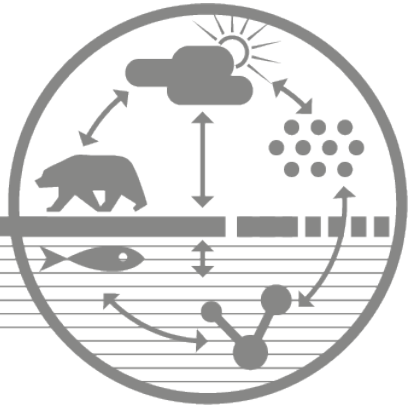
MOSAiC
International Arctic Drift Expedition



IT-Unterstützung der Arktisexpedition MOSAiC

Antonia Immerz & Daniela Ransby

Alfred-Wegener-Institut,
Helmholtzzentrum für Polar- und Meeresforschung
Bremerhaven

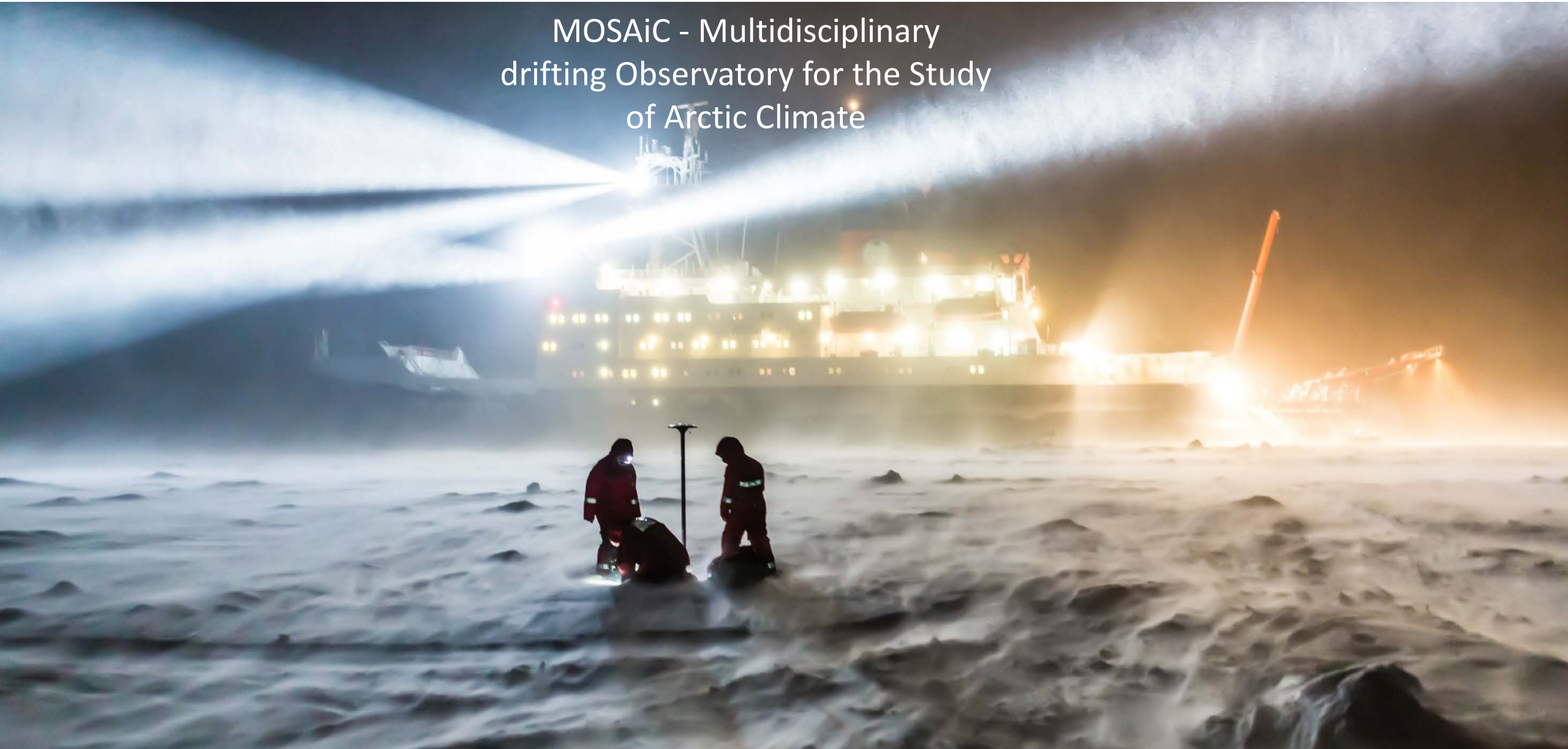
Jahrestagung der Fachgruppe “Informatik und Nachhaltigkeit”
Fachgruppe Frauen und Informatik
Gesellschaft für Informatik

11.05.2019

ALFRED-WEGENER-INSTITUT
HELMHOLTZ-ZENTRUM FÜR POLAR- UND MEERESFORSCHUNG

MOSAiC

The largest Arctic expedition of our time



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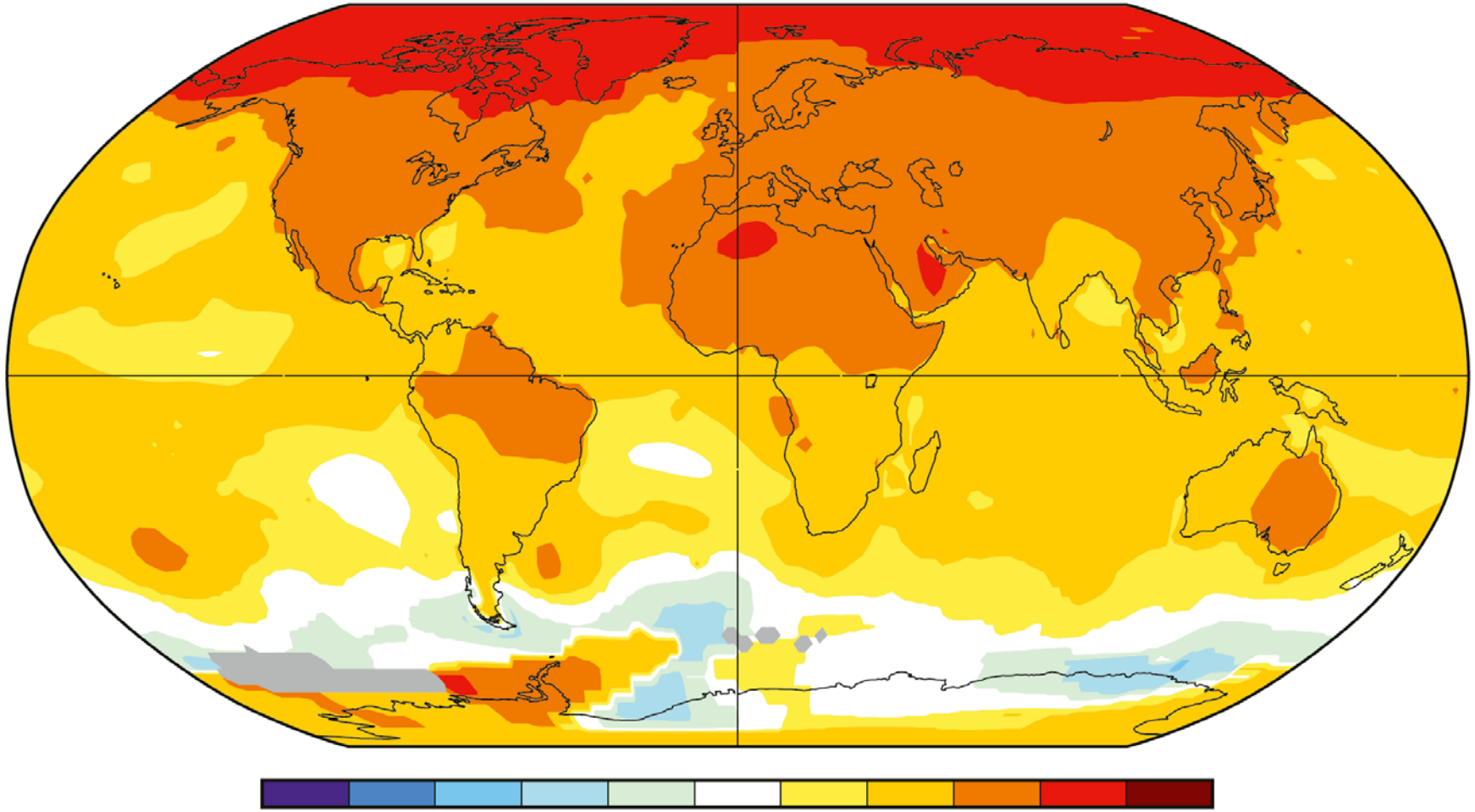
Arctic: The Epicenter of Global Warming



Observed change of temperature 1970 – 2017 [°C]

Arctic change is dramatic

"What used to be skidoo or skiing trips are boat trips now"

March / April, Kongsfjord, Svalbard

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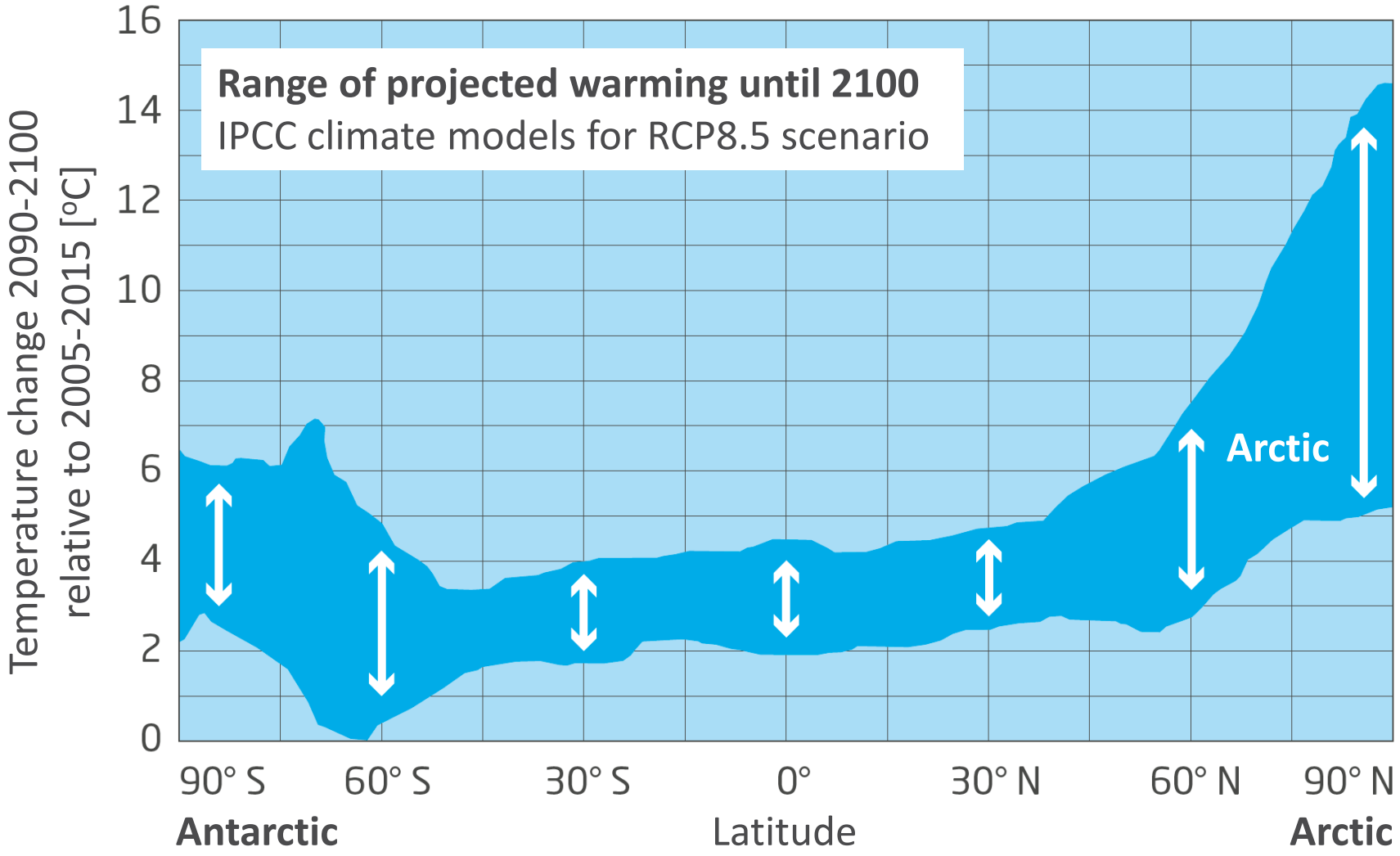
Largest uncertainties of climate projections



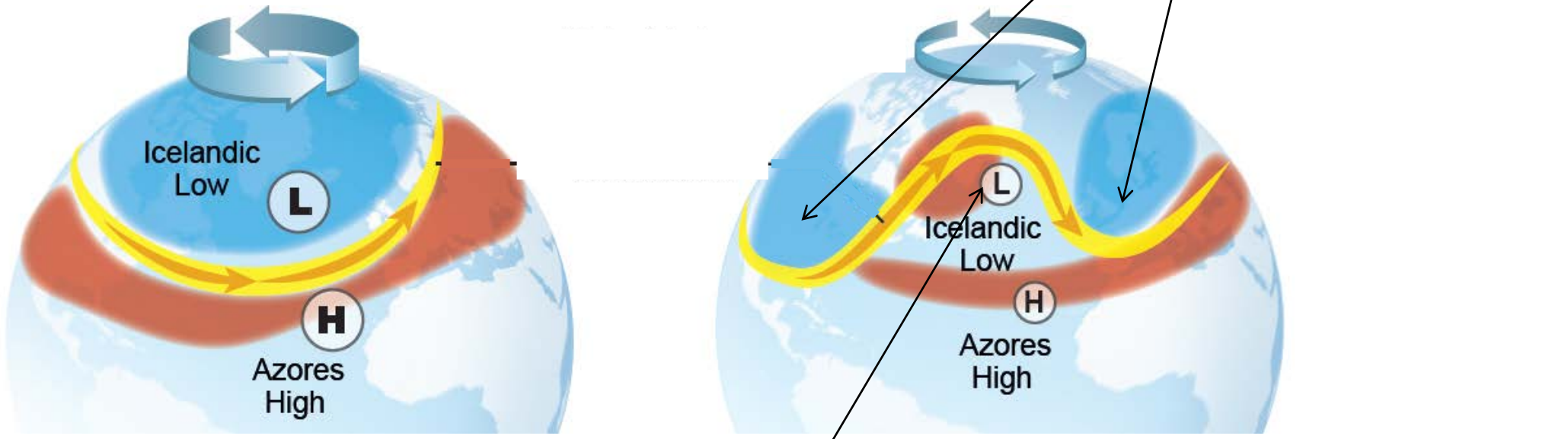
Many processes in the Arctic climate system only roughly represented in Climate Models

Understanding of key climate processes in the Arctic is limited by lack of observations!

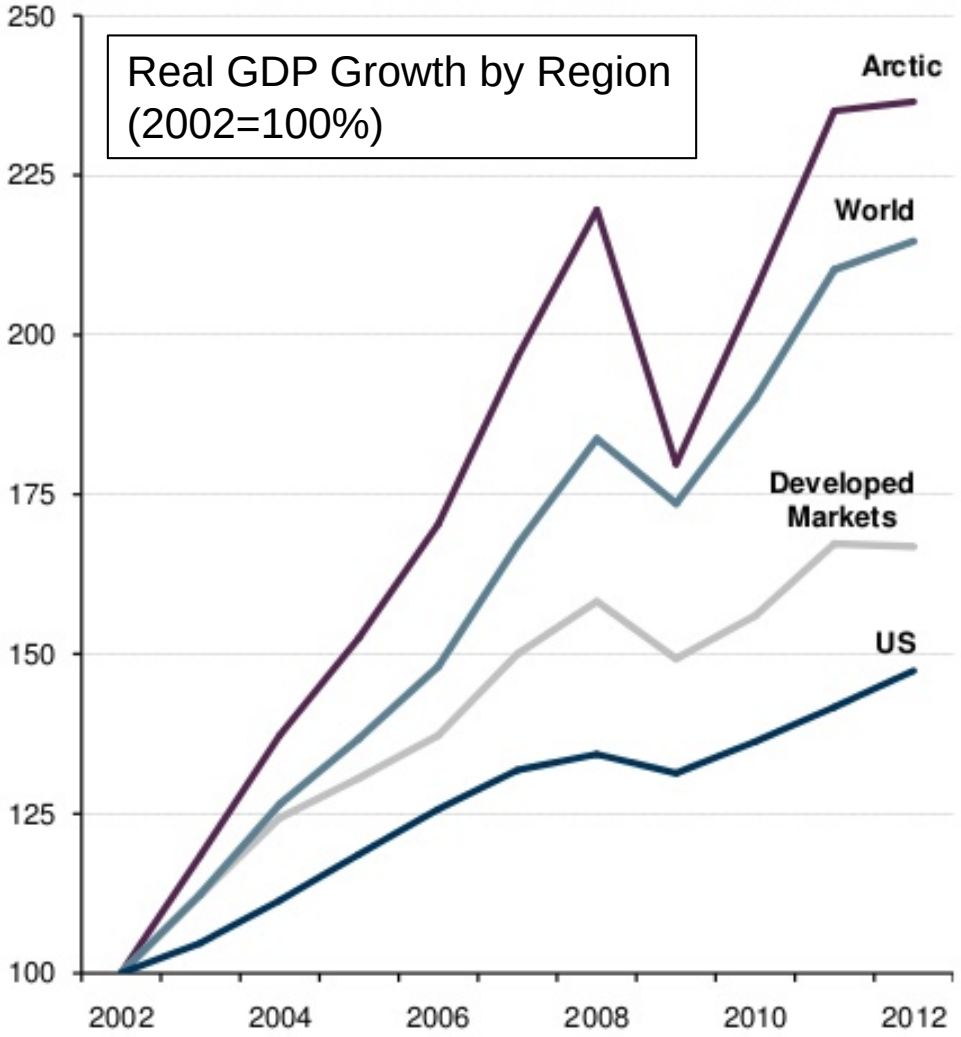
What happens in the Arctic does not stay in the Arctic

Arctic climate change & decreasing sea ice

stable jet stream → **meandering jet stream**



Rapid economic development in the Arctic



Rapid development in several areas:

- Shipping
- Mining / resource extraction
- Fishing

Investments planned in Arctic Infrastructure 2014-2024:

~100 billion US$

Investment needs over next two decades:

~1000 billion US$

Source: Guggenheim Partners, 2014

MOSAiC

Multidisciplinary drifting Observatory for the Study of Arctic Climate

Largest Arctic research expedition ever

- 5 icebreakers
- Polar 5 & 6 and Halo research aircraft
  + support helicopters
  + support aircraft
- More than 60 institutions
- 17 nations
- A total of ~600 people will operate in the central Arctic
- >120 Mio€ budget

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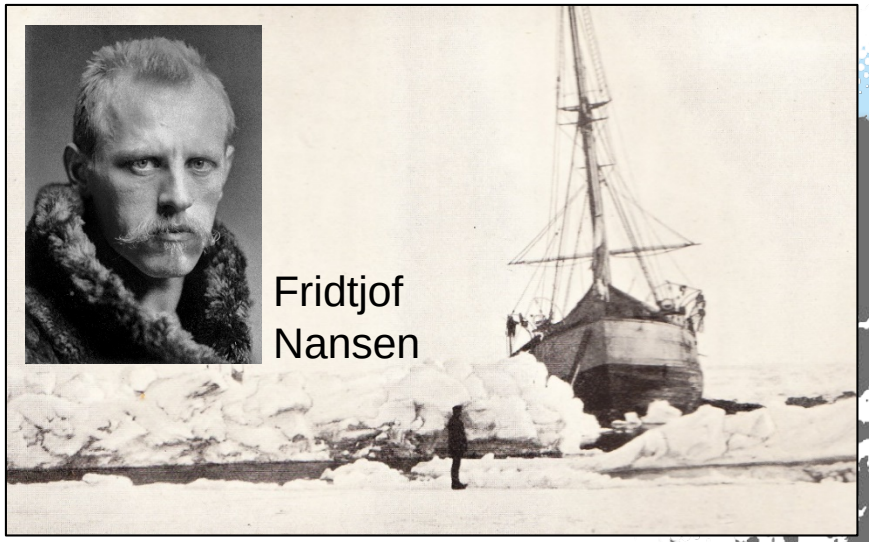
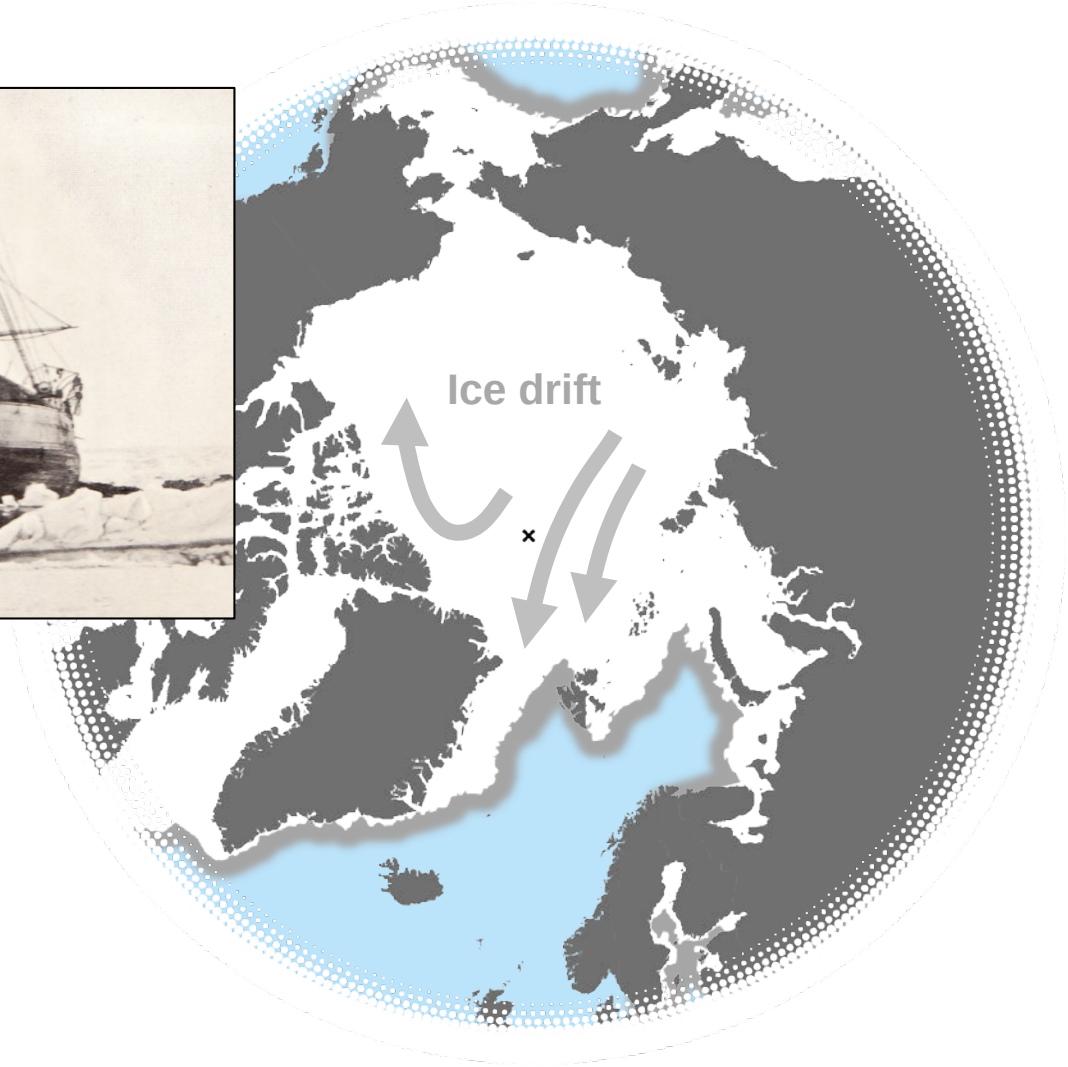
The MOSAiC-Expedition



