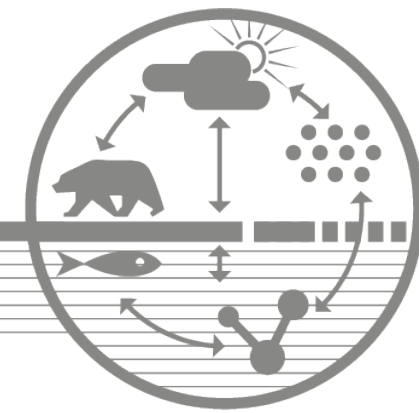


# MOSAiC

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

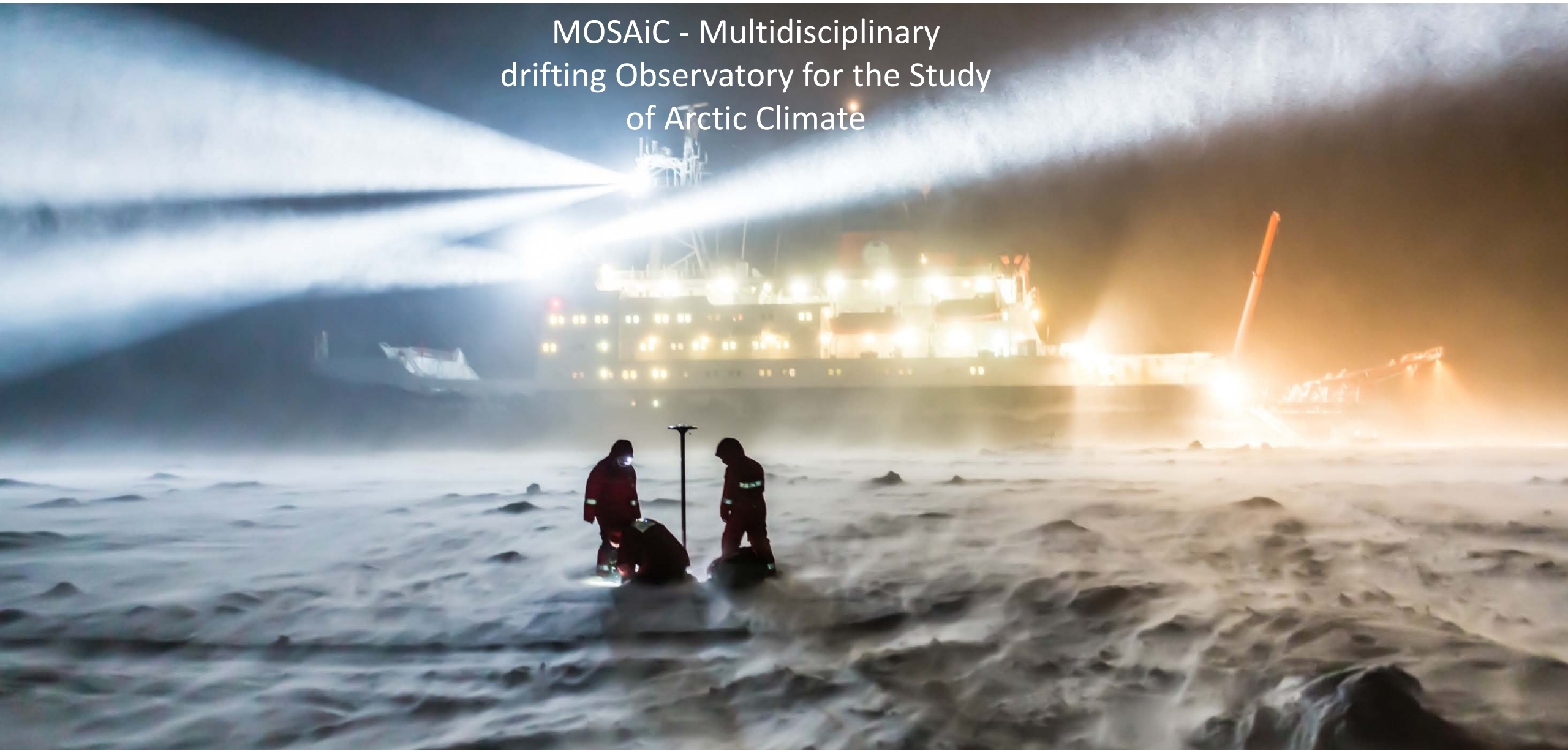
11.05.2019



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

## The largest Arctic expedition of our time

MOSAiC - Multidisciplinary  
drifting Observatory for the Study  
of Arctic Climate



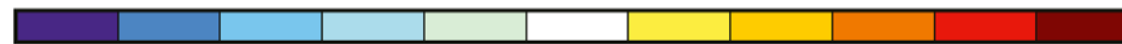
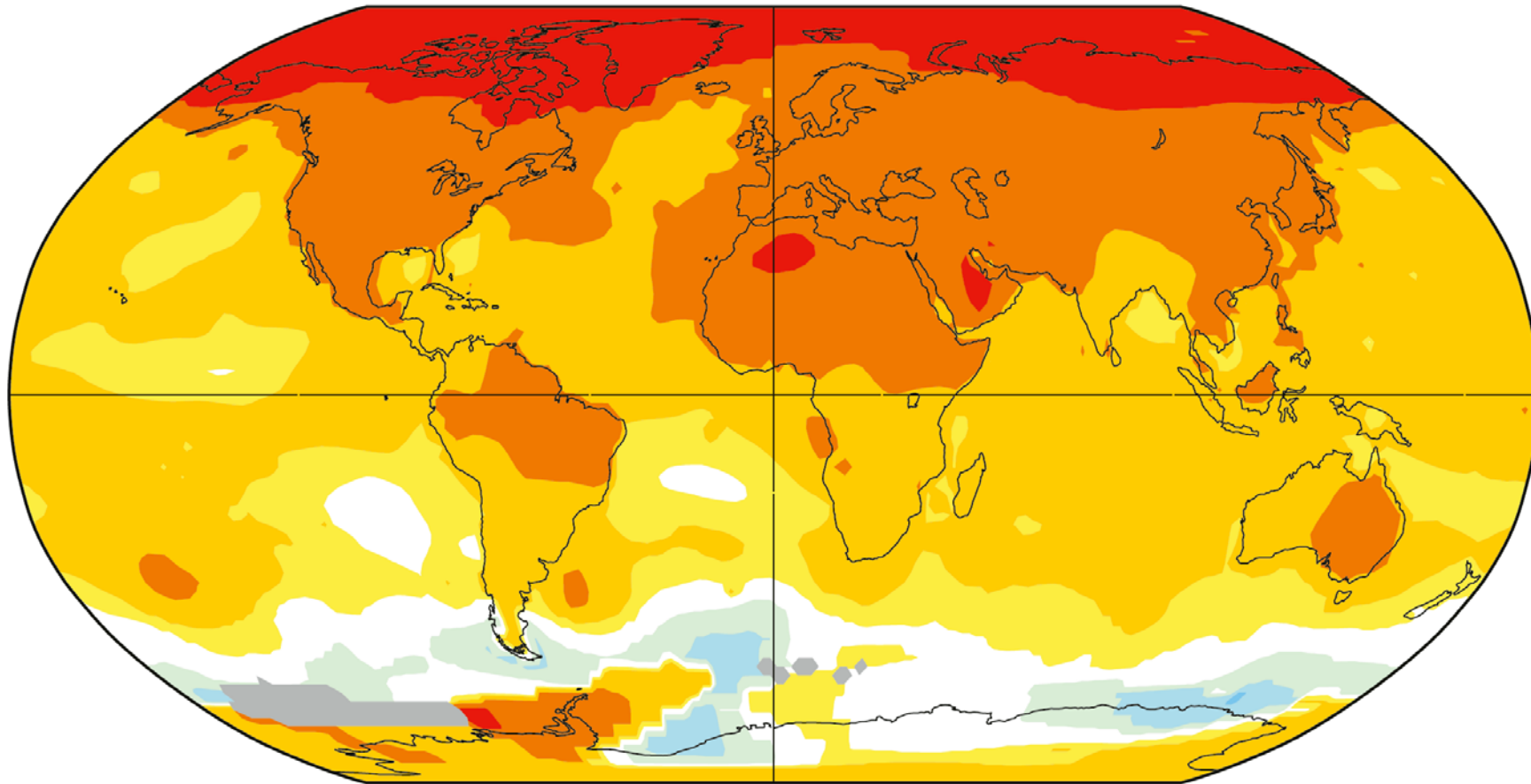


# Table of Contents

- Overview of the Expedition
- Data Management in MOSAiC
- Data Archiving with PANGAEA



# Arctic: The Epicenter of Global Warming



-4,0 -2,0 -1,0 -0,5 -0,2 0,2 0,5 1,0 2,0 4,0

Observed change of temperature 1970 – 2017 [°C]



# Arctic change is dramatic

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

1992

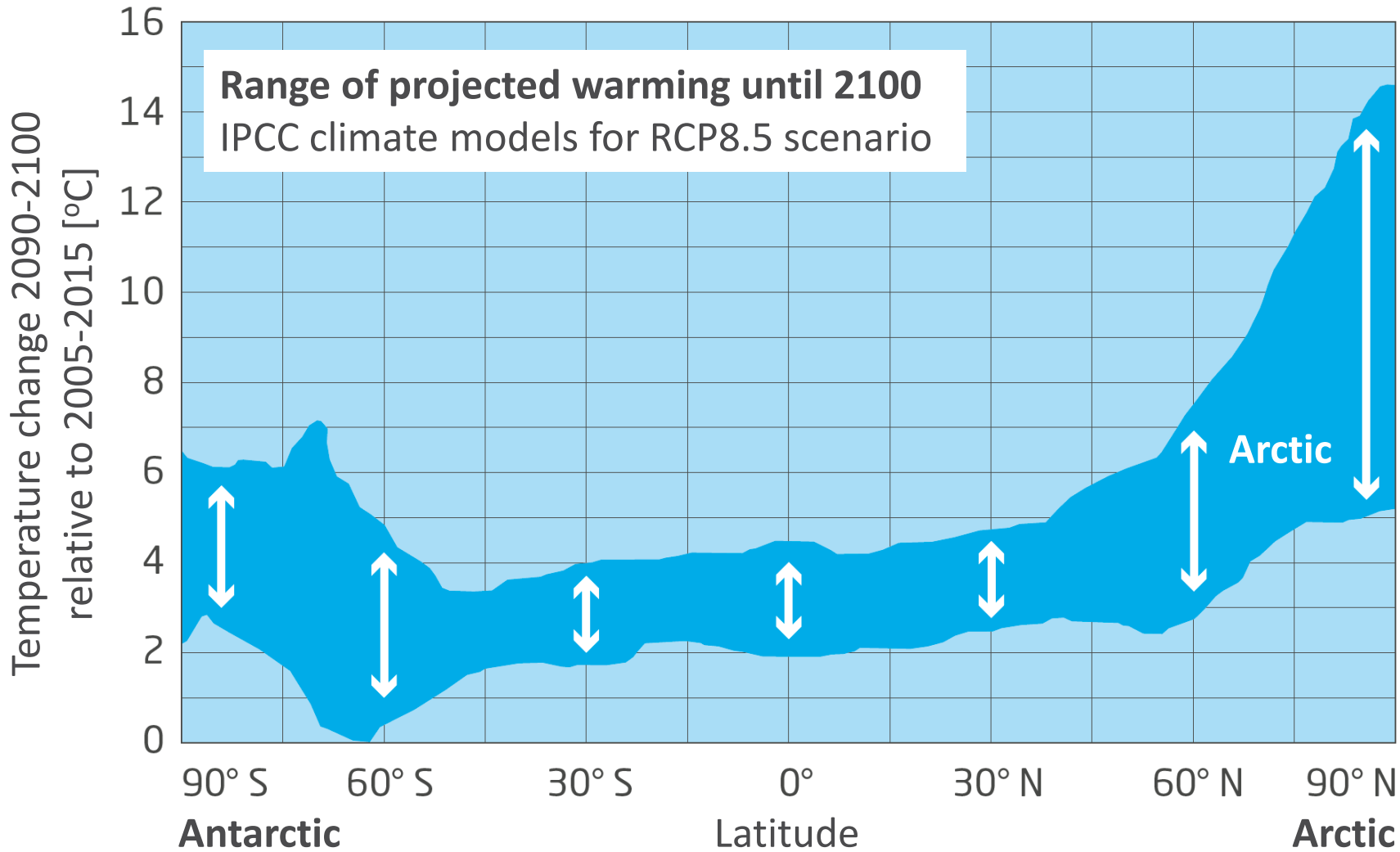


2018



March / April, Kongsfjord, Svalbard

# 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!

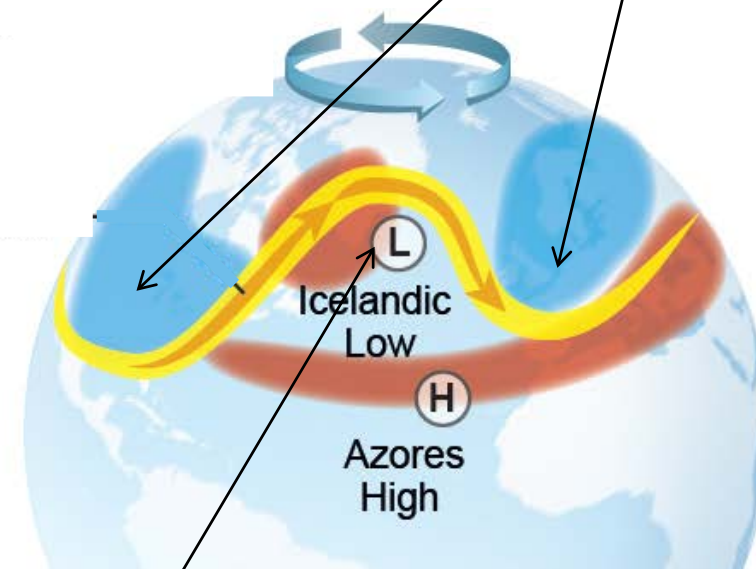
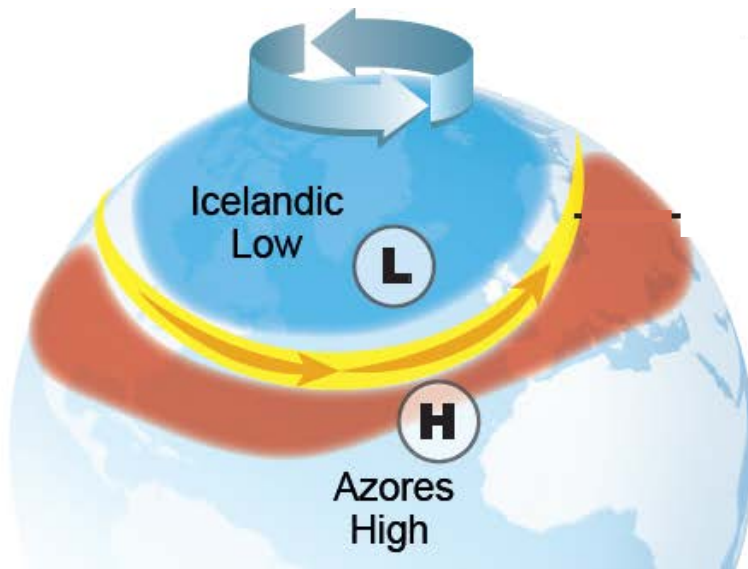
# What happens in the Arctic does not stay in the Arctic

Arctic climate change & decreasing sea ice

stable  
jet stream



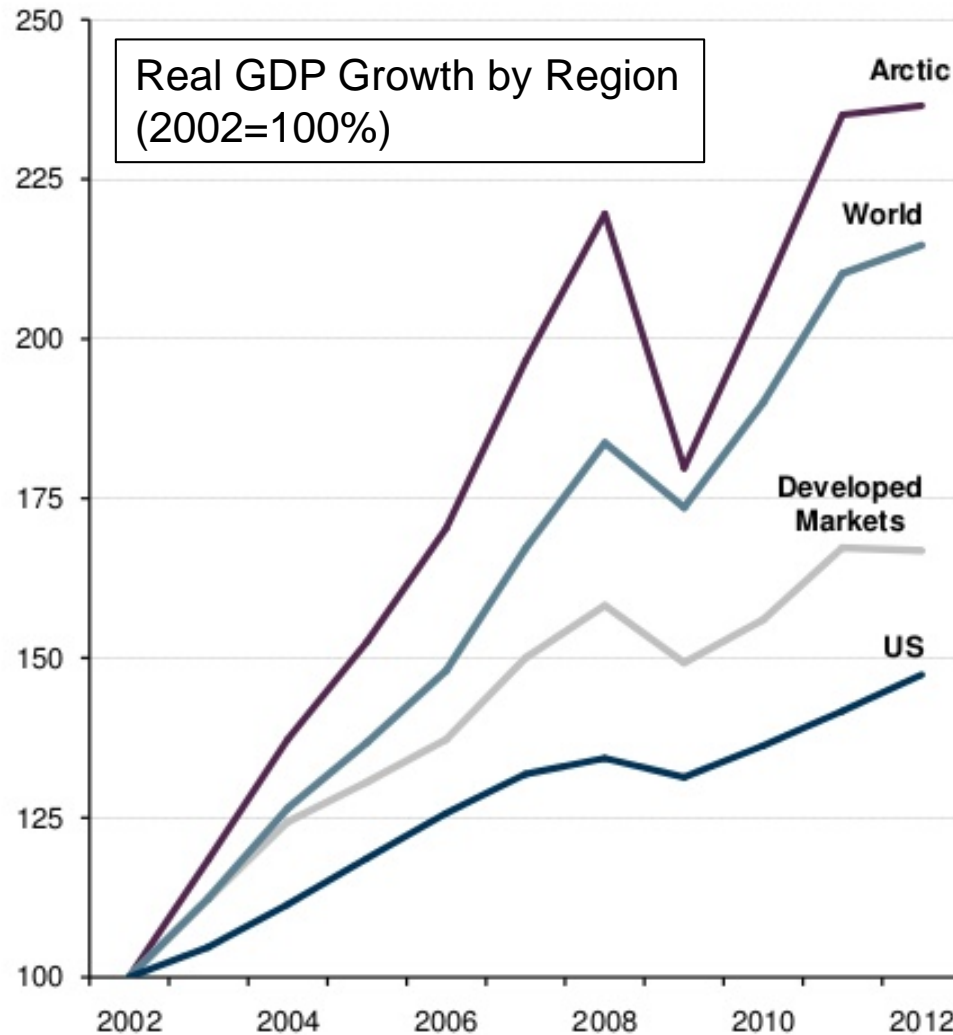
meandering  
jet stream



Potential for cold air outbreaks  
→ Cold spells in Europe and US

Advection of warm and  
humid air into the Atlantic sector of 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\$

