

# German marine seismic data access

## Mid Term Progress Reports NFDI4Earth Pilots and Incubators

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University of Bremen  
University of Hamburg  
+ all German institutions that produce seismic data

# Marine seismic data access

- General Overview
- Seismic data
- Legacy seismic data
- Standard for future raw data
- Standard for future processed data
- Expected outcomes

# General overview

## German marine seismic data access

- Development of a rescue strategy of legacy seismic data
- Development of an agreed standard for data archival

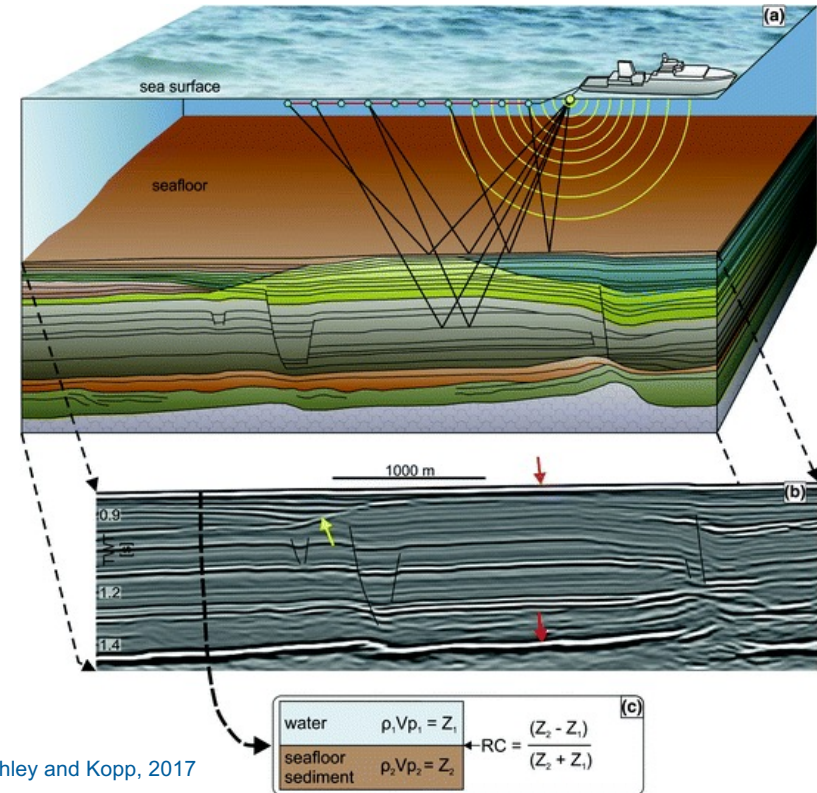
## Motivation

- Seismic data handling is required by DFG for all cruises and has to fulfil the FAIR principles
- Retrieving legacy data is extremely valuable because of
  - the geographic areas are not accessible any more for political reasons (Crimea, North Cyprus, Russia)
  - or research permits are no longer granted because of environmental legislation (Italy, Canada, US)
  - they allow a temporal look into the Earth system (sediment system changes, seismic oceanography)