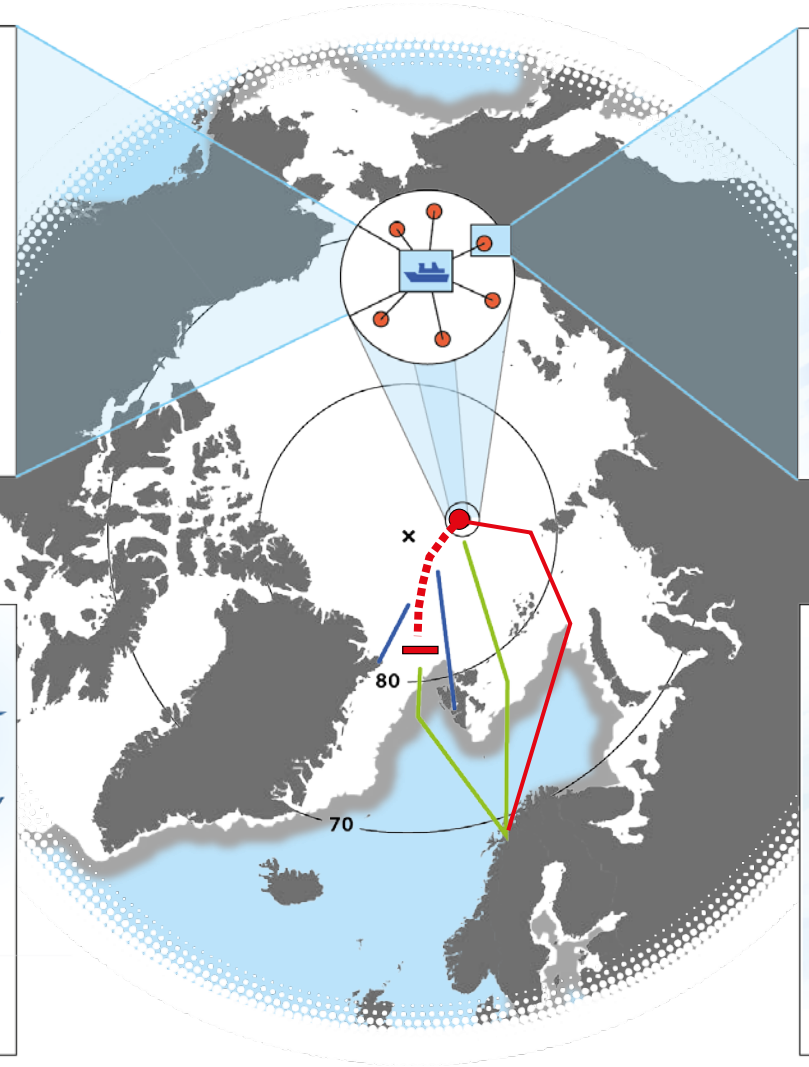
1893-1896: Fram-Expedition



The MOSAiC-Expedition

September 2019 — Drift — September 2020

Central observatory:
RV Polarstern



Network of camps on the ice

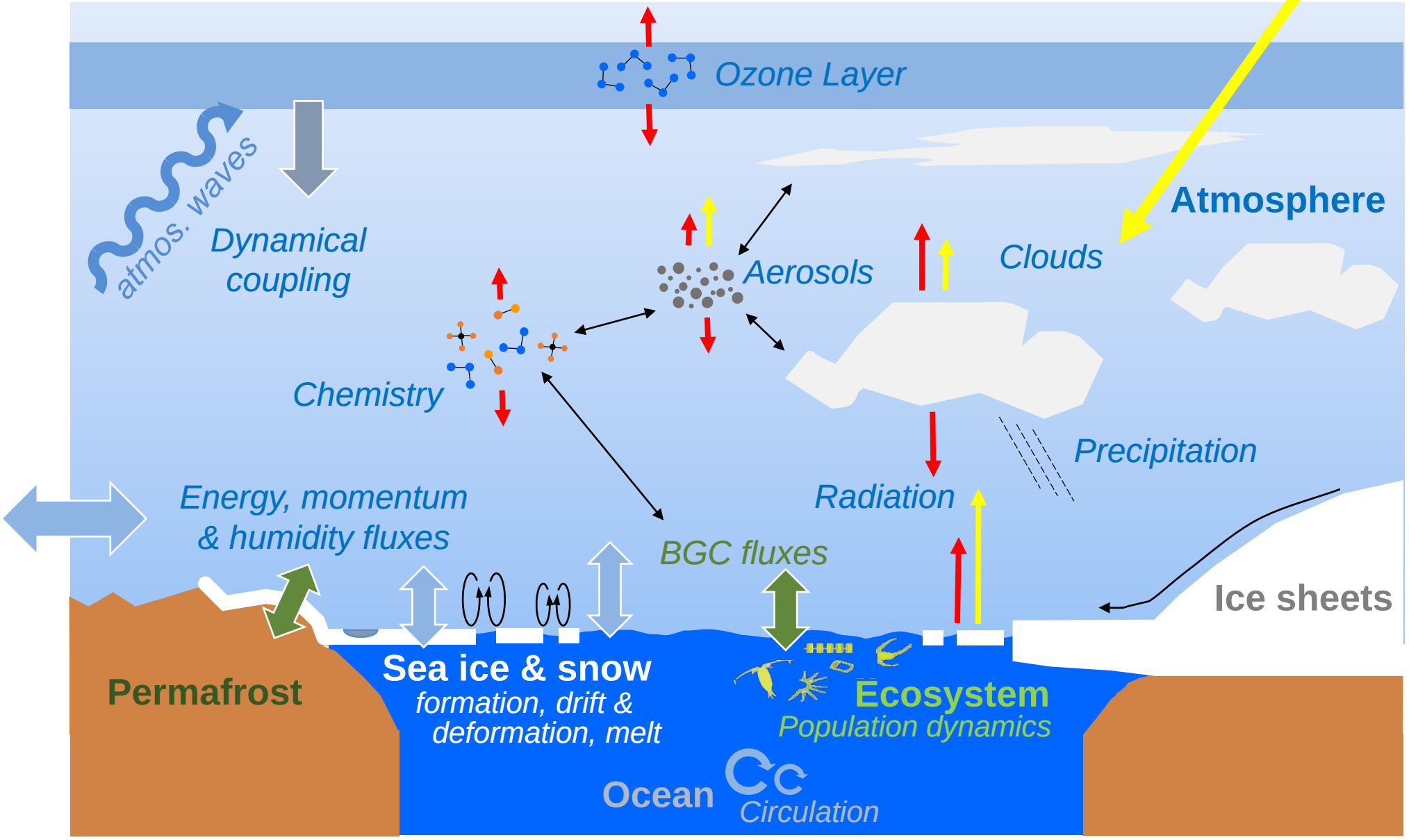
Operations of research aircraft and helicopters

Extended vertical and geographical coverage

Visits by four icebreakers from MOSAiC partners

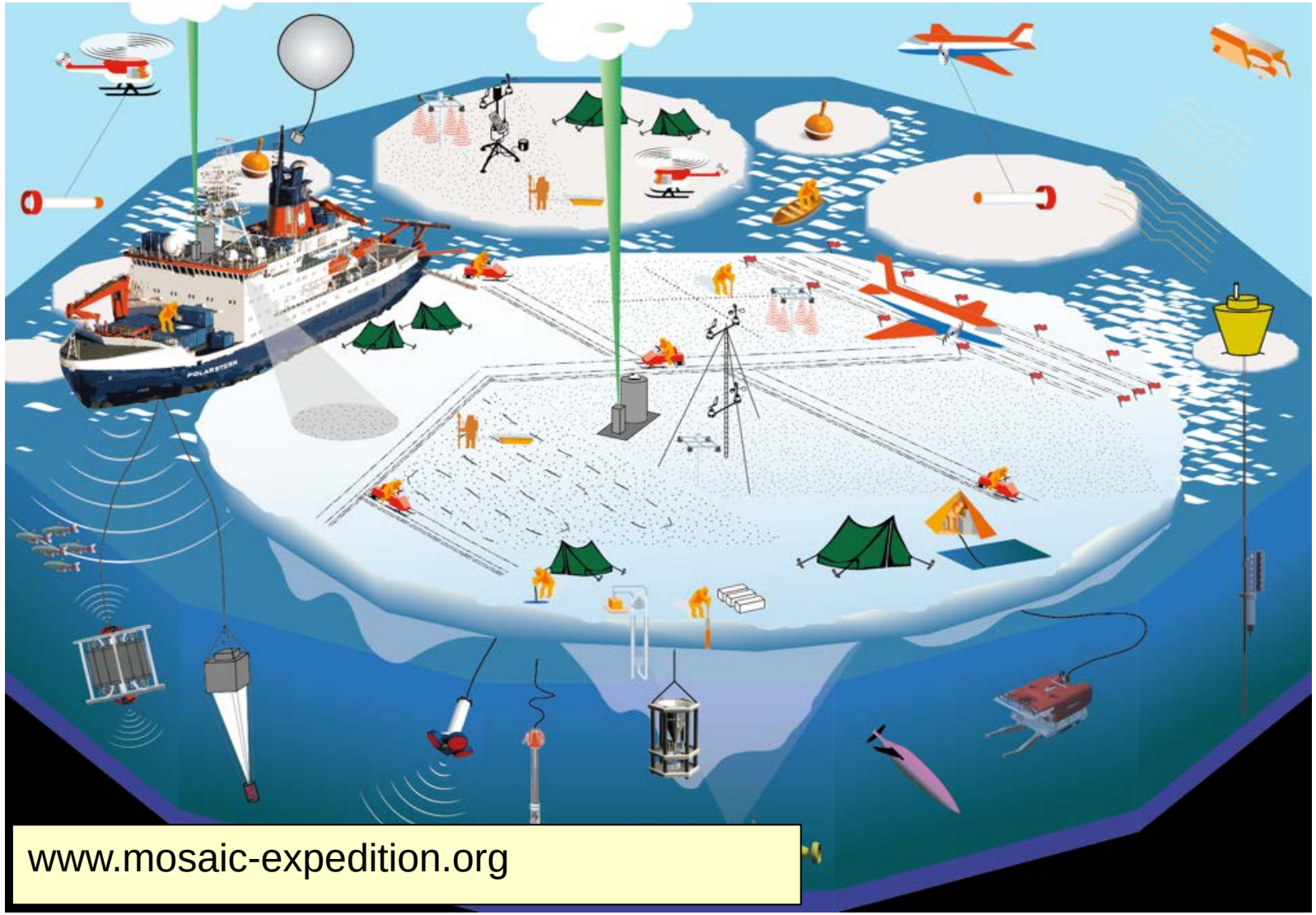
Broader geografic coverage and supply

Main scientific focus areas



MOSAiC
International Arctic Drift Expedition

AWI



www.mosaic-expedition.org

- **Largest** Arctic research expedition ever.
- **Integrates** between disciplines and between observations & models.
- Will lead to **breakthrough** in Arctic climate science.
- **Unique experience** & network for **next generation scientists**.

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MOSAiC
International
Arctic Drift
Expedition

AWI

Data Management in MOSAiC

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Timeline - Data Policy

Expedition Start:
09/2019

- First data at AWI: January 2020

Expedition End: 20.10.2020

31.01.2021

- All Sensor Data at AWI storage
- fast analysis sample data
- primary subset of laboratory data

31.01.2022

- full collection of laboratory data

Public release: 01.01.2023 or earlier!

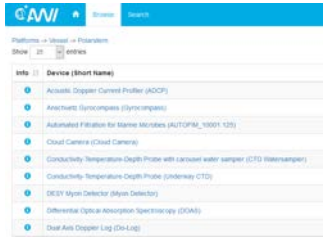
Data Policy – Key Points

- Meta Data Standards
  - Use of meta data standards. Meta data must be machine readable and interpretable as well as human understandable and follow the FAIR principles
- Data ingest, transfer, storage and archiving.
  - MOSAiC Central Storage (MCS) aboard Polarstern basis for gathering data along the year of operation
  - land MCS provided by AWI is the central and reliable storage and working database of MOSAiC data.
  - Only MOSAiC consortium members with authentication/authorization will have access to the data prior to public release.
  - PANGAEA primary long-term archive for the MOSAiC data set
  - All primary data must be submitted to the PANGAEA data base for long-term archival, or other suitable long-term repositories

- **Data Provision, Access and Sharing**
  - all data must be made available to the consortium by the MCS as fast as possible.
- **Public Release of Data**
  - MOSAiC data will be freely and publicly available on the open MCS or PANGAEA and/or alternate public archives on **1 Jan 2023**.
- **Authorship and Acknowledgment**
  - Generally, **co-authorship** on publications and other public documentation must be offered to those that have **made a substantial contribution** following the principles of good scientific practice.

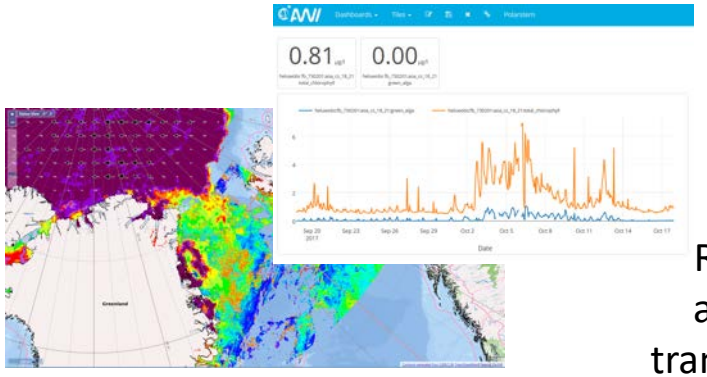
(Meta-)Data Flow in MOSAiC

Data Flow in MOSAiC

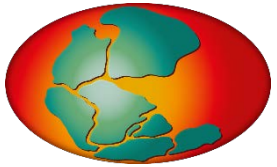


SensorWeb at AWI and onboard of Polarstern

Acquisition organized by MOSAiC groups.
DShip-ActionLog for Device-Operation ID management



DShip-Mapviewer and Dashboard at AWI and onboard of Polarstern



Raw and primary data archiving at AWI. Data transfers after legs or parts during legs

Sensor Metadata Description → Data Acquisition → Data Ingestion → Data Storage → Data Monitoring → Data Analysis → Data Archiving

Data transfer via satellite, local LAN, radio LAN as stream and/or in delayed mode

MOSAiC Central Storage and workspace

Using workspace and Marketplace (VM) e.g. with Jupyter Notebook (R or Python) or Bash-Script or or …?

Sensor metadata description (SensorWeb) is the basis for all parts!!!

MOSAiC International Arctic Drift Expedition

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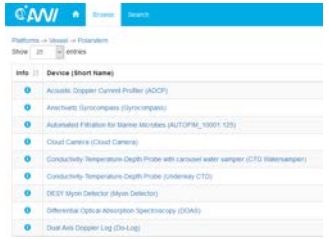
Data Flow in MOSAiC



SensorWeb at AWI and onboard of Polarstern

Sensor Metadata Description → Data Acquisition → Data Ingestion → Data Storage → Data Monitoring → Data Analytics → Data Archiving

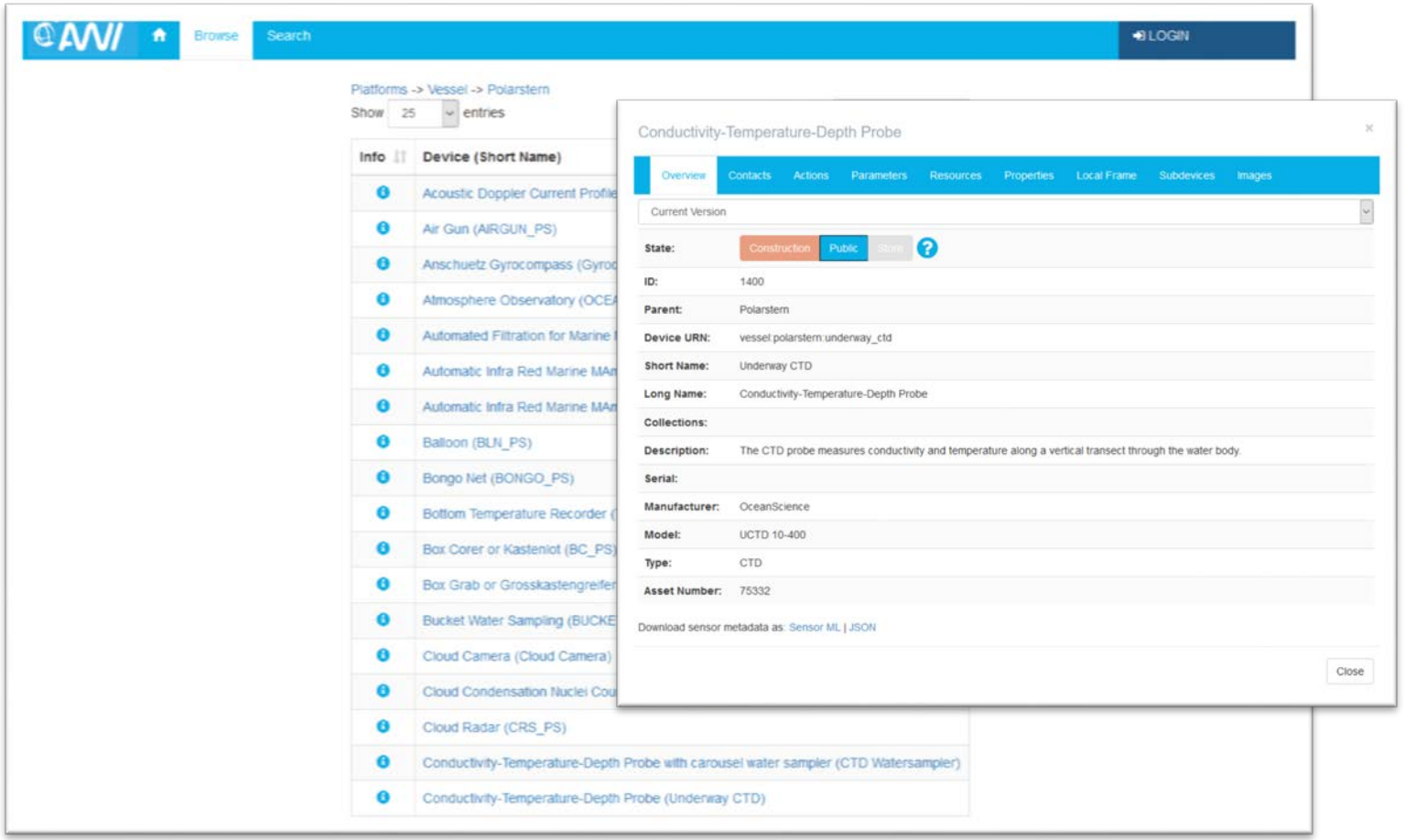
Sensor metadata description (SensorWeb) is the basis for all parts!!!

MOSAiC International Arctic Drift Expedition

AWI

SENSOR

- ✓ Describe your sensor only once with SENSORWeb
- ✓ Then sensor data can be ingested, stored, monitored, analysed and archived



Sensor Metadata Description → Data Acquisition → Data Ingestion → Data Storage → Data Monitoring → Data Analytics → Data Archiving

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SENSOR

SensorWeb

- Sensor Information System - Create and manage meta data of devices and sensors

https://sensor.awi.de/?urn=vessel:polarstern:ctd_watersampler

Platform-Type: Vessel
Platform: RV Polarstern
Device: CTD Watersampler

Overview
Long and short names
Manufacturer
Model-Nr.

Subdevices
Altimeter
Lowered Acoustic Doppler Current Profiler
SBE32 water sampler
SBE3plus temperature sensor
SBE4 conductivity sensor
SBE43 oxygen sensor
Transmissiometer

Properties
- used for quality checks: e.g. Water temperature min/max values

Contact
Owner: AWI
Editor: Peter Gerchow
Engineer in Charge: Marius Hirsekorn
Principal Investigator: …
Data Scientist: …
Data Provider: …

Parameters
conductivity
temperature
altimeter
transmission
oxygen
pressure
fluorescence

Resources
- factsheets
- calibration certificates
- manuals

Actions
Deployment
Recovery

MOSAiC International Arctic Drift Expedition

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SENSOR

SST_CTD_183

Overview | Contacts | Actions | Parameters | Resources | Properties | Local Frame | Subdevices | Images

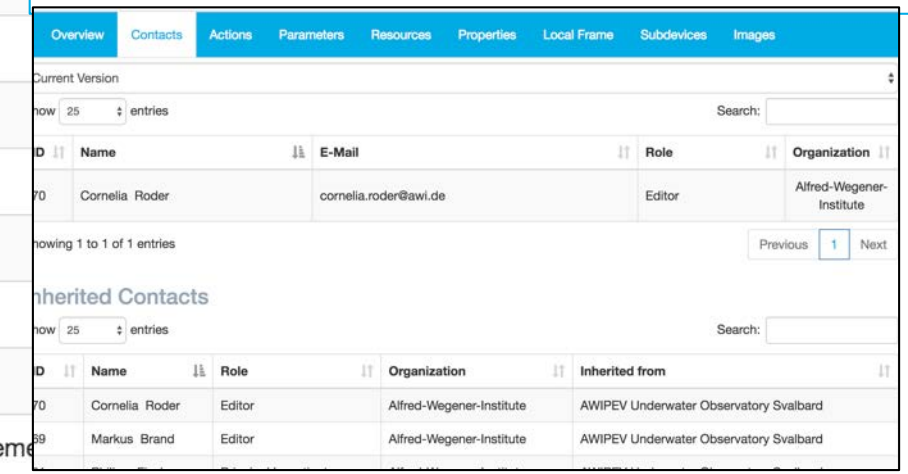
2018-06-04 11:00:00 Mount Mounted to svluw2

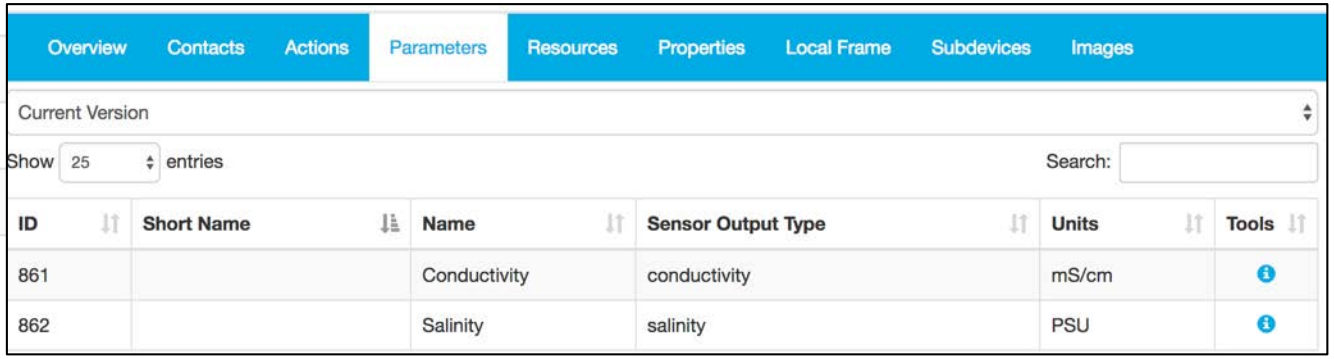
SENSOR (2014). Sensor metadata for SST_CTD_183 of Station AWIPEV Underwater Observatory Svalbard. Confi
Alfred Wegener Institute for Polar and Marine Research. https://hdl.handle.net/10013/sensor.82f77b6c-a35d-40ff-
65442cfb49e7#subItemID=1285&subItemEventID=3389