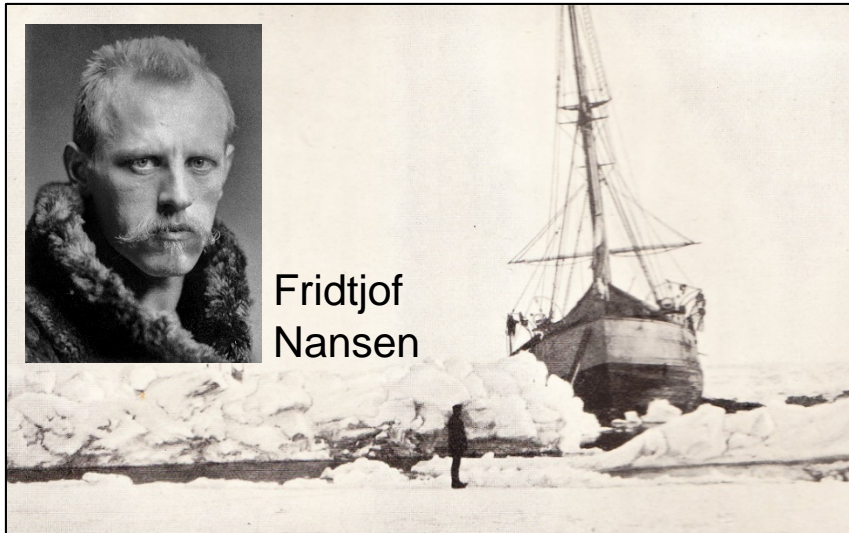
Source: Guggenheim Partners, 2014



## Largest Arctic research expedition ever

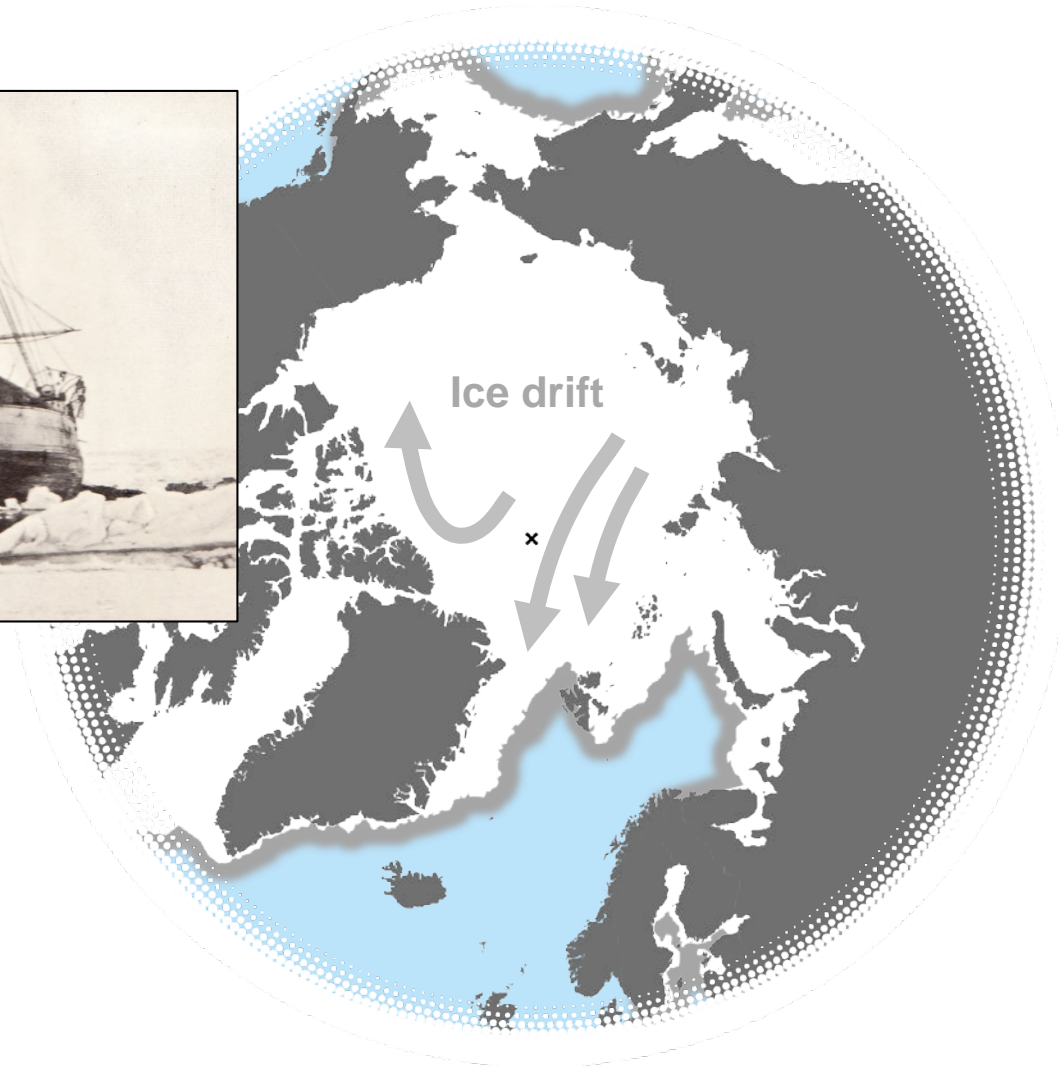
- 5 icebreakers
- Polar 5 & 6 and Halo research aircraft  
+ support helicopters  
+ support aircraft
- More than 60 institutions
- 17 nations
- A total of ~600 people will operate in  
the central Arctic
- >120 Mio€ budget

# The MOSAiC-Expedition



Fridtjof  
Nansen

1893-1896: Fram-Expedition





# The MOSAiC-Expedition

September 2019 ● **Drift** ■ September 2020

Central observatory:  
RV Polarstern



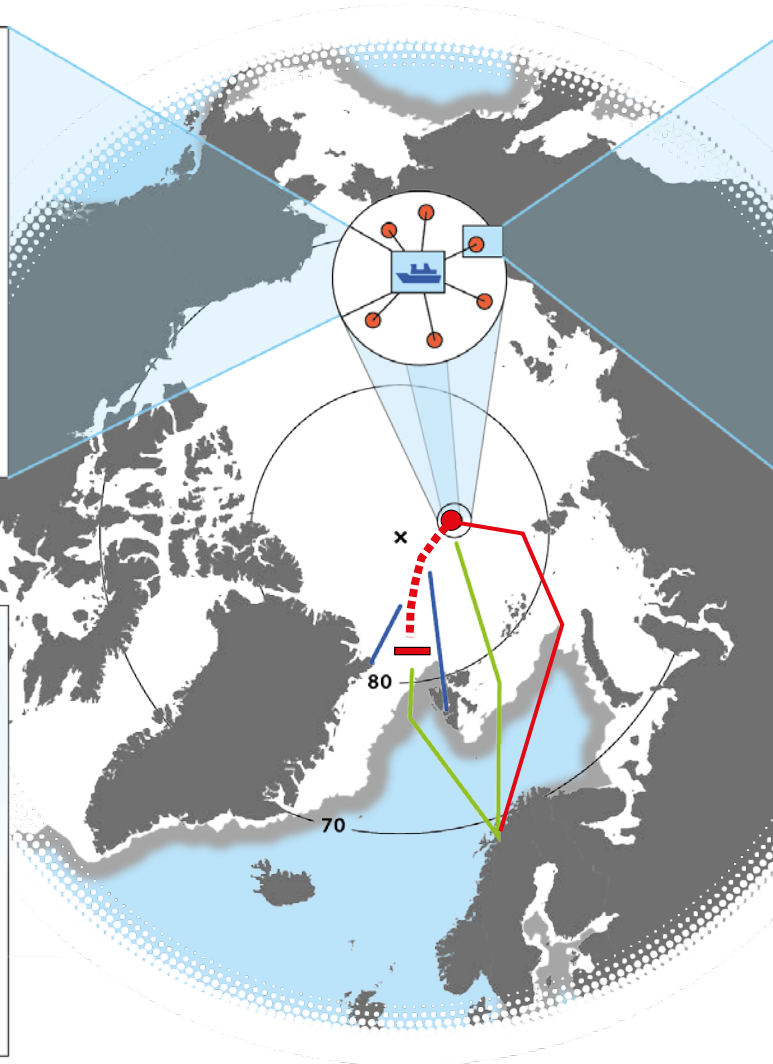
Network of camps on the ice



Operations of research  
aircraft and helicopters



▶ Extended vertical and geo-  
graphical coverage

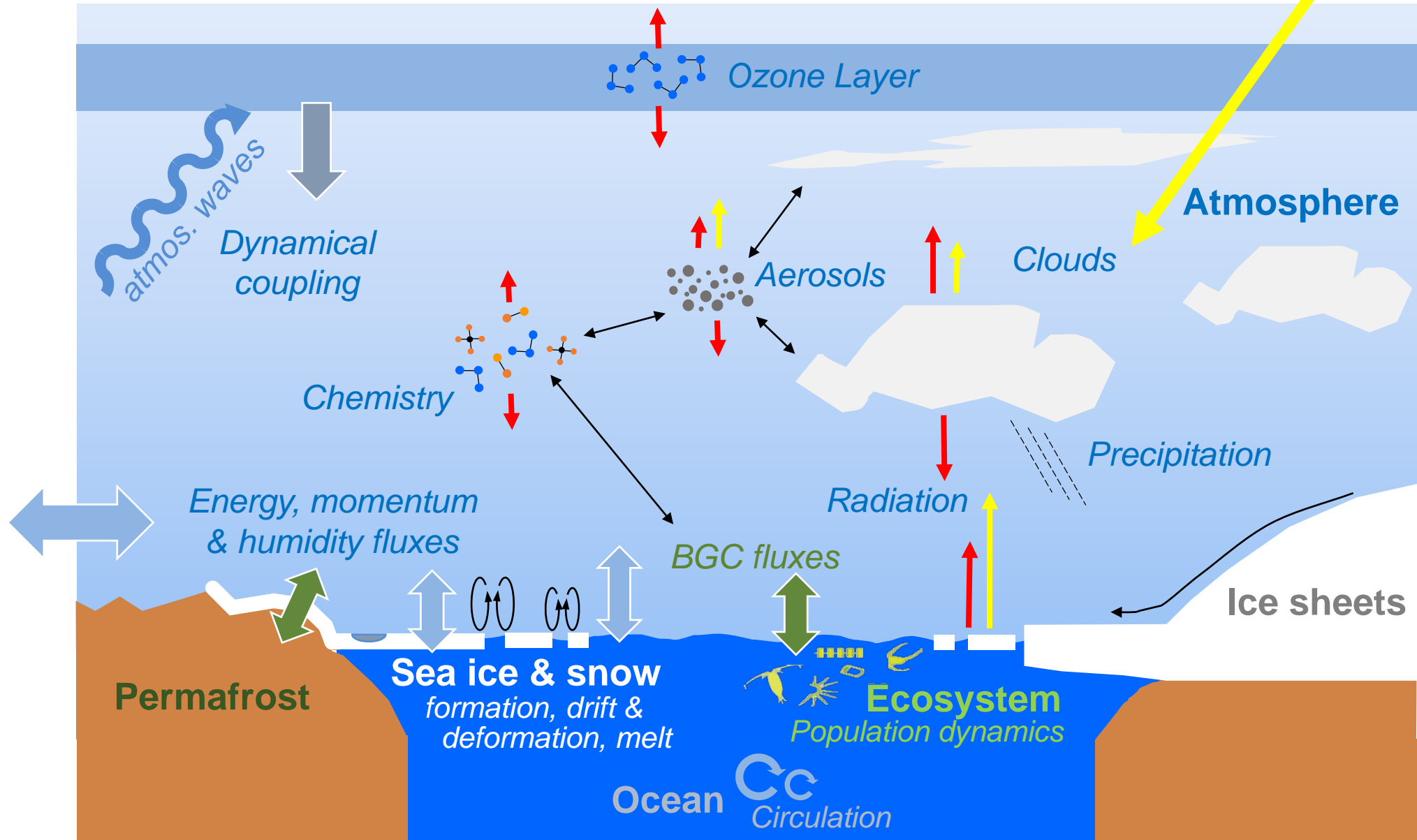


Visits by four icebreakers from  
MOSAiC partners



▶ Broader geographic coverage  
and supply

# Main scientific focus areas





- **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.



# Data Management in MOSAiC



# 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

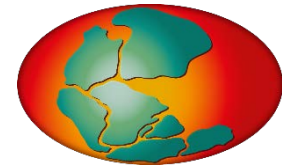
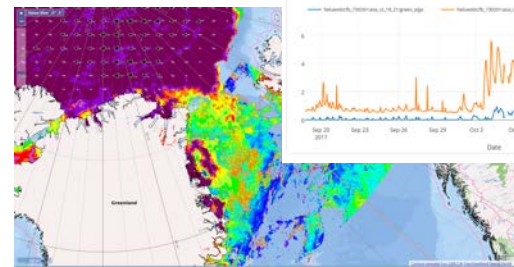


# Data Flow in MOSAiC



ActionLog Events

Activity - Device Operator	Start	Device	Action	Latitude	Longitude
PS4_4-1 ADCP	12.10.2016 11:49:24	Acoustic Doppl...	station start	51° 03,088' 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'

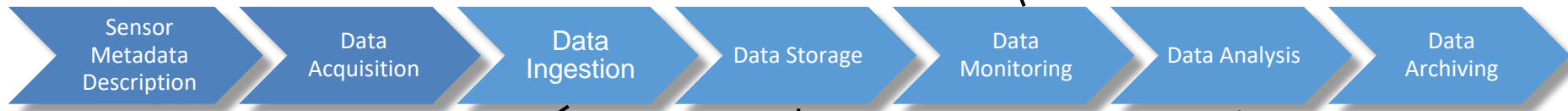
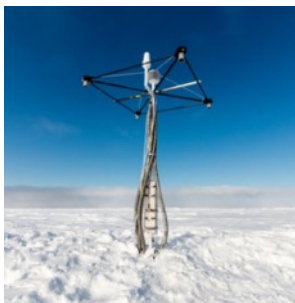


SensorWeb at AWI and onboard of Polarstern

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

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



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

MOSAiC Central Storage and workspace

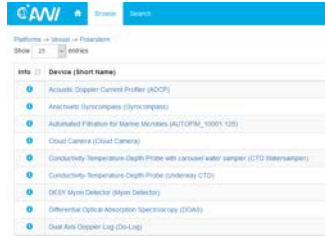


Using workspace and Marketplace (VM) e.g. with Jupyter Notebook (R or Python) or Bash-Script or or ...?

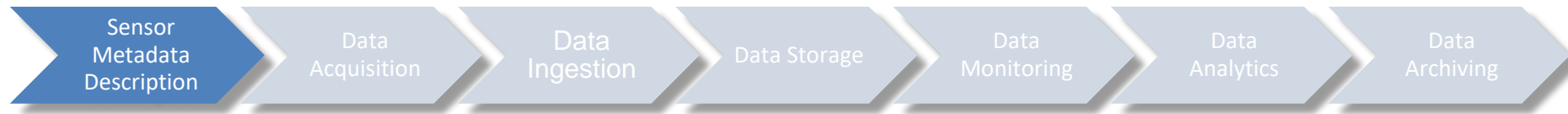
**Sensor metadata description (SensorWeb) is the basis for all parts!!!**



# Data Flow in MOSAic



SensorWeb at AWI and onboard of Polarstern

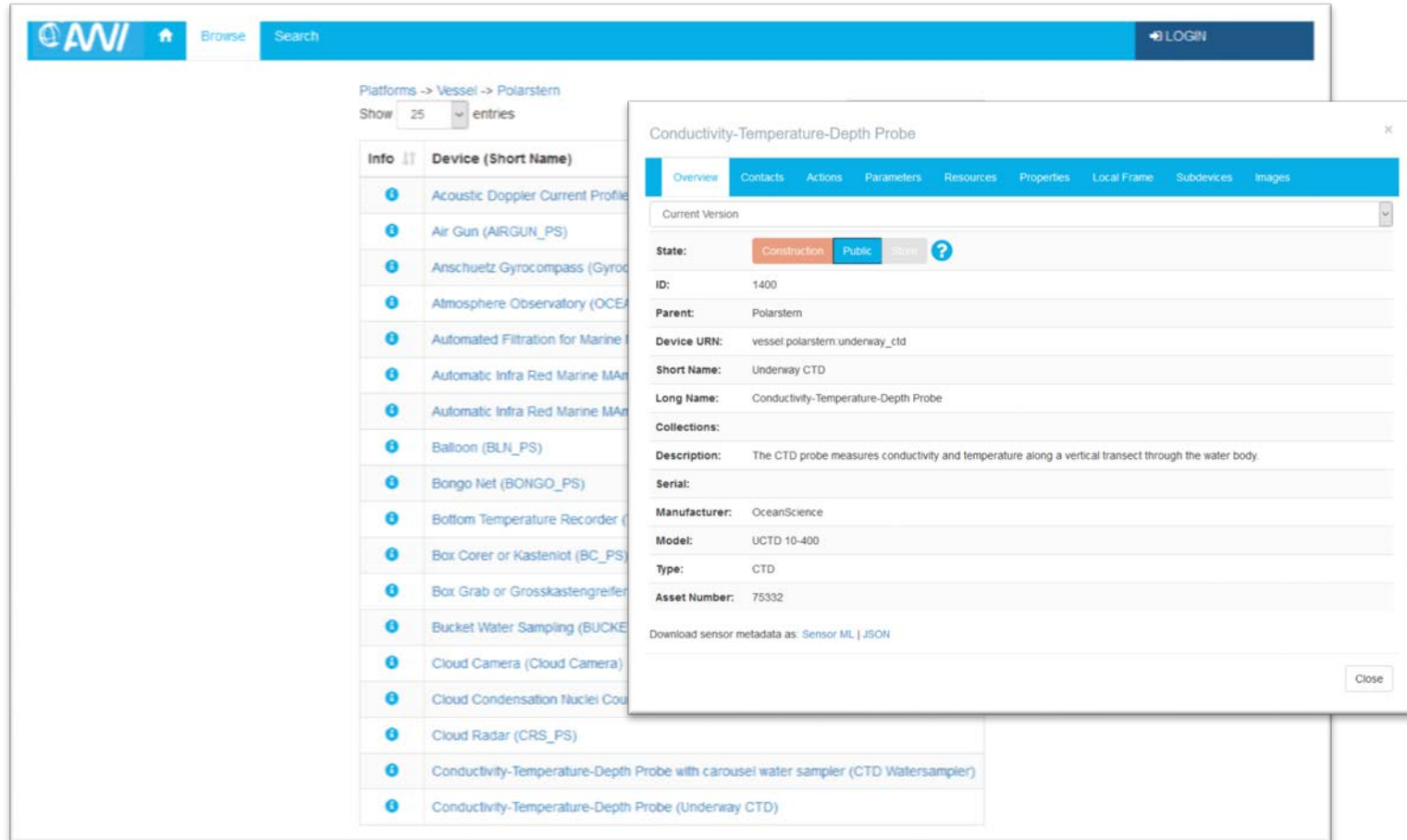


**Sensor metadata description (SensorWeb) is the basis for all parts!!!**



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

# SENSOR

The screenshot shows the SENSORWeb interface. At the top, there is a navigation bar with 'Browse', 'Search', and 'LOGIN' options. Below this, the breadcrumb path is 'Platforms -> Vessel -> Polarstern'. A dropdown menu shows 'Show 25 entries'. The main content area displays a table of sensors with columns for 'Info' and 'Device (Short Name)'. A modal window is open over the 'Conductivity-Temperature-Depth Probe' entry, showing its details:

Conductivity-Temperature-Depth Probe	
Current Version	
State:	Construction Public Store ?
ID:	1400
Parent:	Polarstern
Device URN:	vessel polarstern underway_ctd
Short Name:	Underway CTD
Long Name:	Conductivity-Temperature-Depth Probe
Collections:	
Description:	The CTD probe measures conductivity and temperature along a vertical transect through the water body.
Serial:	
Manufacturer:	OceanScience
Model:	UCTD 10-400
Type:	CTD
Asset Number:	75332
Download sensor metadata as: Sensor ML   JSON	

Sensor Metadata Description

Data Acquisition

Data Ingestion

Data Storage

Data Monitoring

Data Analytics

Data Archiving

# SensorWeb



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

[https://sensor.awi.de/?urn=vessel:polarstern:ctd\\_watersampler](https://sensor.awi.de/?urn=vessel:polarstern:ctd_watersampler)

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

**Subdevices**

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

**Parameters**

- conductivity
- temperature
- altimeter
- transmission
- oxygen
- pressure
- fluorescence

**Overview**

- Long and short names
- Manufacturer
- Model-Nr.



**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: ...

**Resources**

- factsheets
- calibration certificates
- manuals

**Actions**

- Deployment
- Recovery





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. Confirmed by 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 measurement of various parameters.

Serial: 183

Manufacturer: Sea and Sun Technology

Model: CTD 90

Type: CTD

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

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

ID	Name	E-Mail	Role	Organization
70	Cornelia Roder	cornelia.roder@awi.de	Editor	Alfred-Wegener-Institute

ID	Name	Role	Organization	Inherited from
70	Cornelia Roder	Editor	Alfred-Wegener-Institute	AWIPEV Underwater Observatory Svalbard
89	Markus Brand	Editor	Alfred-Wegener-Institute	AWIPEV Underwater Observatory Svalbard

ID	Short Name	Name	Sensor Output Type	Units	Tools
861		Conductivity	conductivity	mS/cm	<a href="#">i</a>
862		Salinity	salinity	PSU	<a href="#">i</a>

# Further Features



### Platform type

Mooring (53)

### Device type

- MicroCAT (53)
- releaser (44)
- current meter (36)
- current profiler (30)
- satellite tracking system (25)

See more...

### Action type

- Deployment (50)
- Recovery (21)
- Configuration (3)
- Total failure (1)

### Action

- PS107\_38-2 (2)
- Calibration of SonoVault 1101 (1)
- Commissioned of SonoVault 1101 (1)
- Deployment of SBE37-SMP-ODO\_10507 (1)
- HE451-2/1-1 (1)

See more...

### Contact

- Vernaleken, Jutta (50)
- von Appen, Wilken-Jon (50)
- Lochthofen, Normen (11)
- Scholz, Daniel (3)
- Hattermann, Tore (2)

### Collections

- FRAM (35)
- HAUSGARTEN (1)

### State

- public (53)

Search...