# Seismic data

# Seismic data acquisition

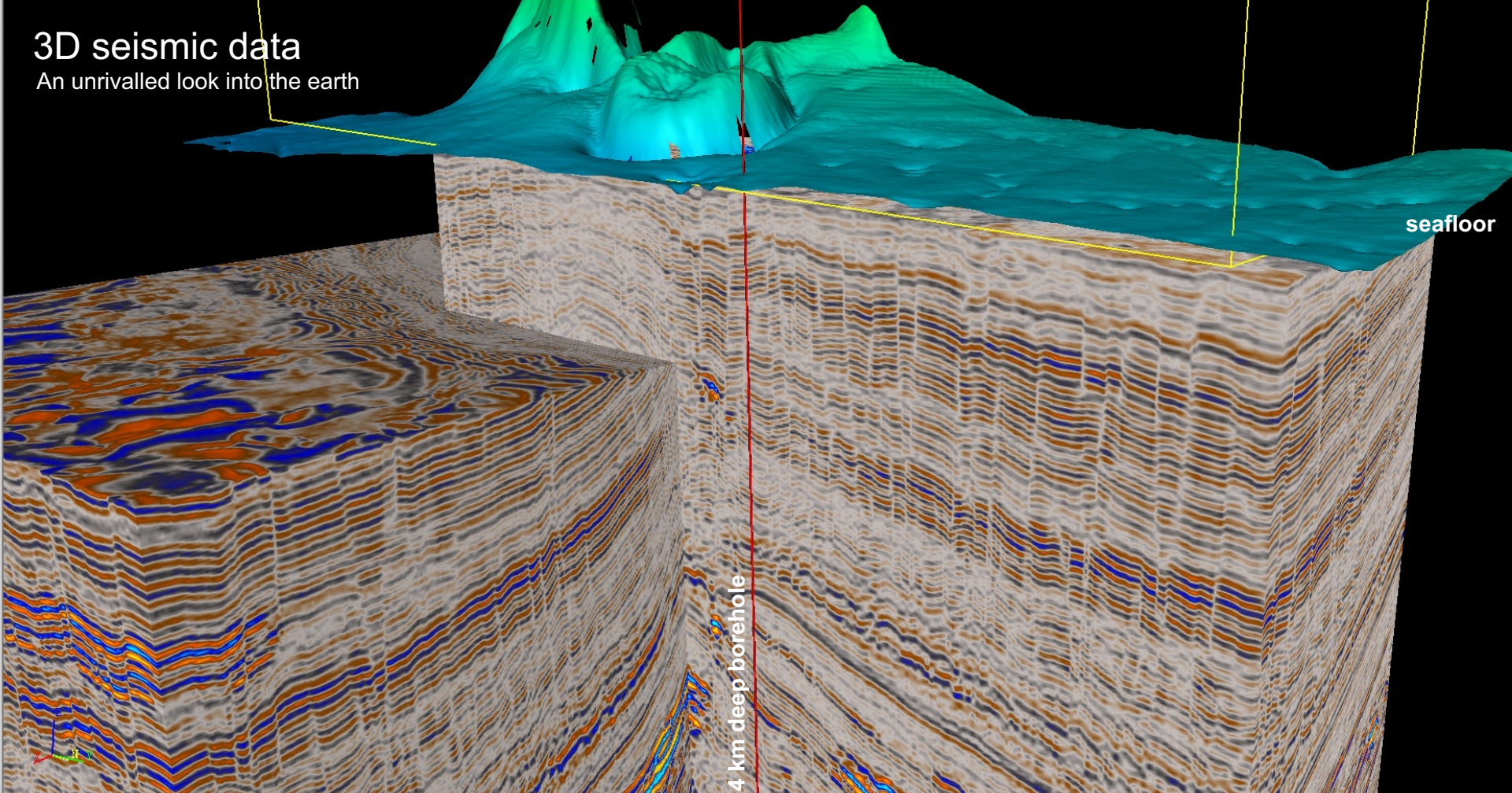
- Imaging of changes of seismic velocity and density
- Highest resolution of any marine geophysical method (5-50 m resolution)
- Penetration down to 30 km (upper mantle)
- Main application in the past: oil and gas exploration
- Possible future application: CCS (**C**arbon **C**apture and **S**torage)
- Crucial for many geological research directions: resources, climate change, geohazards, tectonics
- Size of field data easily > 500 GBytes



Crutchley and Kopp, 2017

# 3D seismic data

An unrivalled look into the earth



# Legacy seismic data



# Legacy Data



# Standard for future raw data

# Standard for future raw data

## Data standard

Format set by SEG (**S**ociety of **E**xploration **G**eophysicists) Field Tape Standards : **SEG-D** file

## Metadata standard

- GEOMAR, BGR (**B**undesanstalt für **G**ewissenschaften und **R**ohstoffe - Federal Institute for Geosciences and Natural Resources), and Uni Kiel agreed
- Consultation with Uni Bremen / Hamburg and AWI ongoing
- Complex to find **one solution for all**
  - Different output: **raw data quality control 0**
  - Same output: **raw data quality control 1**
  - Needs to be confirmed (e.g. test cruises)

# Data handling

## Up to now

- Recording seismic data (shot or lines)
- Saved to tapes or discs ...
- Archived months or years later ...

