TrilaWatt



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