Selected facets: MicroCAT ✕

[Sort by relevance](#) [Sort alphanumerically](#)

### F4-16

Serial:	
Model:	
Urn:	mooring:f4_16
Description:	
State:	<a href="#">public</a>

### F6-17

Serial:	
Model:	
Urn:	mooring:f6_17
Description:	
State:	<a href="#">public</a>

### AK4-1

Serial:	
Model:	
Urn:	mooring:ak4_1
Description:	Deployment during NABOS2015 expedition
State:	<a href="#">public</a>

<a href="#">+</a>	FEVI-32 (FEVI-32)	<a href="#">+</a> <a href="#">📄</a> <a href="#">🗑️</a>
<a href="#">+</a>	FEVI-33 (FEVI-33)	<a href="#">+</a> <a href="#">📄</a> <a href="#">🗑️</a>
<a href="#">+</a>	FEVI-34 (FEVI-34)	<a href="#">+</a> <a href="#">📄</a> <a href="#">🗑️</a>
<a href="#">+</a>	FEVI-35 (FEVI-35)	<a href="#">+</a> <a href="#">📄</a> <a href="#">🗑️</a>
<a href="#">+</a>	FEVI-36 (FEVI_36)	<a href="#">+</a> <a href="#">📄</a> <a href="#">🗑️</a>
<a href="#">+</a>	FSE2 (FSE2_300234061032780)	<a href="#">+</a> <a href="#">📄</a> <a href="#">🗑️</a>
<a href="#">+</a>	...	<a href="#">+</a> <a href="#">📄</a> <a href="#">🗑️</a>

**Clone**  
functionality



# Linking PANGAEA to SENSOR



- Configuration of device at measurement time linked directly to SENSORWeb

**PANGAEA.**  
Data Publisher for Earth & Environmental Sciences

**Wulff, Thorben; Bauerfeind, Eduard; von Appen, Wilken-Jon; Sascha (2018):** Vertical profiles of physical and chemical parameters in the vicinity of an ice tongue in the Fram Strait. <https://doi.org/10.1594/PANGAEA.887579>

**Abstract:** AWI's autonomous underwater vehicle "PAUL" covered two 10 km transects across the meltwater front. The meltwater front was associated to a large ice tongue. The resolution profile of the following parameters: Temperature, Conductivity, Salinity, Depth, and Pressure. The dataset contains the data of the vertical ascends only. Due to the high resolution, each parameter has an individual depth stamp.

**Related to:** **Wulff, Thorben; Bauerfeind, Eduard; von Appen, Wilken-Jon; Sascha (2018):** Vertical profiles of physical and chemical parameters in the vicinity of an ice tongue in the Fram Strait. <https://doi.org/10.1016/j.dsr.2016.07.001>

**Project(s):** **Physical Oceanography @ AWI (AWI\_PhYOce)**

**Coverage:** *Median Latitude: 78.753080 \* Median Longitude: 5.144880 \* South-bound Latitude: 78.714727 \* West-bound Longitude: 5.100582 \* North-bound Latitude: 78.794343 \* East-bound Longitude: 5.185734*  
*Date/Time Start: 2013-07-02T20:45:38 \* Date/Time End: 2013-07-03T01:35:26*  
*Minimum DEPTH, water: 1.22 m \* Maximum DEPTH, water: 52.62 m*

**Event(s):** **MSM29\_440-5** *\* Latitude Start: 78.714170 \* Longitude Start: 5.160830 \* Latitude End: 78.715330 \* Longitude End: 5.168000 \* Date/Time Start: 2013-07-02T19:58:00 \* Date/Time End: 2013-07-03T02:58:00 \* Elevation Start: -2332.3 m \* Elevation End: -2332.0 m \* SENSOR AWI: <https://hdl.handle.net/10013/sensor.664525cf-45b9-4969-bb88-91a1c5e97a5b> \* Location: North Greenland Sea \* Campaign: MSM29 (HAUSGARTEN 2013) \* Basis: Maria S. Merian*

**SENSOR.awi.de**

AWI AUV Polar Autonomous Underwater Laboratory

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

2013-07-02 19:58:00 Deployment MSM29\_440-5

SENSOR (2013). Platform metadata for Vehicle AWI AUV Polar Autonomous Underwater Laboratory. Configuration from 2013-07-02 21:58:00. Alfred Wegener Institute for Polar and Marine Research. <https://hdl.handle.net/10013/sensor.664525cf-45b9-4969-bb88-91a1c5e97a5b>

State: public

ID: 458

Parent:

Device URN: vehicle:awi\_paul

Short Name: AWI-PAUL

Long Name: AWI AUV Polar Autonomous Underwater Laboratory

Collections:

Description: The Bluefin-21 is a highly modular autonomous underwater vehicle able to carry multiple sensors and payloads at once. It boasts a high energy capacity that enables extended operations even at the greatest depths. The Bluefin-21 has immense capability but is also flexible enough to operate from various ships of opportunity worldwide.

Serial: Paul

Manufacturer: Bluefin Robotics

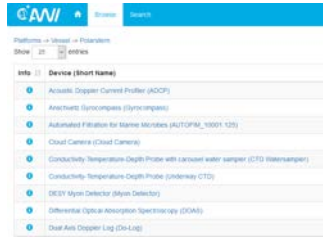
Model: Bluefin-21

Type: Vehicle

Asset Number: 44055



# Data Flow in MOSAiC

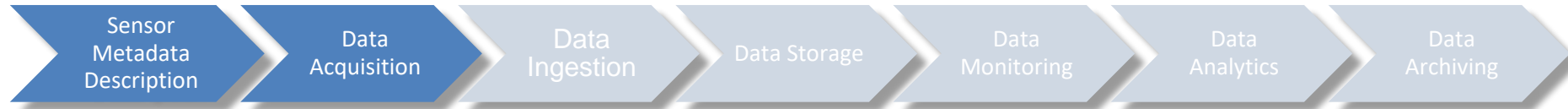


ActionLog Events

Activity - Device Operation	Start	Device	Action	Latitude	Longitude
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

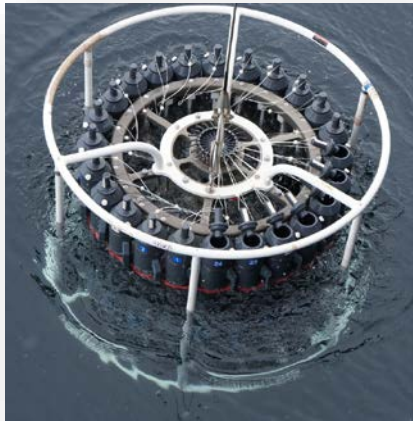


**Sensor metadata description (SensorWeb) is the basis for all parts!!!**



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

# DSHIP-ActionLog



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		

Sensor Metadata Description

Data Acquisition

Data Ingestion

Data Storage

Data Monitoring

Data Analytics

Data Archiving

# 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

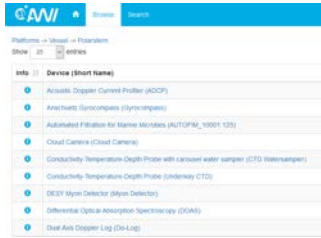
- Concept

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





# Data Flow in MOSAiC

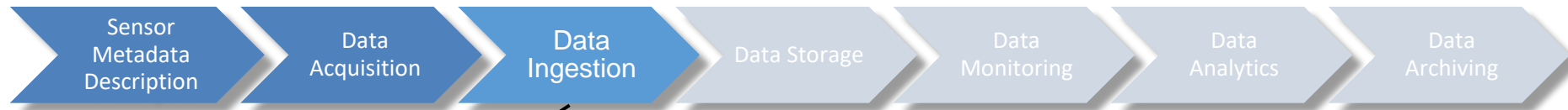


ActionLog Events

Activity - Device Operation	Start	Device	Action	Latitude	Longitude
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

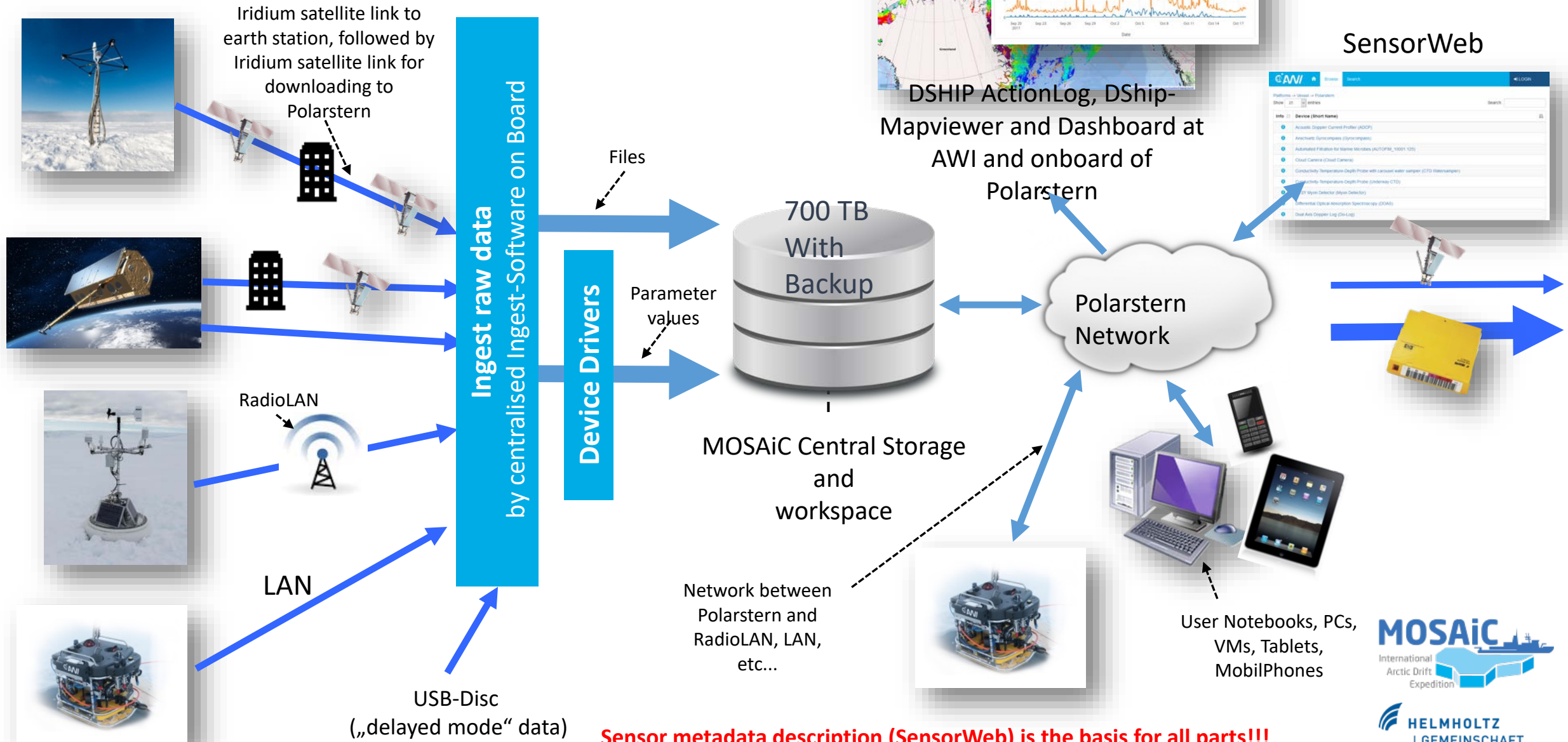


Data transfer via satellite, local LAN, radio LAN as stream and/or in delayed mode

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

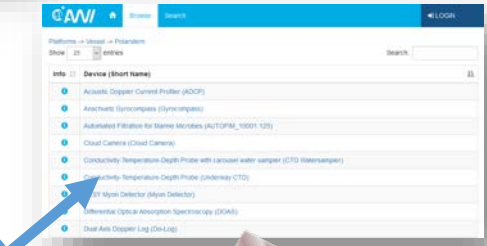
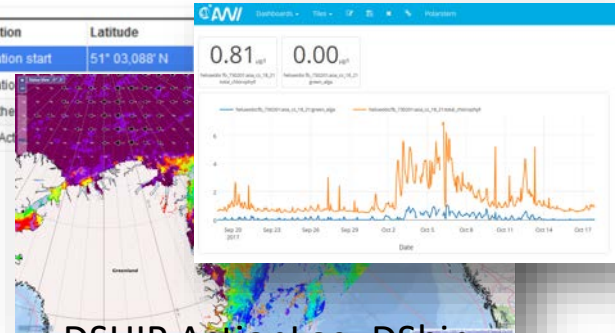


# Overview Architecture



ActionLog Events

Activity - Device Operator	Start	Device	Action	Latitude
PS4_4-1 ADCP	12.10.2016 11:49:24	Acoustic Doppl...	station start	51° 03.088' N
PS4_1-3 BLN	12.10.2016 11:49:01	Acoustic Doppl...	station...	
PS4_1-1 BOAT	11.10.2016 14:17:22	BALLON	in the	
	11.10.2016 14:13:31	Boat	MyAc	



Files

Parameter values

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

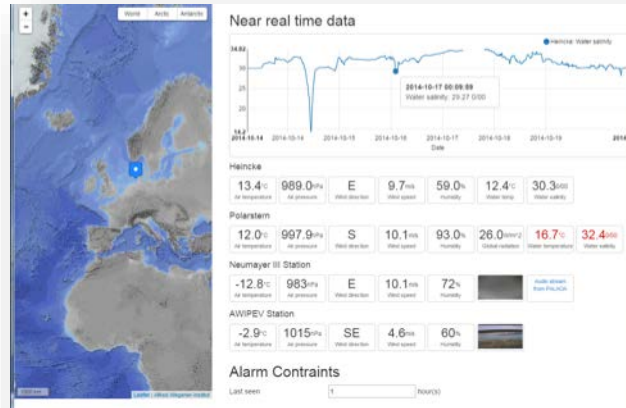
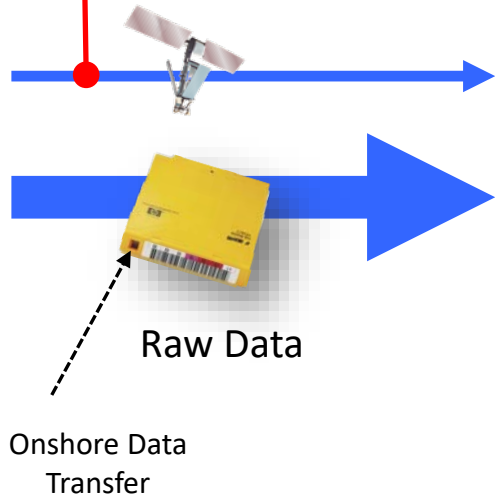
User Notebooks, PCs, VMs, Tablets, MobilPhones

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

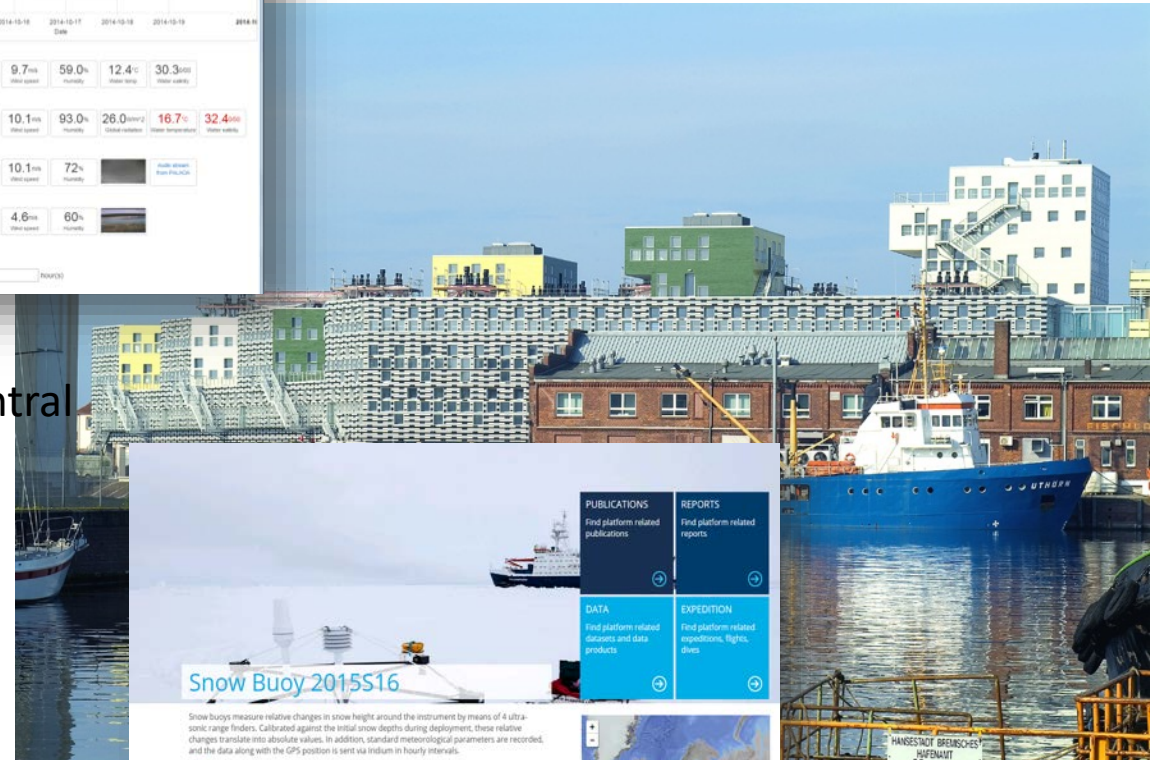
# Raw Data at AWI



Currently only 3 x 200MB/day



Land-MOSAic Central Storage





# Computing Network

## Cabled LAN (fibre optical)

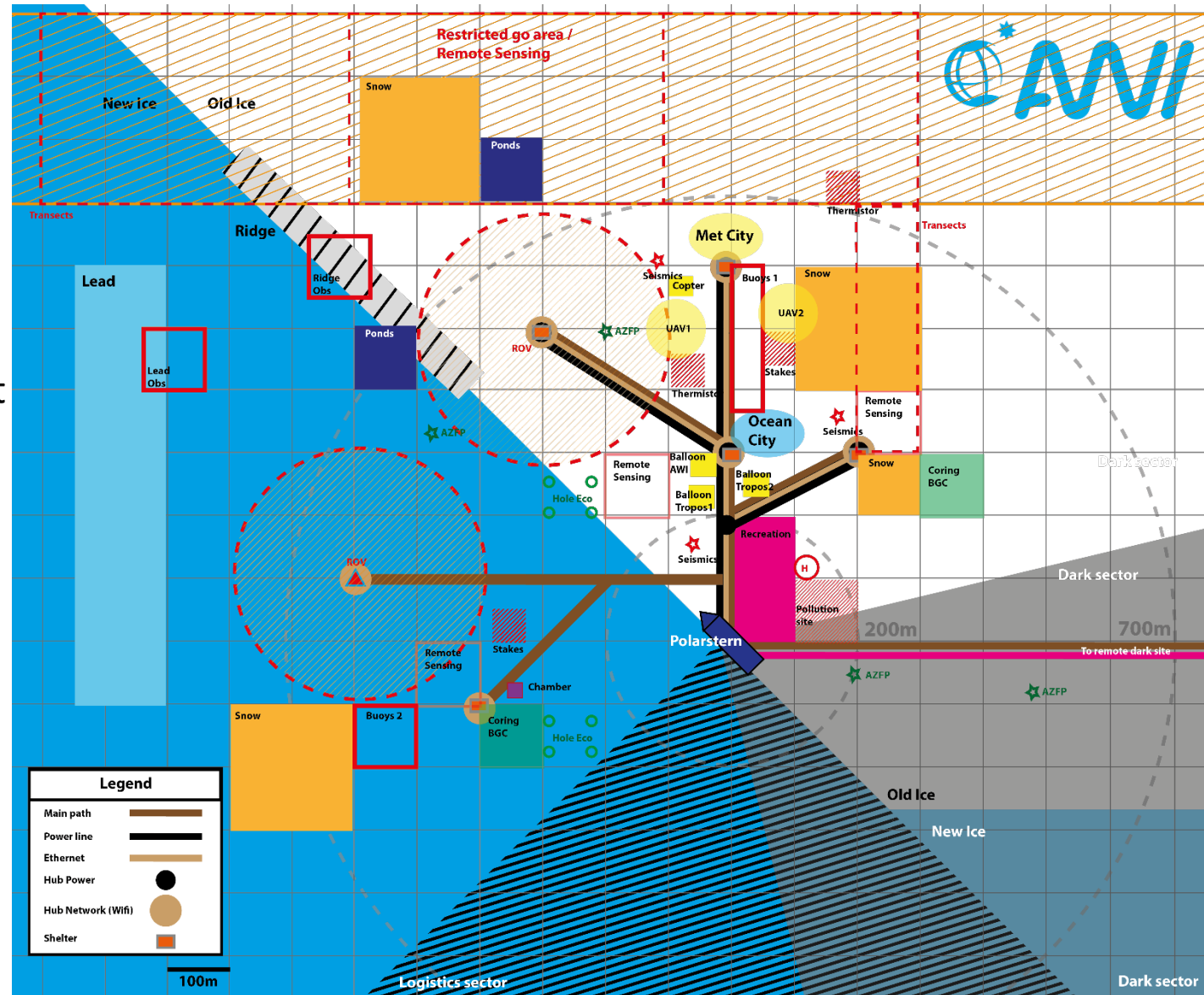
- at power lines
- 1Gbit/s

## 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

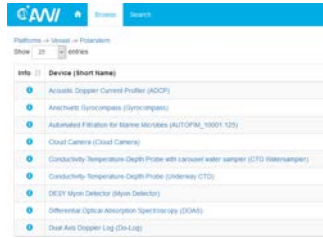
Data Storage

Data Monitoring

Data Analytics

Data Archiving

# Data Flow in MOSAiC

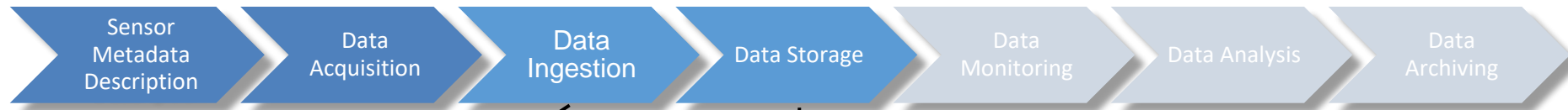
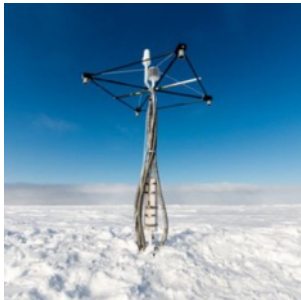


ActionLog Events

Activity - Device Operation	Start	Device	Action	Latitude	Longitude
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



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



## platforms

vessel

polarstern

ctd\_watersampler

SBE3plus temperature sensor

DSHIP-DEVICEOPERATION-ID

SensorFile.xxx

FerryBox

DATE

SensorFile.xxx

vehicle

BEAST

ECO-Triplet Fluorometer

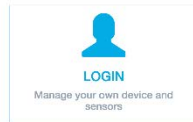
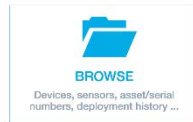
DSHIP-DEVICEOPERATION-ID

SensorFile.xxx

Micron Scanning Sonar

## SENSOR INFORMATION SYSTEM

Create and manage platform, device and sensor related information



## 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

...