State:	public
ID:	1285
Parent:	Svalbard Underwater Node 2
Device URN:	station:svluwobs:svluw2:ctd_183
Short Name:	CTD_183
Long Name:	SST_CTD_183
Collections:	undefined
Description:	High quality, high accuracy multi parameter probe for oceanographic and limnological measureme parameters.
Serial:	183
Manufacturer:	Sea and Sun Technology
Model:	CTD 90
Type:	CTD

PIDs + Citation for all actions of type: calibration, comissioned, deployment, mount

https://hdl.handle.net/10013/sensor.82f77b6c-a35d-40ff-ba8d-65442cfb49e7#subItemID=1285&subItemEventID=3389

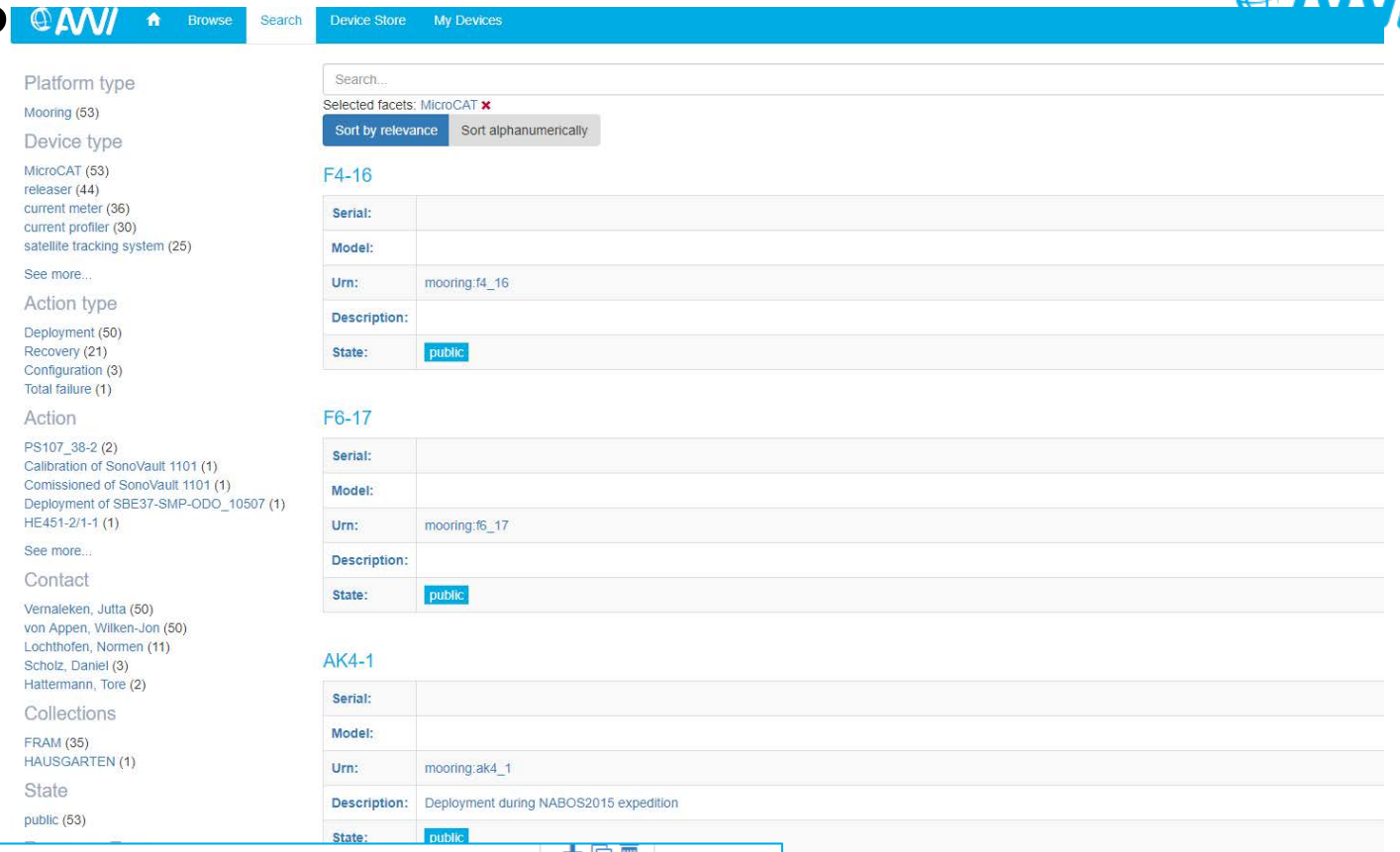


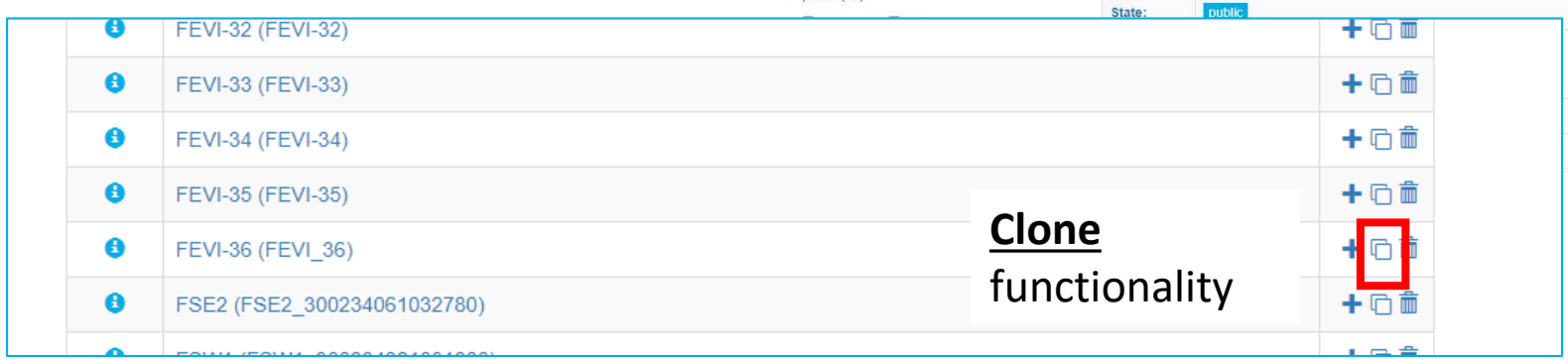


SENSOR

Further Features

Facetted Search

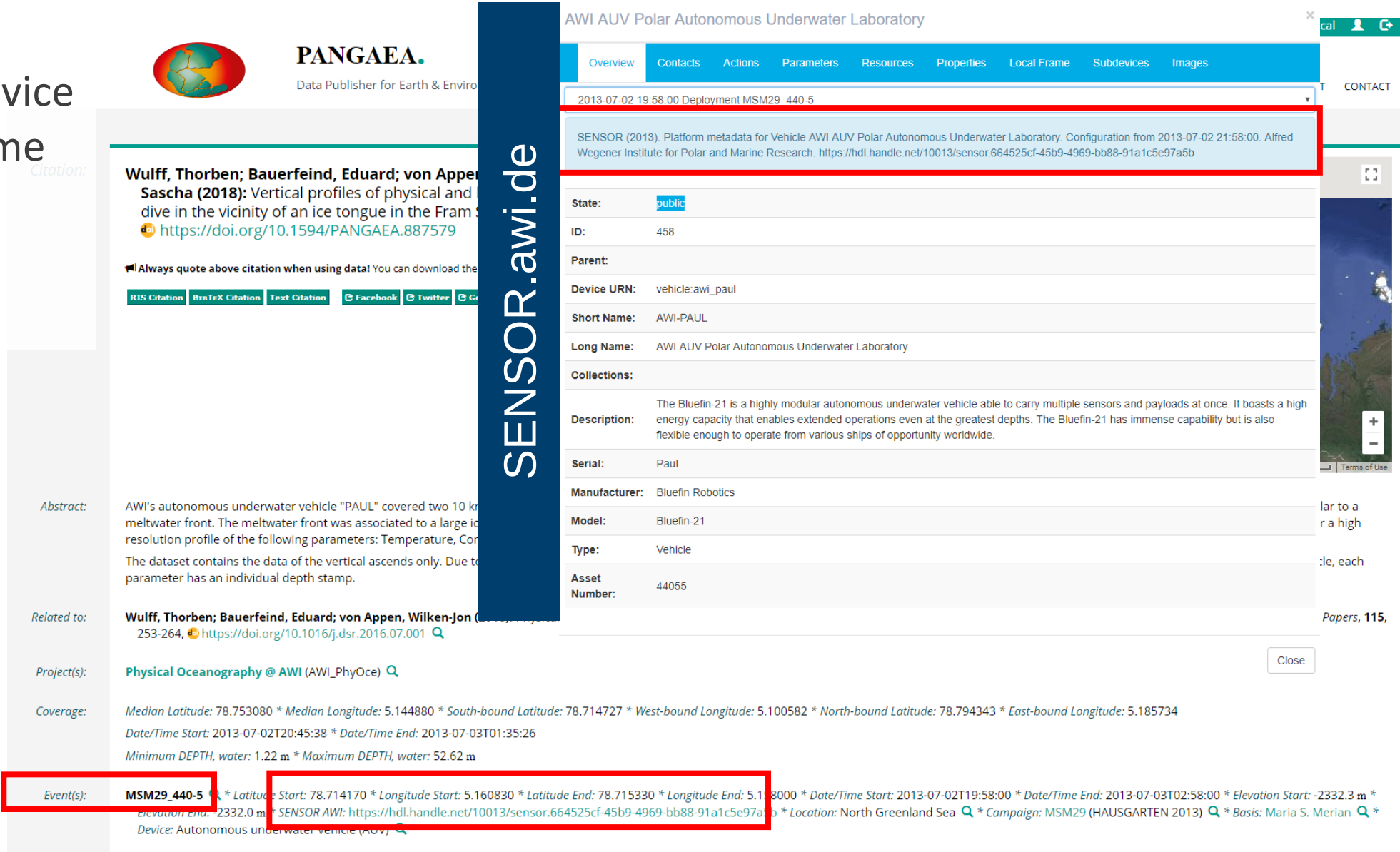




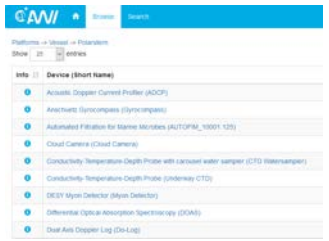
Clone functionality

Linking PANGAEA to SENSOR

- Configuration of device at measurement time linked directly SENSORWeb



Data Flow in MOSAiC



ActionLog Events

Activity - Device Operatio	Start	Device	Action	Latitude	Longitu
PS4_4-1 ADCP	12.10.2016 11:49:24	Acoustic Doppl...	station start	51° 03,088' N	001° 23
	12.10.2016 11:49:01	Acoustic Doppl...	station start	51° 03,157' N	001° 23,
PS4_1-3 BLN	11.10.2016 14:17:22	BALLON	in the water	46° 07,339' N	010° 15,
PS4_1-1 BOAT	11.10.2016 14:13:31	Boat	MyAction	46° 07,251' N	010° 15,

SensorWeb at AWI and onboard of Polarstern

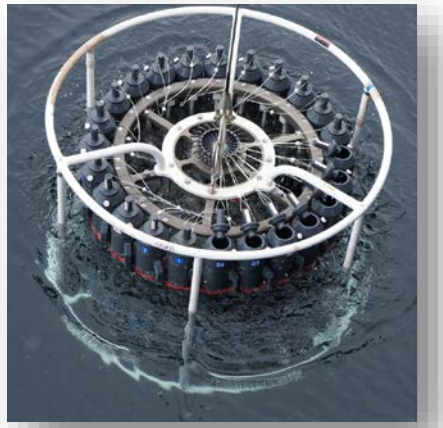
Acquisition organized by MOSAiC groups.
DShip-ActionLog for Device-Operation ID management

Sensor Metadata Description → Data Acquisition → Data Ingestion → Data Storage → Data Monitoring → Data Analytics → Data Archiving

Sensor metadata description (SensorWeb) is the basis for all parts!!!

DSHIP-ActionLog

- ✓ Logs science activities and device operations during cruise
- ✓ Logging can be easily done in Webbrowser (real time) or using the IceFloeNavi-APP (delayed)



DSHIP Finland Snow School 1 || 16° 25,971' N 155° 38,183' W || 20

Page 1 +

ActionLog Events

Activity - Device Operation	Timestamp	Device	Action	Transponder ...	Transponder ...
	27.02.2019 12:14:09	Hand CTD	information		
	27.02.2019 11:14:09	Hand CTD	deployed		
WE003_7-1 zodiac_luisa	26.02.2019 16:39:03	Zodiac Luisa o...	information		
WE003_14-1 HandCTD-12321-...	26.02.2019 16:14:09	Hand CTD	recovered	-14.1348	37.2113
	26.02.2019 15:14:09	Hand CTD	information	-14.1345	37.2114
	26.02.2019 14:14:09	Hand CTD	deployed	-14.1344	37.2113
WE003_11-1 HandCTD-12321-...	26.02.2019 16:14:09	Hand CTD	recovered		
	26.02.2019 15:14:09	Hand CTD	information		
	26.02.2019 14:14:09	Hand CTD	deployed		

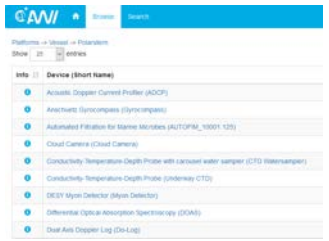
Floe Navigation System

- Requirements (science)
  - Orientation and navigation in fixed coordinate system
  - (relative) Position of installations and sites
  - Registration of measurements and samples
- Benefits
  - Increasing safety
  - Monitoring of movements
  - Navigation on moving Ice Floe

- Concept
  - Based on AIS transponders
    - FIX stations on the ice
    - Mobile units
  - Tablet devices with map view
  - Sync-Server on board

Development of AWI and Hochschule Bremerhaven:
Marcel Nicolaus, Martin Schiller, Nadeem Gul, Rintu Raju Daniel

Data Flow in MOSAiC



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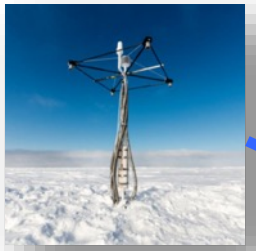
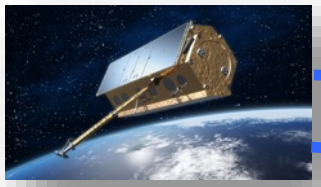
Data transfer via satellite, local LAN, radio LAN as stream and/or in delayed mode

Sensor metadata description (SensorWeb) is the basis for all parts!!!

Overview Architecture





Iridium satellite link to earth station, followed by Iridium satellite link for downloading to Polarstern

RadioLAN

LAN

USB-Disc („delayed mode“ data)

Ingest raw data by centralised Ingest-Software on Board

Files

Parameter values

Device Drivers

700 TB With Backup

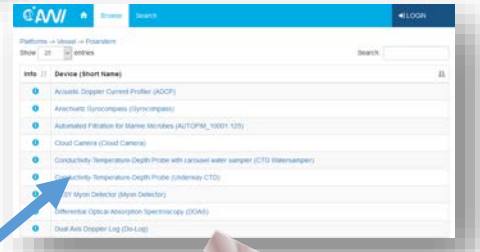
MOSAiC Central Storage and workspace

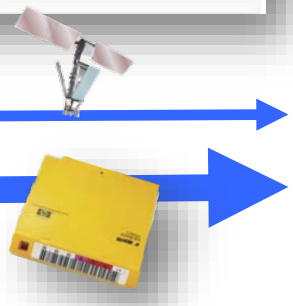
Network between Polarstern and RadioLAN, LAN, etc...

Polarstern Network

DSHIP ActionLog, DShip-Mapviewer and Dashboard at AWI and onboard of Polarstern

SensorWeb



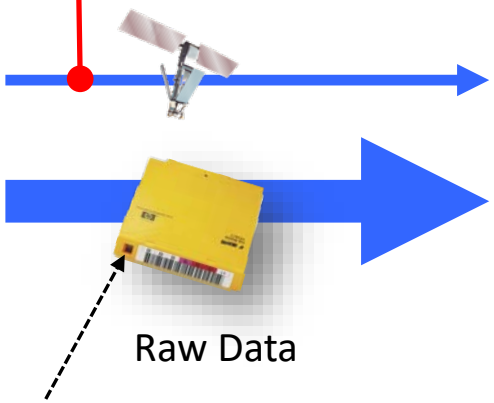


User Notebooks, PCs, VMs, Tablets, MobilPhones

Sensor metadata description (SensorWeb) is the basis for all parts!!!

Raw Data at AWI

Currently only 3 x 200MB/day



Raw Data

Onshore Data Transfer

Land-MOSAiC Central Storage

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Computing Network

Cabled LAN (fibre optical)

- at power lines
- 1Gbit/s

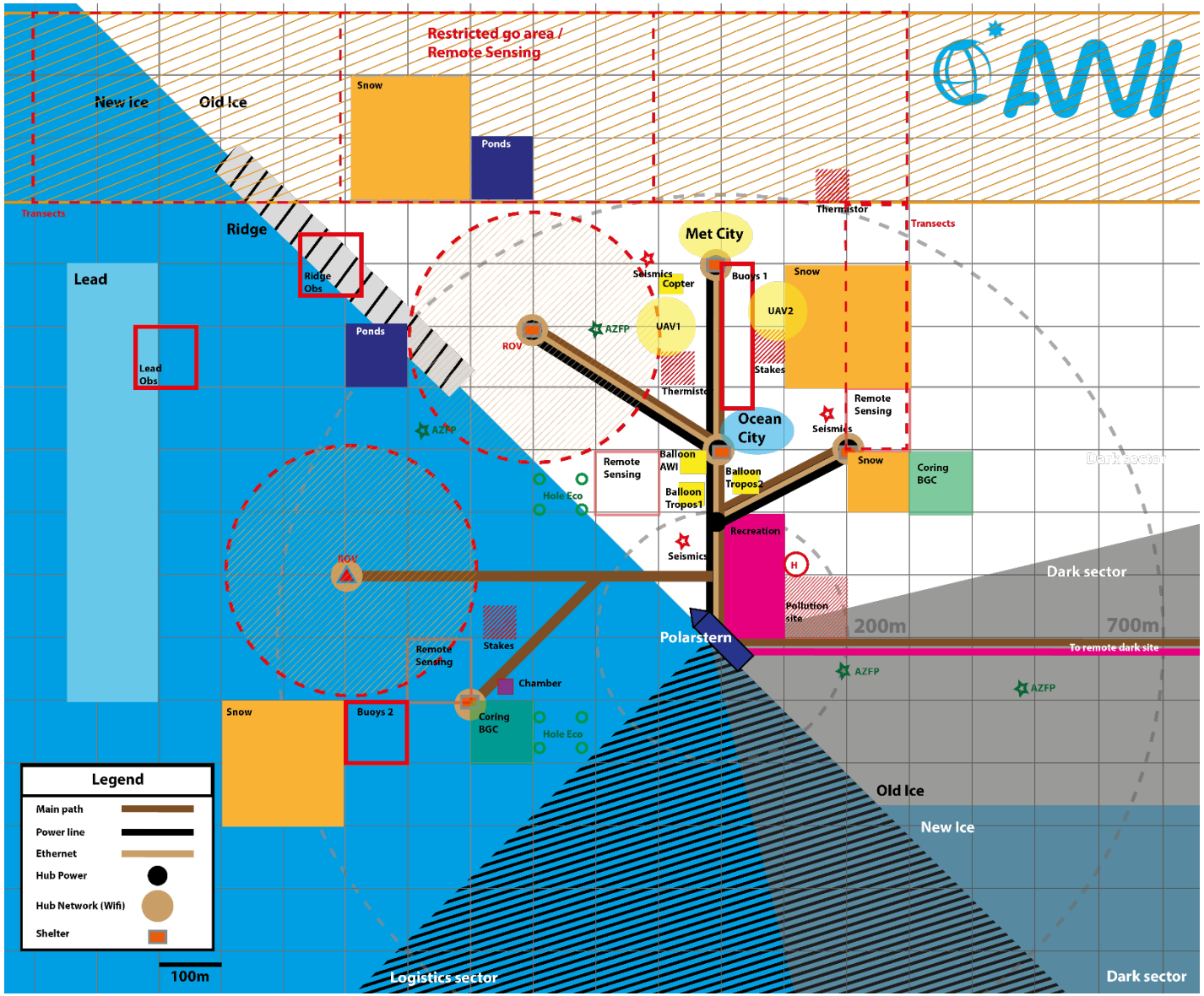
Radio LAN (Estimated transfer rates, not yet tested in polar regions)

- 50-200 Mbit/s near Polarstern
- 3Mbit/s in 20km distance
- Needs mobile power supply

Internet satellite connections

- 3 up 4 Iridium CERTUS Terminals
- 0.44 Mbit/s each

- No internet access available for user pcs and personal laptops!
- Email quotas: 50 kB to 1 MB per Email



Sensor Metadata Description | Data Acquisition | Data Ingestion | **Data Storage** | Data Monitoring | Data Analytics | Data Archiving

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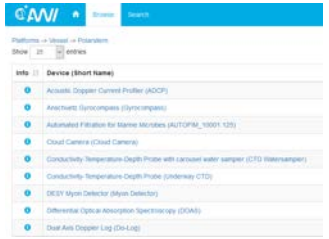
Data Flow in MOSAiC



ActionLog Events

Activity - Device Operatio	Start	Device	Action	Latitude	Longitu
PS4_4-1 ADCP	12.10.2016 11:49:24	Acoustic Doppl...	station start	51° 03,088' N	001° 23
	12.10.2016 11:49:01	Acoustic Doppl...	station start	51° 03,157' N	001° 23,
PS4_1-3 BLN	11.10.2016 14:17:22	BALLON	in the water	46° 07,339' N	010° 15,
PS4_1-1 BOAT	11.10.2016 14:13:31	Boat	MyAction	46° 07,251' N	010° 15,

SensorWeb at AWI and onboard of Polarstern

Acquisition organized by MOSAiC groups.
DShip-ActionLog for Device-Operation ID management

Sensor Metadata Description → Data Acquisition → Data Ingestion → Data Storage → Data Monitoring → Data Analysis → Data Archiving

Data transfer via satellite, local LAN, radio LAN as stream and/or in delayed mode

MOSAiC Central Storage and workspace

Sensor metadata description (SensorWeb) is the basis for all parts!!!

MOSAiC Central Storage (MCS)

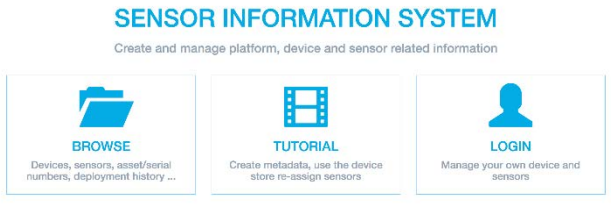
- Central Storage for raw data and data products on board Polarstern
- Naming convention of device area is derived from SensorWeb
- Data transferred to in Bremerhaven for common access by MOSAiC consortium members

Device Area
(Raw Data)

Workspace Area

platforms

- vessel
  - polarstern
    - ctd_watersampler
      - SBE3plus temperature sensor
        - DSHIP-DEVICEOPERATION-ID
          - SensorFile.xxx
    - FerryBox
      - DATE
        - SensorFile.xxx
- vehicle
  - BEAST
    - ECO-Triplet Fluorometer
      - DSHIP-DEVICEOPERATION-ID
        - SensorFile.xxx
    - Micron Scanning Sonar



Tasks

- Coring
  - Site 1
    - Quicklooks
    - Processed Data
    - Combined Datasets
  - Site 2
    - DN
    - …
- SnowPits
  - Site 1
  - Site 2
  - DN
- ROV

Team-Folders (PS only?)

