HELMHOLTZ Metadata Collaboration

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Helmholtz Metadata Collaboration (HMC) MetaSeis

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www.helmholtz-metadaten.de

Metadata concept for OBS and 3D **Seis**mic data for the German Community

1) **Standardization of raw OBS (Ocean Bottom Seismometer) data from active source experiments**
2) **Standardization of raw 3D MCS (Multichannel Seismic) data**

- *Adopt and extend existing standards and vocabularies to establish harmonized data workflows for archival and publication*

Participants

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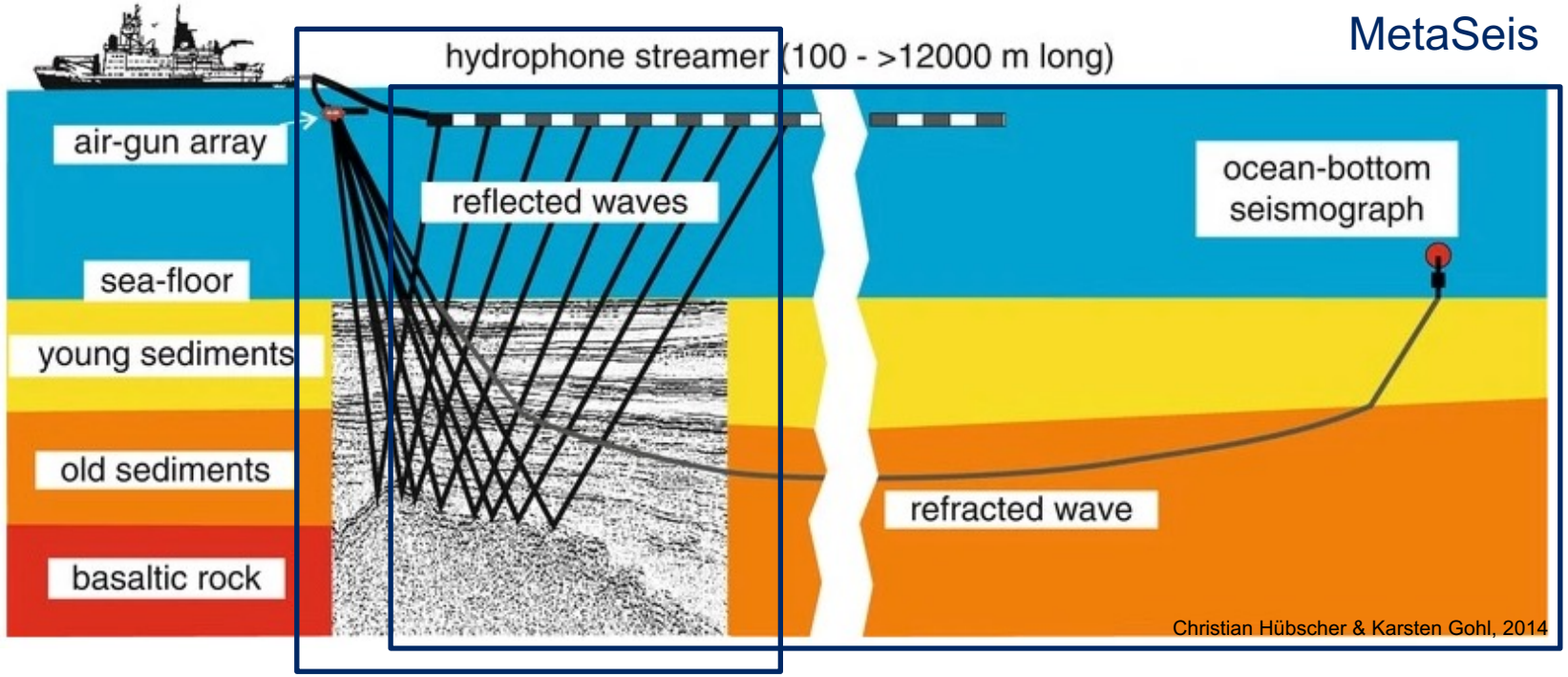
HMC Project MetaSeis



NFDI$_4$Earth pilot

OBS (Ocean Bottom Seismometer) Data

General

- OBS data mostly acquired in academia
  - Even less standardization
- Active and passive OBS data
  - Passive OBS data – **eFAIRs** HMC Project (GFZ, GEOMAR and AWI)
  - **MetaSeis** – only active OBS data

Implication for acquiring active OBS data

- Active OBS – airguns are shot to generate the seismic energy
- Need to store also information on the shots (location and time)