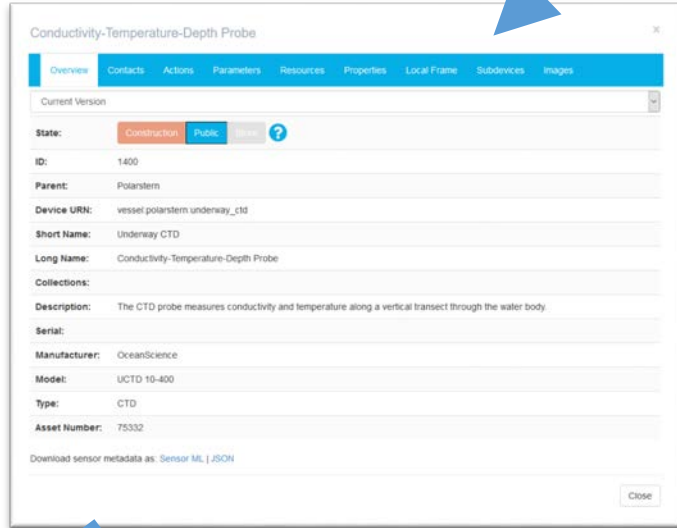
**primary data**



Devices has to be created in SENSOR (only once)

Log every device operation

SENSOR.fs-polarstern.de



Conductivity-Temperature-Depth Probe

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

Current Version

State: Construction Public

ID: 1400

Parent: Polarstern

Device URN: vessel.polarstern.underway\_ctd

Short Name: Underway CTD

Long Name: Conductivity-Temperature-Depth Probe

Collections:

Description: The CTD probe measures conductivity and temperature along a vertical transect through the water body

Serial:

Manufacturer: OceanScience

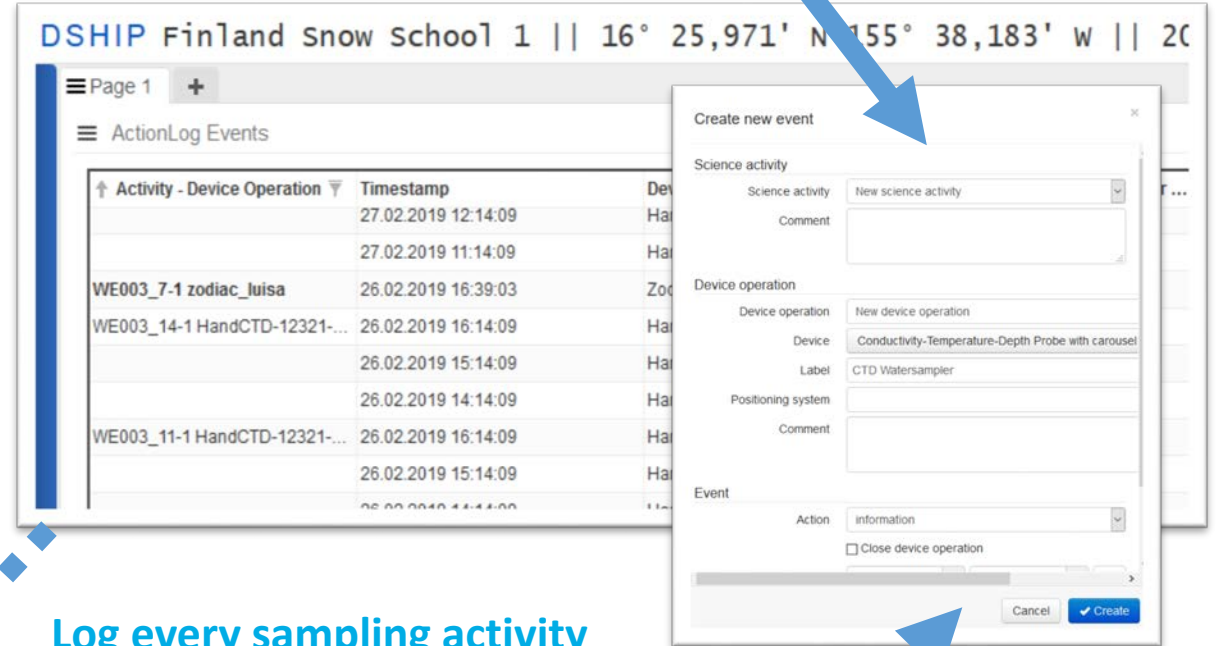
Model: UCTD 10-400

Type: CTD

Asset Number: 75332

Download sensor metadata as: Sensor ML (JSON)

DSHIP-ActionLog



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

Page 1 +

ActionLog Events

Activity - Device Operation	Timestamp	Dev
	27.02.2019 12:14:09	Ha
	27.02.2019 11:14:09	Ha
WE003_7-1 zodiac_luisa	26.02.2019 16:39:03	Zod
WE003_14-1 HandCTD-12321-...	26.02.2019 16:14:09	Ha
	26.02.2019 15:14:09	Ha
	26.02.2019 14:14:09	Ha
WE003_11-1 HandCTD-12321-...	26.02.2019 16:14:09	Ha
	26.02.2019 15:14:09	Ha
	26.02.2019 14:14:09	Ha

Create new event

Science activity

Science activity: New science activity

Comment:

Device operation

Device operation: New device operation

Device: Conductivity-Temperature-Depth Probe with carousel

Label: CTD Watersampler

Positioning system:

Comment:

Event

Action: information

Close device operation

Cancel Create

background  
Synching  
(device & device operation)

Background creating directories  
(device & device operation)

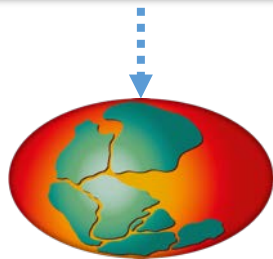
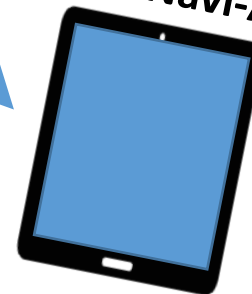
Storage MCS

vessel/polarstern/ctd\_watersampler/SBE3plus\_  
temperature\_sensor/DEVICEOPERATION\_ID/

Log every sampling activity

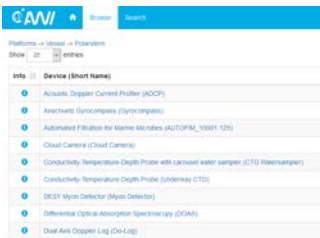
manually  
Synching  
(device & device operation)

IceFloeNavi-App



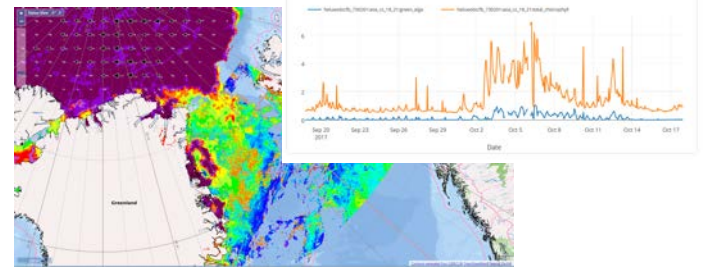
Data Flow in more detail

# Data Flow in MOSAiC



ActionLog Events

Activity - Device Operator	Start	Device	Action	Latitude	Longitude
PS4_4-1 ADCP	12.10.2016 11:49:24	Acoustic Doppl...	station start	51° 03,088' 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

DShip-Mapviewer and Dashboard at AWI and onboard of Polarstern



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!!!**



✓ *Monitoring realtime data from ship sensors*

**DSHIP-RawData**



DSHIP Finland Snow School 1 || 16° 25,809' N 155° 38,542' W || 2019-03-10 15:07:36 UTC werum

Logging Bridge +

Position

16° 25,809' N 155° 38,542' W

Course

299 °

Temperature

Air temperature 26,4 °C

Water temperature 16,43 °C

Speed / Depth

Speed 5,1 kn

depth 0 m

Direction-Thrust

Heading 232 °

Course 299 °

Ship Speed 5,1 kn

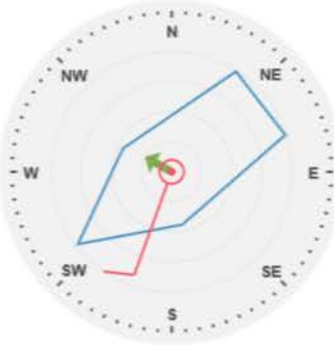
Wind direction 200 °

Wind speed 3,3 m/s

Wind

Winddirection true 200 °

Windspeed true 3,3 m/s



admin ONLINE SYS ACQ TERR 2019-03-10 15:07:36 UTC

Sensor Metadata Description

Data Acquisition

Data Ingestion

Data Storage

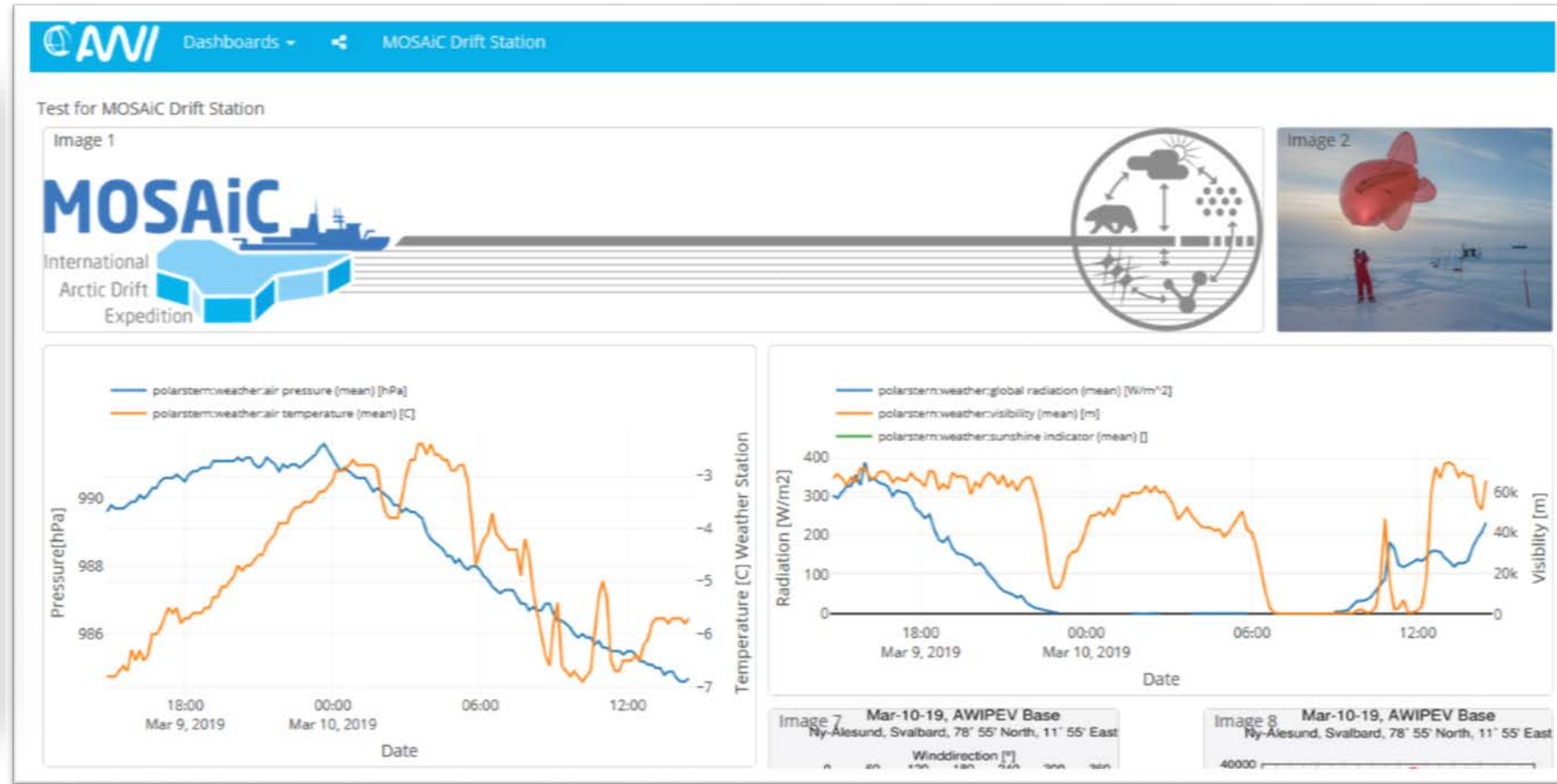
**Data Monitoring**

Data Analytics

Data Archiving

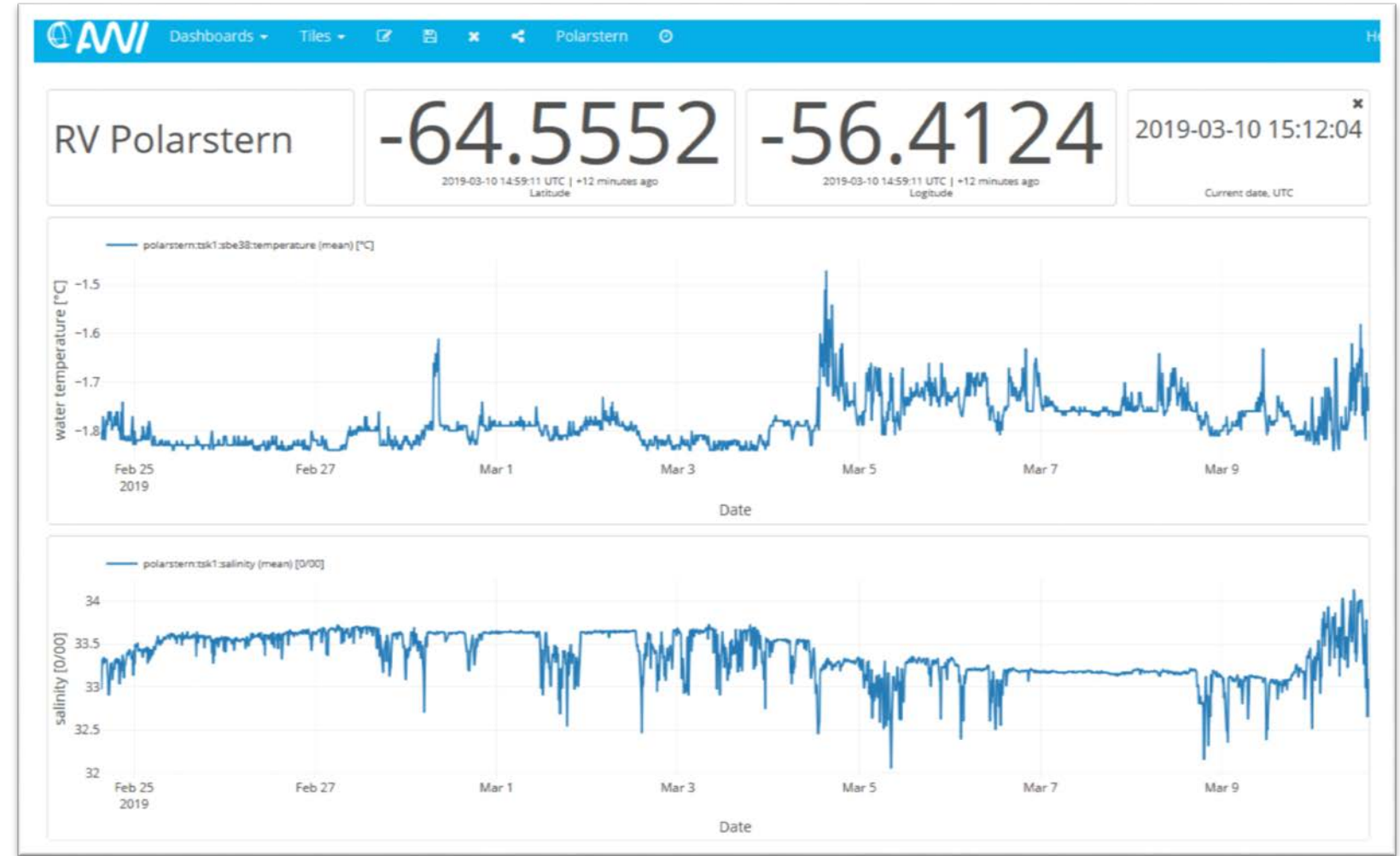
✓ *Monitoring of near real-time and delayed-mode MOSAIC data*