- OCEAN
- ICE
- ATMOS
- …

primary data

Data Fow in more detail

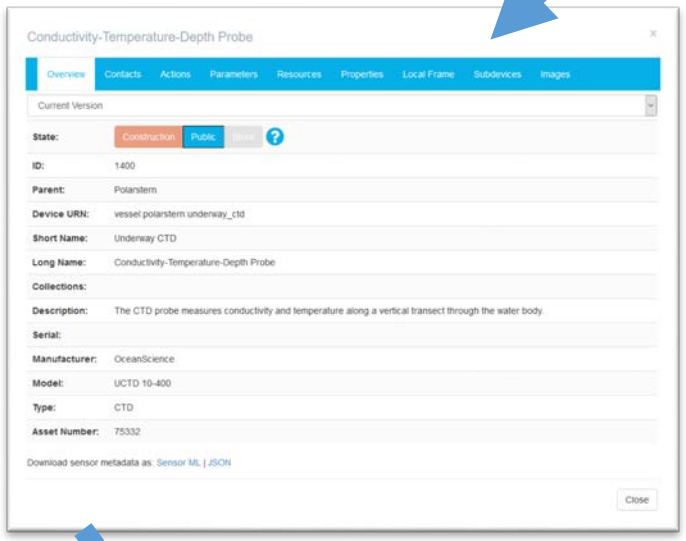
MOSAiC International Arctic Drift Expedition

AWI

Devices has to be created in SENSOR (only once)

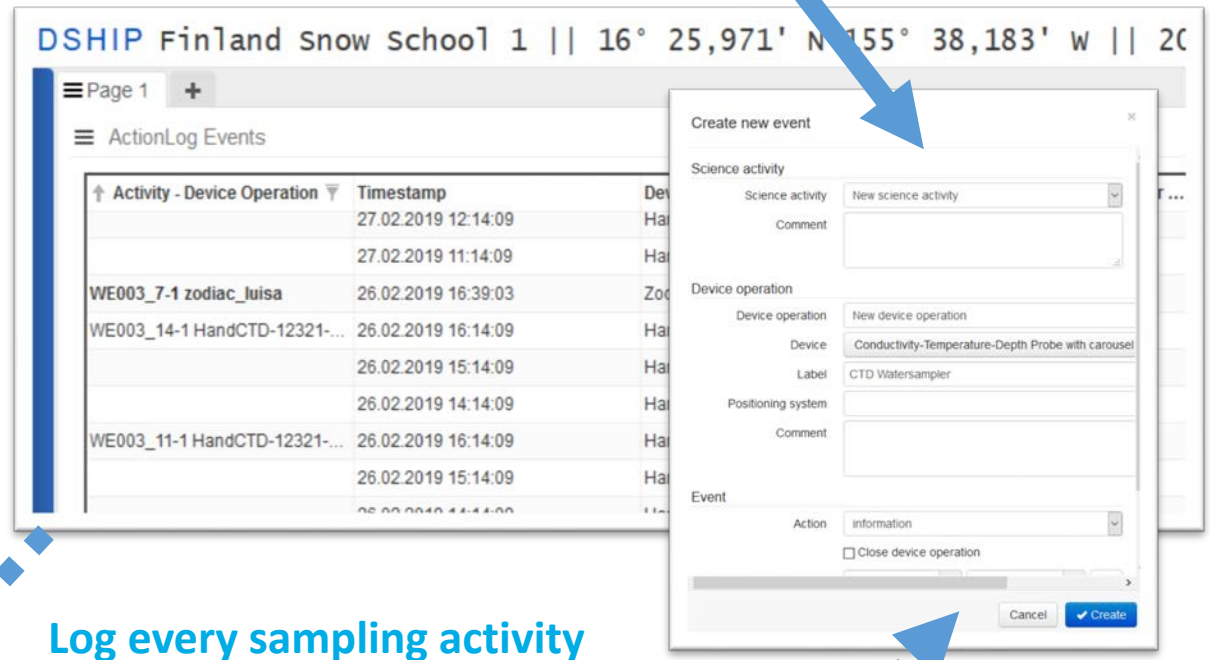
Log every device operation

SENSOR.fs-polarstern.de



background Synching (device & device operation)

DSHIP-ActionLog



Background creating directories (device & device operation)

Log every sampling activity

Storage MCS

vessel/polarstern/ctd_watersampler/SBE3plus_temperature_sensor/DEVICEOPERATION_ID/

IceFloeNavi-App

manually Synching (device & device operation)

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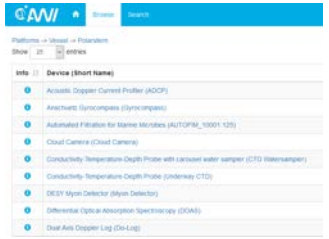
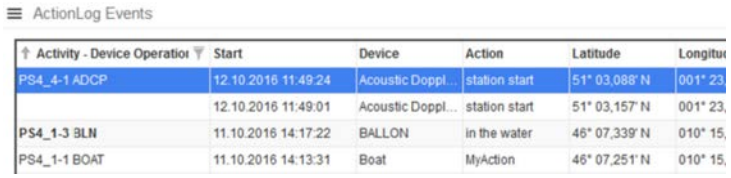
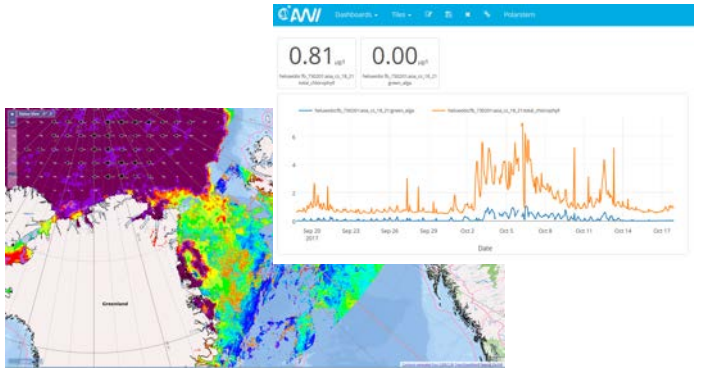
Data Flow in MOSAiC



SensorWeb at AWI and onboard of Polarstern



Acquisition organized by MOSAiC groups.
DShip-ActionLog for Device-Operation ID management



DShip-Mapviewer and Dashboard at AWI and onboard of Polarstern

Sensor Metadata Description → Data Acquisition → Data Ingestion → Data Storage → Data Monitoring → Data Analysis → Data Archiving

Data transfer via satellite, local LAN, radio LAN as stream and/or in delayed mode

MOSAiC Central Storage and workspace

Sensor metadata description (SensorWeb) is the basis for all parts!!!

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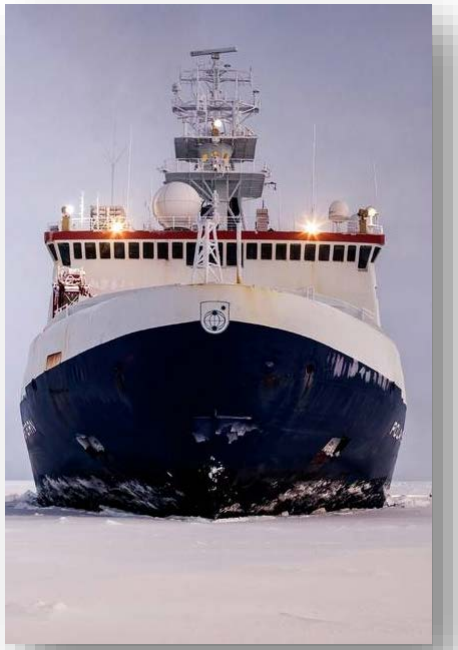
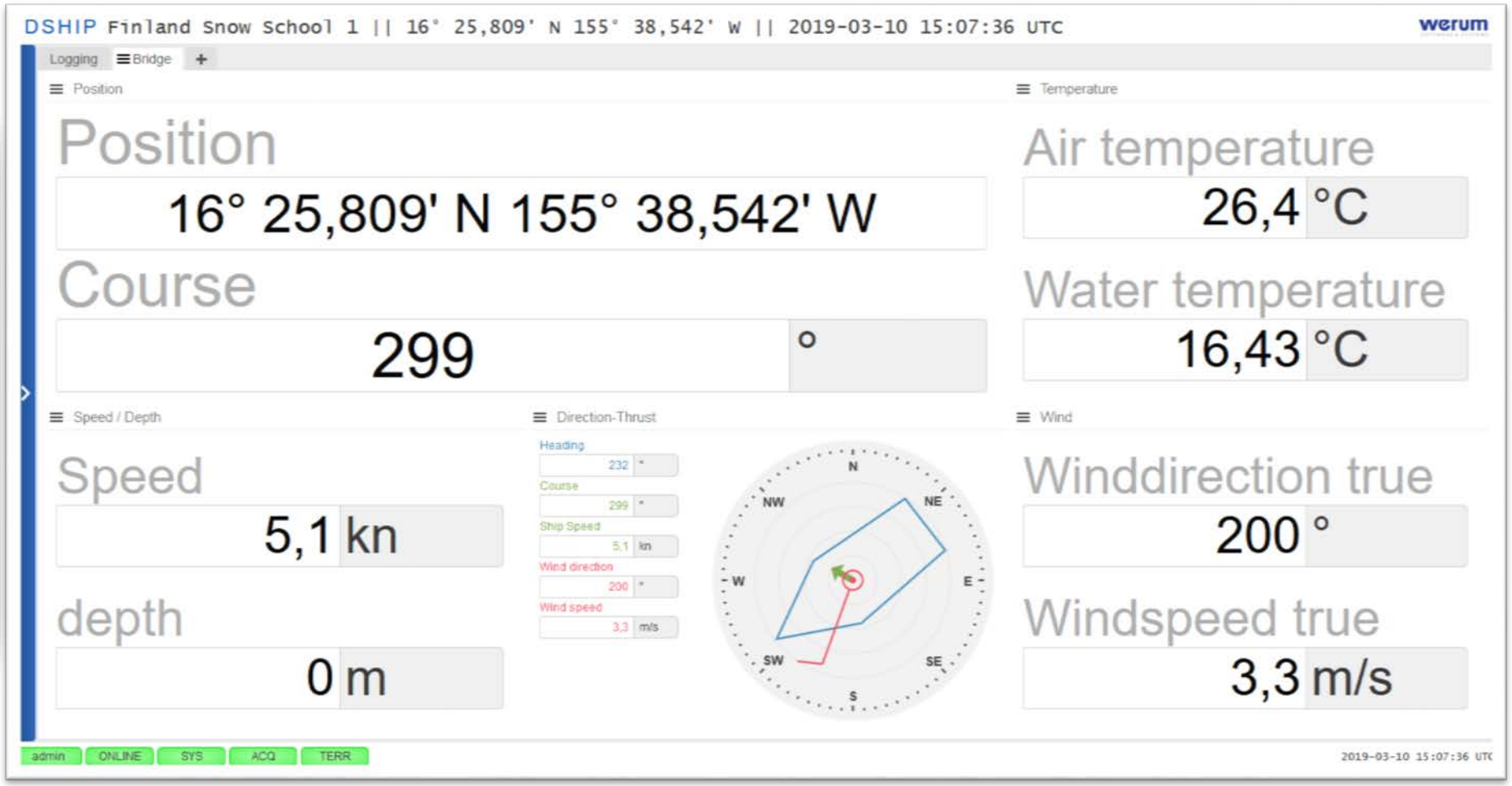
✓ *Monitoring realtime data from ship sensors*

AWI

DSHIP-RawData





Sensor Metadata Description | Data Acquisition | Data Ingestion | Data Storage | **Data Monitoring** | Data Analytics | Data Archiving

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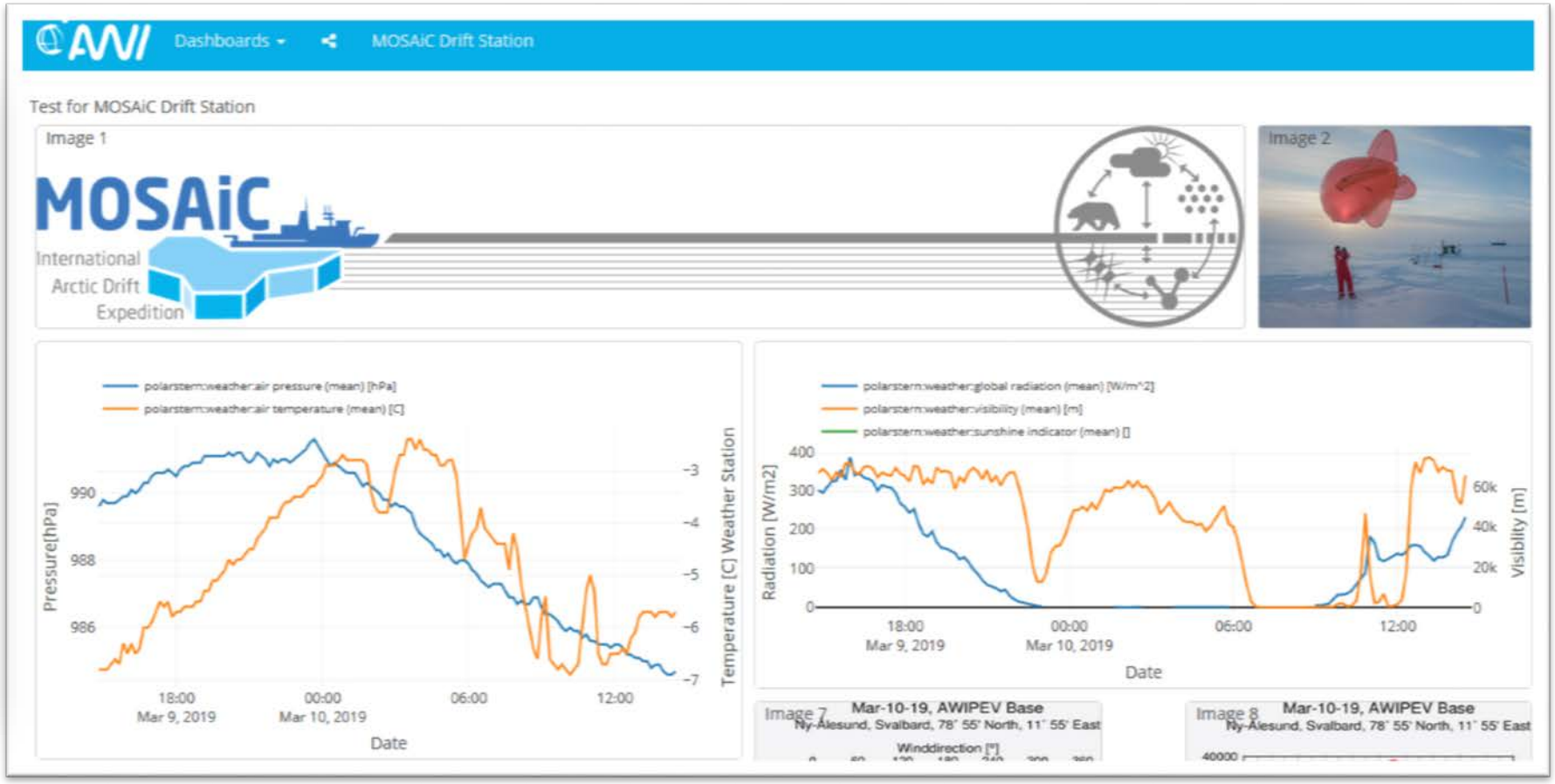
✓ *Monitoring of near real-time and delayed-mode MOSAiC data*

DASHBOARD



Sensor Metadata Description | Data Acquisition | Data Ingestion | Data Storage | **Data Monitoring** | Data Analytics | Data Archiving

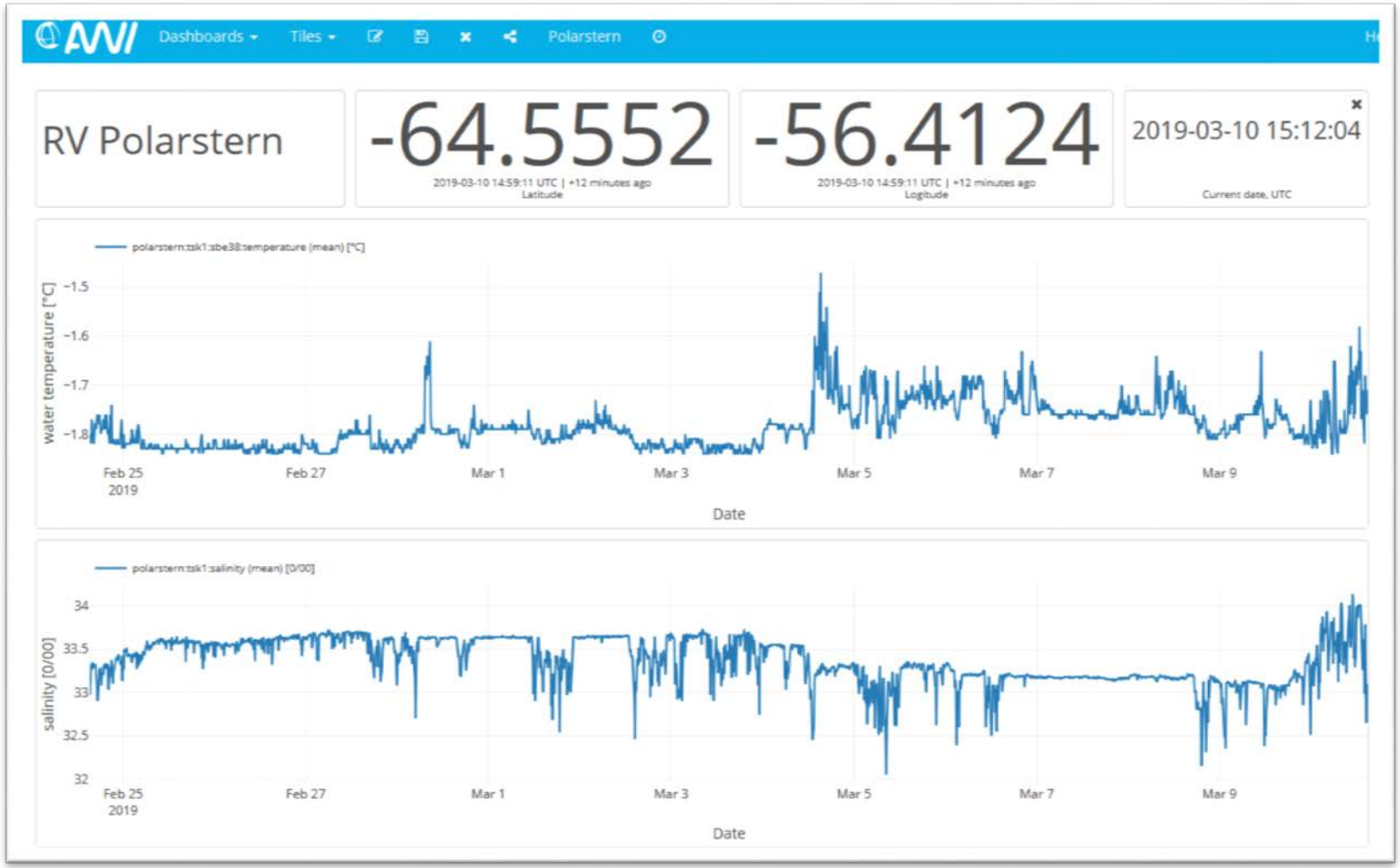
HELMHOLTZ

MOSAiC International Arctic Drift Expedition

✓ *Monitoring of near real-time and delayed-mode data on shore*

AWI

DASHBOARD



Sensor Metadata Description | Data Acquisition | Data Ingestion | Data Storage | **Data Monitoring** | Data Analytics | Data Archiving

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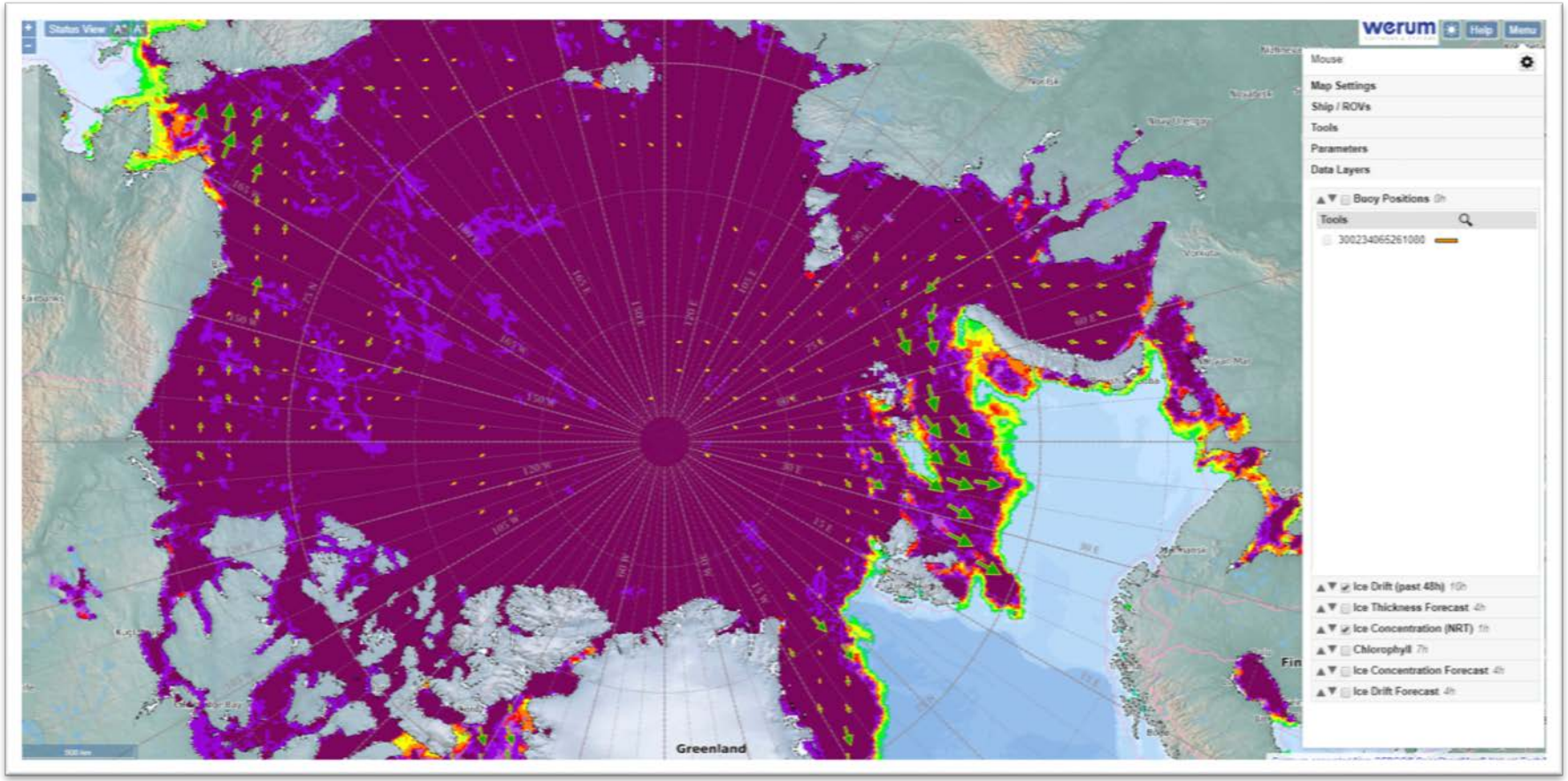
MOSAiC International Arctic Drift Expedition

MAPVIEWER

- ✓ *A browser based mapping and viewing system available on board*
- ✓ *Decision support on board*



Sensor Metadata Description | Data Acquisition | Data Ingestion | Data Storage | **Data Monitoring** | Data Analytics | Data Archiving

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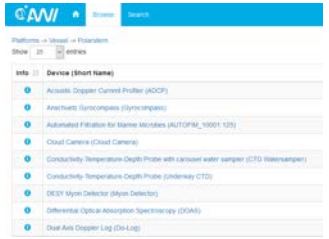
Data Flow in MOSAiC



SensorWeb at AWI and onboard of Polarstern

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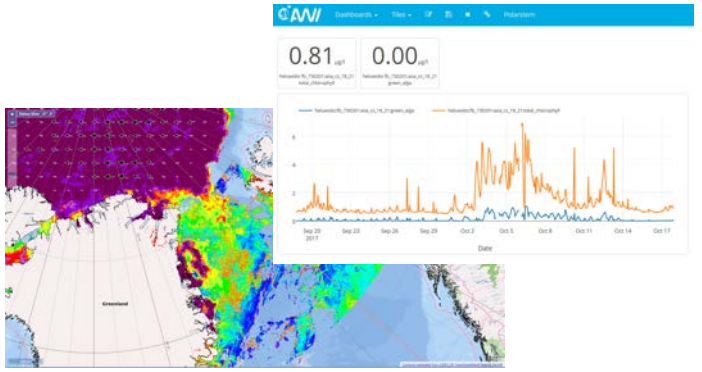


DShip-Mapviewer and Dashboard at AWI and onboard of Polarstern

Sensor Metadata Description → Data Acquisition → Data Ingestion → Data Storage → Data Monitoring → Data Analytics → Data Archiving

Data transfer via satellite, local LAN, radio LAN as stream and/or in delayed mode

MOSAiC Central Storage and workspace

Using workspace and Marketplace (VM) e.g. with Jupyter Notebook (R or Python) or Bash-Script or or …?

