Ludwig-Franzius-Institute
for Hydraulic, Estuarine and
Coastal Engineering

Leibniz
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Hannover

Development of seastate maps for the German Bight based on real-time data from multiple measuring sites

RAVE online Workshop 2022 - 03.02.2022

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Outline

- Data basis

- MetOcean data analysis

- Seastate maps based on real-time data

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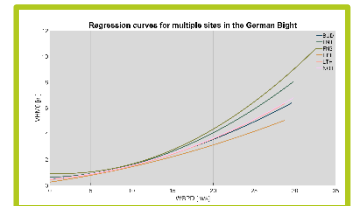for Hydraulic, Estuarine and
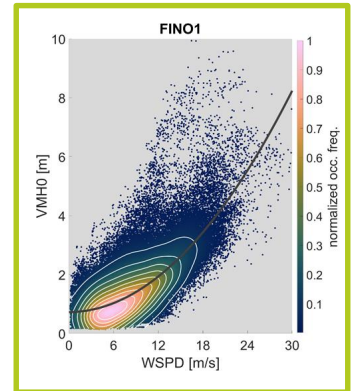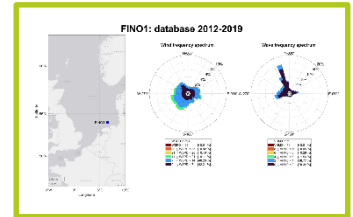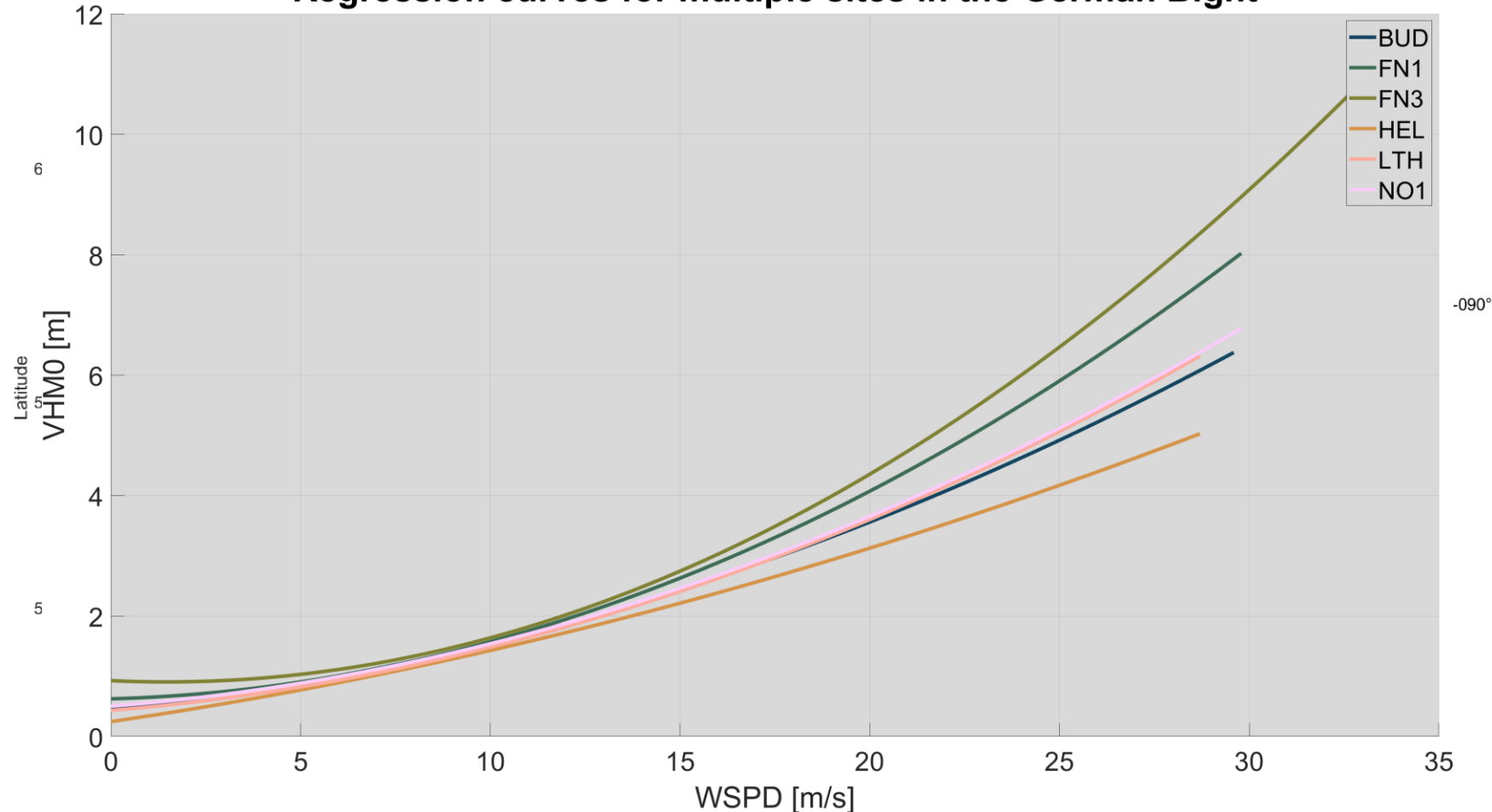Coastal Engineering