## New concept

- Generation of one SEG-D file per shot
- Generation of corresponding metadata file per shot
- Automated synchronisation with DShip to **Mass Data Management (MDM)**
- Archival of raw data

Framework



**AGMAR**  
Arbeitsgruppe Marine Geophysik der Deutschen  
Geophysikalischen Gesellschaft

**NDFI4Earth Pilot: German marine seismic data access**



**NDFI4Earth**

User Support Network



**NDFI4Earth**

Repositories and Infrastructure

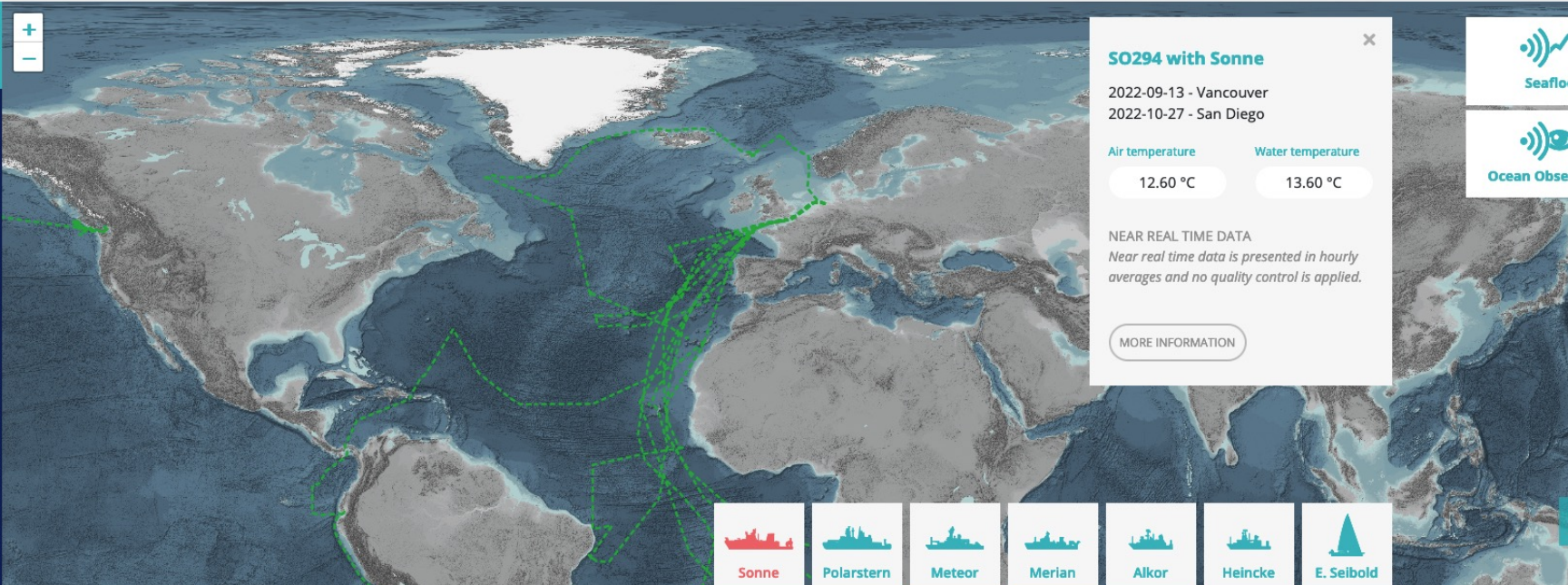


DAM/DataHUB portal and viewer  
[marine-data.de](http://marine-data.de)



# The DAM/DataHUB portal and viewer

Search for author, expedition, project, ...



**SO294 with Sonne**  
2022-09-13 - Vancouver  
2022-10-27 - San Diego

Air temperature: 12.60 °C  
Water temperature: 13.60 °C

NEAR REAL TIME DATA  
*Near real time data is presented in hourly averages and no quality control is applied.*