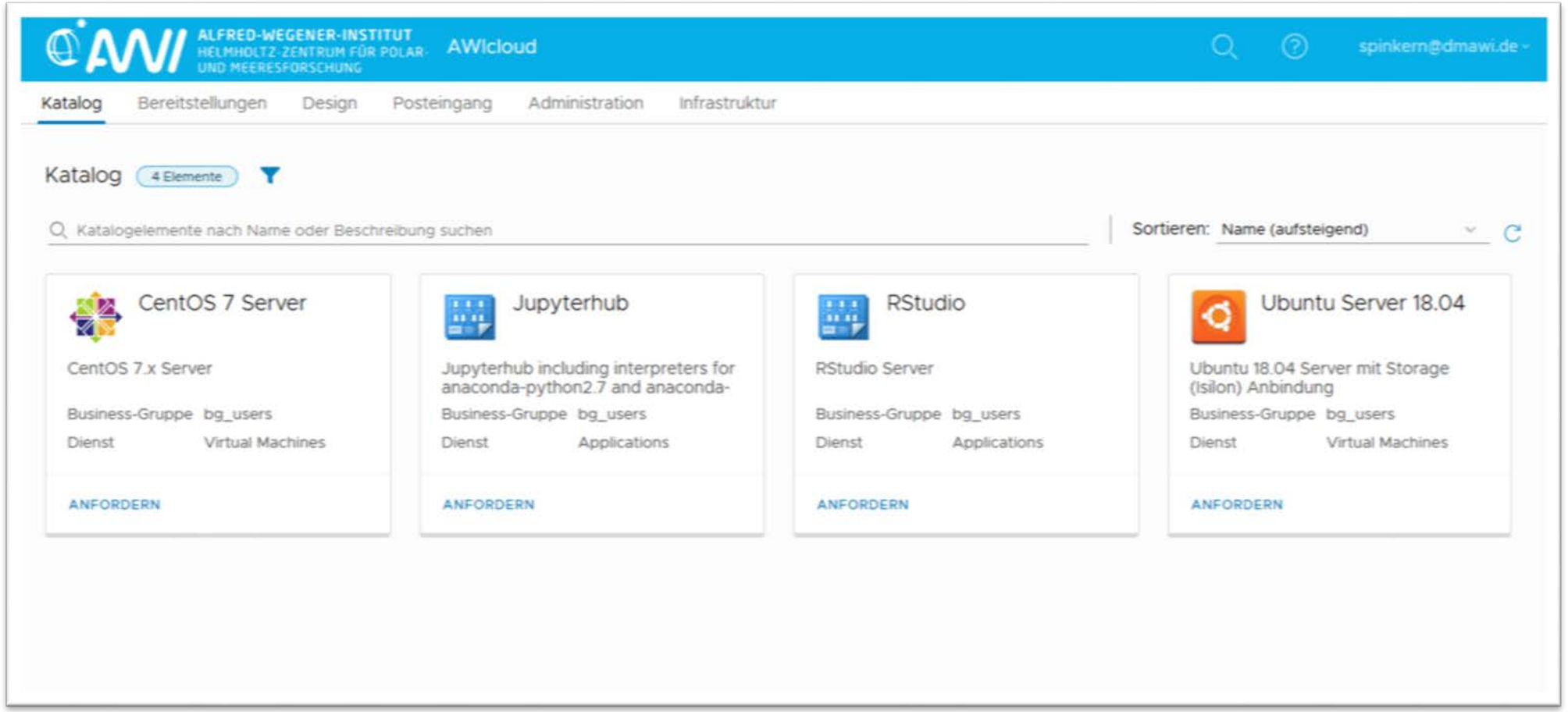
Sensor metadata description (SensorWeb) is the basis for all parts!!!

MOSAiC International Arctic Drift Expedition

✓ *Order your virtual machine with Linux, Windows, Jupyterhub, R,…*

AWI

MARKETPLACE



Sensor Metadata Description | Data Acquisition | Data Ingestion | Data Storage | Data Monitoring | **Data Analytics** | Data Archiving

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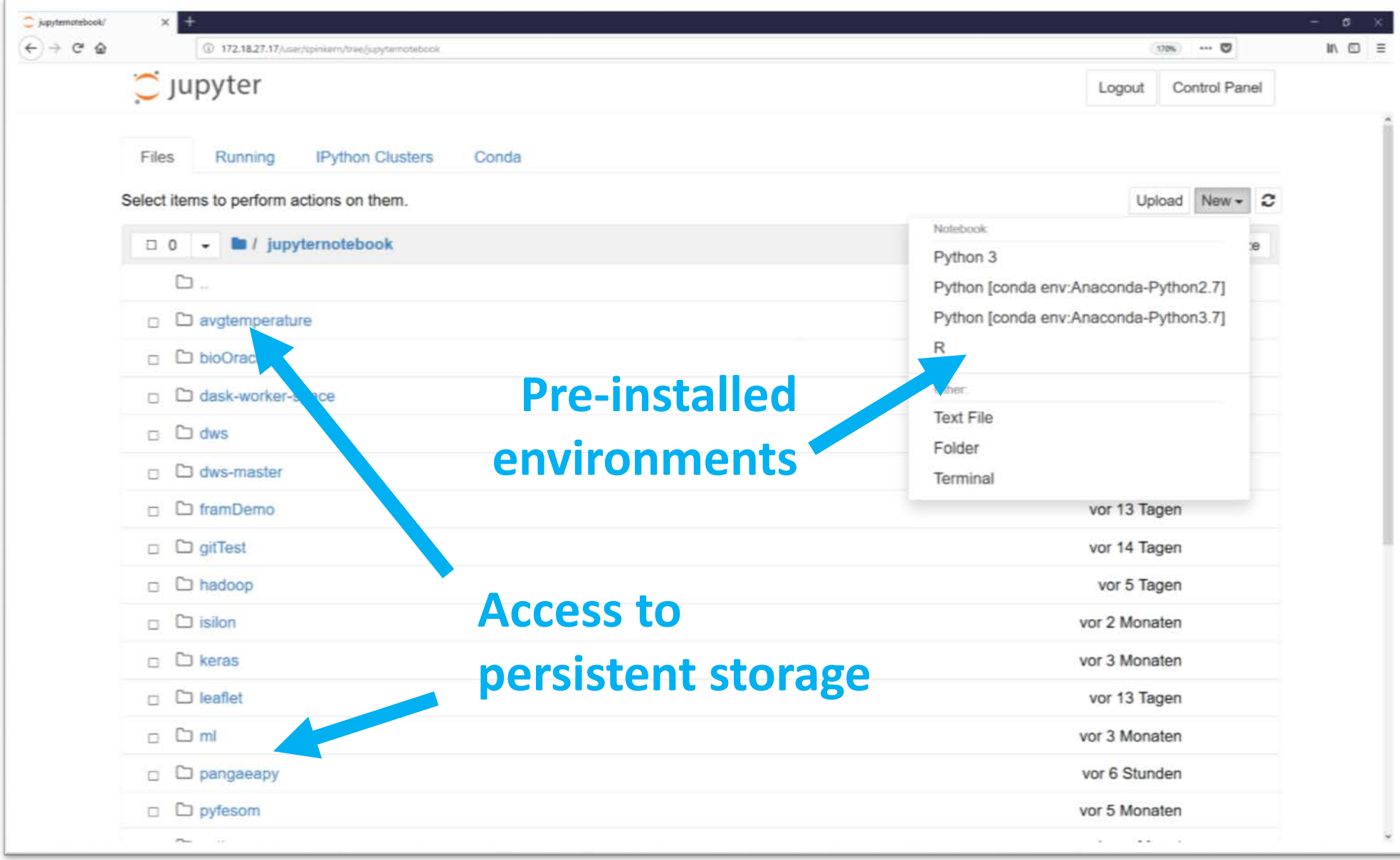
International Arctic Drift Expedition

MARKETPLACE



Sensor Metadata Description | Data Acquisition | Data Ingestion | Data Storage | Data Monitoring | **Data Analytics** | Data Archiving

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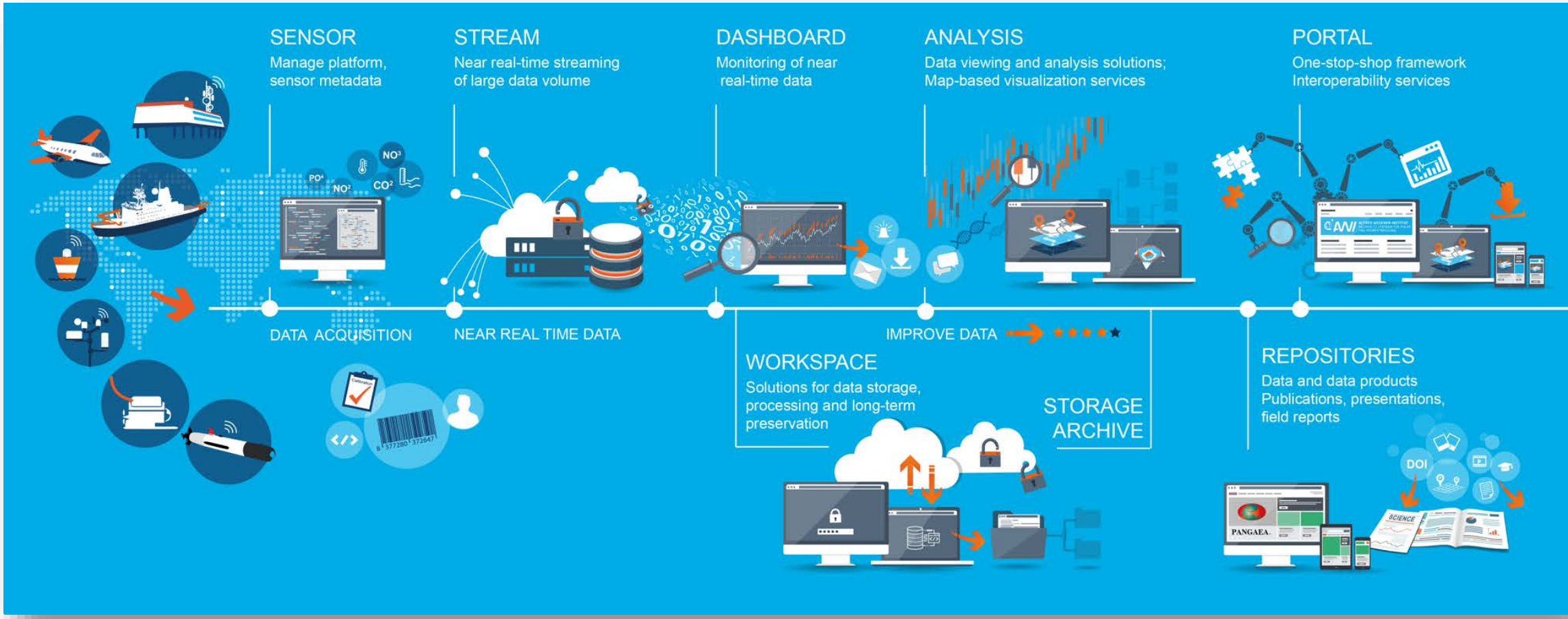
Observations to Achive (O2A)

- ✓ The MOSAiC – Data Flow based on O2A. A modular virtual research infrastructure designed to support scientific workflows, in particular the flow of sensor Observations to Archives



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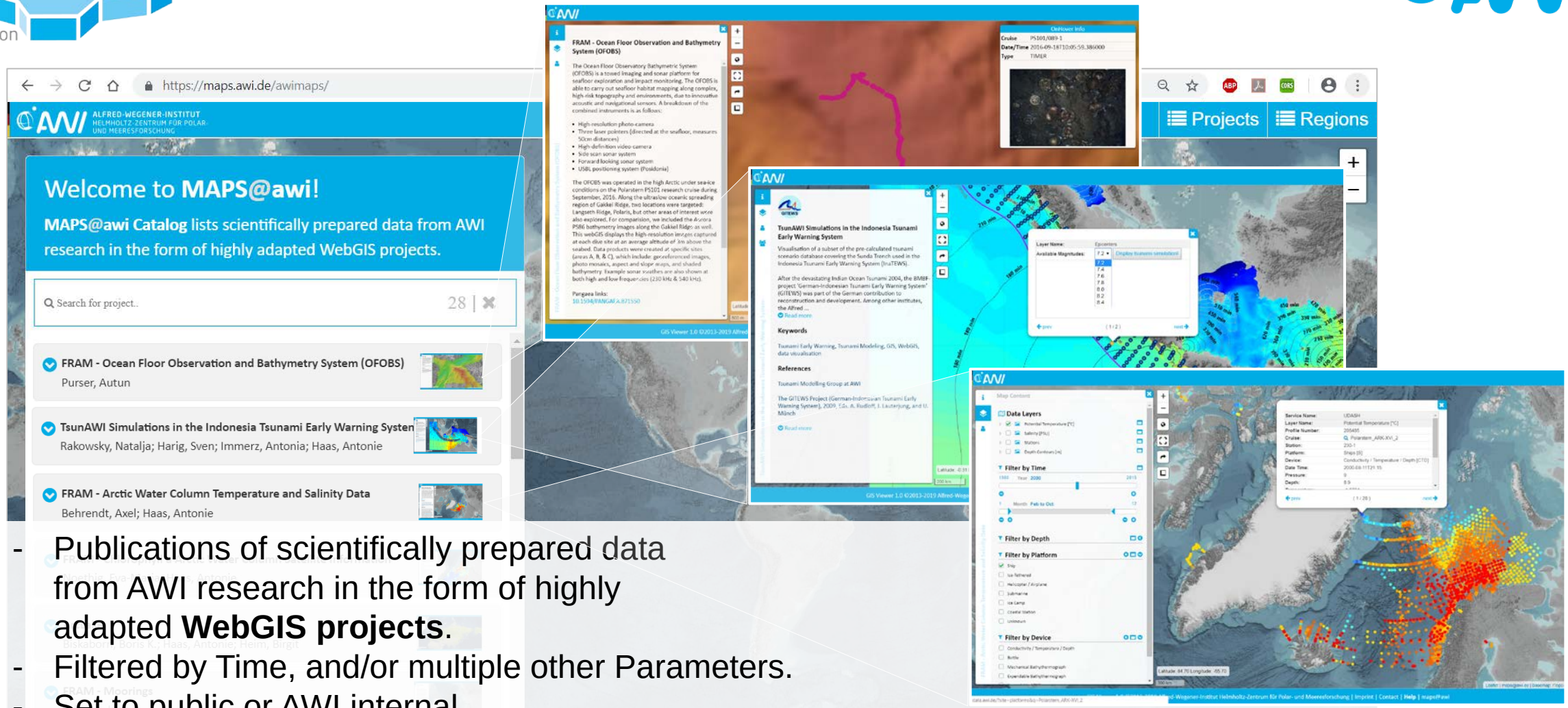
MAPS.awi.de



- Publications of scientifically prepared data from AWI research in the form of highly adapted **WebGIS projects**.
- Filtered by Time, and/or multiple other Parameters.
- Set to public or AWI internal.
- Searchable on DATA.awi.de

Interested? Contact us under **MAPS@awi.de**

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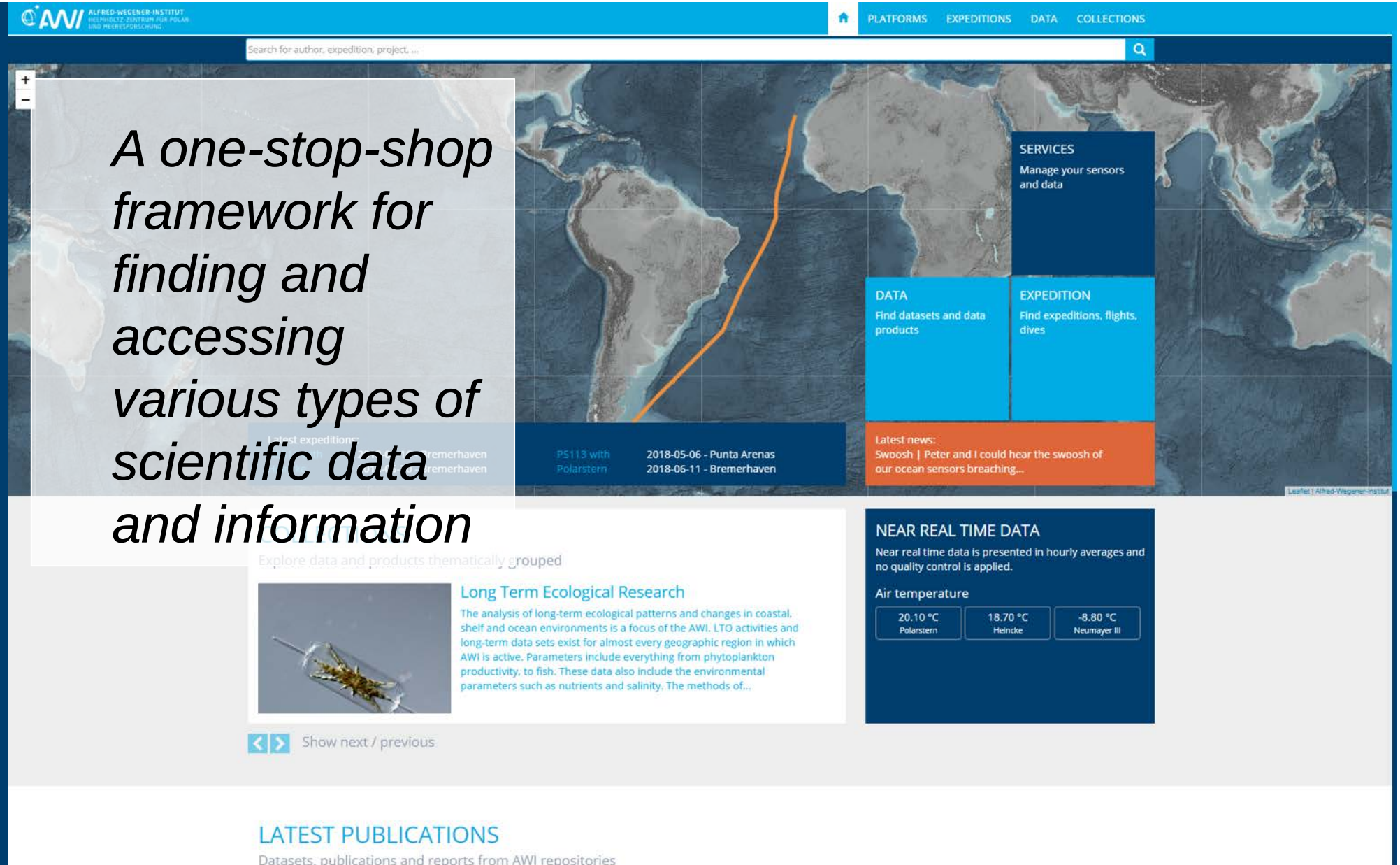
DATA.awi.de



A one-stop-shop framework for finding and accessing various types of scientific data and information

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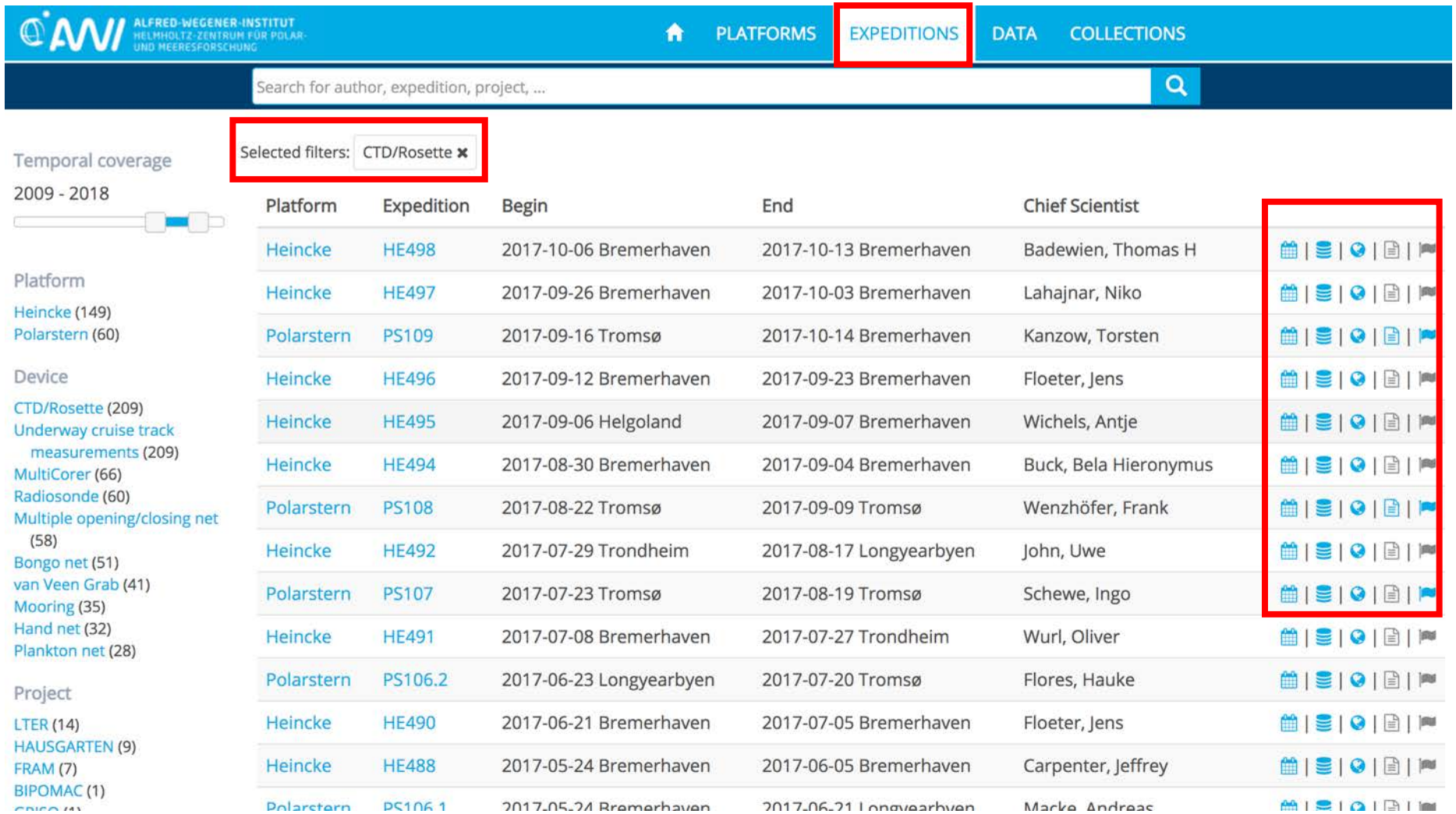
Expedition Data