Data basis

- Multiple measuring sites in German Bight

- Live and historical data of wind, wave & current

- Provided and quality controlled by the
  Federal Maritime and Hydrographic Agency (BSH)

- Data can be accessed via **BSH Seastate Portal**

Overview sites

©BSH
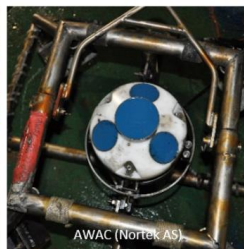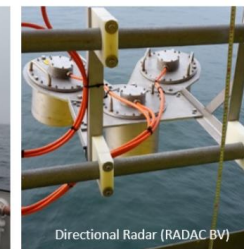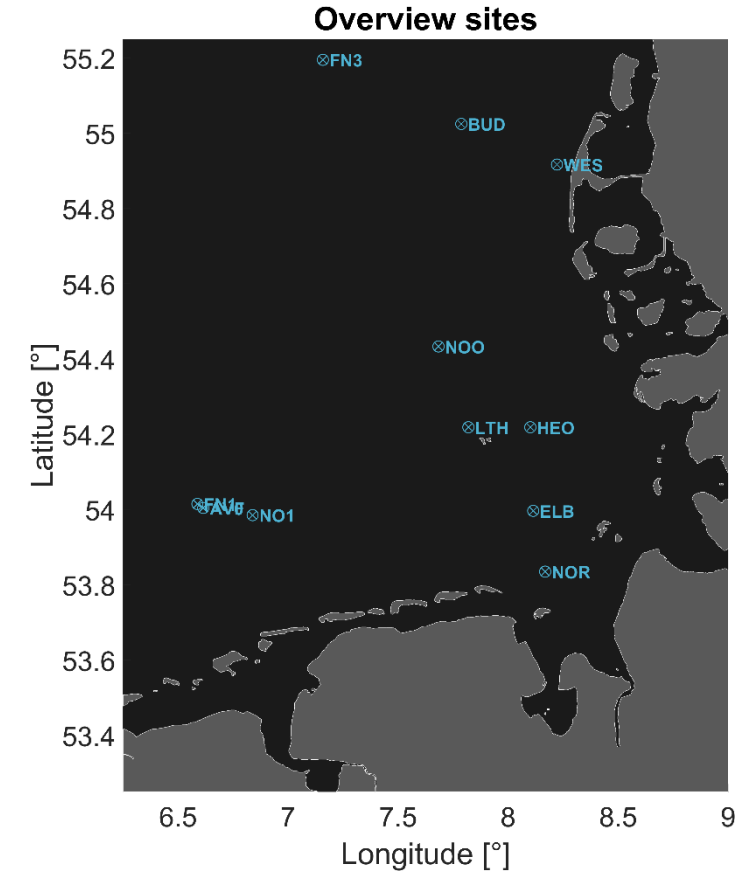
Analysis of environmental data

Aims of the seastate module

- Real-time seastate map based on live data and correlation results

- Maps as assessment basis in the German Bight for offshore logistic vessel operations

- Implementation as module into the sea state portal

➢ Is there a need for this seastate map?

Numerical Wave Model (WAM)

- Introduced in 1988 by an international group of experts («WAMDI Group»)

- Spectral seastate model

- With its numerical atmospheric models, the German Weather Service (DWD) calculates forecasts for wind and waves based on the WAM several times a day:

  - Global: GWAM
  - Europe: EWAM
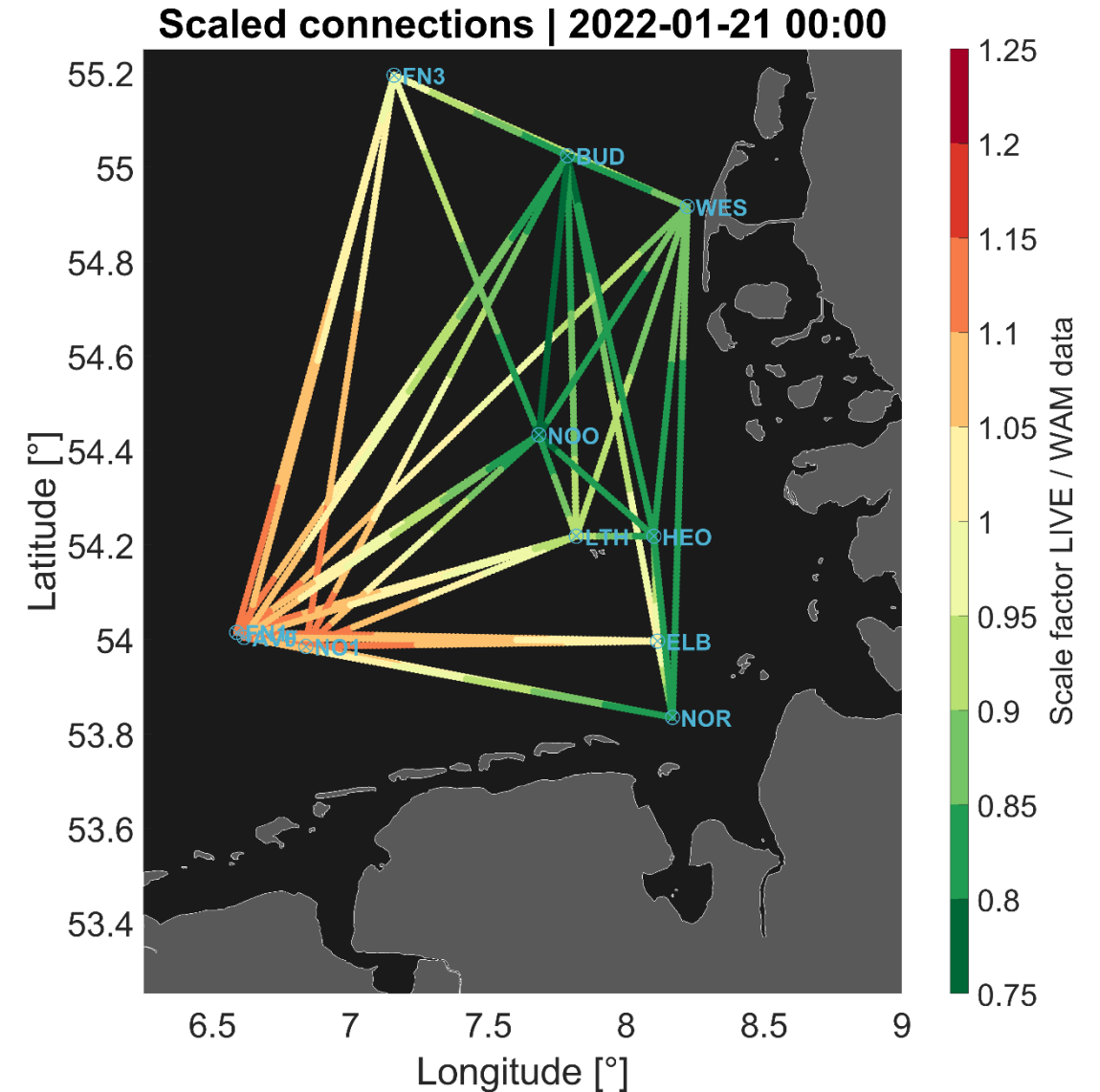 - German Bight: CWAM

CWAM model | 2022-01-19 01:30
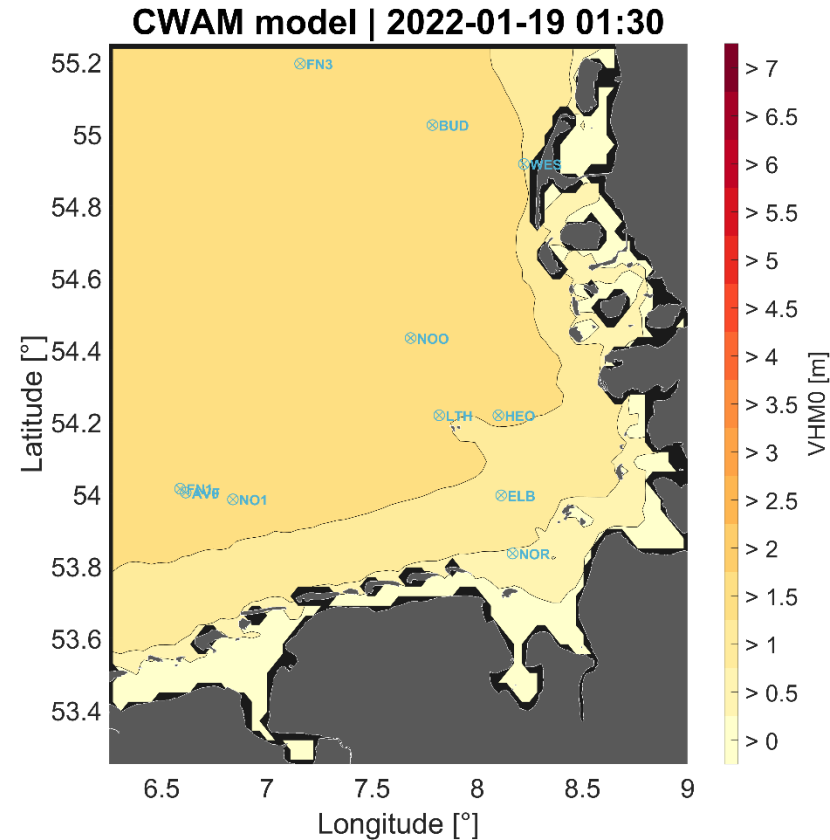
Numerical Wave Model (WAM)