**DASHBOARD**



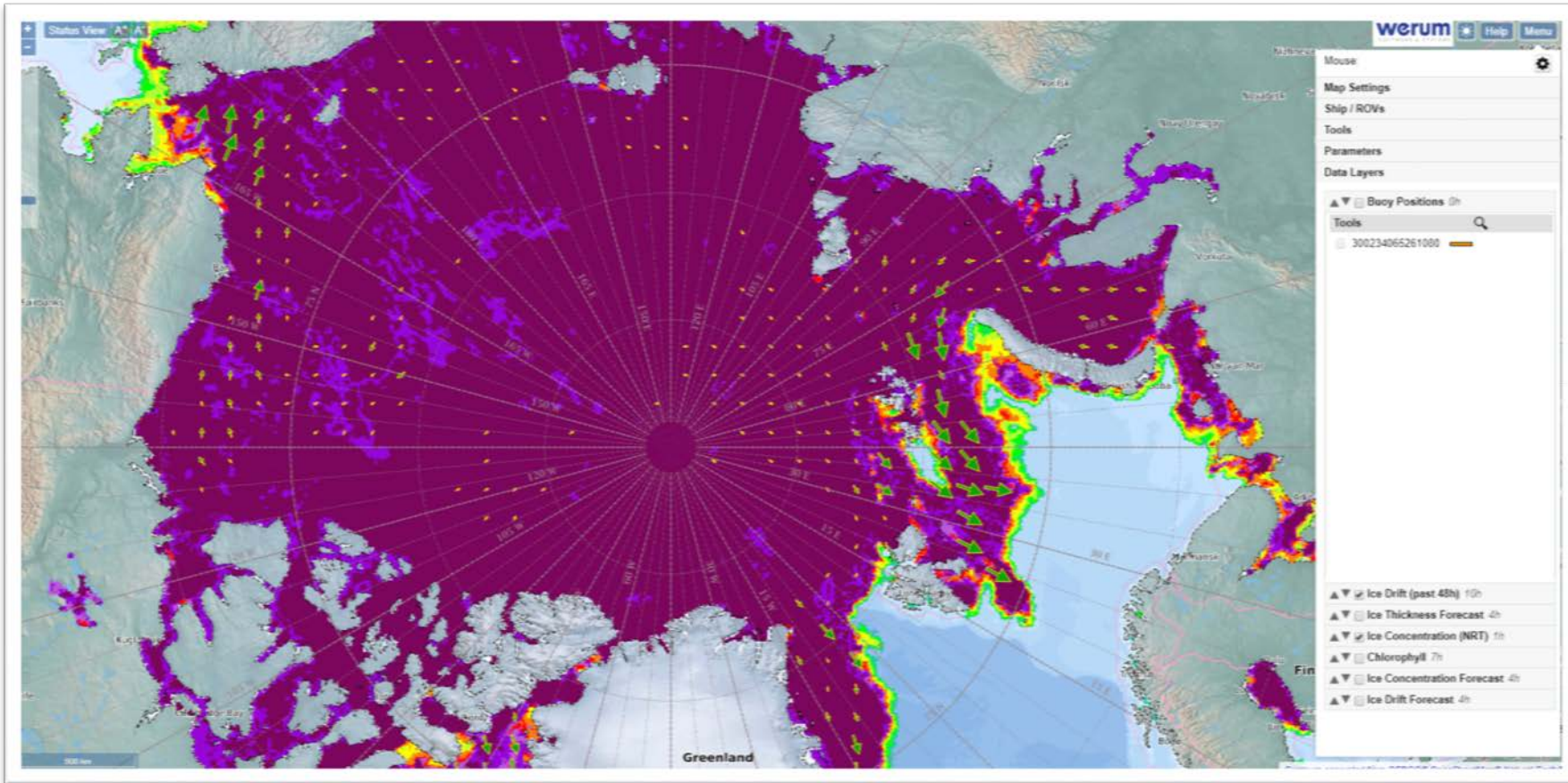


**DASHBOARD**



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

# MAPVIEWER



Sensor  
Metadata  
Description

Data  
Acquisition

Data  
Ingestion

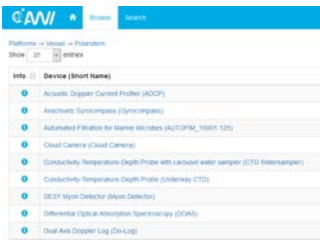
Data  
Storage

Data  
Monitoring

Data  
Analytics

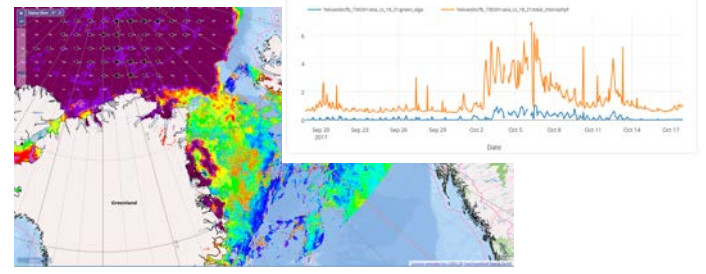
Data  
Archiving

# Data Flow in MOSAiC



ActionLog Events

Activity - Device Operator	Start	Device	Action	Latitude	Longitude
PS4_4-1 ADCP	12.10.2016 11:49:24	Acoustic Doppl...	station start	51° 03,088' 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

DShip-Mapviewer and Dashboard at AWI and onboard of Polarstern



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 ...?

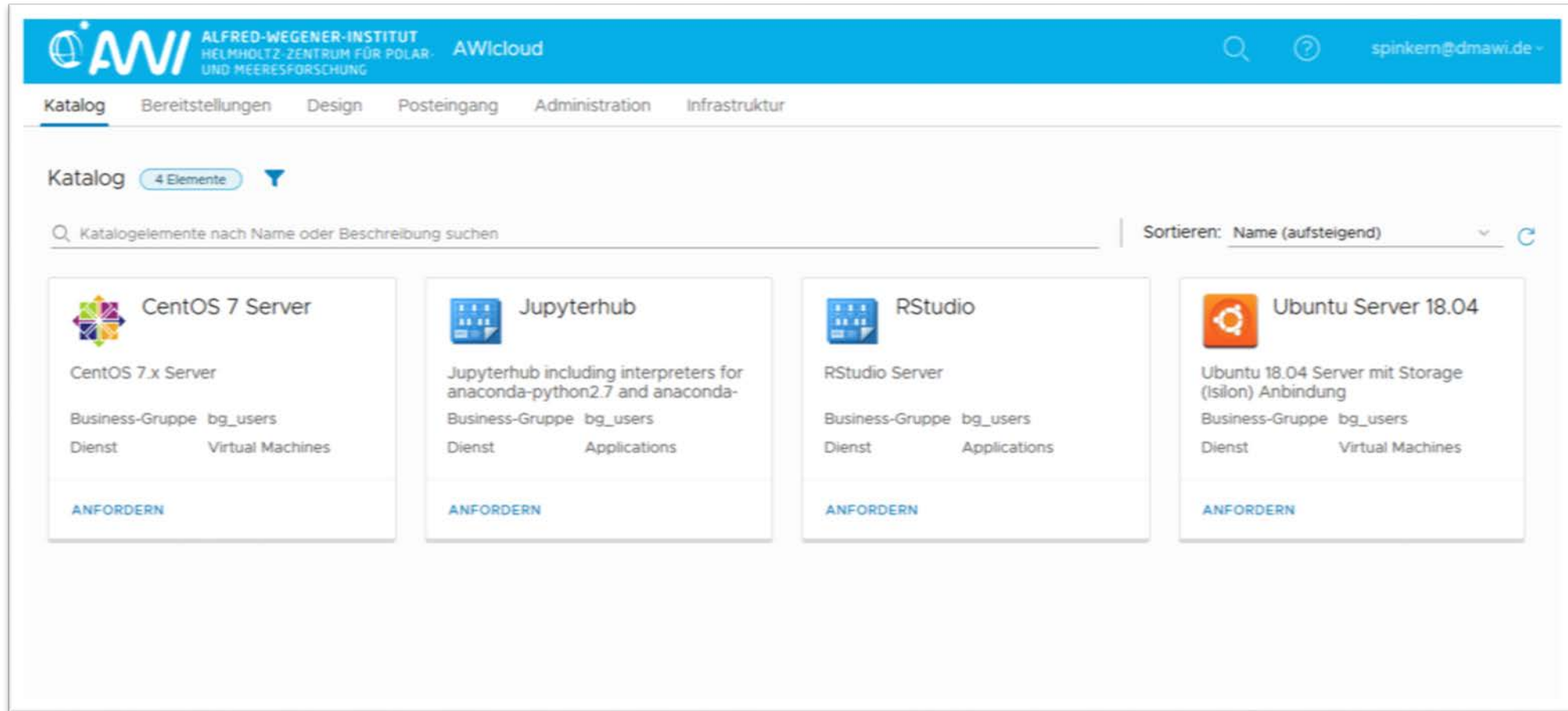


**Sensor metadata description (SensorWeb) is the basis for all parts!!!**





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



The screenshot shows the AWIcloud marketplace interface. The header includes the AWI logo, the text 'ALFRED-WEGENER-INSTITUT HELMHOLTZ-ZENTRUM FÜR POLAR- UND MEERESFORSCHUNG', and 'AWIcloud'. A navigation menu contains 'Katalog', 'Bereitstellungen', 'Design', 'Posteingang', 'Administration', and 'Infrastruktur'. The main content area is titled 'Katalog' and shows 4 elements. A search bar is present with the text 'Katalogelemente nach Name oder Beschreibung suchen'. A sorting dropdown is set to 'Name (aufsteigend)'. Four virtual machine options are displayed in a grid:

- CentOS 7 Server**: CentOS 7.x Server, Business-Gruppe bg\_users, Dienst Virtual Machines, ANFORDERN
- Jupyterhub**: Jupyterhub including interpreters for anaconda-python2.7 and anaconda-, Business-Gruppe bg\_users, Dienst Applications, ANFORDERN
- RStudio**: RStudio Server, Business-Gruppe bg\_users, Dienst Applications, ANFORDERN
- Ubuntu Server 18.04**: Ubuntu 18.04 Server mit Storage (Isilon) Anbindung, Business-Gruppe bg\_users, Dienst Virtual Machines, ANFORDERN

Sensor  
Metadata  
Description

Data  
Acquisition

Data  
Ingestion

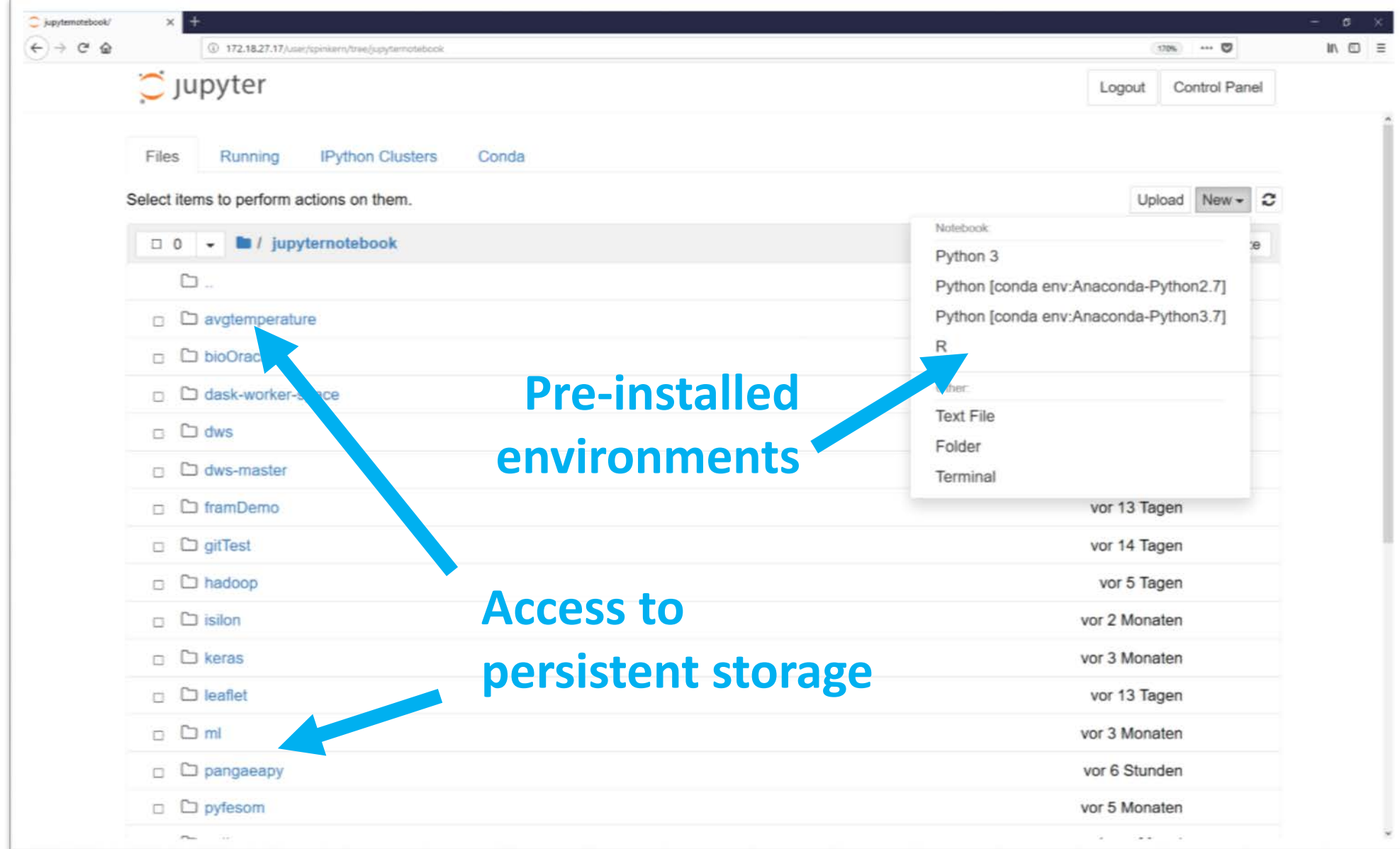
Data  
Storage

Data  
Monitoring

Data  
Analytics

Data  
Archiving



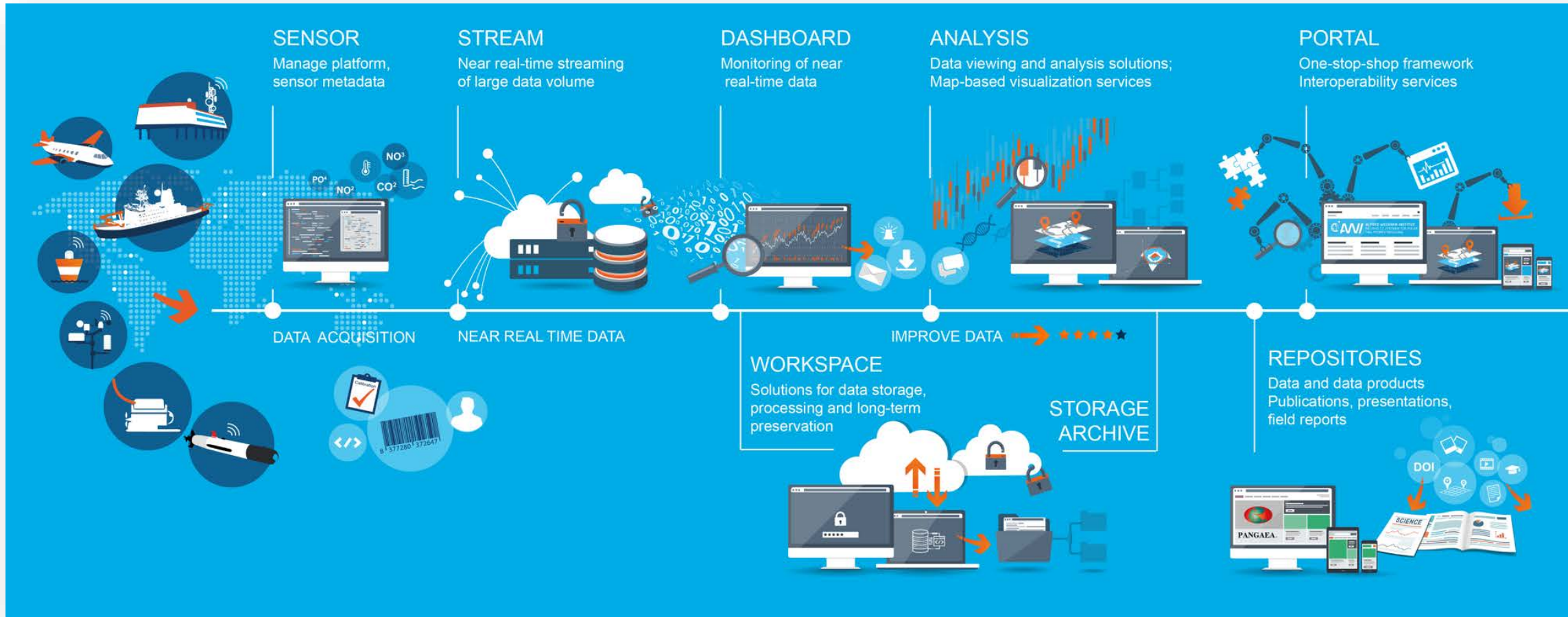


The screenshot shows the JupyterLab interface with a file browser. The 'New' dropdown menu is open, showing options like Notebook, Python 3, Python [conda env:Anaconda-Python2.7], Python [conda env:Anaconda-Python3.7], R, Text File, Folder, and Terminal. Annotations with blue arrows point to the 'avgtemperature' folder (labeled 'Pre-installed environments') and the 'ml' folder (labeled 'Access to persistent storage').



✓ 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

Observations to Archive (O2A)





https://maps.awi.de/awimaps/

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

## Welcome to MAPS@awi!

MAPS@awi Catalog lists scientifically prepared data from AWI research in the form of highly adapted WebGIS projects.

Search for project. 28 | ✕

- FRAM - Ocean Floor Observation and Bathymetry System (OFOPS)  
Purser, Autun
- TsunAWI Simulations in the Indonesia Tsunami Early Warning System  
Rakowsky, Natalja; Harig, Sven; Immerz, Antonia; Haas, Antonie
- FRAM - Arctic Water Column Temperature and Salinity Data  
Behrendt, Axel; Haas, Antonie

**FRAM - Ocean Floor Observation and Bathymetry System (OFOPS)**

The Ocean Floor Observatory Bathymetric System (OFOPS) is a towed imaging and sonar platform for seafloor exploration and impact monitoring. The OFOPS is able to carry out seafloor habitat mapping along complex, high risk topography and environments, due to innovative acoustic and navigational sensors. A breakdown of the combined instruments is as follows:

- High resolution photo camera
- Three laser pointers (directed at the seafloor, measures 50cm distances)
- High definition video camera
- Side scan sonar system
- Forward looking sonar system
- USBL positioning system (Posidonia)

The OFOPS was operated in the high Arctic under sea ice conditions on the Polarstern PS102 research cruise during September, 2016. Along the ultraslow oceanic spreading region of Gakkel Ridge, two locations were targeted: Langmuir Ridge, Hobart, but other areas of interest were also explored. For comparison, we included the Aurora PS86 bathymetry images along the Gakkel Ridge as well. This webGIS displays the high resolution images captured at each dive site at an average altitude of 3m above the seafloor. Data products were created at specific sites (Areas A, B, & C) which include georeferenced images, photo mosaics, aspect and slope maps, and shaded bathymetry. Example sonar swaths are also shown at both high and low frequencies (220 kHz & 540 kHz).

**TsunAWI Simulations in the Indonesia Tsunami Early Warning System**

Visualization of a subset of the pre-calculated tsunami scenario database covering the Sunda Trench used in the Indonesia Tsunami Early Warning System (InaTEWS).

After the devastating Indian Ocean Tsunami 2004, the BMBF project "German-Indonesian Tsunami Early Warning System" (GITEWS) was part of the German contribution to reconstruction and development, among other institutes, the Alfred ...

**FRAM - Arctic Water Column Temperature and Salinity Data**

Service Name: LEADIS  
Layer Name: Potential Temperature [°C]  
Profile Number: 205405  
Cruise: Polarstern\_ARK\_XIV\_2  
Station: 2357  
Platform: SVPs (3)  
Device: Conductivity / Temperature / Depth (CTD)  
Date Time: 2003-08-11T21:15  
Pressure: 9  
Depth: 9.9

- 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**

Search for author, expedition, project, ...

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



**SERVICES**  
Manage your sensors and data

**DATA**  
Find datasets and data products

**EXPEDITION**  
Find expeditions, flights, dives

**Latest news:**  
Swoosh | Peter and I could hear the swoosh of our ocean sensors breaching...

PS113 with Polarstern  
2018-05-06 - Punta Arenas  
2018-06-11 - Bremerhaven

Explore data and products thematically grouped



**Long Term Ecological Research**

The analysis of long-term ecological patterns and changes in coastal, shelf and ocean environments is a focus of the AWI. LTO activities and long-term data sets exist for almost every geographic region in which AWI is active. Parameters include everything from phytoplankton productivity, to fish. These data also include the environmental parameters such as nutrients and salinity. The methods of...

◀ ▶ Show next / previous

**NEAR REAL TIME DATA**

Near real time data is presented in hourly averages and no quality control is applied.

**Air temperature**

20.10 °C Polarstern	18.70 °C Heincke	-8.80 °C Neumayer III
------------------------	---------------------	--------------------------

**LATEST PUBLICATIONS**

Datasets, publications and reports from AWI repositories



# Expedition Data

Station list, tracklines, data, publications, reports

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

PLATFORMS EXPEDITIONS DATA COLLECTIONS

Search for author, expedition, project, ...

