EasyGSH

BAW Federal Waterways Engineering and Research Institute · BSH · TUHH Hamburg University of Technology · smile consult · Küste und Raum Ahlhorn & Meyerdirks GbR · mFUND · Federal Ministry of Transport and Digital Infrastructure

BMVI mFUND joint research project: EasyGSH-DB
Creation of application-oriented synoptic reference data on geomorphology, sedimentology and hydrodynamics in the German Bight (EasyGSH-DB)

Motivation and objectives

The heterogenous and sectorally distributed **administrative data** will be made accessible for **multiple use**.
Currently, there is a lack of homogenous, nationwide, gapless data and metadata for longer periods of time -> **Big Data**.
Quality-assured synoptic **reference data** on geomorphology, sedimentology, hydrodynamics and sea state are generated as **hindcast** from existing datasets.
Together with a variety of **analyses**, these are made available to different target groups via established branch Web portals. Users come from a wide range of organizations in the maritime industry, the administrations and representatives of public interests.
Interactive product development ensures a high degree of practical relevance through a **stakeholder participation process**.
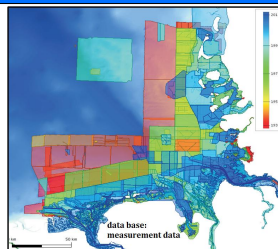
Project partner

- Federal Waterways Engineering and Research Institute (**BAW**):
  Project management, simulations, analyses, data management and publication
- Federal Maritime and Hydrographic Agency (**BSH**):
  Provision of soil-related field data and products
- Hamburg University of Technology (**TUHH**):
  Simulations (multi-model-approach) as well as E-Learning applications
- **smile consult** GmbH: Creation of time-variant bathymetries by interpolation model grids
- Küste und Raum GbR (**KuR**):
  Participative product development and stakeholder surveys

Project structure

WP 1 · WP 2 quality assured data compilation · WP 3 analyses
- WP 2.1 seabed data — BSH/Smile
- WP 2.2 simulation data — BAW/TUHH
- WP 3.1 seabed data — BSH/Smile
- WP 3.2 simulation data — BAW/TUHH
- AP 3.3 stakeholder / requirements — KuR

project management

WP 4 participatives product development
- WP 4.1 product development and optimising — BAW/BSH/TUHH/Smile
- product
- WP 4.2 dialogue phase — KuR
- WP 4.3 prototype — KuR/BAW/Smile/TUHH

WP 5 data management and publication
- WP 5.1 branch portal MDI-DE — BAW
- WP 5.2 E-Learning — TUHH

BAW/KuR

stakeholders and potential users

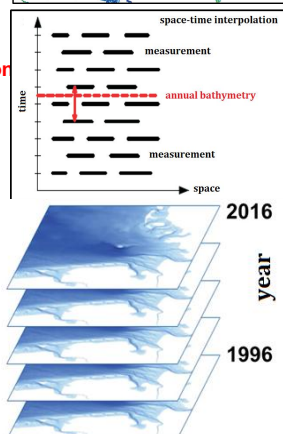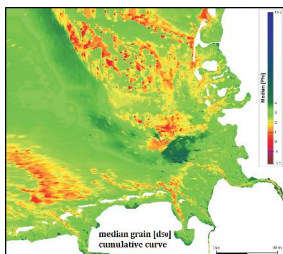## Sea bed data for bathymetry and sedimentology