- Live & WAM VHM0 data at measuring sites from 01/19 – 01/21/2022

- Differences of up to ±1.5m

➤ Combining the advantages of accuracy of live data and availability of the WAM


CWAM model | 2022-01-19 01:30
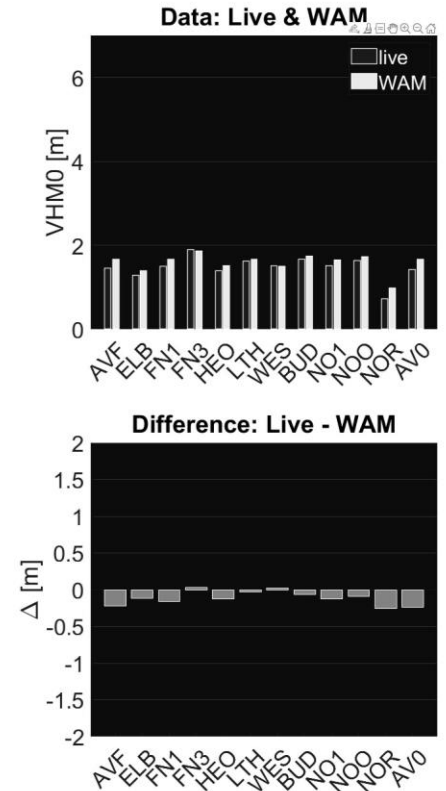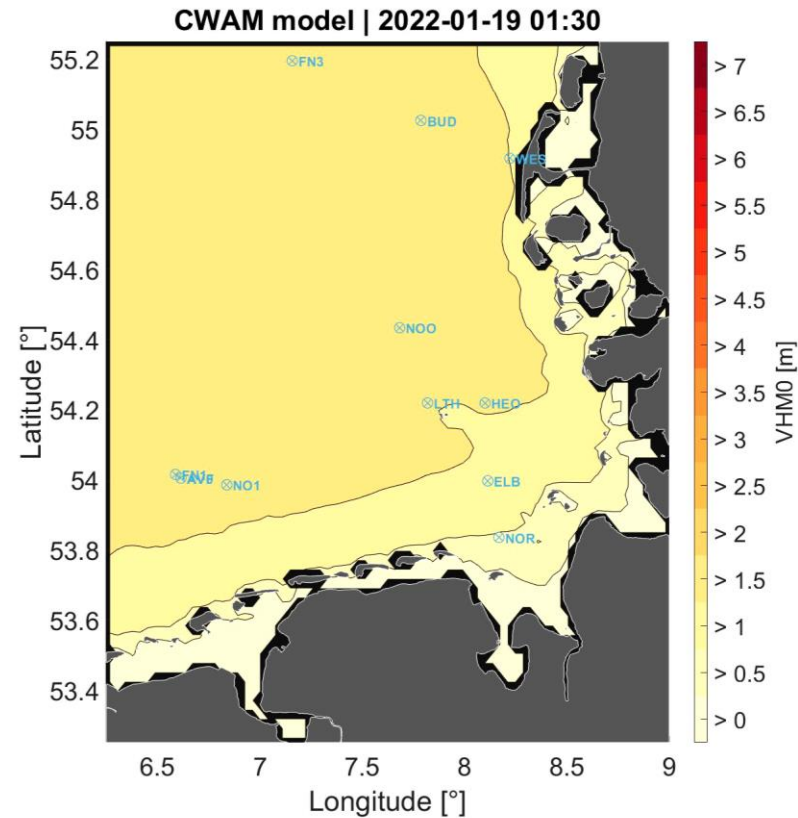
Methodology of map creation

- Number of measuring sites in the German Bight > 10

- Identify scale factor = $\dfrac{\text{live data}}{\text{WAM data}}$ for each site