DATA.awi.de

Station list, tracklines, data, publications, reports

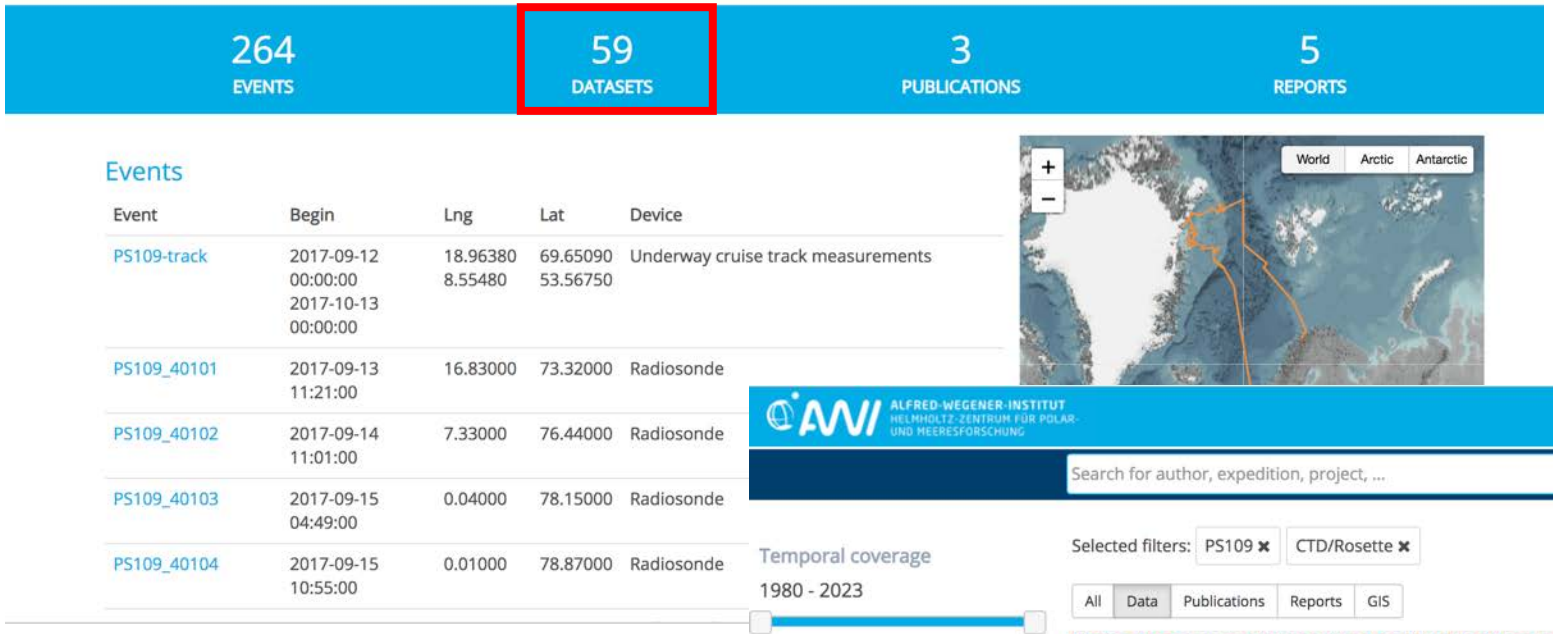


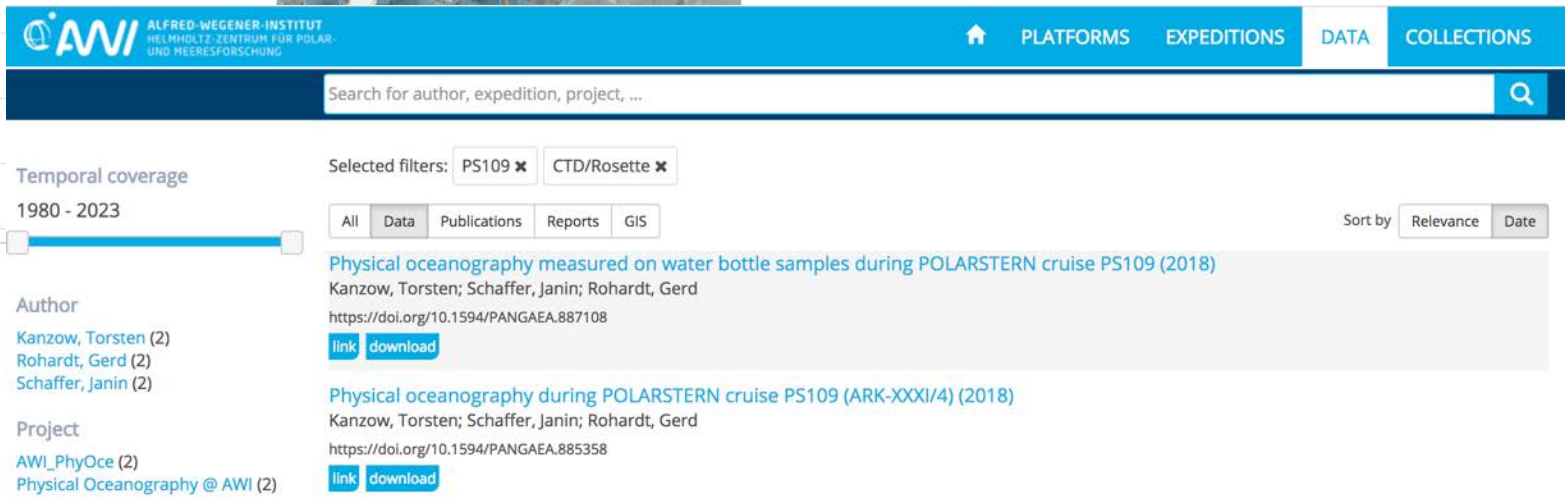
Platform	Expedition	Begin	End	Chief Scientist
Heincke	HE498	2017-10-06 Bremerhaven	2017-10-13 Bremerhaven	Badewien, Thomas H
Heincke	HE497	2017-09-26 Bremerhaven	2017-10-03 Bremerhaven	Lahajnar, Niko
Polarstern	PS109	2017-09-16 Tromsø	2017-10-14 Bremerhaven	Kanzow, Torsten
Heincke	HE496	2017-09-12 Bremerhaven	2017-09-23 Bremerhaven	Floeter, Jens
Heincke	HE495	2017-09-06 Helgoland	2017-09-07 Bremerhaven	Wichels, Antje
Heincke	HE494	2017-08-30 Bremerhaven	2017-09-04 Bremerhaven	Buck, Bela Hieronymus
Polarstern	PS108	2017-08-22 Tromsø	2017-09-09 Tromsø	Wenzhöfer, Frank
Heincke	HE492	2017-07-29 Trondheim	2017-08-17 Longyearbyen	John, Uwe
Polarstern	PS107	2017-07-23 Tromsø	2017-08-19 Tromsø	Schewe, Ingo
Heincke	HE491	2017-07-08 Bremerhaven	2017-07-27 Trondheim	Wurl, Oliver
Polarstern	PS106.2	2017-06-23 Longyearbyen	2017-07-20 Tromsø	Flores, Hauke
Heincke	HE490	2017-06-21 Bremerhaven	2017-07-05 Bremerhaven	Floeter, Jens
Heincke	HE488	2017-05-24 Bremerhaven	2017-06-05 Bremerhaven	Carpenter, Jeffrey
Polarstern	PS106.1	2017-05-24 Bremerhaven	2017-06-21 Longyearbyen	Macke, Andreas

Expedition Data

DATA.awi.de

- Events, Data and Publications

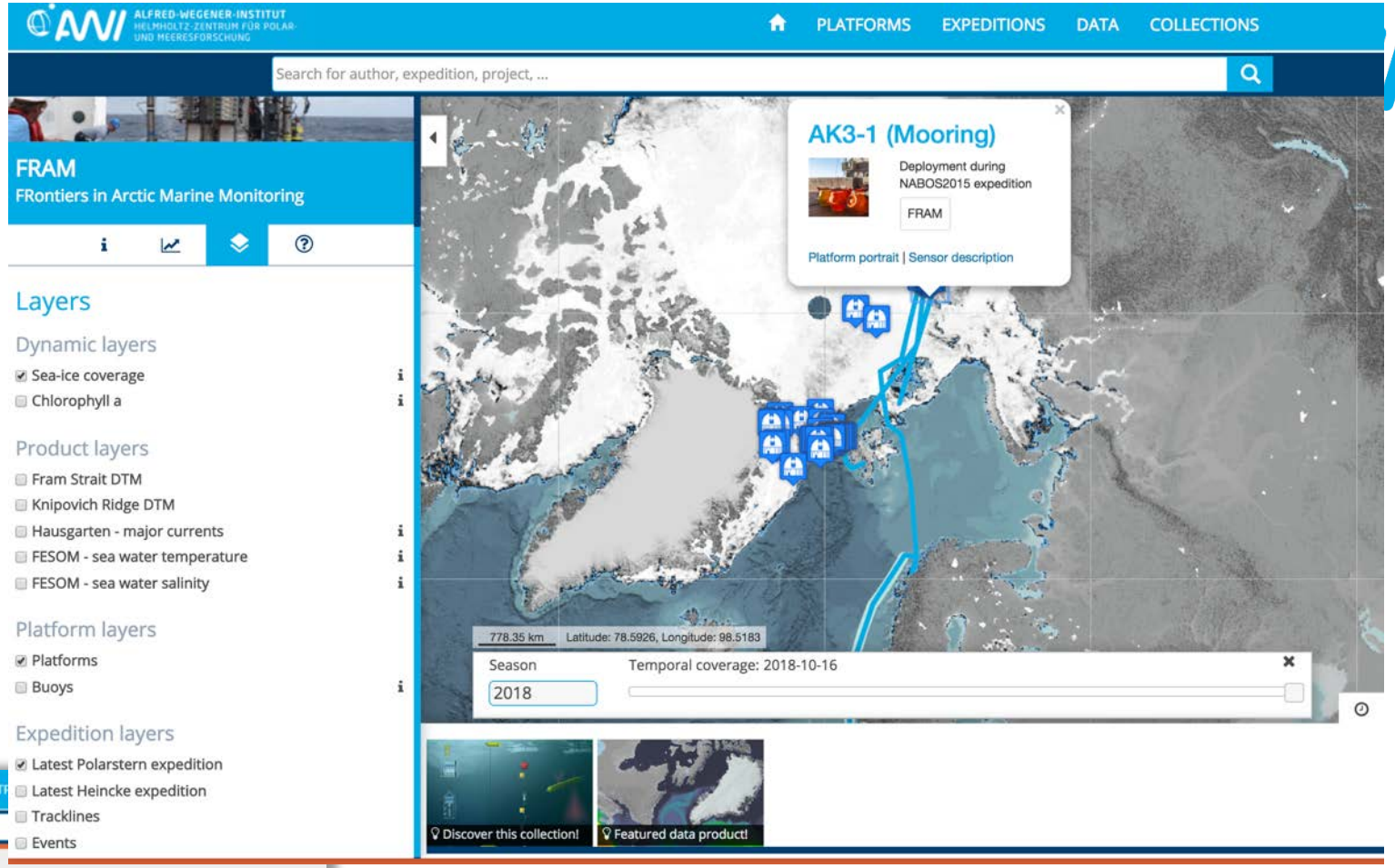


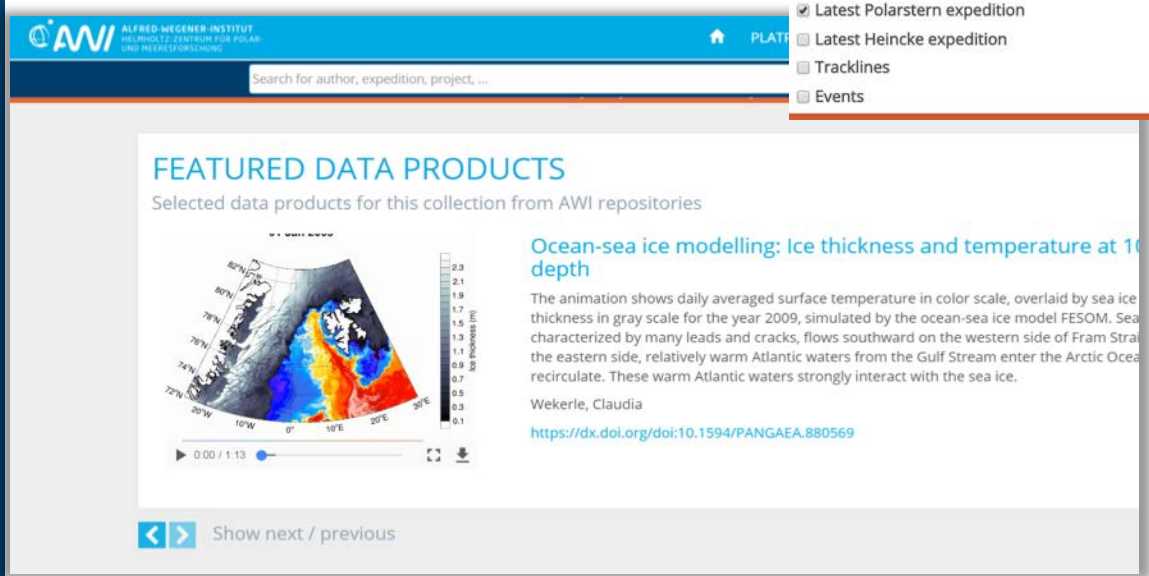


More Features

DATA.awi.de

Collections





Simulations, videos, audios, …

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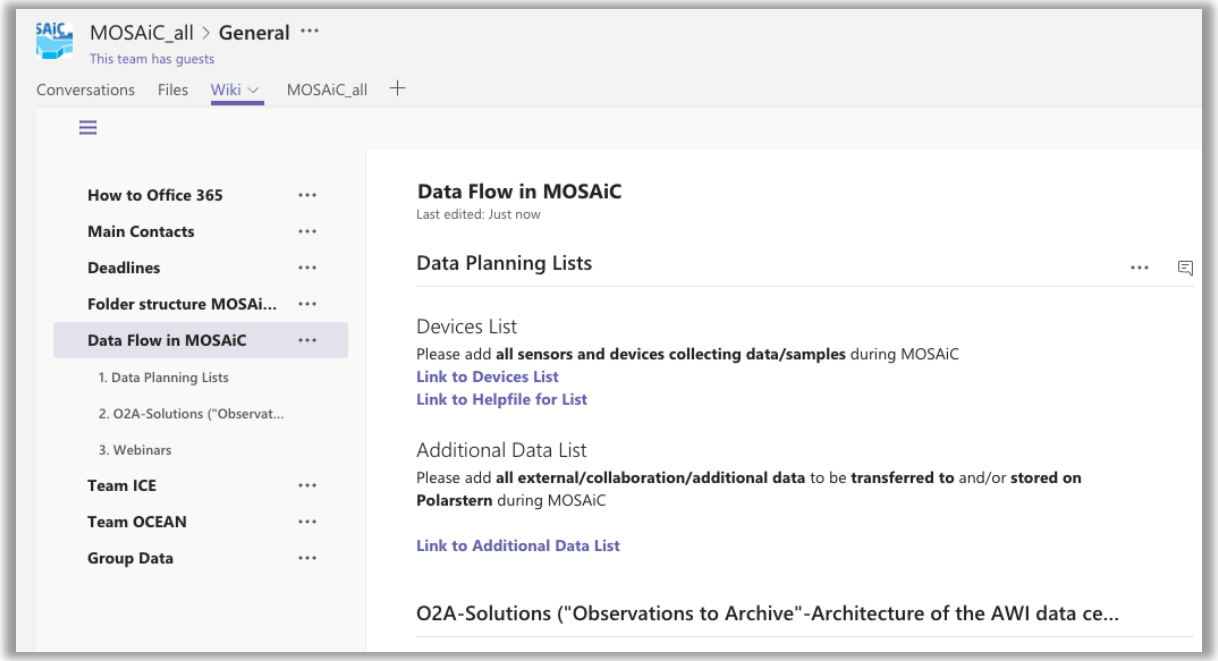
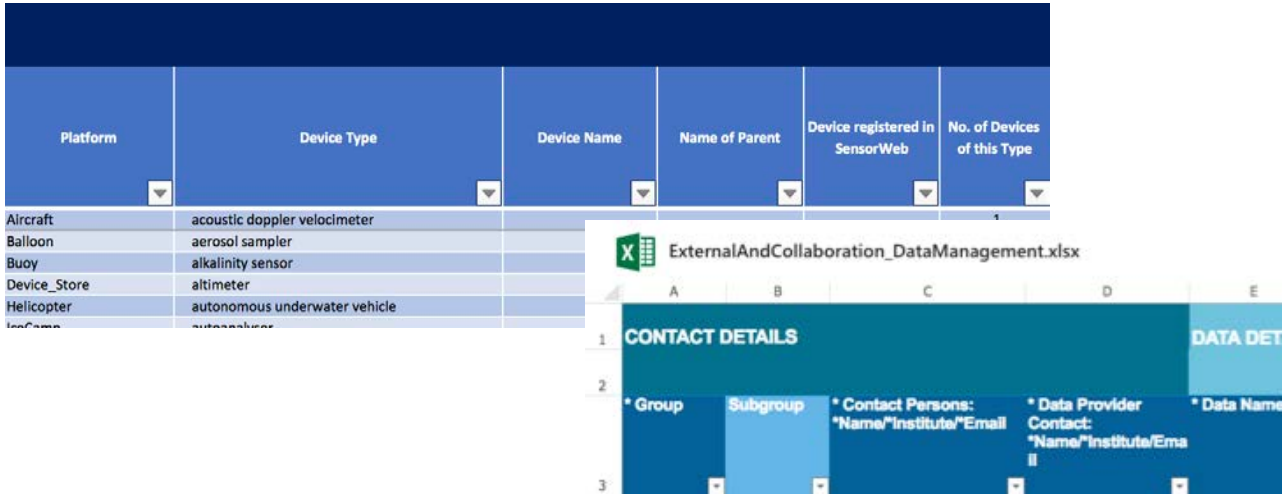
Data Support

Spreadsheets – Input needed for planning!

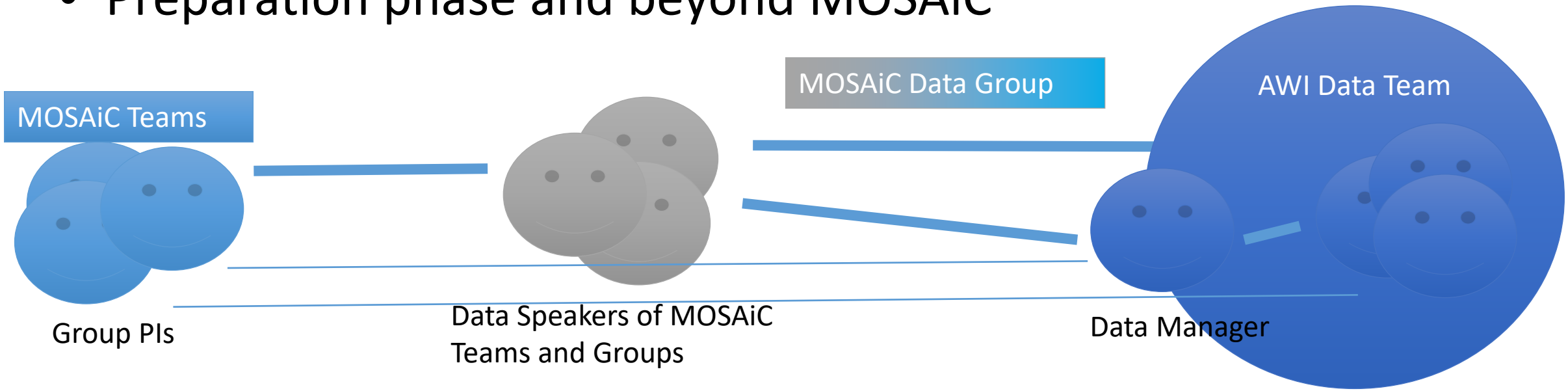
- Overview of expected data volume stored and transferred during MOSAiC!
- Device Management
  - All sensors and devices collecting data/samples
- External Data
  - External/Collaboration and additional data transferred to and/or stored on Polarstern





Communication Paths for Data Questions

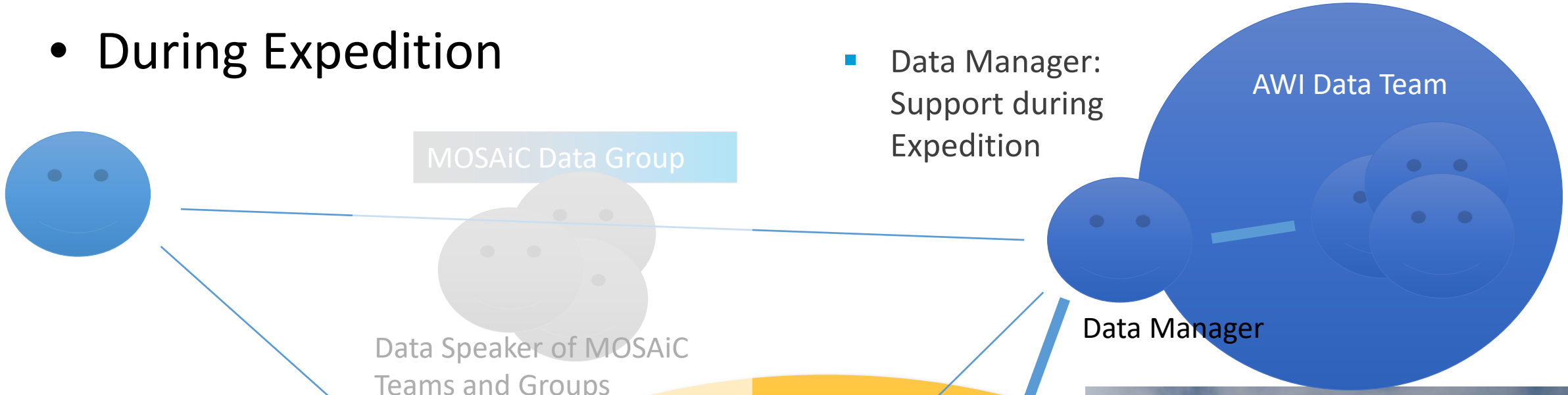
- Preparation phase and beyond MOSAiC



- Support during Preparation phase and beyond Expedition

- During Expedition

- Data Manager: Support during Expedition



- Data Supporter: Onboard Support during Expedition

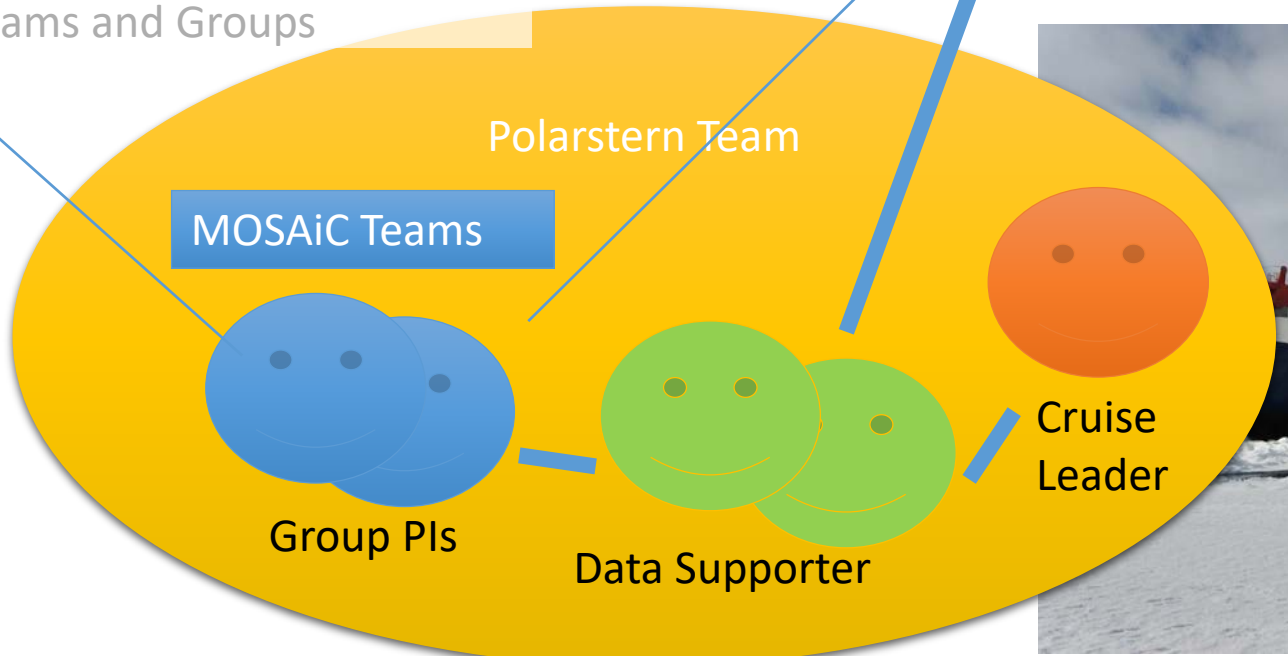


Foto: Peter Lemke (AWI)

Tasks of a Data Manager

- Communication
- Discussions
- Workshops
- Intermediation
- Training: Webinars
- Documentation
- Patience and empathy

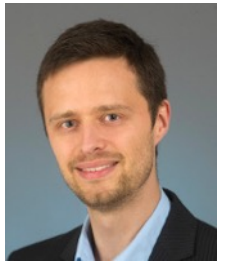
Datacentre Team!