MORE INFORMATION

Portal  
Sensor  
Dashboard  
Workspace

Seafloor  
Ocean Observatory

Sonne  
Polarstern  
Meteor  
Merian  
Alkor  
Heincke  
E. Seibold

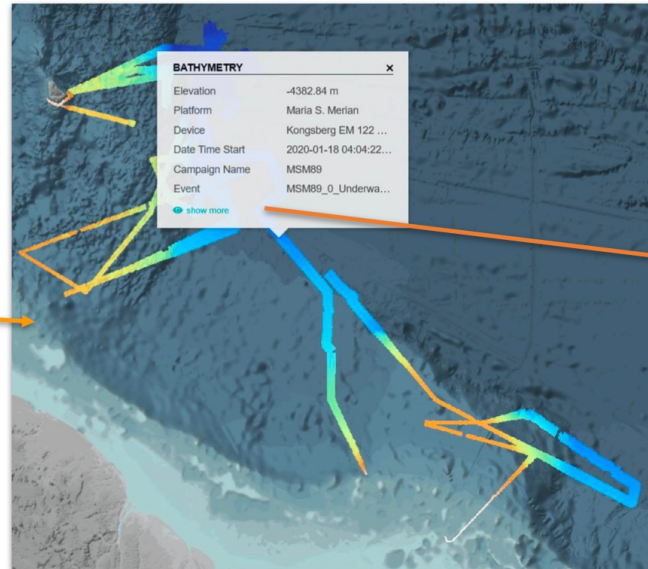
# The DAM/DataHUB portal and viewer

**LAYER TREE**

- Expeditions
- Water
  - Samples
  - In-Situ
  - Remote Sensing or Modelled
- Sediment
  - In-Situ
  - Remote Sensing or Modelled
- Bathymetry**
- Gazetteers

DAM underway research data (Anne Wölfel)

- 2D Seismic
- Raw Data
- Processed Data



Clicking on the data opens a popup with measurement-specific metadata—including a reference to the source

**PANGAEA MULTIBEAM RAW DATA BATHYMETRY (0... x**

**SOURCE & DOWNLOAD**

Source (DOI) <https://doi.org/10.1594/PAN...>  
PANGAEA Dataset ID 923066

**FILE INFO**

File Suffix .all  
MBIO MB-System Data Format 58

**REFERENCES**

Citation Karstensen, Johannes; Lavik...  
License CC-BY-4.0  
Access Rights unrestricted

**MEASUREMENT INFO**

Platform Maria S. Merian  
Platform Type (NERC L06 SeaVx) research vessel  
Method (NERC L05 SeaDataNet) multi-beam echosounders  
Device (NERC L22 SeaVx) Devic Kongsberg EM 122 multibea...  
Sensor URN void  
Ancillary SVP Available no  
Date Time Start 2020-01-18 04:04:22:095 UTC  
Date Time End 2020-02-19 18:30:39:077 UTC  
Elevation (Minimum) -6477.00 m  
Elevation (Maximum) -42.00 m  
Elevation -4382.84 m

**CAMPAIGN & PROJECT INFO**

Campaign Name MSM89  
Campaign Optimal Name EUREC4A  
Cruise Report (DOI) <https://doi.org/10.2312/cr...>  
Campaign Start 2020-01-17 00:00:00 UTC  
Campaign Start Location Bridgetown  
Campaign End 2020-02-20 00:00:00 UTC  
Campaign End Location Bridgetown  
Expedition Program <https://www.lfd.uni-hambur...>  
BSH ID 20200086  
Project Label DAM  
Project Name Underway Research Data  
Project URI <https://www.allianz-meeresf...>

**PANGAEA STATUS**

PANGAEA Curation Level Enhanced curation

**PANGAEA EVENT INFO**

Event Name MSM89\_0\_Underway-9  
Depth Type ELEVATION, Bathymetric

Ulrike Schroller-Lomnitz, 2022

# Standard for future processed data



# Standard for processed data

## Data standard

Format set by SEG (**S**ociety of **E**xploration **G**eophysicists) Technical Standards Committee: **SEG-Y** file

## Metadata standard

- AWI – in-house solution: data stored in PANGAEA
- BGR (**B**undesanstalt für **G**eowissenschaften und **R**ohstoffe - Federal Institute for Geosciences and Natural Resources) – in-house solution: in-house repository → visualization Geoviewer and GeoSeas/SeaDataNet
- **Consistent data management would make the data much easier accessible to the community and in the long-term may facilitate automatic access and big data approaches!**
- Work in progress: Developing a metadata standard for processed data which describes the data to the extent to be **reusable** and **interoperable**.
- Aligning with the industry initiative OSDU (**O**pen **S**ubsurface **D**ata **U**niverse) run by the Open Group to exchange data and knowledge with the seismic industry

# Expected Outcomes

# Expected outcomes

## Seismic data handling

- Agreed standard for the storage of 2D reflection seismic data
- Strategy for acquisition and storage of 2D reflection seismic data
- Proposal for implementation of this strategy and extension of the strategy for 3D reflection seismic data and OBS data ← HMC (**H**elmholtz **M**etadata **C**ollaboration) MetaSeis proposal

## Seismic data archaeology

- Full overview of existing seismic data at German institutions
- Prioritization of data to be rescued
- Applying for further funding → storage / manpower for archival

# Thank you very much for your attention!

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