- Identify connections between sites

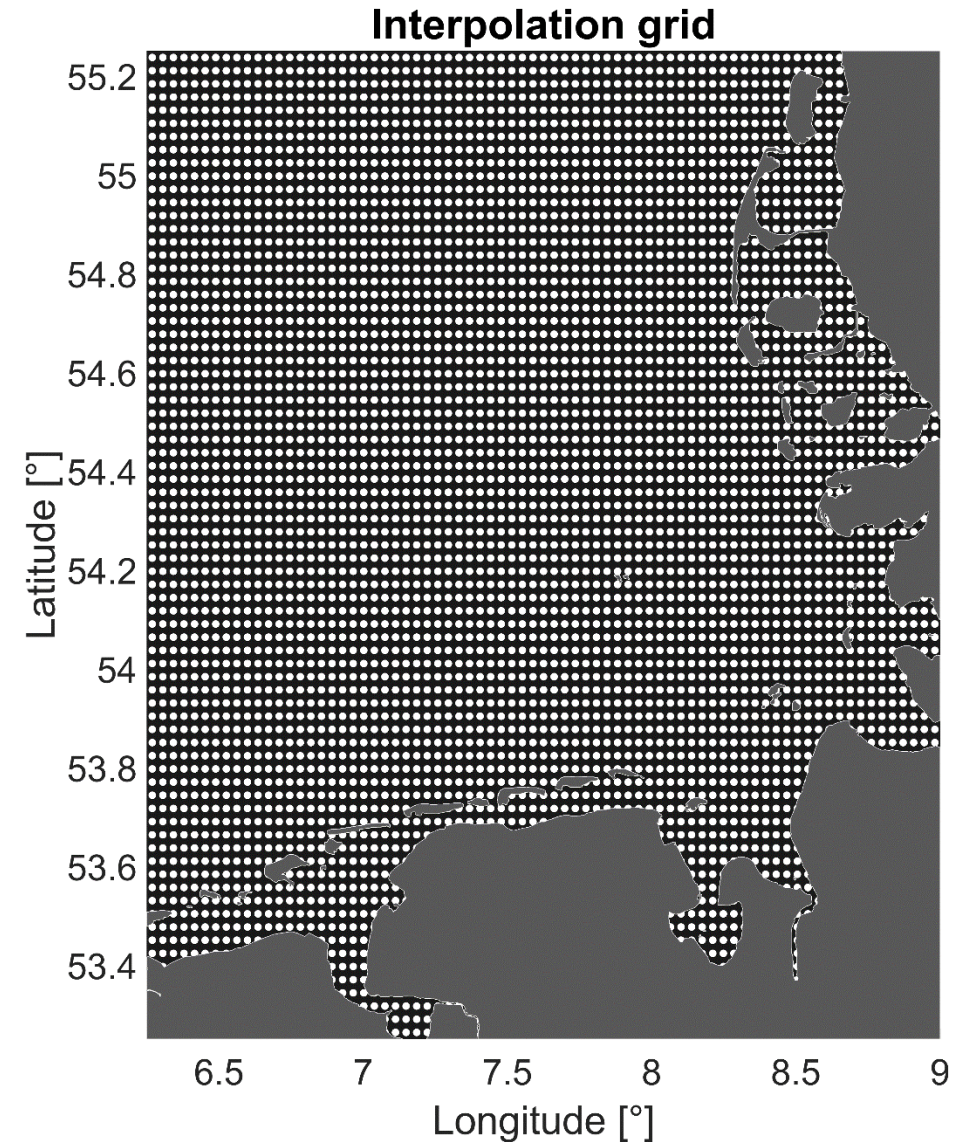- Interpolate scale values between end points of each line