Raw OBS Data Challenges

Deciding on raw data format and metadata standard

- Digital data format for the data
- Processing steps towards the standard, e.g., rotation
- Including already available vocabulary

Need for comprehensive auxiliary information

- Response function of the seismometer
- Water depth grid for the vicinity of the OBS
- All shot time and locations are necessary for every OBS data record

Legacy OBS Data

Up to now

- 40 years of OBS data available at AWI and GEOMAR
- Saved to tapes or discs …
- Archived months or years later …

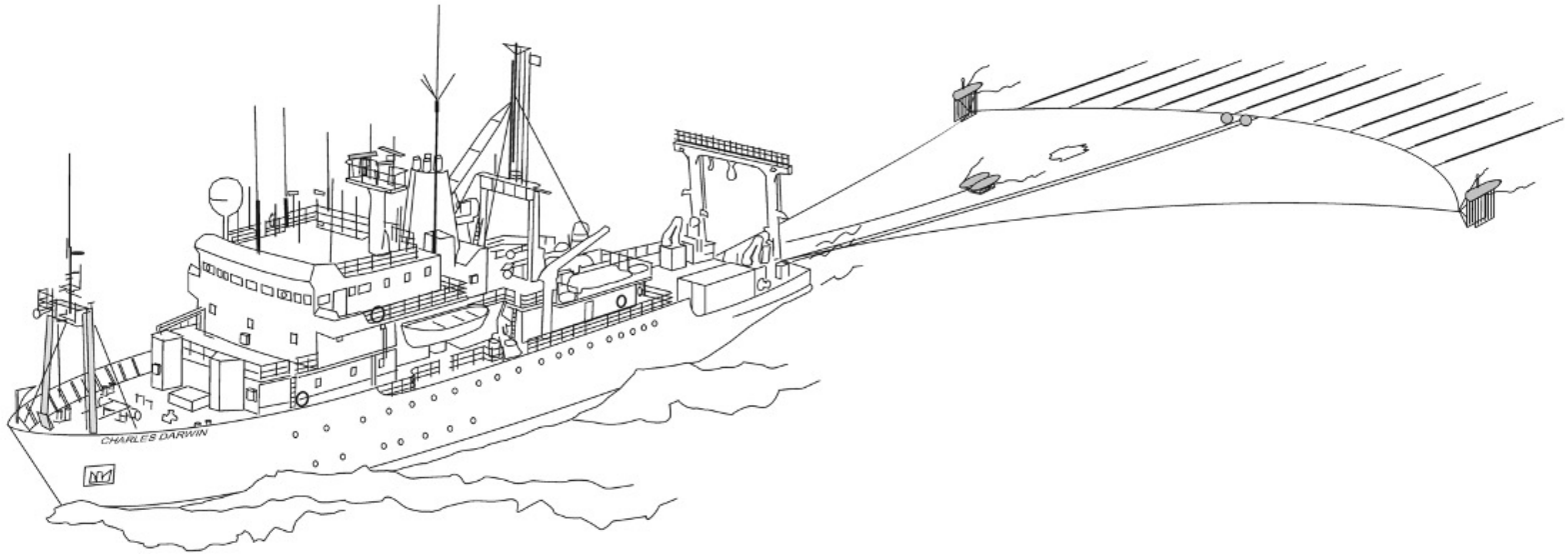
New concept

- Need to develop a strategy how these data can be rescued
  - Development at AWI in cooperation with GEOMAR

    Use case (AWI): Polarstern cruise ARK XIX/4 (2003)