Temporal coverage

2009 - 2018



Selected filters: CTD/Rosette ✕

Platform

Heincke (149)  
Polarstern (60)

Device

CTD/Rosette (209)  
Underway cruise track measurements (209)  
MultiCorer (66)  
Radiosonde (60)  
Multiple opening/closing net (58)  
Bongo net (51)  
van Veen Grab (41)  
Mooring (35)  
Hand net (32)  
Plankton net (28)

Project

LTER (14)  
HAUSGARTEN (9)  
FRAM (7)  
BIPOMAC (1)

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	Marke, Andreas	    

# Expedition Data

- Events, Data and Publications

DATA.awi.de

264 EVENTS    **59 DATASETS**    3 PUBLICATIONS    5 REPORTS

## Events

Event	Begin	Lng	Lat	Device
<a href="#">PS109-track</a>	2017-09-12 00:00:00 2017-10-13 00:00:00	18.96380 8.55480	69.65090 53.56750	Underway cruise track measurements
<a href="#">PS109_40101</a>	2017-09-13 11:21:00	16.83000	73.32000	Radiosonde
<a href="#">PS109_40102</a>	2017-09-14 11:01:00	7.33000	76.44000	Radiosonde
<a href="#">PS109_40103</a>	2017-09-15 04:49:00	0.04000	78.15000	Radiosonde
<a href="#">PS109_40104</a>	2017-09-15 10:55:00	0.01000	78.87000	Radiosonde



Search for author, expedition, project, ...

Selected filters: PS109 ✕ CTD/Rosette ✕

All Data Publications Reports GIS

Sort by Relevance Date

Temporal coverage  
1980 - 2023

### Author

[Kanzow, Torsten](#) (2)  
[Rohardt, Gerd](#) (2)  
[Schaffer, Janin](#) (2)

### Project

[AWI\\_PhYOce](#) (2)  
[Physical Oceanography @ AWI](#) (2)

[Physical oceanography measured on water bottle samples during POLARSTERN cruise PS109 \(2018\)](#)

Kanzow, Torsten; Schaffer, Janin; Rohardt, Gerd

<https://doi.org/10.1594/PANGAEA.887108>

[link](#) [download](#)

[Physical oceanography during POLARSTERN cruise PS109 \(ARK-XXXI/4\) \(2018\)](#)

Kanzow, Torsten; Schaffer, Janin; Rohardt, Gerd

<https://doi.org/10.1594/PANGAEA.885358>

[link](#) [download](#)

# More Features

## Collections

DATA.awi.de

ALFRED WEGENER INSTITUT  
HELMHOLTZ-ZENTRUM FÜR POLAR- UND MEERESFORSCHUNG

PLATFORMS EXPEDITIONS DATA COLLECTIONS

Search for author, expedition, project, ...

**FRAM**  
FRontiers in Arctic Marine Monitoring

Layers

- Dynamic layers
  - Sea-ice coverage
  - Chlorophyll a
- Product layers
  - Fram Strait DTM
  - Knipovich Ridge DTM
  - Hausgarten - major currents
  - FESOM - sea water temperature
  - FESOM - sea water salinity
- Platform layers
  - Platforms
  - Buoys
- Expedition layers
  - Latest Polarstern expedition
  - Latest Heincke expedition
  - Tracklines
  - Events

**AK3-1 (Mooring)**  
Deployment during NABOS2015 expedition  
FRAM  
Platform portrait | Sensor description

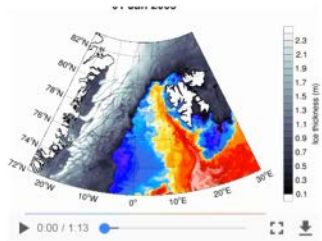
778.35 km Latitude: 78.5926, Longitude: 98.5183

Season: 2018 Temporal coverage: 2018-10-16

Discover this collection! | Featured data product!

### FEATURED DATA PRODUCTS

Selected data products for this collection from AWI repositories



#### Ocean-sea ice modelling: Ice thickness and temperature at 10 depth

The animation shows daily averaged surface temperature in color scale, overlaid by sea ice thickness in gray scale for the year 2009, simulated by the ocean-sea ice model FESOM. Sea ice characterized by many leads and cracks, flows southward on the western side of Fram Strait the eastern side, relatively warm Atlantic waters from the Gulf Stream enter the Arctic Ocean recirculate. These warm Atlantic waters strongly interact with the sea ice.

Wekerle, Claudia

<https://dx.doi.org/doi:10.1594/PANGAEA.880569>

Show next / previous

Simulations, videos, audios, ...



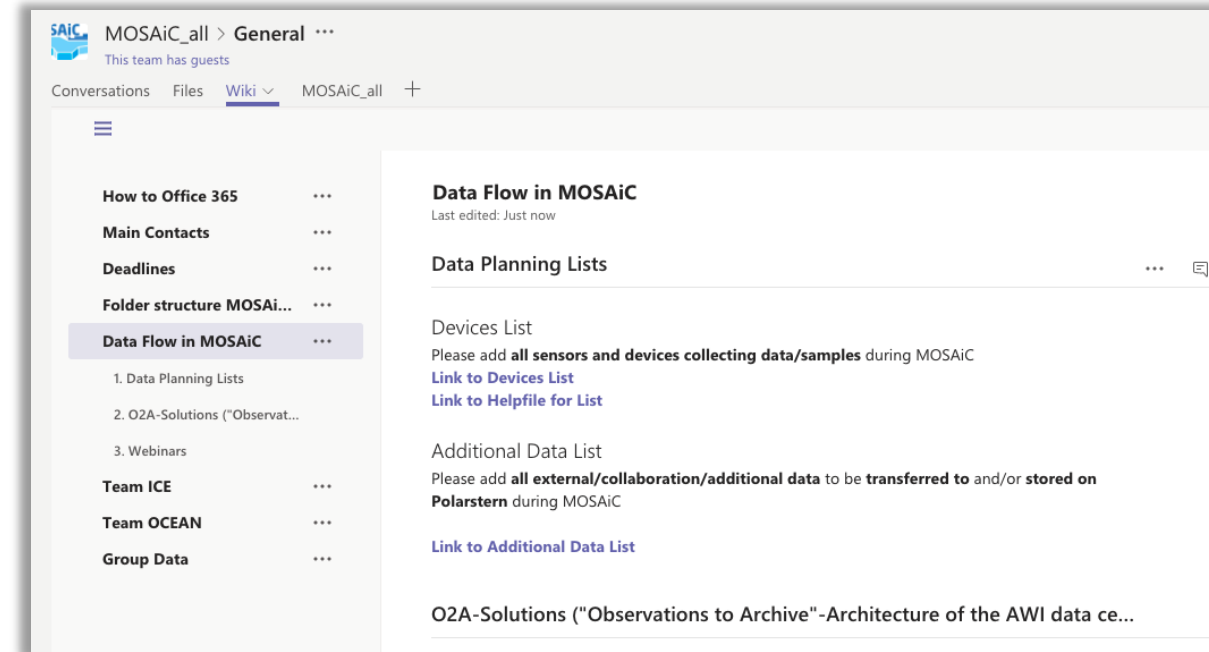
# Data Support





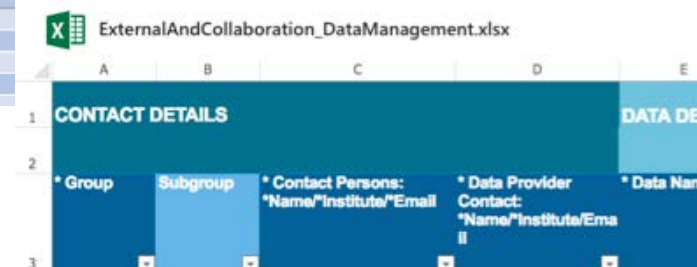
# Spreadsheets – Input needed for planning!

- 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



The screenshot shows a SharePoint Wiki page for the 'MOSAiC\_all' team. The page title is 'Data Flow in MOSAiC' and it was last edited 'Just now'. The page content includes a 'Data Planning Lists' section with a 'Devices List' and an 'Additional Data List'. The 'Devices List' section contains the text: 'Please add all sensors and devices collecting data/samples during MOSAiC' and includes links for 'Link to Devices List' and 'Link to Helpfile for List'. The 'Additional Data List' section contains the text: 'Please add all external/collaboration/additional data to be transferred to and/or stored on Polarstern during MOSAiC' and includes a link for 'Link to Additional Data List'. At the bottom of the page, there is a partial view of a section titled 'O2A-Solutions ("Observations to Archive"-Architecture of the AWI data ce...'. The left sidebar shows a navigation menu with items like 'How to Office 365', 'Main Contacts', 'Deadlines', 'Folder structure MOSAi...', 'Data Flow in MOSAiC' (which is selected), 'Team ICE', 'Team OCEAN', and 'Group Data'.

Platform	Device Type	Device Name	Name of Parent	Device registered in SensorWeb	No. of Devices of this Type
Aircraft	acoustic doppler velocimeter				
Balloon	aerosol sampler				
Buoy	alkalinity sensor				
Device_Store	altimeter				
Helicopter	autonomous underwater vehicle				
IceCamp	autonomous				

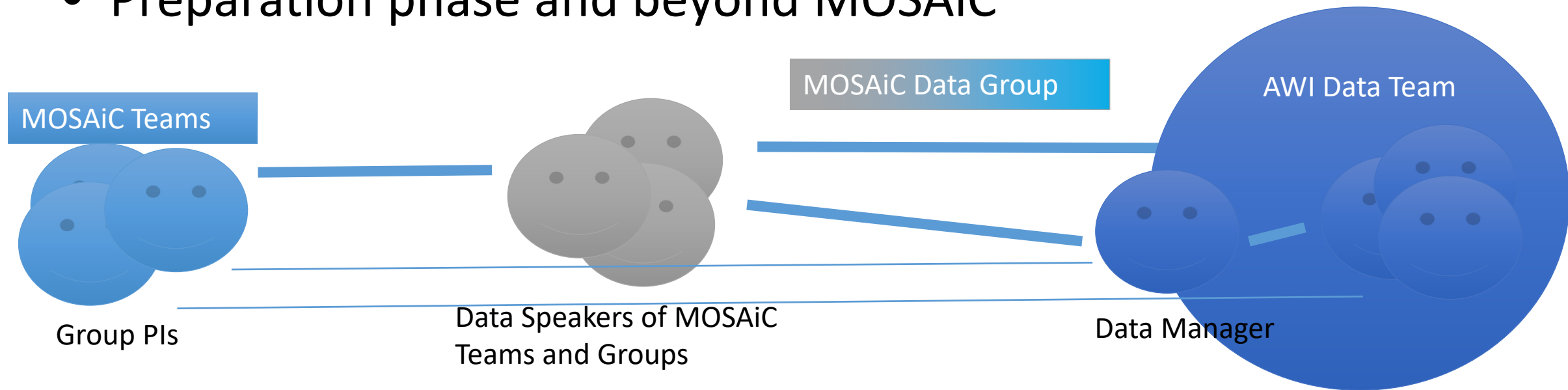


The screenshot shows an Excel spreadsheet with the following structure:

CONTACT DETAILS				DATA DET
* Group	Subgroup	* Contact Persons: *Name*Institute*Email	* Data Provider Contact: *Name*Institute/Em II	Data Name

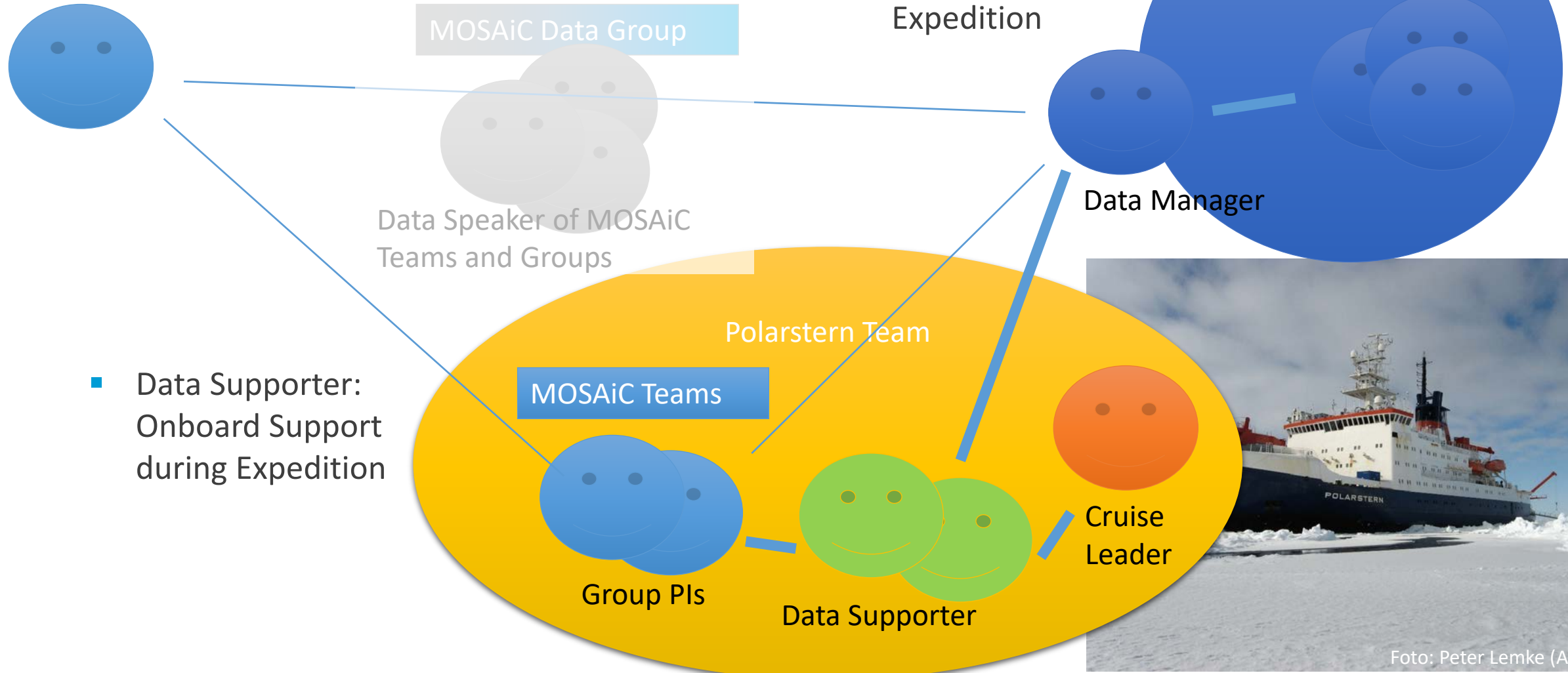
# Communication Paths for Data Questions

- 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

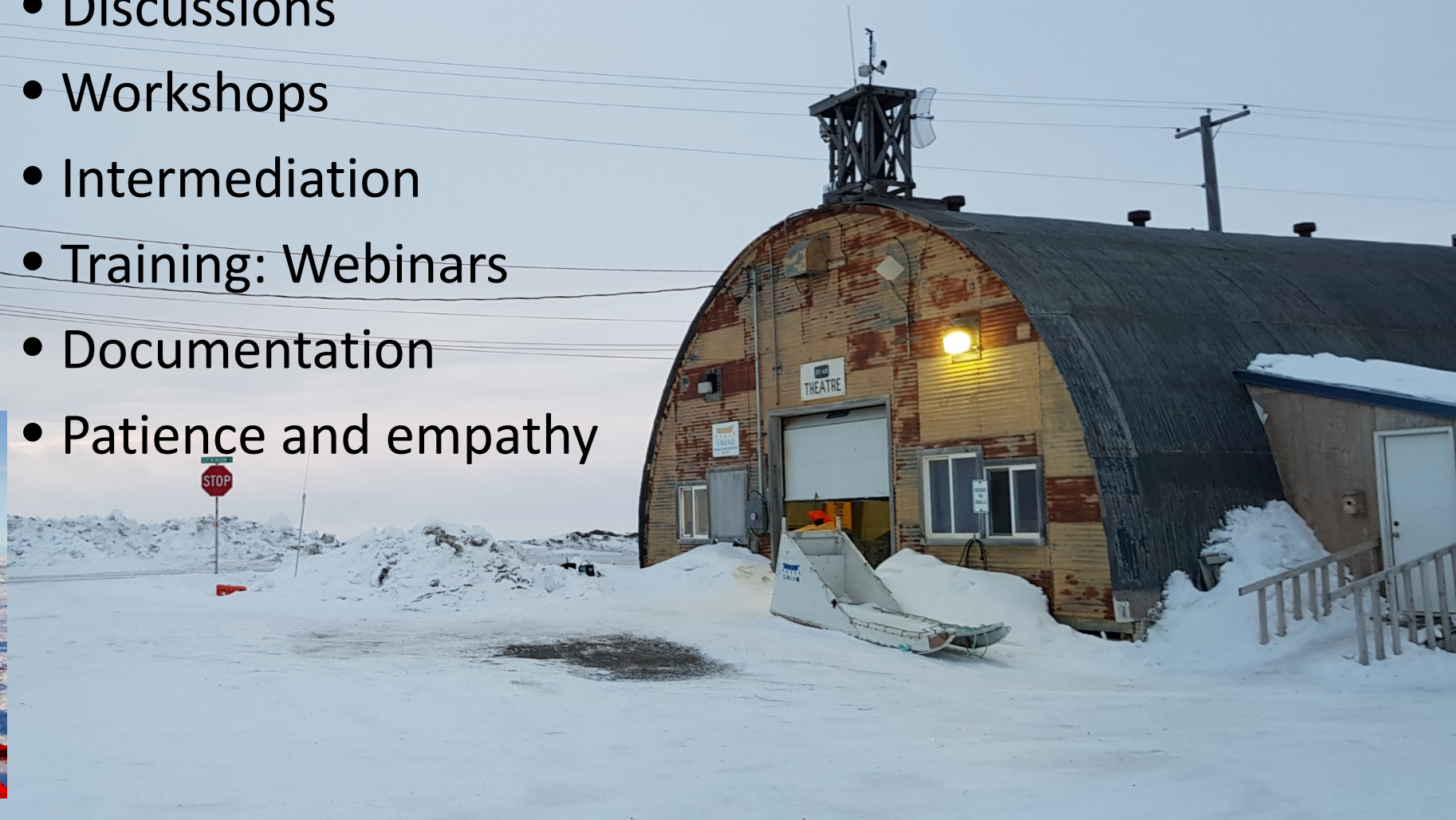


Foto: Peter Lemke (AWI)



# 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 MOSAïC



**Peter Gerchow**

Data Logistics Support Head



**Roland Koppe**

Group leader:  
Software Engineering



**Daniela Ransby**

PANGAEA



**Antonia Immerz**

Data Manager MOSAïC



**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

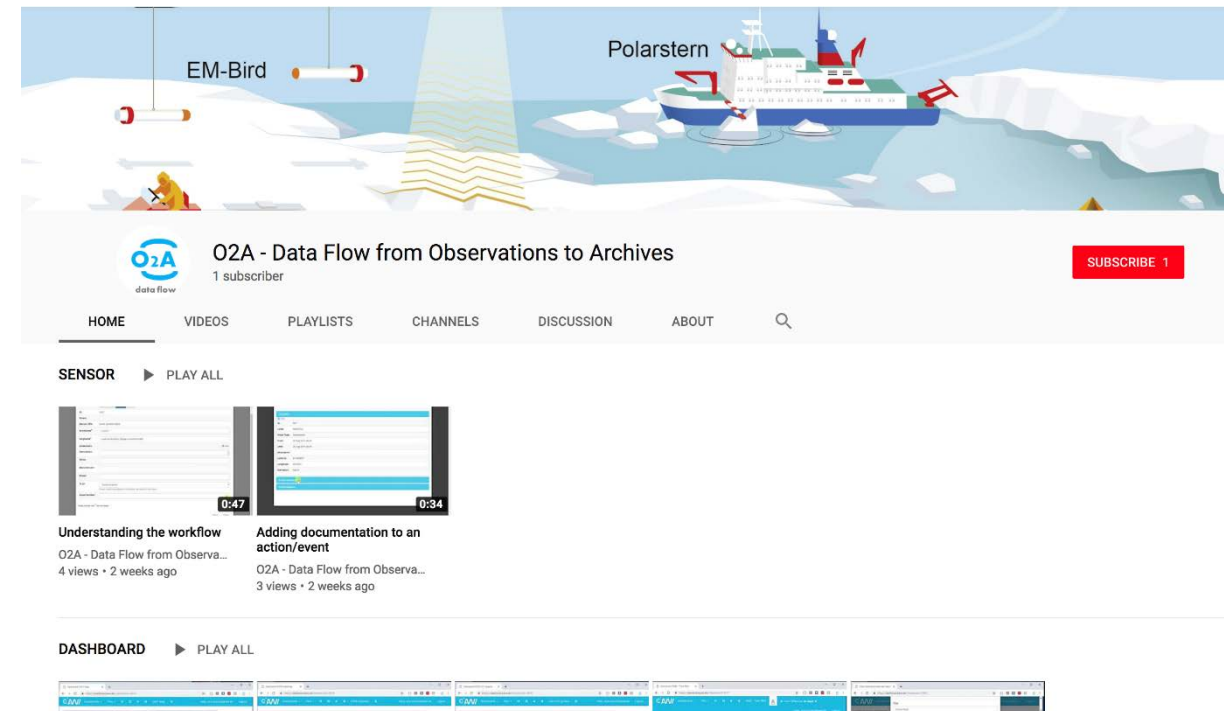


Mohammad Ajjan  
Data Management Plan

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

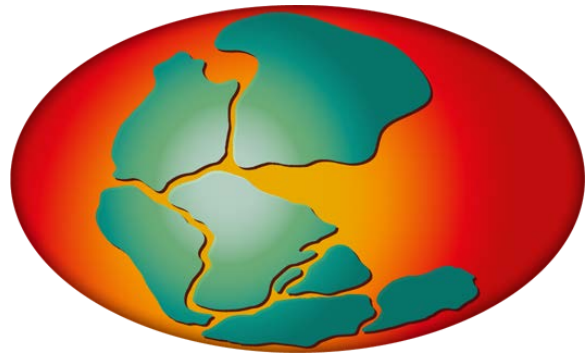
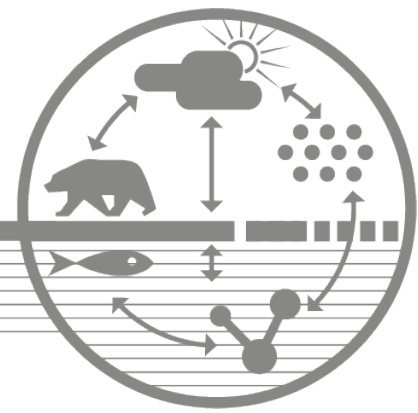
# References and Further Documentation