Scaled connections | 2022-01-21 00:00

Methodology of map creation

- Discretization of the German Bight as NxM grid

Interpolation grid

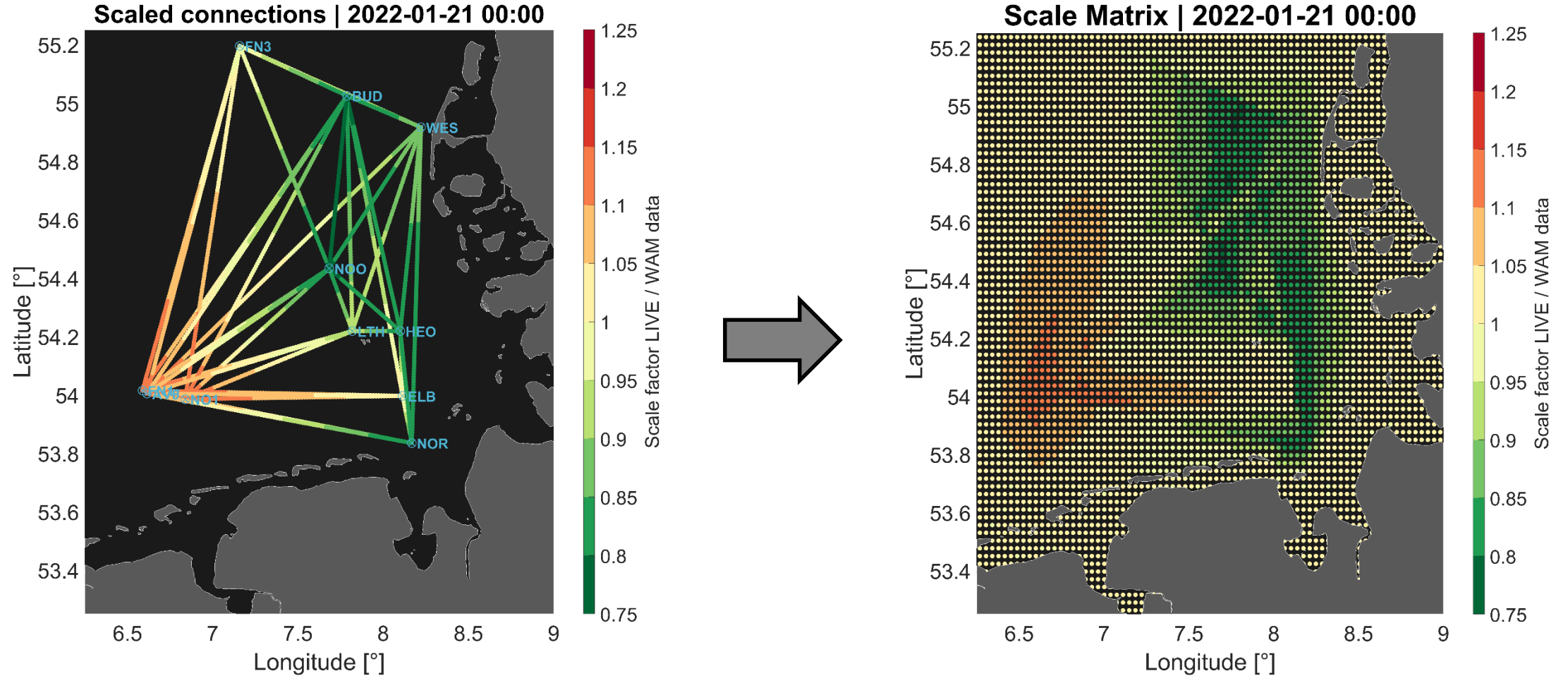# Methodology of map creation
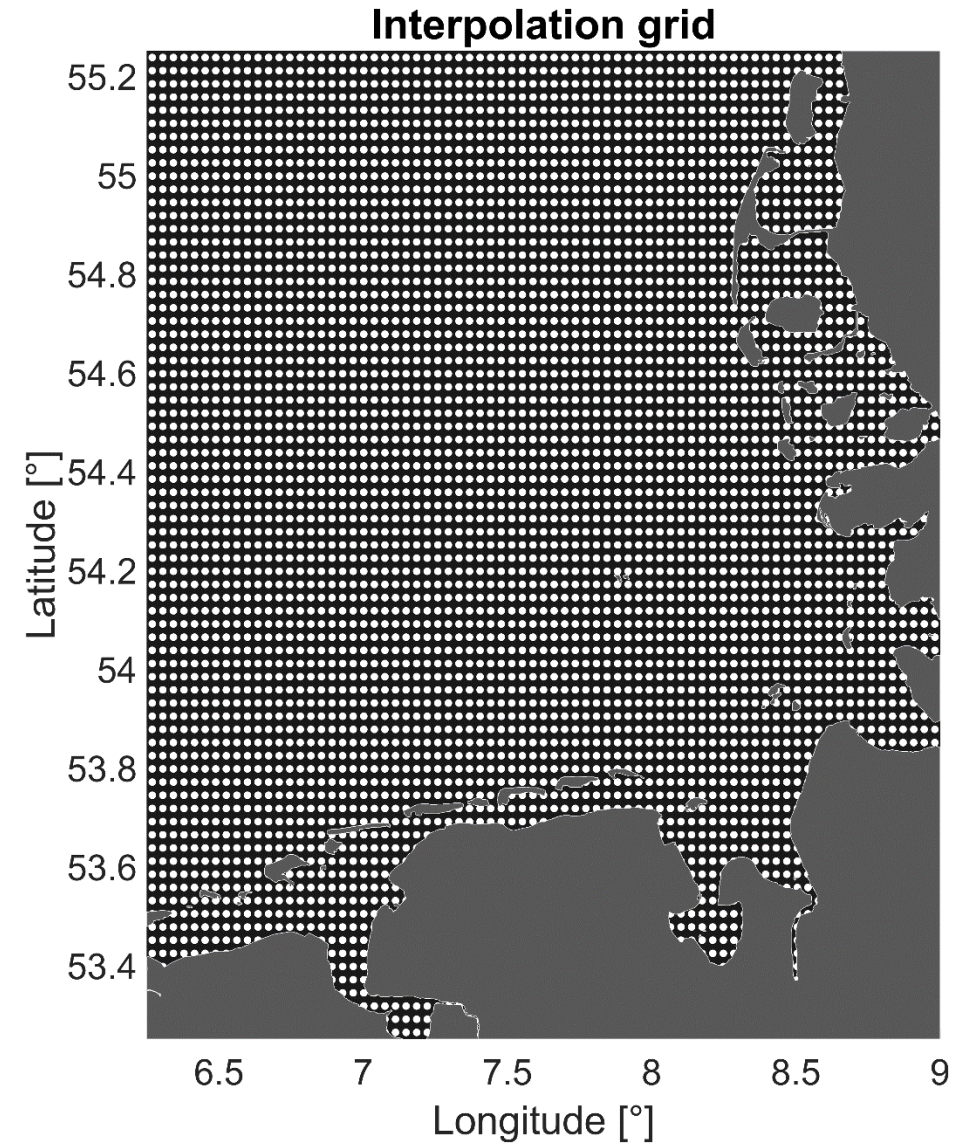
- Discretization of the German Bight as NxM grid