Variable bathymetry on the coast and in the wadden sea:
- consistent digital **annual bathymetries**
  - by a space-time interpolation
  - for each year from 1996 to 2016
  - as a synoptic basis for the different computational grids -> **model depths**
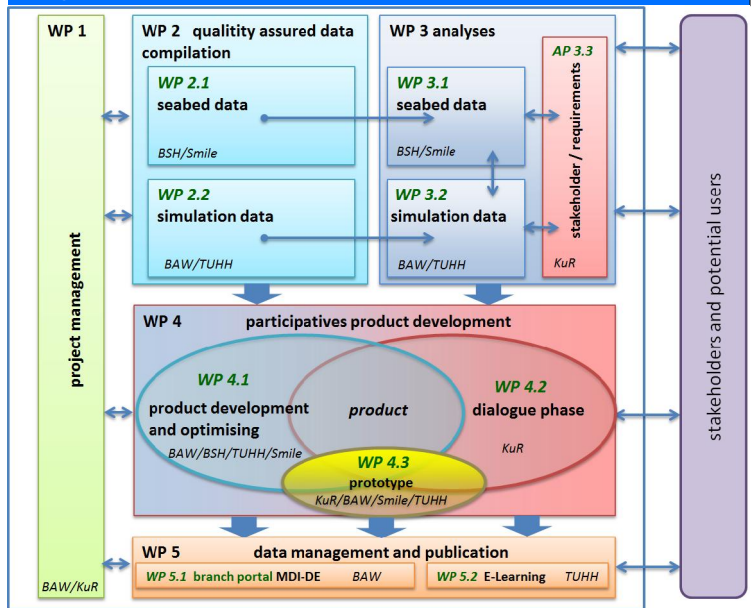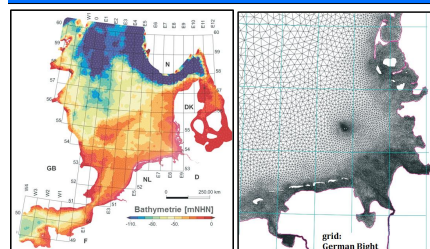- grid-based deployment

Sedimentology:
- **grain size distribution function**
- spatial interpolation on different computational grids -> **sediment distribution**
- variable number of grain fractions
- constant for all simulation years
- grid-based deployment

data base: measurement data — Bathymetrie [mNHN]

space-time interpolation — measurement — annual bathymetry — measurement — time / space

2016 — year — 1996

median grain [d50] cumulative curve

Simulation data and analyses from modeling

Bathymetrie [mNHN]

grid: German Bight

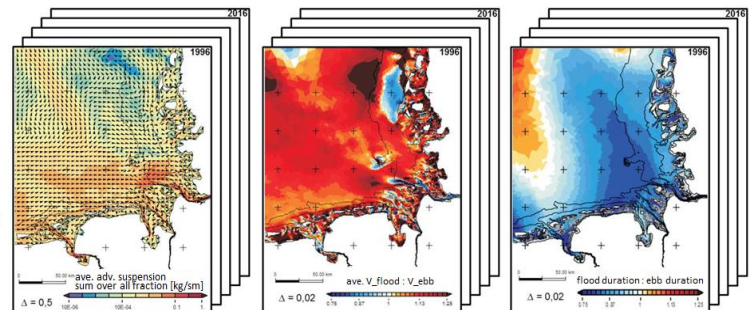**Simulation duration:**
01.01.1996 - 01.01.2016

Simulation models:
BAW: UnTRIM², SediMorph, UnK
TUHH: TELEMAC, TOMAWAC, SYSIPHE

Simulation results:
- tidal dynamics,
- salinity & sediment transport
- sea state parameters

Analyses of simulation data (per year):
- **partial tides**: amplitudes/ phases
- **tidal characteristics**: water level, currents, salinity and bottom shear stress
- **extreme values**: water level, currents and salinity
- **sea state** parameters: wave height, lenght and direction

ave. adv. suspension sum over all fraction [kg/sm] — Δ=0,5

ave. V_flood : V_ebb — Δ=0,02

flood duration : ebb duration — Δ=0,02

Open Data Catalog

Data Management for Big Data:
Data management for Big Data consists of a hierarchical, distributed **database system** and context-adapted **data models** in combination with a **metadata mangement system**.

Quality assurance:
Quality assurance is ensured by the chosen multi-model-approach and detailed documentation by metadata.

E-Learning:
The E-Learning modules (https://e-learning.tu-harburg.de/studip/) for **teaching** and **practice** ensures easy usage of all data sets by potential users.

Publication and use of the data products

The annual analyses of the state variables are provided as
- **WMS** for visualization with shape files,
- **WFS** for download as raster data in netCDF or CSV files and
- **CS-W** for documentation with INSPIRE compliant metadata.

The data products are searchable
- in the **EasyGSH-DB Web portal** (http://easygsh-db.org), being
- a branch Web portal of the Marine Data Infrastructure Germany **MDI-DE** (https://www.mdi-de.org/mdi-portal/ui), which is connected to
- the national spatial data infrastructure **GDI-DE** (http://www.geoportal.de/DE/GDI-DE) as well as
- in the **mCLOUD** (https://www.mcloud.de/) of the **BMVI.**