- [mosaic-expedition.org](https://mosaic-expedition.org)
- <https://www.youtube.com/watch?v=I4JULQ9klqM>
  
- [sensor.awi.de](https://sensor.awi.de)
- [dashboard.awi.de](https://dashboard.awi.de)
- [pangaea.de](https://pangaea.de)
- [maps.awi.de](https://maps.awi.de)
- [data.awi.de](https://data.awi.de)
- [mapviewer1.awi.de:8081/mapviewer](https://mapviewer1.awi.de:8081/mapviewer)
- <https://www.youtube.com/channel/UCljKBoLBJqy8XASA3QKrRxA/>



# MOSAIC

International  
Arctic Drift  
Expedition



## Data archiving with PANGAEA

*For sustainable environmental research*

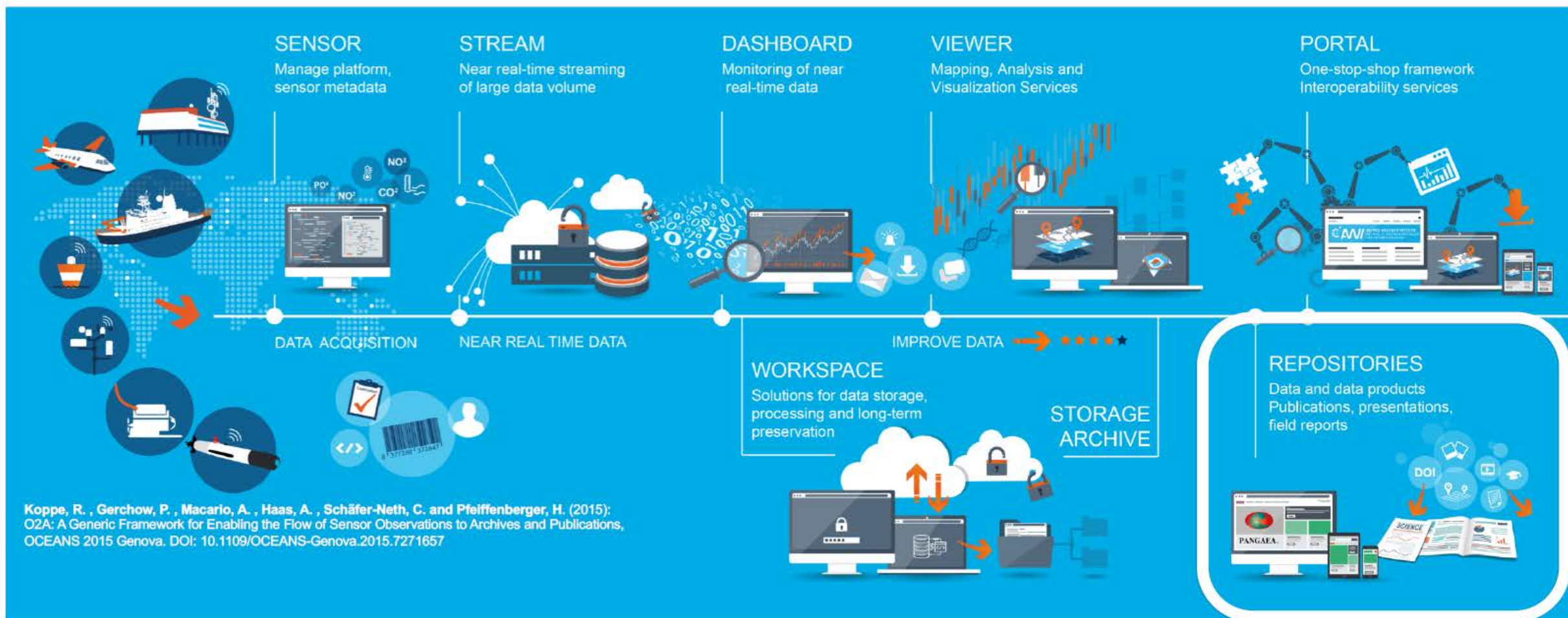


ALFRED-WEGENER-INSTITUT  
HELMHOLTZ-ZENTRUM FÜR POLAR-  
UND MEERESFORSCHUNG



# 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

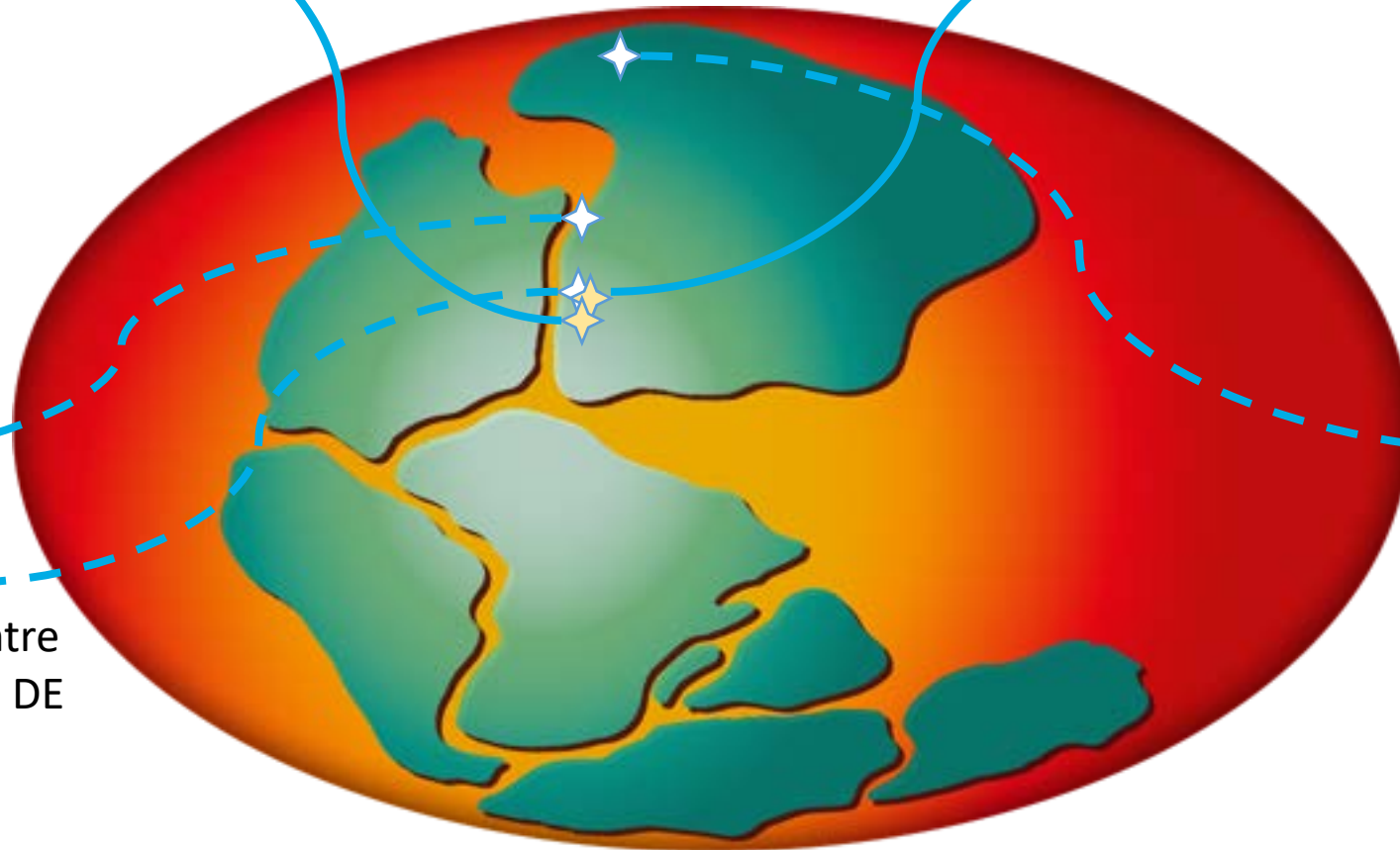
# About PANGAEA

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

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

- 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.

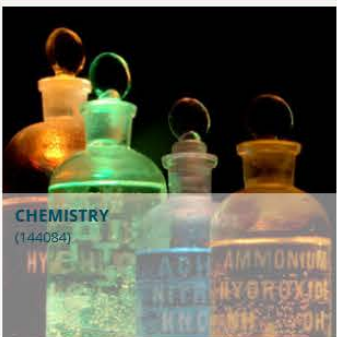
ALL TOPICS

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

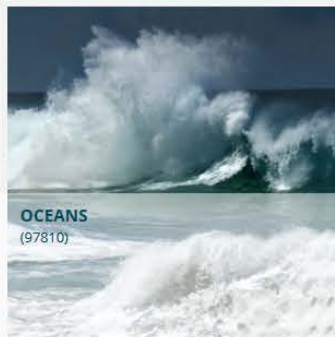


TOPICS

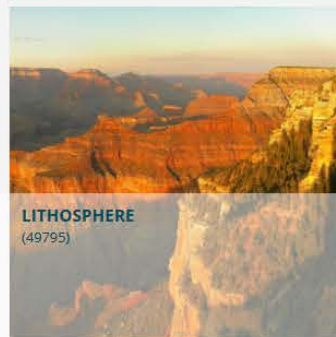
MAP



CHEMISTRY  
(144084)



OCEANS  
(97810)



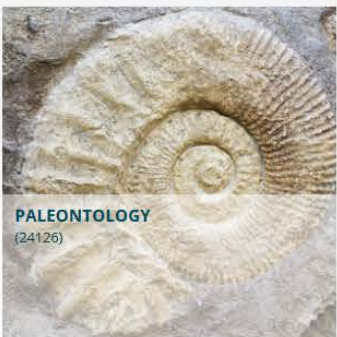
LITHOSPHERE  
(49795)



BIOLOGICAL CLASSIFICATION  
(30523)



ATMOSPHERE  
(26829)



PALEONTOLOGY  
(24126)



ECOLOGY  
(15268)



BIOSPHERE  
(7325)



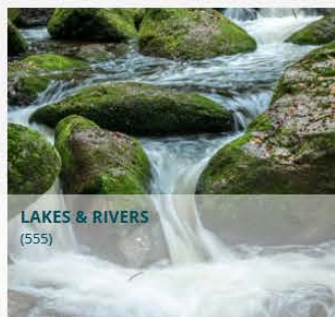
LAND SURFACE  
(6491)



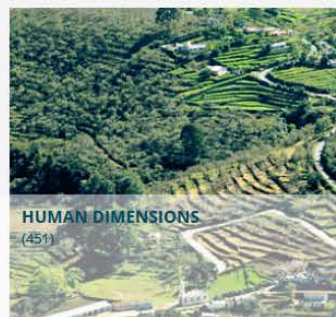
GEOPHYSICS  
(3179)



CRYOSPHERE  
(1346)



LAKES & RIVERS  
(555)



HUMAN DIMENSIONS  
(451)



FISHERIES  
(253)



AGRICULTURE  
(110)

## 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>

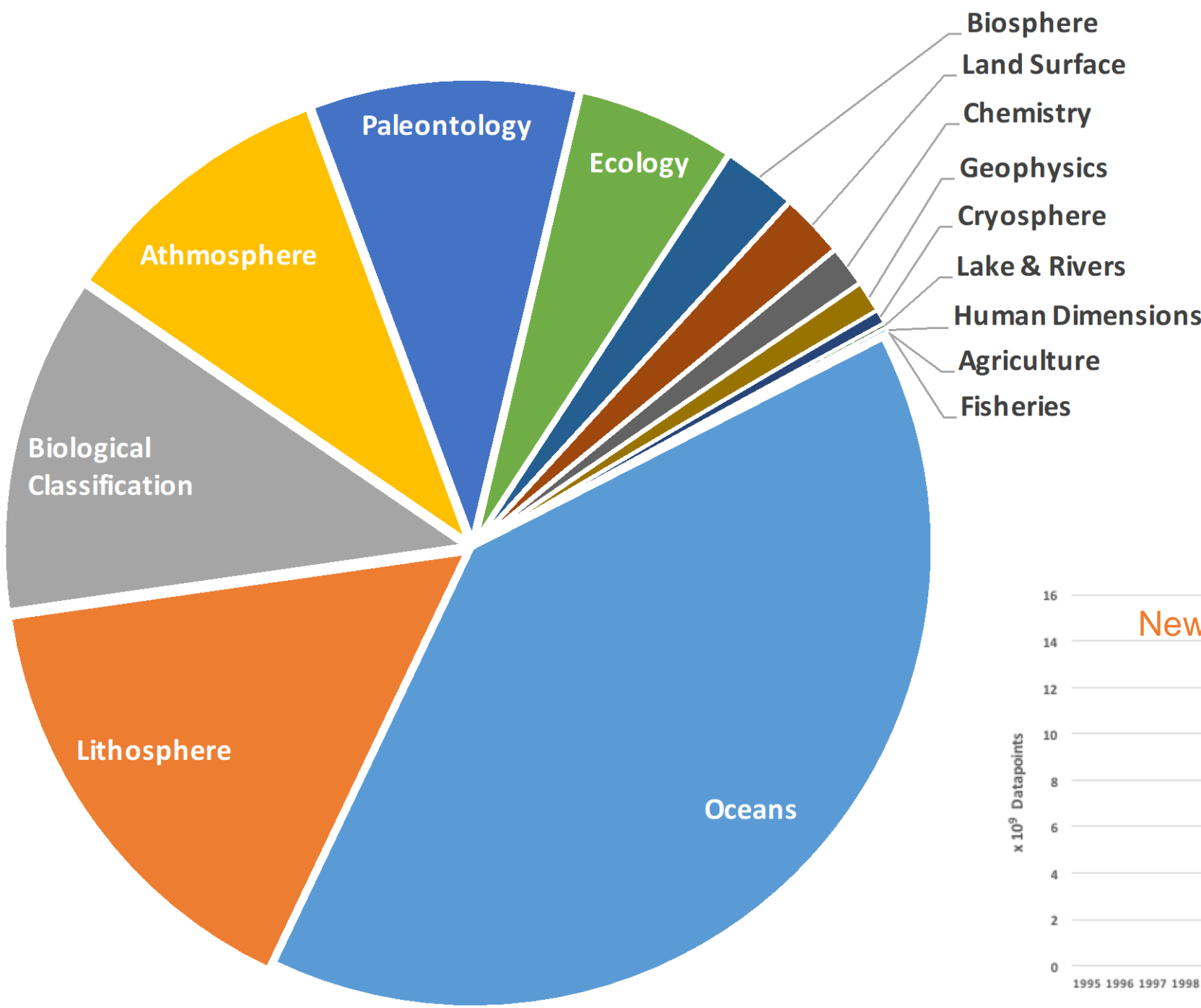
**Nitze, I; Grosse, G; Jones, BM et al. (2018):** Remote sensing quantifies widespread abundance of permafrost region disturbances across the Arctic and Subarctic, Datasets  
► <https://doi.org/10.1594/PANGAEA.894755>

**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...

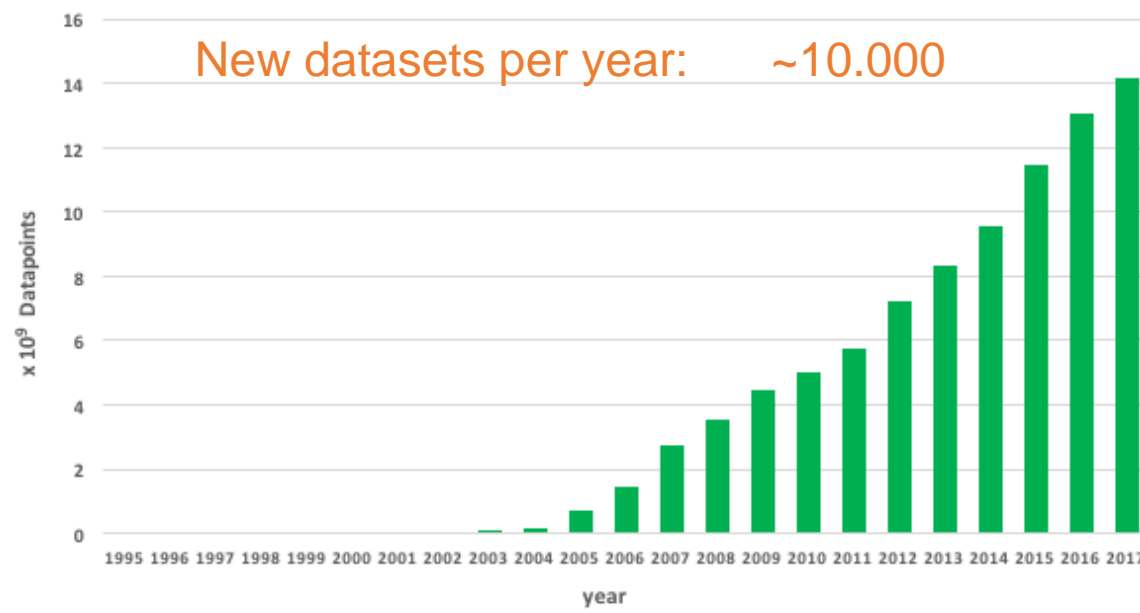




Large range of different environment related data e.g.