- Scale interpolation lines as input for creation of scale matrix
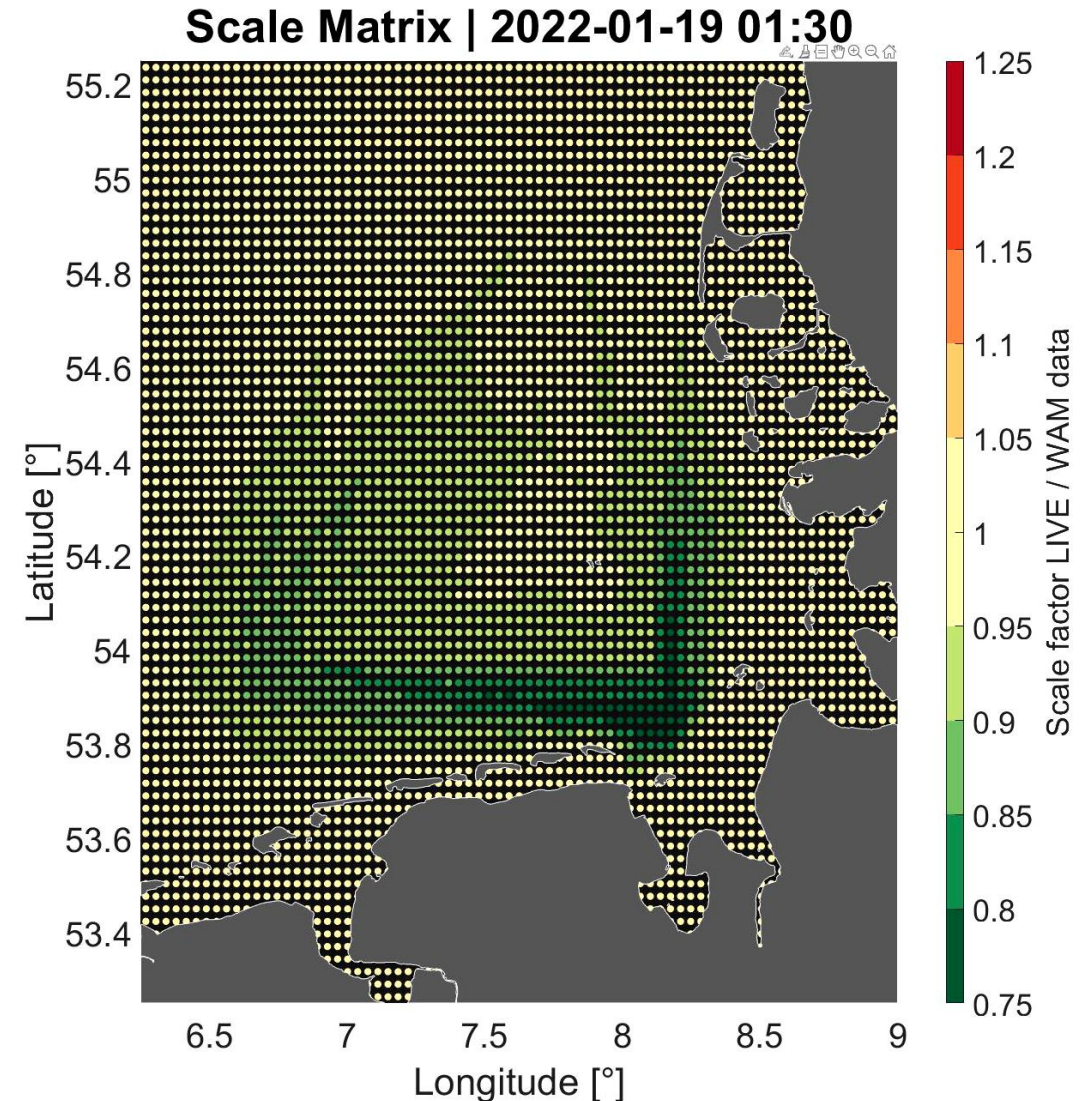
Interpolation grid
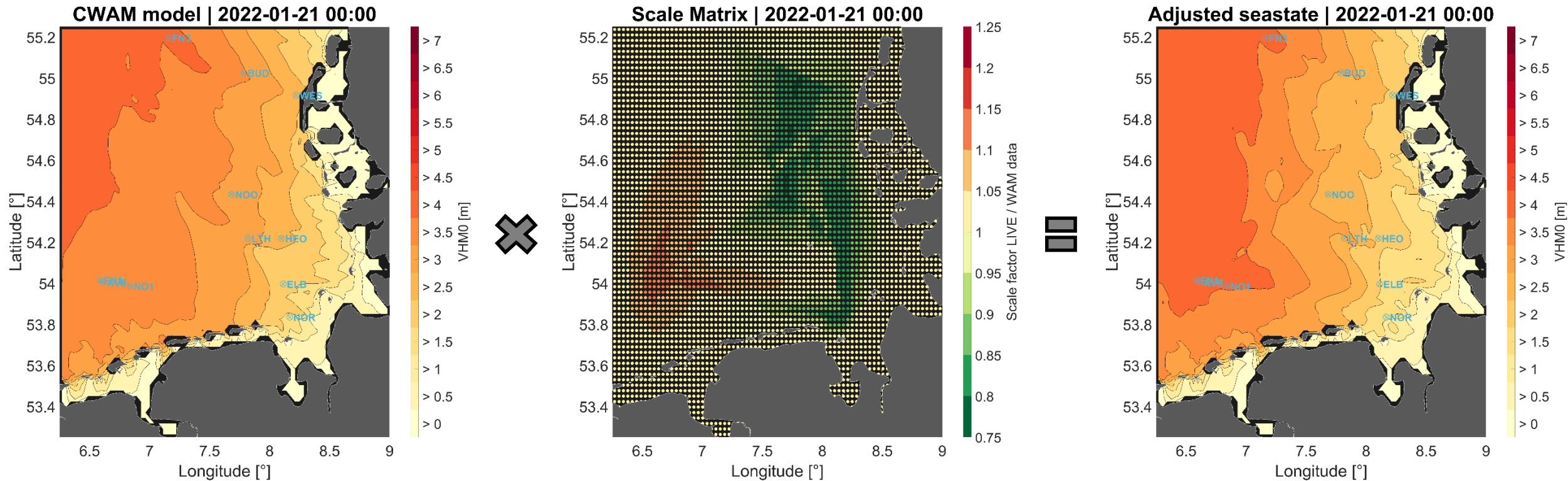
Methodology of map creation