Stephan Frickenhaus

Head of Data Centre
Data Representative MOSAiC

Peter Gerchow

Data Logisitics Support Head



Roland Koppe

Group leader:
Software Engineering

Daniela Ransby

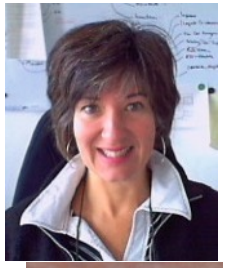
PANGAEA

Antonia Immerz

Data Manager MOSAiC

Tilman Dinter

Map Viewer



Ana Macario

Group leader:
Data Science Support

Janik Eilers

SensorWeb Support

Angela Schäfer

Deputy Data

Amelie Driemel

PANGAEA

Christian Schäfer-Neth

Head of SYSTEMS

Stefanie Schumacher

PANGAEA

Jörg Matthes

Virtualisierungsumgebung

Steven Rehmcke

Entwickler

Sebastian Immoor

Data Logistics Support

Antonie Haas

Geographical
Information Systems

Tobias Düde

Entwickler

Malte Thoma

Group leader: Server & Storage

Stefan Pinkernell

Virtual Workspaces

Andreas Walter

GIS Entwickler

Jens-Michael Schlüter

Netzwerk Sicherheit

Hans Pfeiffenberger

Former Deputy Data Centre

Benny Bräuer

Group leader:
Core IT Services

Frank Oliver Glöckner

Head of DATA

Martin Petri

Authentication and authorisation

Siegfried Makedanz

Communication Platform

Mohammad Ajjan

Data Management Plan

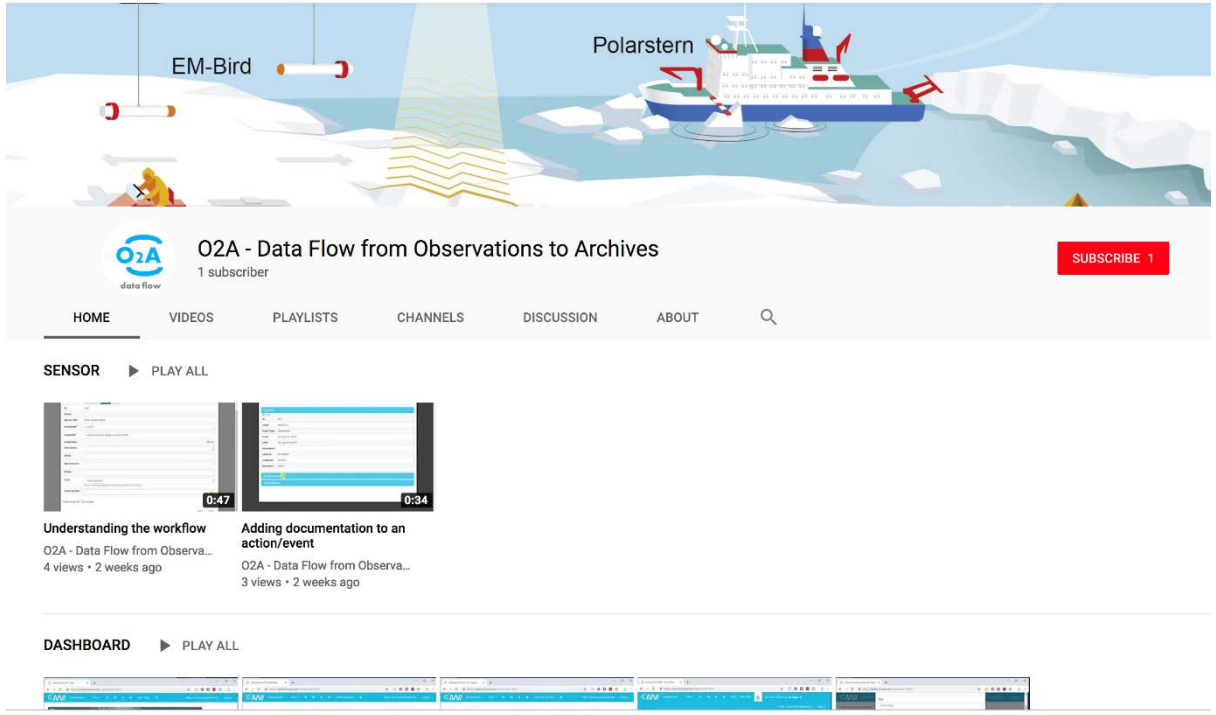
…Besten Dank an alle Mitwirkenden aus dem AWI Rechenzentrum!!

HELMHOLTZ

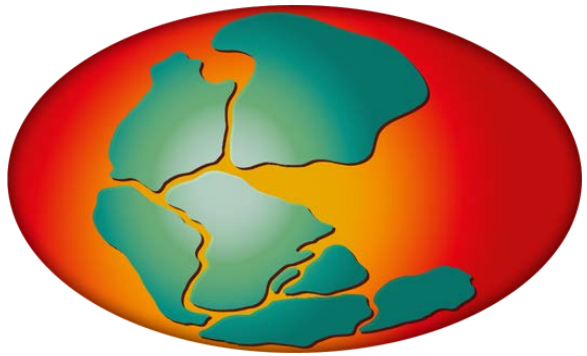
References and Further Documentation

- mosaic-expedition.org
- https://www.youtube.com/watch?v=I4JULQ9klqM

- sensor.awi.de
- dashboard.awi.de
- pangaea.de
- maps.awi.de
- data.awi.de
- mapviewer1.awi.de:8081/mapviewer
- https://www.youtube.com/channel/UCljKBoLBJqy8XASA3QKrRxA/



MOSAiC
International
Arctic Drift
Expedition

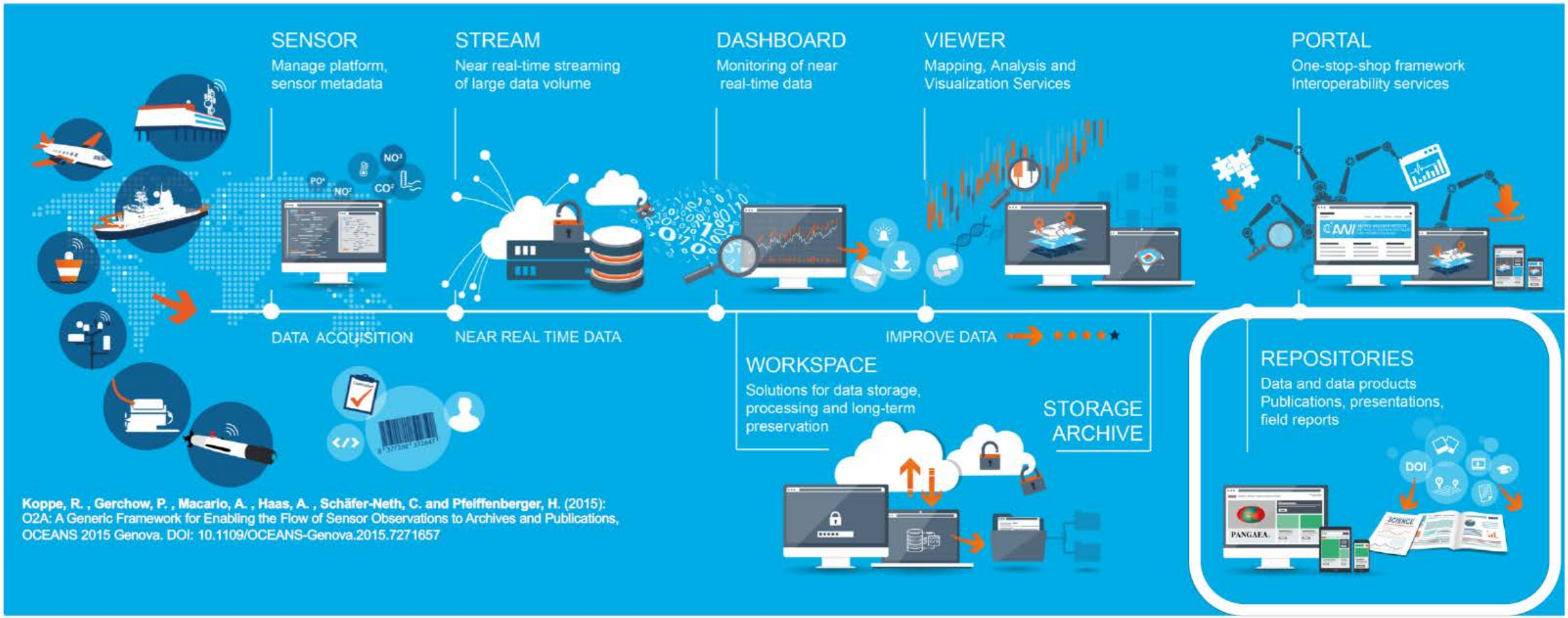


Data archiving with PANGAEA

For sustainable environmental research

ALFRED-WEGENER-INSTITUT
HELMHOLTZ-ZENTRUM FÜR POLAR-
UND MEERESFORSCHUNG

PANGAEA®
Data Publisher for Earth and Environmental Science



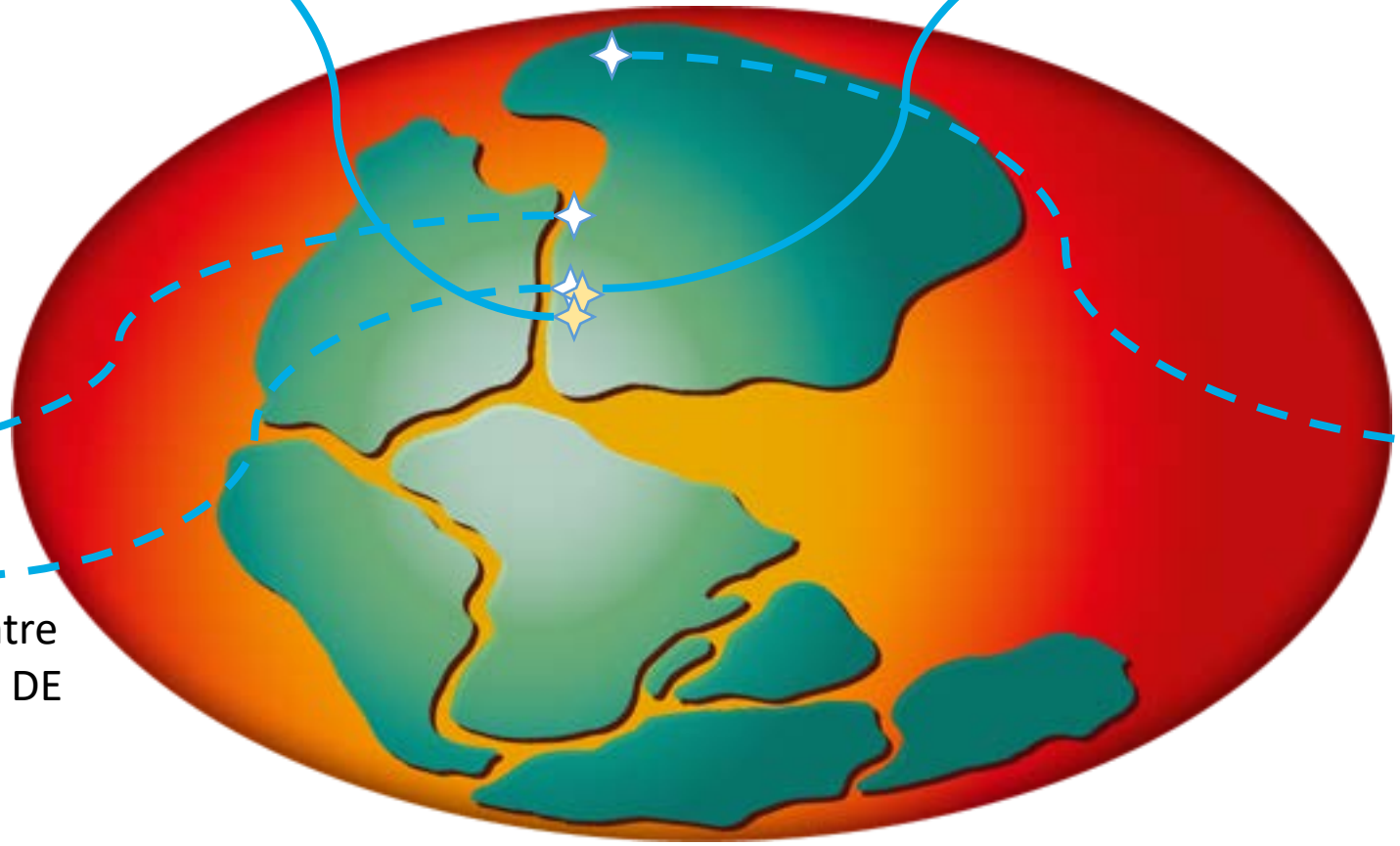
Koppe, R. , Gerchow, P. , Macario, A. , Haas, A. , Schäfer-Neth, C. and Pfeiffenberger, H. (2015): O2A: A Generic Framework for Enabling the Flow of Sensor Observations to Archives and Publications, OCEANS 2015 Genova. DOI: 10.1109/OCEANS-Genova.2015.7271657

About PANGAEA

ALFRED-WEGENER-INSTITUT
HELMHOLTZ-ZENTRUM FÜR POLAR- UND MEERESFORSCHUNG

Open access data repository for geoscientific & environmental data hosted by:

marum
Center for Marine Environmental Sciences



Bjerknes Climate Data Centre, NO

GEOMAR Helmholtz Centre for Ocean Research Kiel, DE

Ocean Acidification International Coordination Centre (OA-ICC) / Xiamen University, CN

What is PANGAEA

PANGAEA.de

- Data Publisher for Earth & Environmental Science
- Data georeferenced in space & time, **relational database**
- Data citation and persistent identifier (Digital Object Identifier, DOI)
- Long-term accessibility of data guarantee
- Dedicated data repository for MOSAiC expedition data

About PANGAEA

Short CV

- 1993: Foundation as Information system for long-term archiving and publication of data from earth & environmental science
- 2001: Accreditation by the „International Council for Science“ (ICSU)
- 2007: Accredited by the „World Meteorological Organisation“ (WMO) as „World Radiation Monitoring Center“ (WRMC)
- 2013: Becoming a data repository for the German Federation for Biological Data (Gesellschaft für Biologische Daten, GFBio)
- 2015: Selected for the German Federation for Bioinformatics Infrastructure (Deutsches Netzwerk für Bioinformatik-Infrastruktur, de.NBI) Service Center “Biodata” as data resources

International Ocean Discovery Program (IODP) Core Repository

Submit Data

Welcome to PANGAEA® Data Publisher

Our services are generally open for archiving, publishing, and re-usage of data. The World Data Center PANGAEA is member of the ICSU World Data System.

ALL TOPICS

Search for measurement type, author name, project, taxa,...

TOPICS

MAP

Latest News

2019-05-06

UNITED NATIONS REPORT ON BIODIVERSITY

A hard-hitting report into the impact of humans on nature shows that nearly one million species risk becoming extinct within decades, while current efforts to conserve the earth's resources will likely fail without radical action.

2019-05-01

NEW PANGAEA TOOL

The software module 'pangaeapy' allows to download and analyse metadata as well as data from tabular PANGAEA datasets. Please take a look at the example Jupyter Notebooks.

Show all 31 news items...

Featured Data

Bonne, J-L; Werner, M; Meyer, H et al. (2019): Near-surface atmospheric vapour and oceanic surface water isotopic compositions calibrated data from Polarstern cruises, 2015-2017
https://doi.org/10.1594/PANGAEA.897578

Wörmer, L; Hoshino, T; Bowles, MW et al. (2018): Dipicolinic acid concentration in sediment samples
https://doi.org/10.1594/PANGAEA.896621

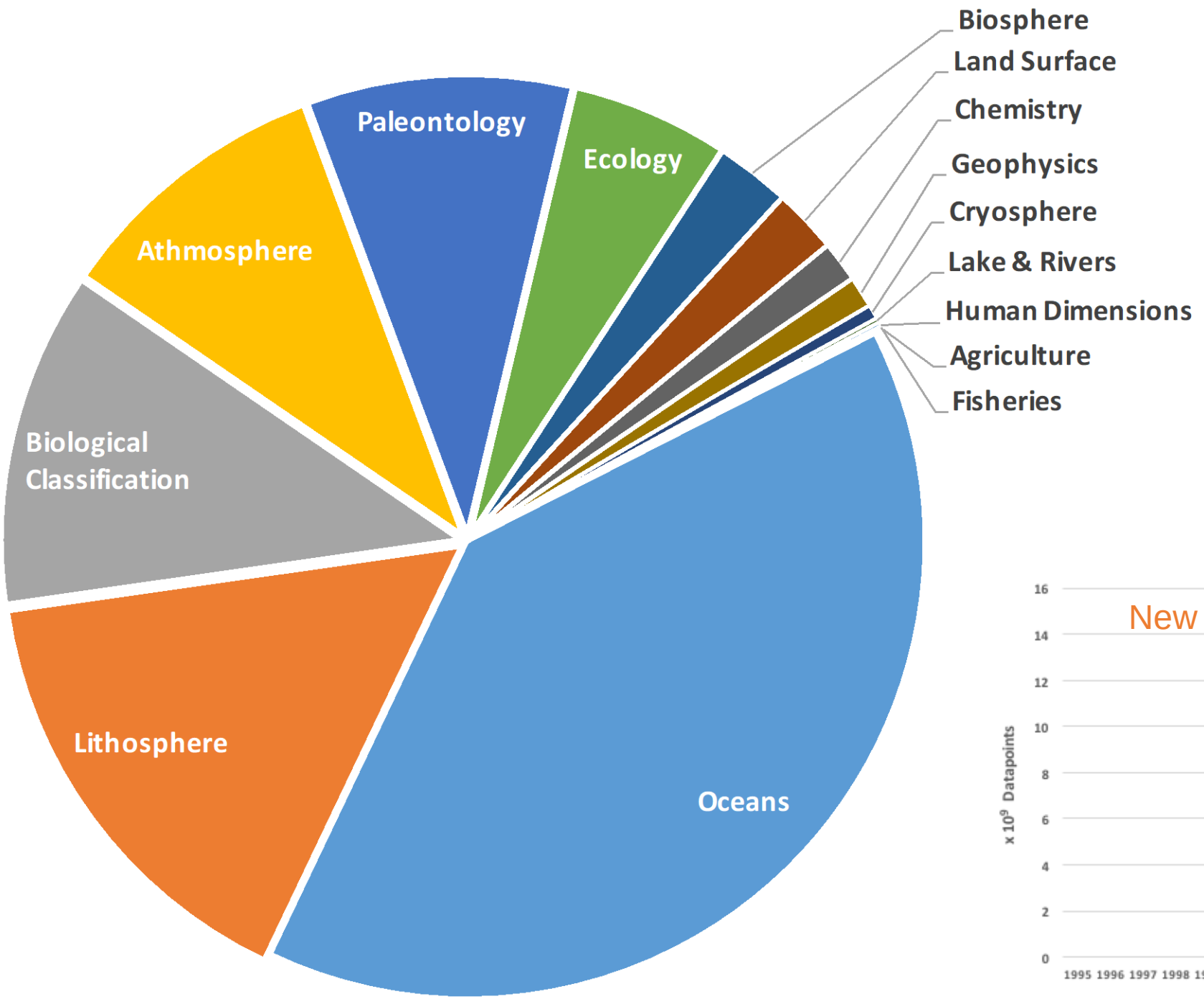
Nitze, I; Grosse, G; Jones, BM et al. (2018): Remote sensing quantifies widespread abundance of permafrost region disturbances across the Arctic and Subarctic, Datasets
https://doi.org/10.1594/PANGAEA.894755

Braun, MH; Malz, P; Sommer, C et al. (2018): Annual glacier elevation change rate raster dataset, South American Andes 2000 and 2011-2015
https://doi.org/10.1594/PANGAEA.893612

Cornils, A; Schnack-Schiel, SB (2018): Abundance and distribution of planktonic Copepoda in the Southern Ocean and other regions from 1980 to 2005
https://doi.org/10.1594/PANGAEA.884619

Show all 35 featured data sets...

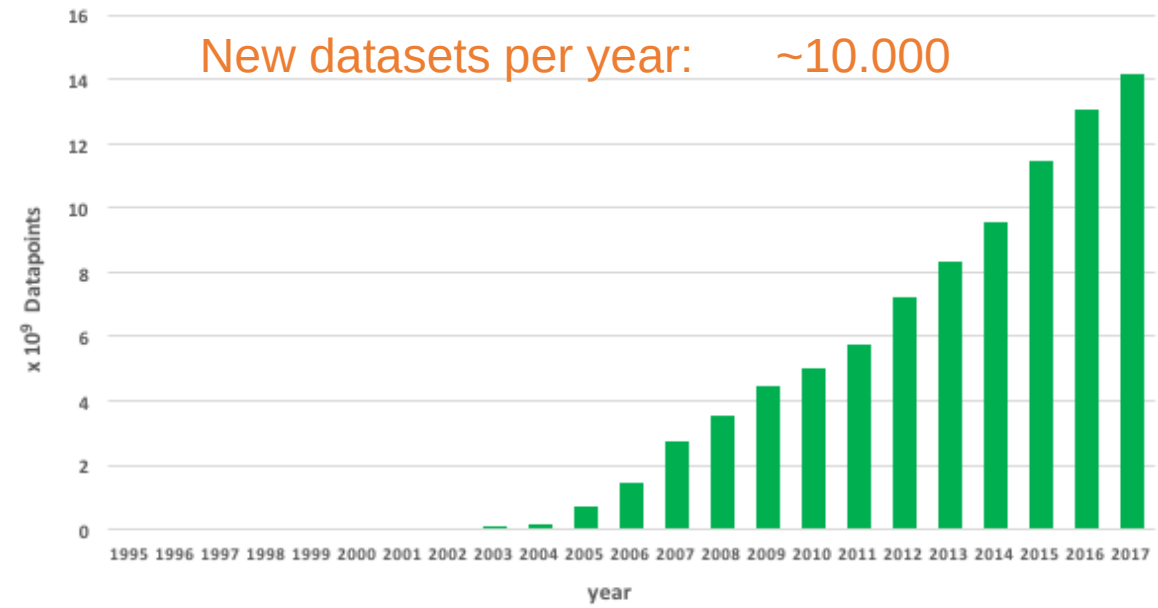
www.pangaea.de



Large range of different environment related data e.g.

