Coastal Digital Twin of the World's Largest Tidal Flat System

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Abstract: https://doi.org/10.5194/egusphere-egu25-19359

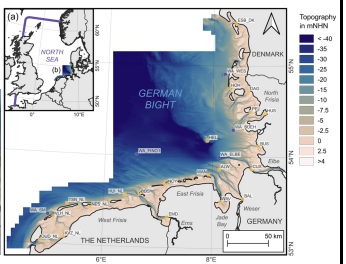
BAW Coastal Information System: https://mdi-dienste.baw.de/viewer/

BAW Datenrepository: https://datenrepository.baw.de/

The Wadden Sea – The World's Largest Tidal Flat System

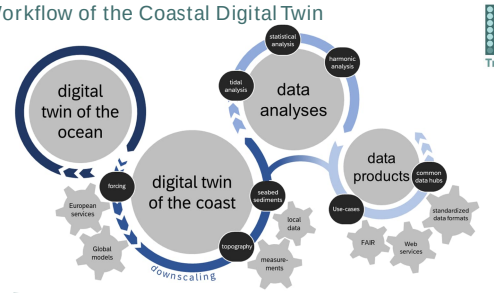
- Unique ecosystem (UNESCO World Heritage)
- Economically important
- Reliable high-resolution data needed for science, engineering and policy-making
- Lack of consistent data before TrilaWatt

Seals in the Wadden Sea © Casper Tybjerg



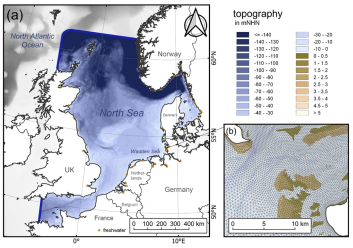
Workflow of the Coastal Digital Twin

TrilaWatt



Model Setup for the Coastal Digital Twin

- Hydrodynamic model UnTrim2 coupled to sediment model and wave model (Casulli and Walters 2000, Casulli 2009, Malcherek et al. 2002, Schneggenburger et al. 2000)
- Unstructured grid (△ and ▭) with 250 m resolution in the Wadden Sea
- Refined topography resolution (over 16 million subgrid elements)
- Vertical resolution with 70 z-layers
- Boundary data from NEMO model of Copernicus Marine Service (CMEMS)



Wadden Sea Data provided by TrilaWatt (open and FAIR)

From 1996 to 2022:

Annual topographies on a 10-m grid

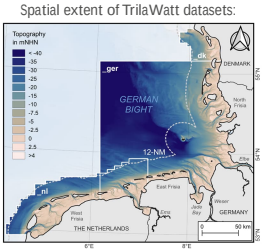
From 2015 to 2022:

Simulation Output (500 m, Δt = 20 min)

Hydrodynamic Analyses (20 m, yearly)

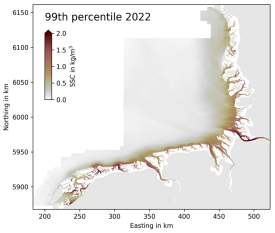
- tidal characteristics
- temperature, salinity, sediments
- surface wave characteristics
- and many more (> 200 products per year)

Spatial extent of TrilaWatt datasets:

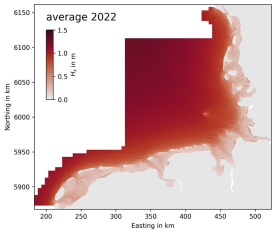


Examples of TrilaWatt Data Products

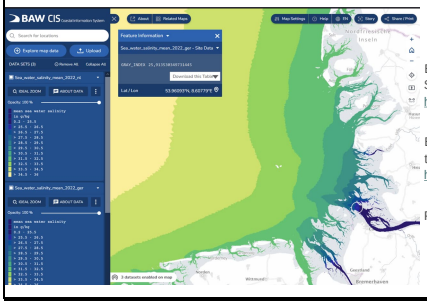
Suspended sediment concentration



Significant wave height



Interactive DataViewer and Data Download



BAW Coastal Information System to view the data:
https://mdi-dienste.baw.de/viewer/

BAW Datenrepository to download the data (soon):
https://datenrepository.baw.de/

Paper in preparation

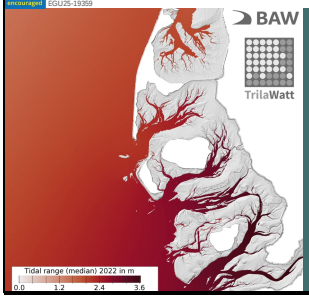
Summary & Outlook

TrilaWatt

- High-resolution data
- User interaction
- Public involvement
- Real-time data

→ Coastal Digital Twin

Interactive data viewer →



Looking forward to seeing TrilaWatt data used in your projects!

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https://trilawatt.eu

References

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