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

Data sets: ~ 380.000  
 Data items: ~ 14 · 10<sup>9</sup> (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





**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**

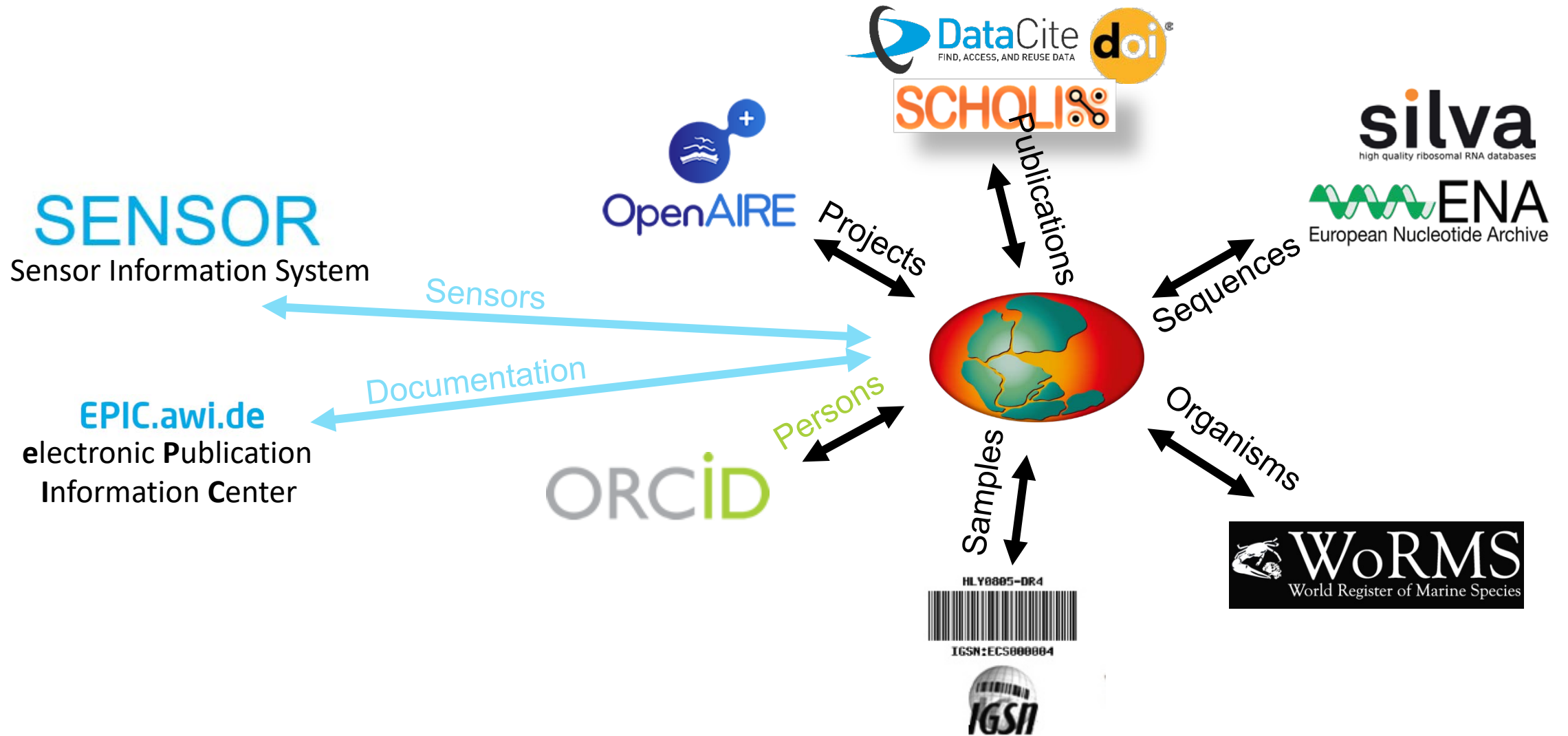
Metadata and data well-described so that they can be replicated and/or combined in different research settings.



## Creative Commons License

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





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](https://doi.org/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](https://doi.org/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 Kongsı 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](https://doi.org/10.1594/pangaea.896852)  
Source: DataCite Preferred source

# Example: ORCID record

**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 Segara Anakan Lagoon, Berau and Kongsı 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, 218, 310-323, https://doi.org/10.1016/j.ecss.2018.12.007**

**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

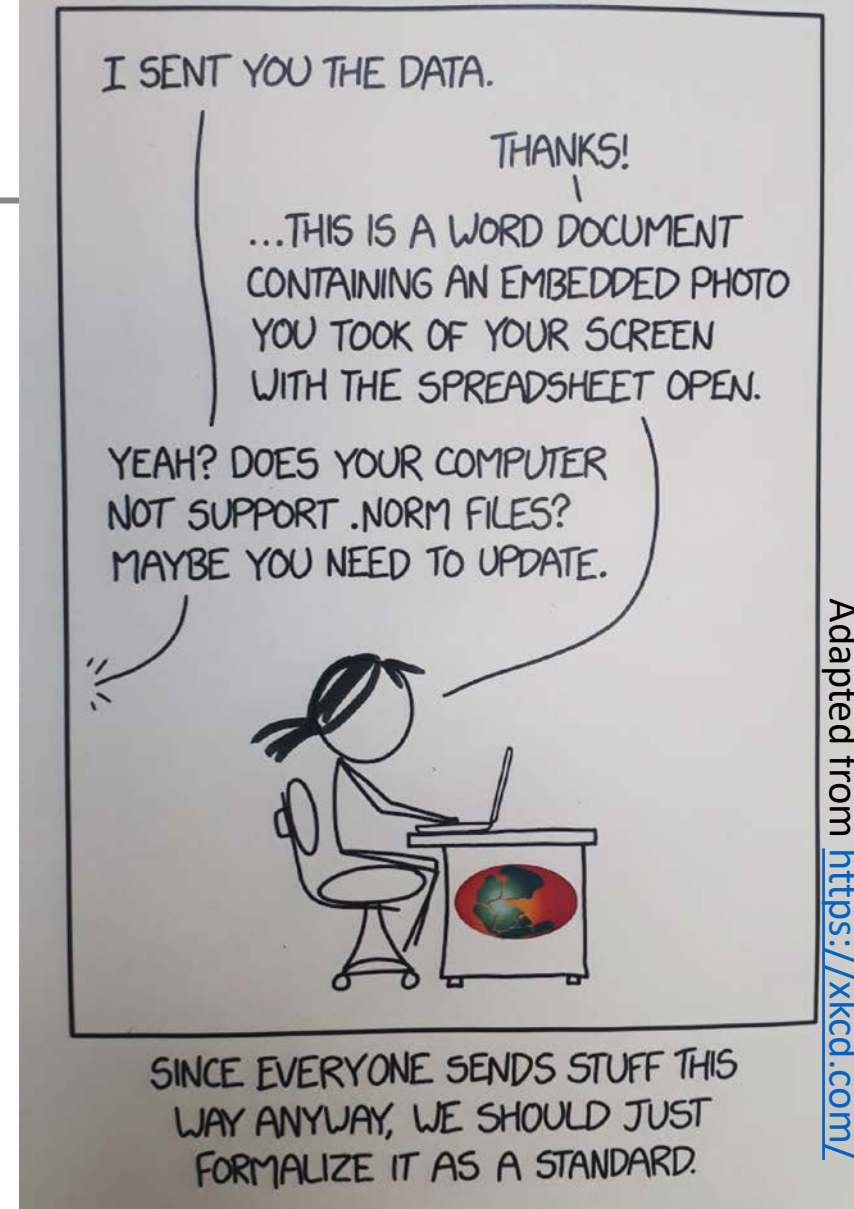
**Abstract:** This compilation contains data from 18 mangrove sediment cores: organic carbon (Corg), total nitrogen (N) and stable carbon isotope composition (δ13Corg). For 3 cores, gamma emitting radionuclides data are additionally available. The cores were sampled in Segara Anakan Lagoon (Central Java), Berau (East Kalimantan) and Kongsı Island (Thousand Islands Marine National Park, Jakarta), in Indonesia. Sediment samples from Segara Anakan Lagoon and Kongsı 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

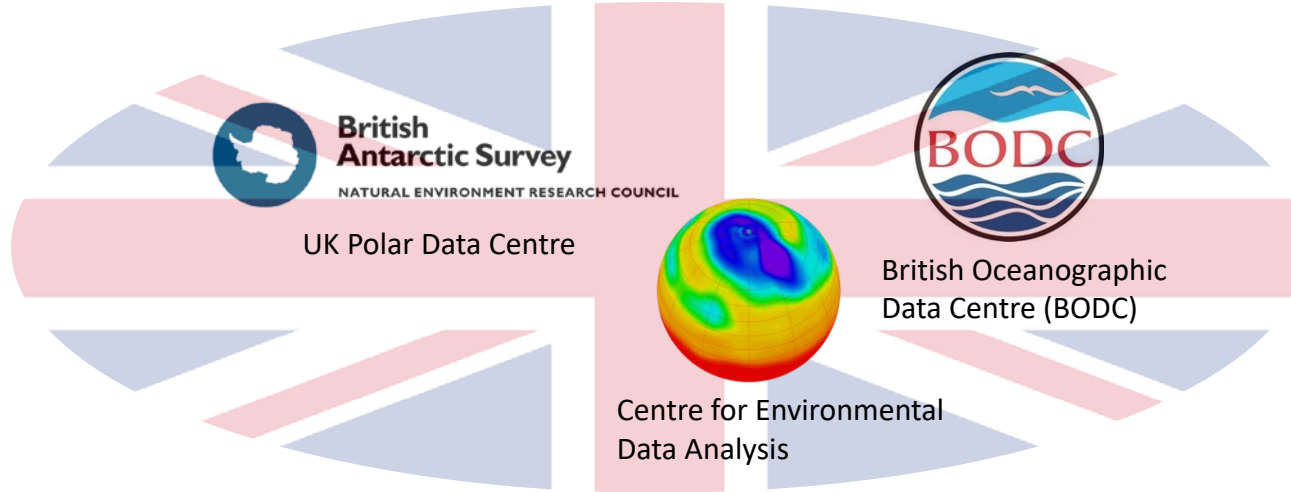




- Bonne, Jean-Louis; Werner, Martin; Meyer, Hanno; Kipfstuhl, Sepp; Rabe, Benjamin; Behrens, Melanie K; Schönicke, Lutz; Steen-Larsen, Hans-Christian; Nikolopoulos, Anna; Heuzé, Céline (2018): Water vapour isotopes analyser raw data from POLARSTERN cruise PS106, links to files. Alfred Wegener Institute, 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)

- 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)

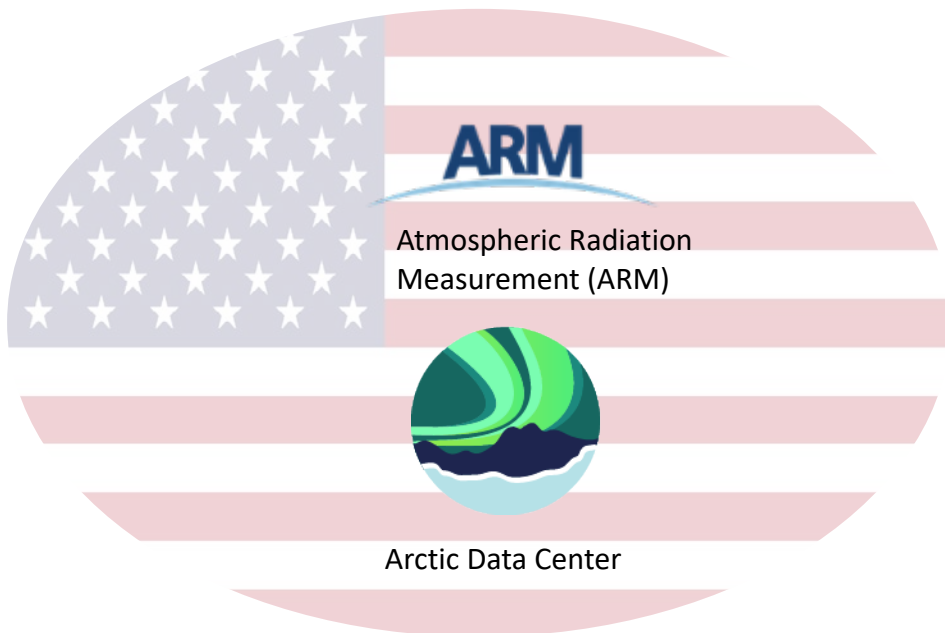
# Data centers for MOSAIC



**British Antarctic Survey**  
NATURAL ENVIRONMENT RESEARCH COUNCIL  
UK Polar Data Centre

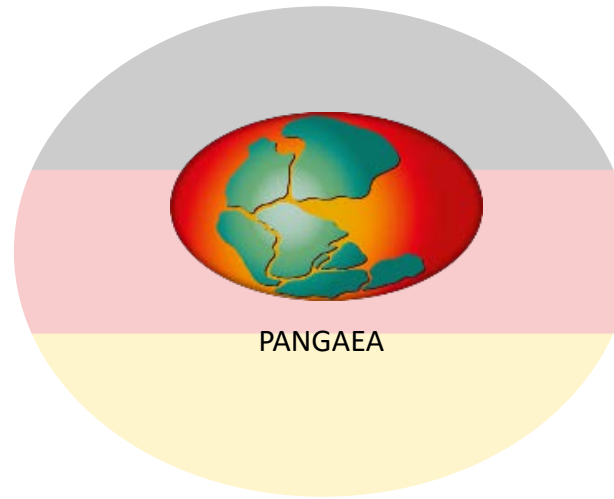
**BODC**  
British Oceanographic  
Data Centre (BODC)

Centre for Environmental  
Data Analysis



**ARM**  
Atmospheric Radiation  
Measurement (ARM)

Arctic Data Center



PANGAEA



中国南北极数据中心  
NADC  
Chinese National Arctic and Antarctic Data Center



## PANGAEA's curator team for MOSAIC



Stefi Schumacher



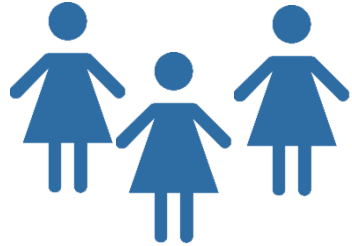
Amelie Driemel



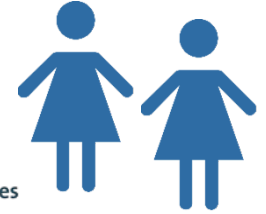
Dana Ransby

# PANGAEA's curator team

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



**marum**  
Center for Marine  
Environmental Sciences



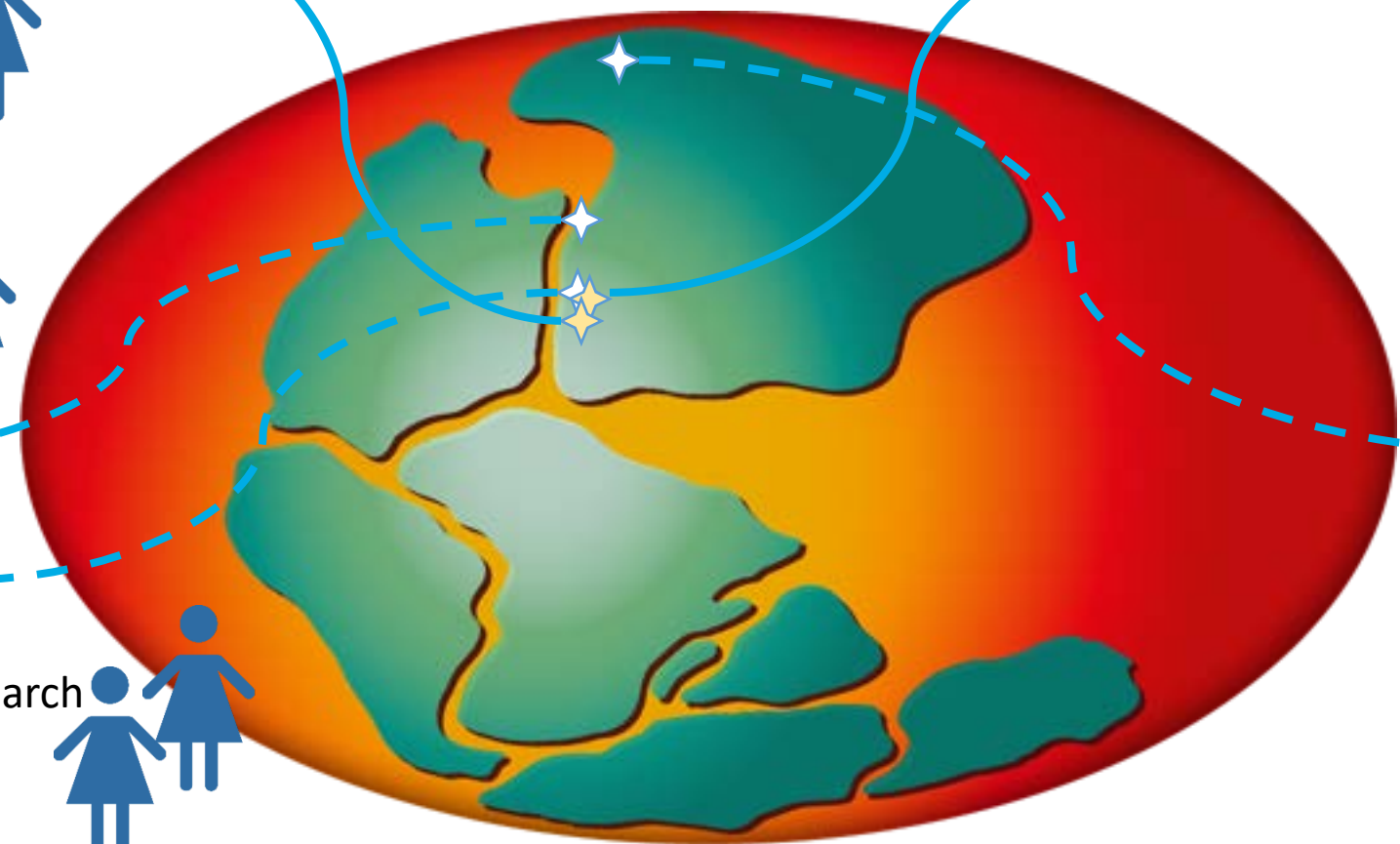
Bjerknes Climate  
Data Centre, NO



GEOMAR Helmholtz  
Centrefor Ocean Research  
Kiel, DE



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







Archive






# PANGAEA's team



# Stellenangebote

Ansprechpartner  [Personalabteilung](#)  
 Stellenangebote als [RSS](#) abonnieren

Hinweis: Sollten die Stellen bei Ihnen nicht richtig dargestellt werden, gehen Sie bitte direkt zum [Bewerberportal](#)

Sie haben sich bereits bei uns beworben? Hier geht es zum [Login](#)

Beschäftigungsart: **Volzeit** und Arbeitsort: **Bremerhaven** | [Suche zurücksetzen](#)  
 1 bis 8 von 8

SUCHE

Volltextsuche:

Position:

Bitte wählen

Beschäftigungsart:

Volzeit

Arbeitsort:

Bremerhaven

 Suchen

Erweiterte Suche

AKTIONEN

> [Stellen-Abonnement einrichten](#)

- Koordinator (m/w/d) Career Center**  
| Stellennummer: 41/G/Dir-b | Art: Volzeit | Position: Direktorium/ Stabsstelle | Unternehmensbereich: Wissenschaftliche Ausbildung | Bremerhaven
- Technischer Informatiker (m/w/d) mit den Schwerpunkten Sensorik und Datenmanagement**  
| Stellennummer: 40/D/RZ-b | Art: Volzeit | Position: Rechenzentrum | Unternehmensbereich: Rechenzentrum und Datenbanken | Bremerhaven
- Wissenschaftlicher Mitarbeiter als Daten-Kurator für PANGAEA (m/w/d)**  
| Stellennummer: 39/D/RZ-b | Art: Volzeit | Position: Rechenzentrum | Unternehmensbereich: Rechenzentrum und Datenbanken | Bremerhaven
- UI/UX Entwickler/Designer (m/w/d)**  
| Stellennummer: 38/D/RZ-b | Art: Volzeit | Position: Rechenzentrum | Unternehmensbereich: Rechenzentrum und Datenbanken | Bremerhaven
- CAFM Koordinator (m/w/d)**  
| Stellennummer: 42/G/HT-u | Art: Volzeit | Position: Verwaltung | Unternehmensbereich: Technik und Umweltschutz | Bremerhaven
- Wissenschaftlicher Programmierer (m/w/d) für ESM-TOOLS**  
| Stellennummer: 33/D/KI-b | Art: Volzeit | Position: Wissenschaft | Unternehmensbereich: Klimadynamik | Bremerhaven
- Doktorand Data Scientist in Marine Science (m/w/d)**  
| Stellennummer: 26/2/MarDATA | Art: Volzeit | Position: Rechenzentrum | Unternehmensbereich: Rechenzentrum und Datenbanken | Bremerhaven
- 2 Master Projekte (Marine Biologie / Mikrobiologie / Geochemie)**  
| Stellennummer: 25/2/MT | Art: Volzeit | Position: Bachelor-/Masterarbeit | Unternehmensbereich: Marine Geochemie | Bremerhaven

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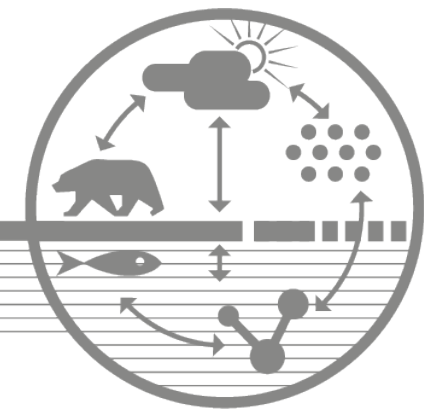
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[Antonia.Immerz@awi.de](mailto:Antonia.Immerz@awi.de)

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