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- Discretization of the German Bight as NxM grid

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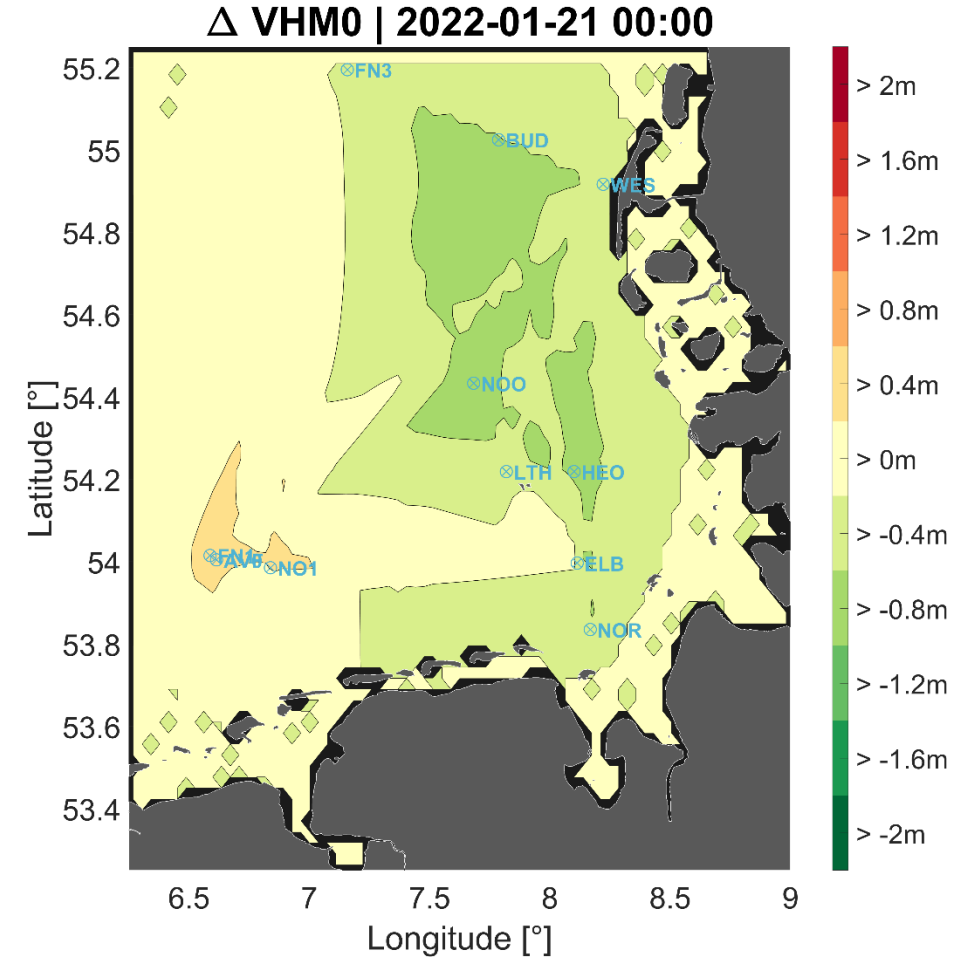
- Apply scale matrix to WAM data

Scale Matrix | 2022-01-19 01:30

Methodology of map creation

Summary seastate module

- Extension of the measurement data to spatial overview maps of the German Bight

- Accuracy of site specific real-time data

- Nearshore data, swell and direction dependencies can be captured much better by the underlying WAM model

△ VHM0 | 2022-01-21 00:00

Outlook

- Apply correlation results to seastate module

- Further development of the model

- Link the seastate maps with generic offshore vessels

- Implementing the seastate module to the seastate portal (2023)

Thank you!