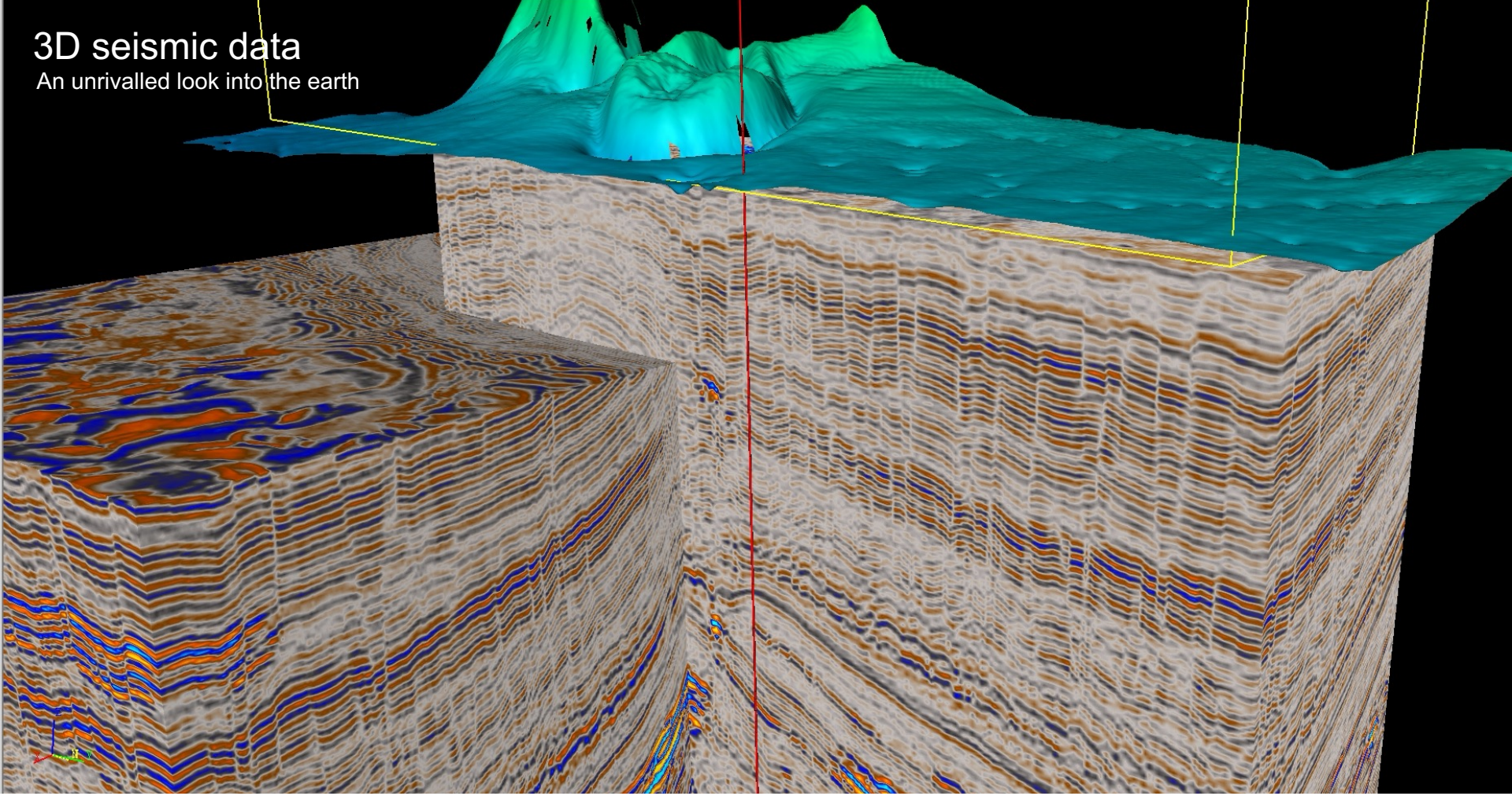
    → Archival at PANGAEA

3D Multichannel Seismic (MCS) Data Acquisition



3D seismic data

An unrivalled look into the earth



3D Multichannel Seismic (MCS) Data

P-cable (UHR 3D)

- Ultra-high resolution 3D imaging of the subsurface (sampling the seismic wavefield at a high spatial and temporal rate)
- Fields of applications
  - Site surveys (drilling)
  - Carbon storage (CCS)
  - Offshore wind farms
- No existing standards for metadata
- Extension of the standards developed for raw 2D MCS data within a NFDI$_4$Earth Pilot
  - One comprehensive metadata file for each shot/ data file
  - Harmonizing across all German users of this method (only BGR and GEOMAR)
  - Integration and harmonizing with industry standards (OSDU, the Open Group)
  - Alignment with and expansion on NERC/ SeaDataNet vocabulary

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 via **M**ass **D**ata **M**anagement (MDM) in close cooperation with DAM (German Marine Research Alliance) Underway Research Data project
- Archival of raw data at PANGAEA
- Tracks and metadata visible on German Marine Data Portal to ensure findability

Expected Outcomes

Development of metadata standard in compliance with **FAIR** data principles for

- Raw OBS (Ocean Bottom Seismometer) data from active source experiments
- Raw 3D MCS (Multichannel Seismic) Data
- Conducting of test cruises – SO310 (February 2025)

Development of data flow to

- Take care of data management requirements stipulated by GPF (Gutachterpanel Deutscher Forschungsschiffe)
- Archival and publication at PANGAEA including quality control

Strategy for legacy data – Archival

- Development of a strategy for legacy data archival at AWI and GEOMAR

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Thank you for your attention