- Environmental time series
- Photos, movies
- Sediment parameters (physical/chemical)
- Biodiversity
- many more....

Data sets:	~ 380.000
Data items:	~ $14 \cdot 10^9$ (14 billion)
Data volume:	<3 PB
Increase:	~5% per year



Why sharing data?

- Data used for published scientific papers:
  - Science reproducibility, verification
  - Easy reuse, open science
- Non-published science:
  - Not to end up in scientists' drawers, get lost for science forever
  - Receive credit
- Funder's requirements
- MOSAiC data policy

Isabel Chadwick, Share and share alike: Top 5 reasons to share your research data, http://www.open.ac.uk/blogs/the_orb/?p=364

Research data guiding principle

Findable

Metadata and data easy to find for both humans and computers.

Accessible

The exact conditions under which the data is accessible provided in such a way that humans and machines can understand them.

Interoperable

The (meta)data based on standardized vocabularies, ontologies, thesauri etc. so that it integrates with existing applications or workflows.

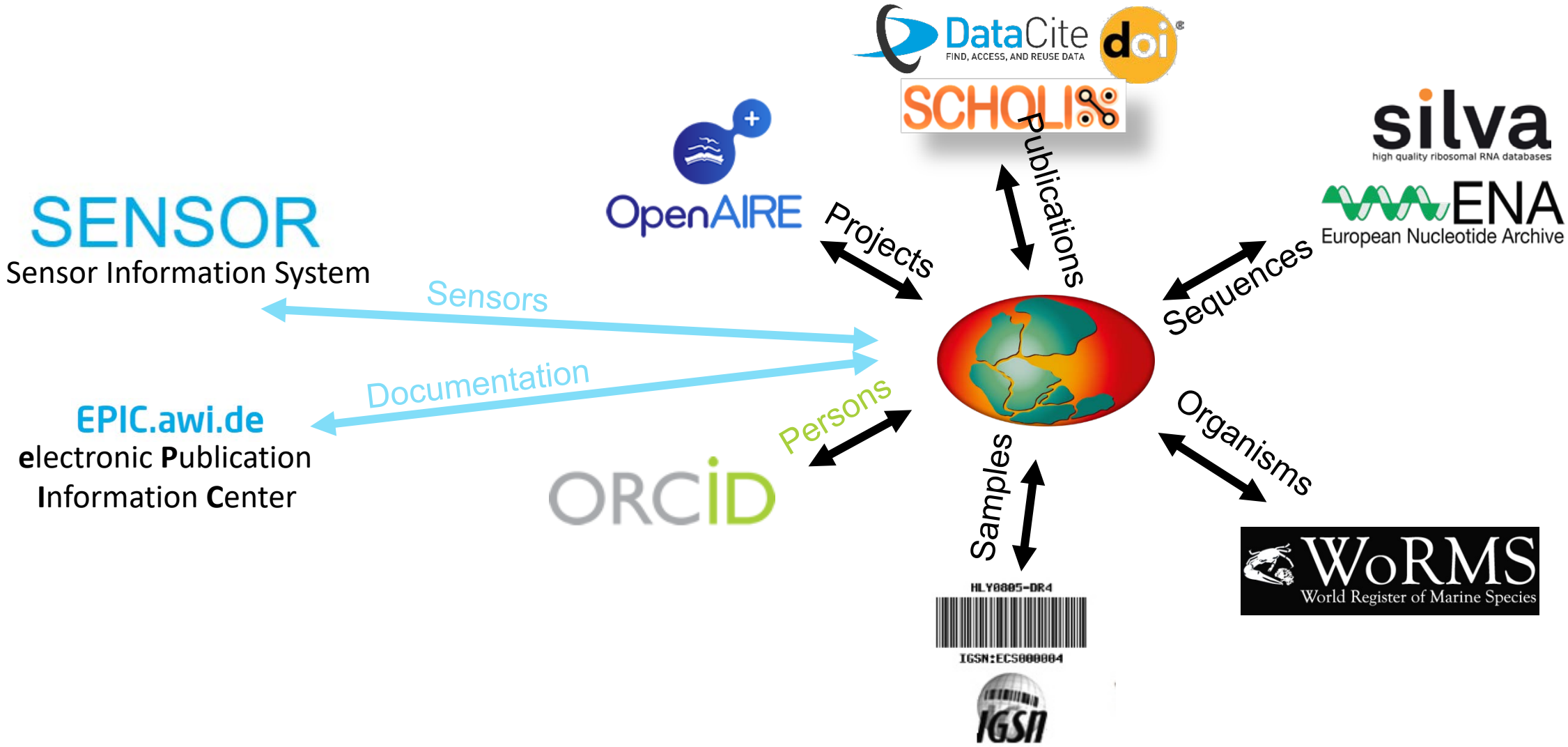
Re-usable

Metadata and data well-described so that they can be replicated and/or combined in different research settings.

Creative Commons License

- Data freely available
- “cite”/”attribute” the original autohor(s)
- No further restrictions on usage

Cross-Referencing, Linking



Example: ORCID record

Search | English

ORCID
Connecting Research and Researchers

EDIT YOUR RECORD | ABOUT ORCID | CONTACT US | HELP

6,424,438 ORCID iDs and counting. See more...

We recently updated our privacy policy - a summary of the changes is available in this blog post

Daniela Ransby

ORCID iD
https://orcid.org/0000-0002-3643-333X

Print view

Also known as
Dana Ransby, Daniela Pittauer, Dana Pittauer, Daniela Pittauerova, Dana Pittauerova, Daniela Pittauerová, Dana Pittauerová, Daniela Makelova

Country
Germany

Other IDs
ResearcherID: G-8854-2014
Scopus Author ID: 35311889100
Loop profile: 424282

› Employment (3)
⌄ Works (43 of 43) | Sort

Variability in the organic carbon stocks, sources, and accumulation rates of Indonesian mangrove ecosystems
Estuarine, Coastal and Shelf Science
2019-03 | journal-article
DOI: 10.1016/j.ecss.2018.12.007
Source: Crossref ★ Preferred source

Pacific Proving Grounds radioisotope imprint in the Philippine Sea sediments
Journal of Environmental Radioactivity
2018-06 | journal-article
DOI: 10.1016/j.jenvrad.2017.06.021
Source: Crossref ★ Preferred source (of 2)

Carbon, nitrogen and stable carbon isotopes, and radionuclides in sediment cores from Segara Anakan Lagoon, Berau and Kongsi Island, Indonesia, 2013 and 2016, supplement to: Kusumaningtyas, Mariska Astrid; Hutahaean, Andreas A; Fischer, Helmut W; Pérez-Mayo, Manuel; Ransby, Daniela; Jennerjahn, Tim C (accepted): Variability in the organic carbon stocks, sources, and accumulation rates of Indonesian mangrove ecosystems. Estuarine, Coastal and Shelf Science
PANGAEA - Data Publisher for Earth & Environmental Science
2018 | data-set
DOI: 10.1594/pangaea.896852
Source: DataCite ★ Preferred source

Daniela Ransby

PANGAEA.
Data Publisher for Earth & Environmental Science
SEARCH | SUBMIT | ABOUT | CONTACT

Citation: **Kusumaningtyas, Mariska Astrid; Hutahaean, Andreas A; Fischer, Helmut W; Pérez-Mayo, Manuel; Ransby, Daniela; Jennerjahn, Tim C (2018):** Carbon, nitrogen and stable carbon isotopes, and radionuclides in sediment cores from ... and Kongsi Island, In... *EA*, https://d... 352, *Supplement to:* Kusumaningtyas, MA et al. (2019): Variability in the organic carbon stocks, sources, and accumulation rates of Indonesian mangrove ecosystems. *Estuarine, Coastal and Shelf Science*, **218**, 310-323, https://doi.org/10.1016/j.ecss.2018.12.007

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https://orcid.org/0000-0002-3643-333X
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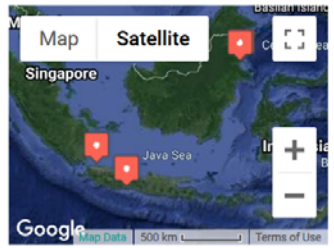
Web Page



Always quote above citation when using data! You can download the citation in several formats below.

RIS Citation | BibTeX Citation | Text Citation | Facebook | Twitter | Show Map | Google Earth | 3

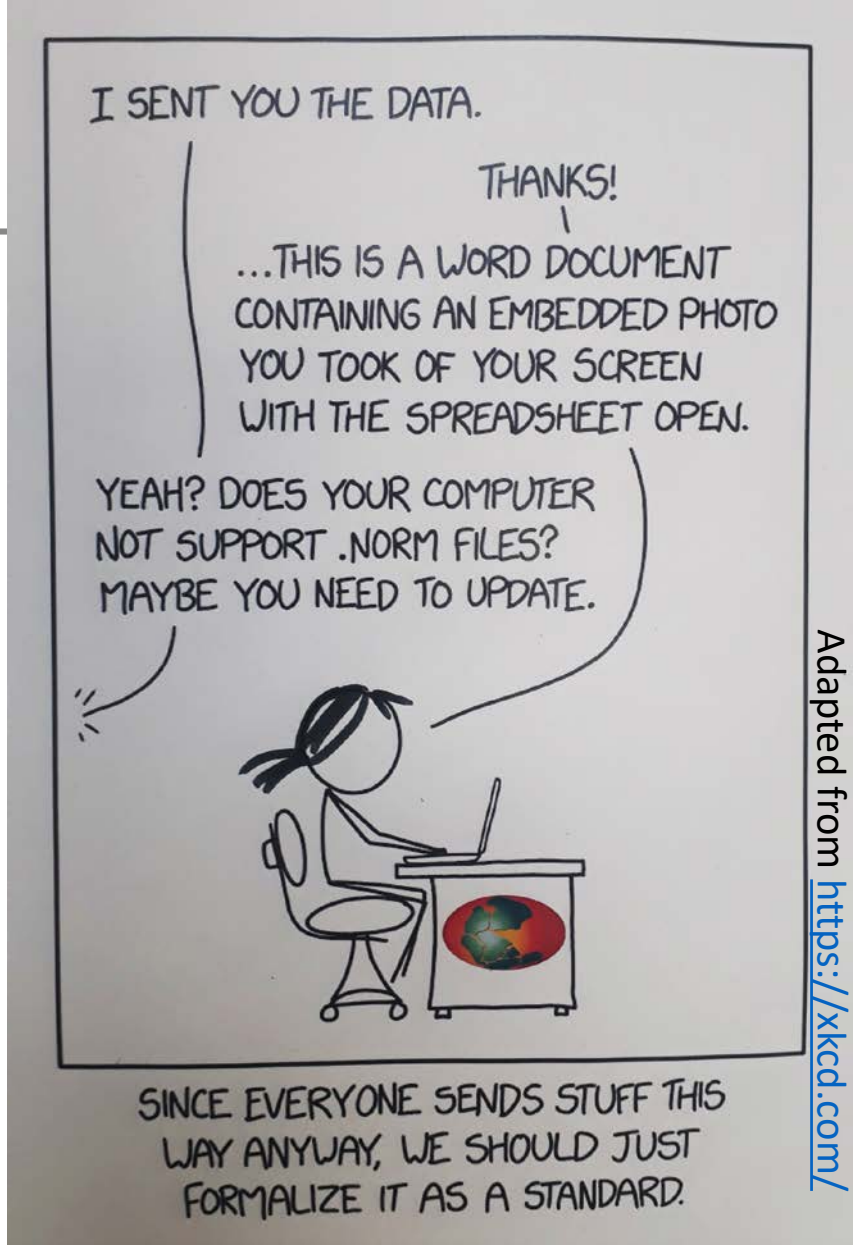
Abstract: This compilation contains data from 18 mangrove sediment cores: organic carbon (Corg), total nitrogen (N) and stable carbon isotope composition (δ13Corg). For 3 cores, gamma emitting radionuclides data are additionally available. The cores were sampled in Segara Anakan Lagoon (Central Java), Berau (East Kalimantan) and Kongsi Island (Thousand Islands Marine National Park, Jakarta), in Indonesia. Sediment samples from Segara Anakan Lagoon and Kongsi Island were taken in October - December 2016. Sediment samples from Berau were taken in May 2013. The mangrove sediment cores were collected using a 1 m long semi-cylindrical auger. Sediments were taken down to 1 m depth, and were sampled in 5 cm intervals.

Project(s): **Science for the Protection of Indonesian Coastal Environment** (SPICE)
Leibniz Centre for Tropical Marine Research (ZMT)

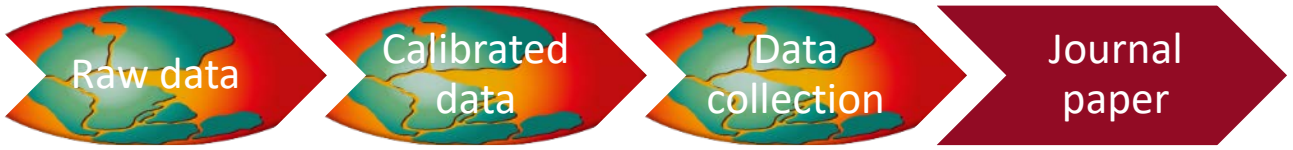
Coverage: *Median Latitude:* -5.261473 * *Median Longitude:* 110.669356 * *South-bound Latitude:* -7.729610 * *West-bound Longitude:* 106.600970 * *North-bound Latitude:* 2.423470 * *East-bound Longitude:* 118.089000

Data submission

- Submission of data and metadata using ticket system
- Curators guide the users through the process
- Possibility of moratorium on access
- PANGAEA can provide access for reviewers of papers
- Final step: before publishing approval needed
- Wiki: detailed manual for PANGAEA



Adapted from https://xkcd.com/



Examples

- Bonne, Jean-Louis; Werner, Martin; Meyer, Hanno; Kipfstuhl, Sepp; Rabe, Benjamin; Behrens, Melanie K; Schönicke, Lutz; Steen-Larsen, Hans-Christian; Nikolopoulos, Anna; Heuzé, Céline (2018): Water vapour isotopes analyser raw data from POLARSTERN cruise PS106, links to files. Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research, Bremerhaven, PANGAEA, https://doi.org/10.1594/PANGAEA.884885

- Wulff, Thorben; Lehmenhecker, Sascha; Hagemann, Jonas (2016): Carbon dioxide measurements along AUV track MSM29_440-5. Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research, Bremerhaven, PANGAEA, https://doi.org/10.1594/PANGAEA.857507

- (Live demonstration)

Data search and retrieval

- Elastic search / Autocomplete function
- Faceted search
- Recommender system
- PANGAEA XML schema can be used for specific queries using the PANGAEA search engine
- Data warehouse: efficient data compilations
- Access via programming interface/(third party) packages (R, Python)

- (Live demonstration)

Data centers for MOSAiC

UK Polar Data Centre

British Oceanographic Data Centre (BODC)

Centre for Environmental Data Analysis

Atmospheric Radiation Measurement (ARM)

Arctic Data Center

PANGAEA

Chinese National Arctic and Antarctic Data Center

PANGAEA's curator team for MOSAiC

Stefi Schumacher

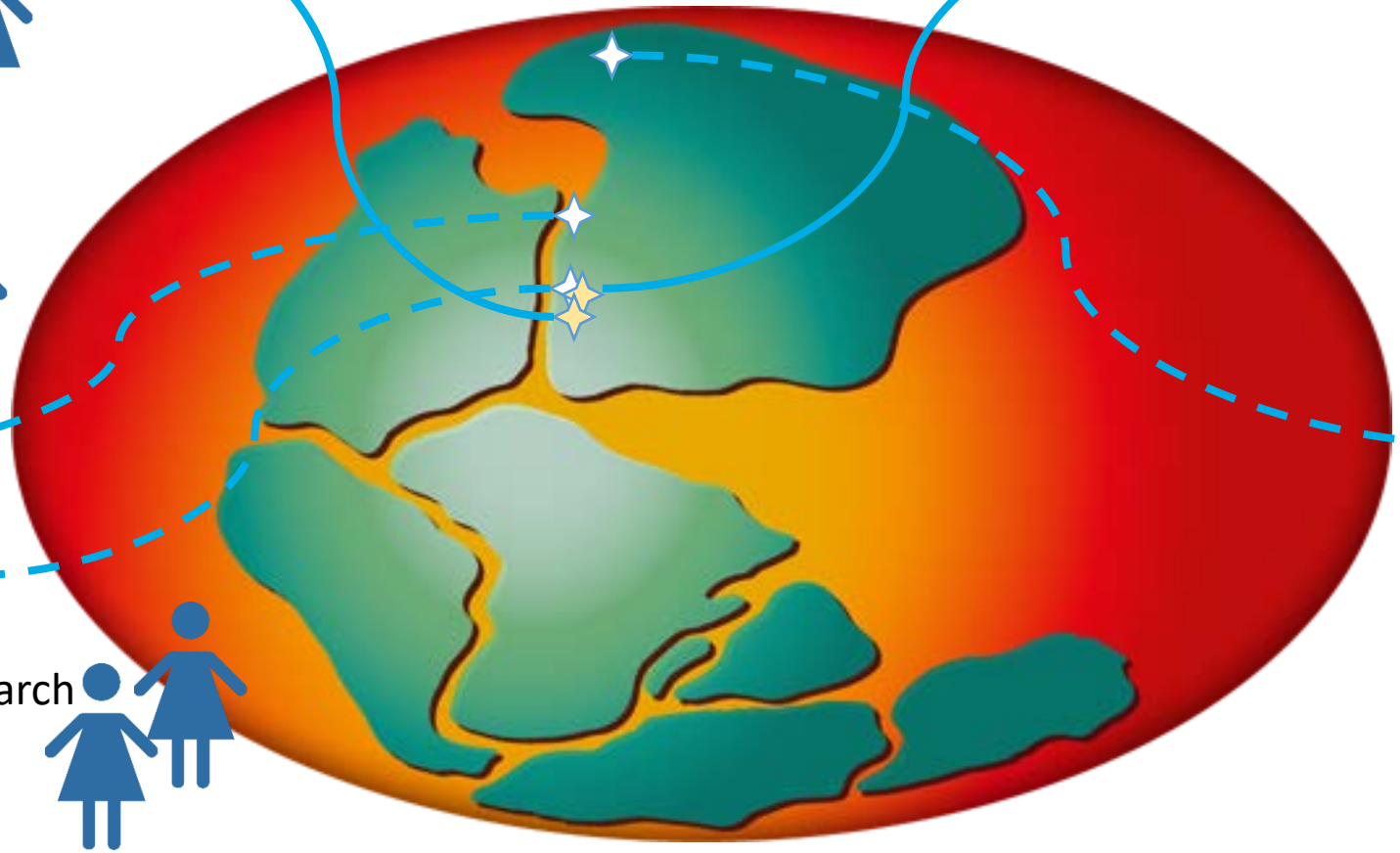
Amelie Driemel

Dana Ransby

PANGAEA's curator team

ALFRED-WEGENER-INSTITUT
HELMHOLTZ-ZENTRUM FÜR POLAR- UND MEERESFORSCHUNG

marum
Center for Marine Environmental Sciences



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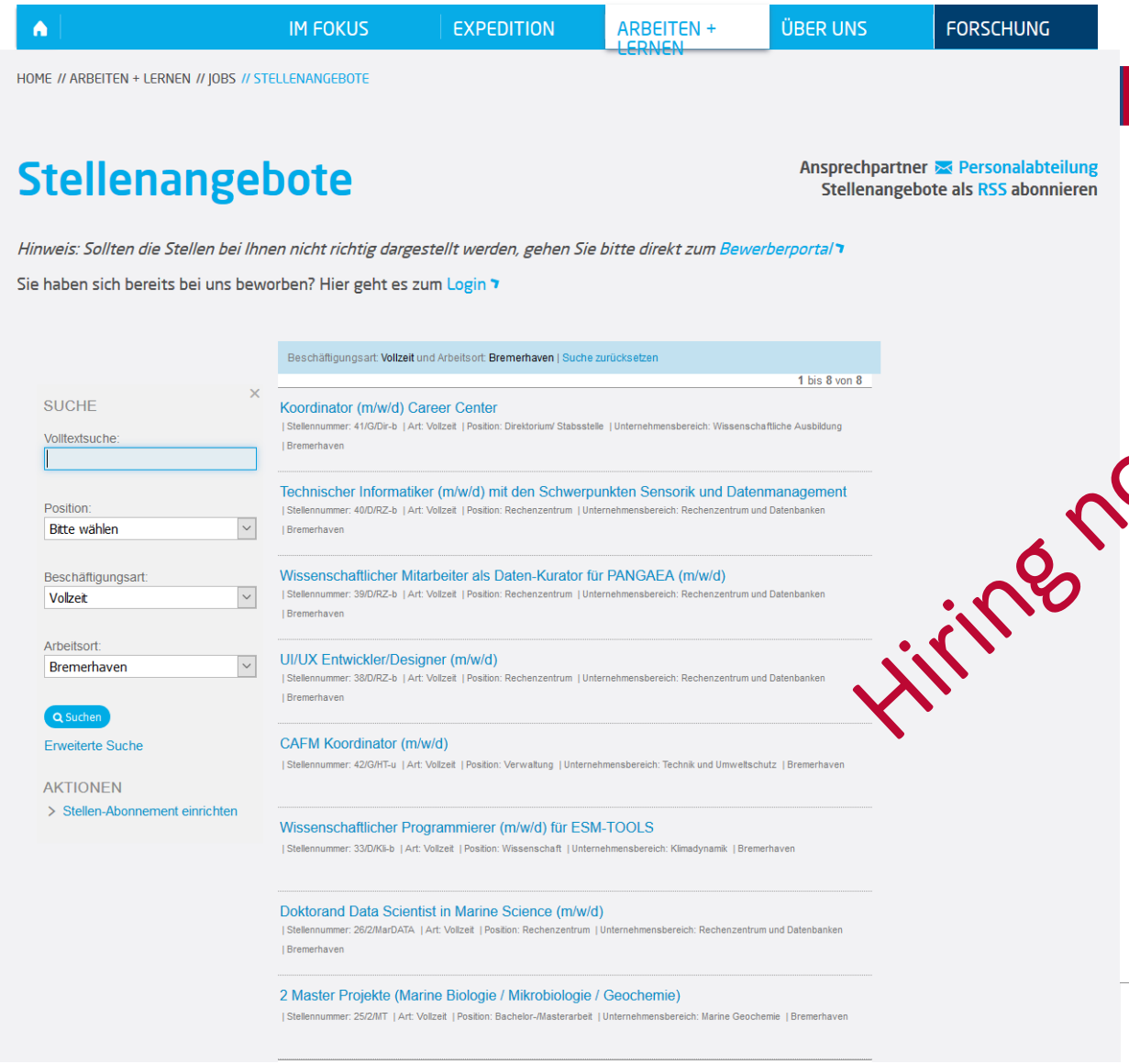
PANGAEA's curator team

Archive

PANGAEA's team



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	1 x 0,5 Wissenschaftliche_r Mitarbeiter_in Entgeltgruppe 13 TV-L	A129/19	Fachbereich 7 Wirtschaftswissenschaft	20.05.2019
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	1 x 1,0 Wissenschaftliche_r Mitarbeiter_in Entgeltgruppe 13 TV-L	A142/19	Marum Center for Marine Environmental Sciences at the University of Bremen	17.05.2019
	1 x 1,0 Wissenschaftliche_r Mitarbeiter_in Entgeltgruppe 13 TV-L	A141/19	Marum Center for Marine Environmental Sciences at the University of Bremen	17.05.2019
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	1 x 1,0 Wissenschaftliche_r	A120/19	Marum Center for Marine Environmental	17.05.2019

https://www.awi.de/arbeiten-lernen/jobs/stellenangebote.html

https://www.uni-bremen.de/universitaet/die-uni-als-arbeitgeber/offene-stellen.html

MOSAiC
International Arctic Drift Expedition

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