

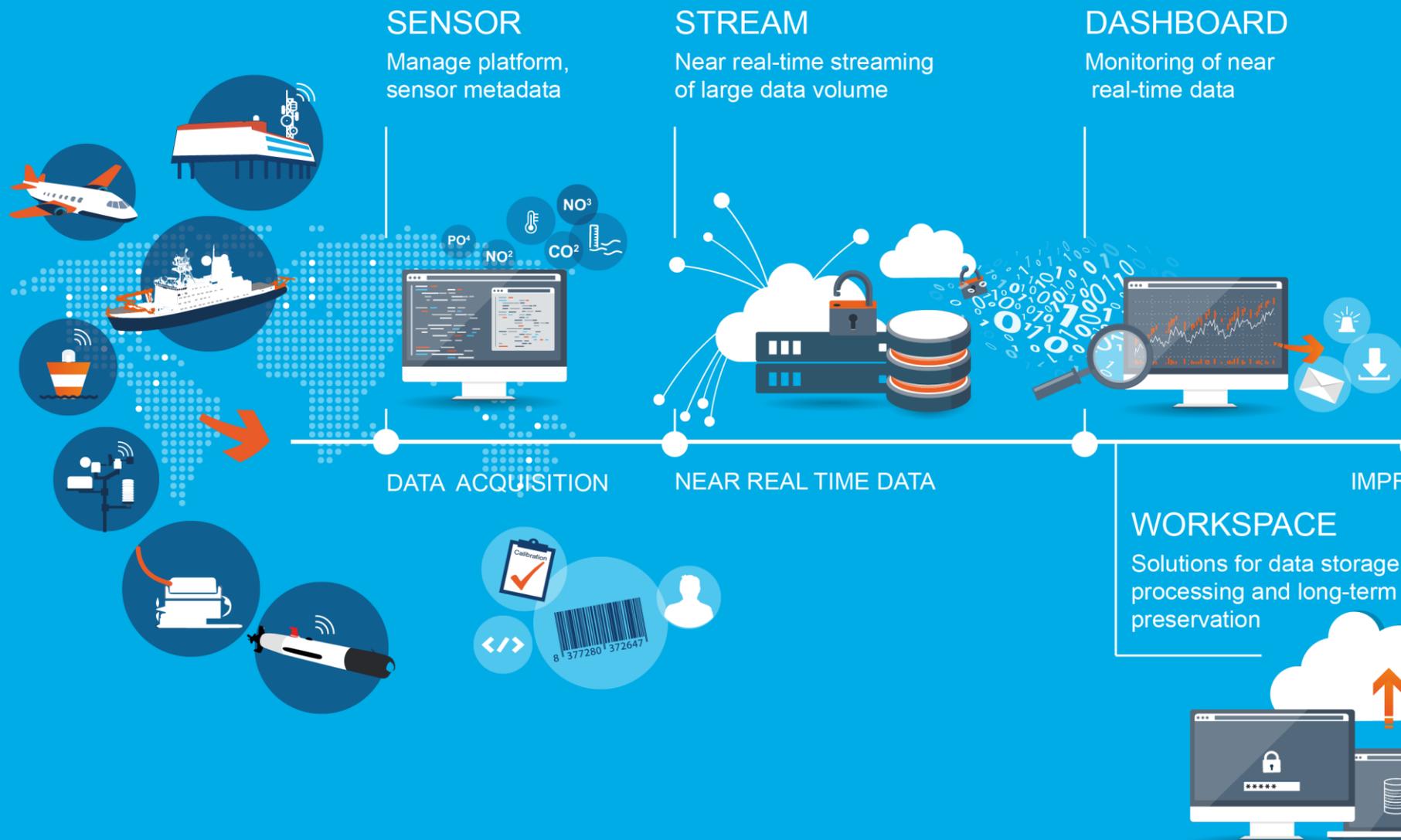
# O2A – Observations to Archive

## Data Flow Framework



Roland Koppe

# Data Flow Framework



# Data Flow Framework



## DASHBOARD

Monitoring of near real-time data

## ANALYSIS

Data viewing and analysis solutions;  
Map-based visualization services

## PORTAL

One-stop-shop framework  
Interoperability services



## WORKSPACE

Solutions for data storage,  
processing and long-term  
preservation

IMPROVE DATA → ★★★★★

STORAGE  
ARCHIVE



## REPOSITORIES

Data and data products  
Publications, presentations,  
field reports



# Objectives



- **Generic** infrastructure for data flows
- **Sustainability** and up-to-date services
- **Interoperability** and standards
  - e.g. Open Geospatial Consortium
- **Seamless integration** with our infrastructure
  - Web GIS
  - Web Portals
  - Data Archive

# Challenges

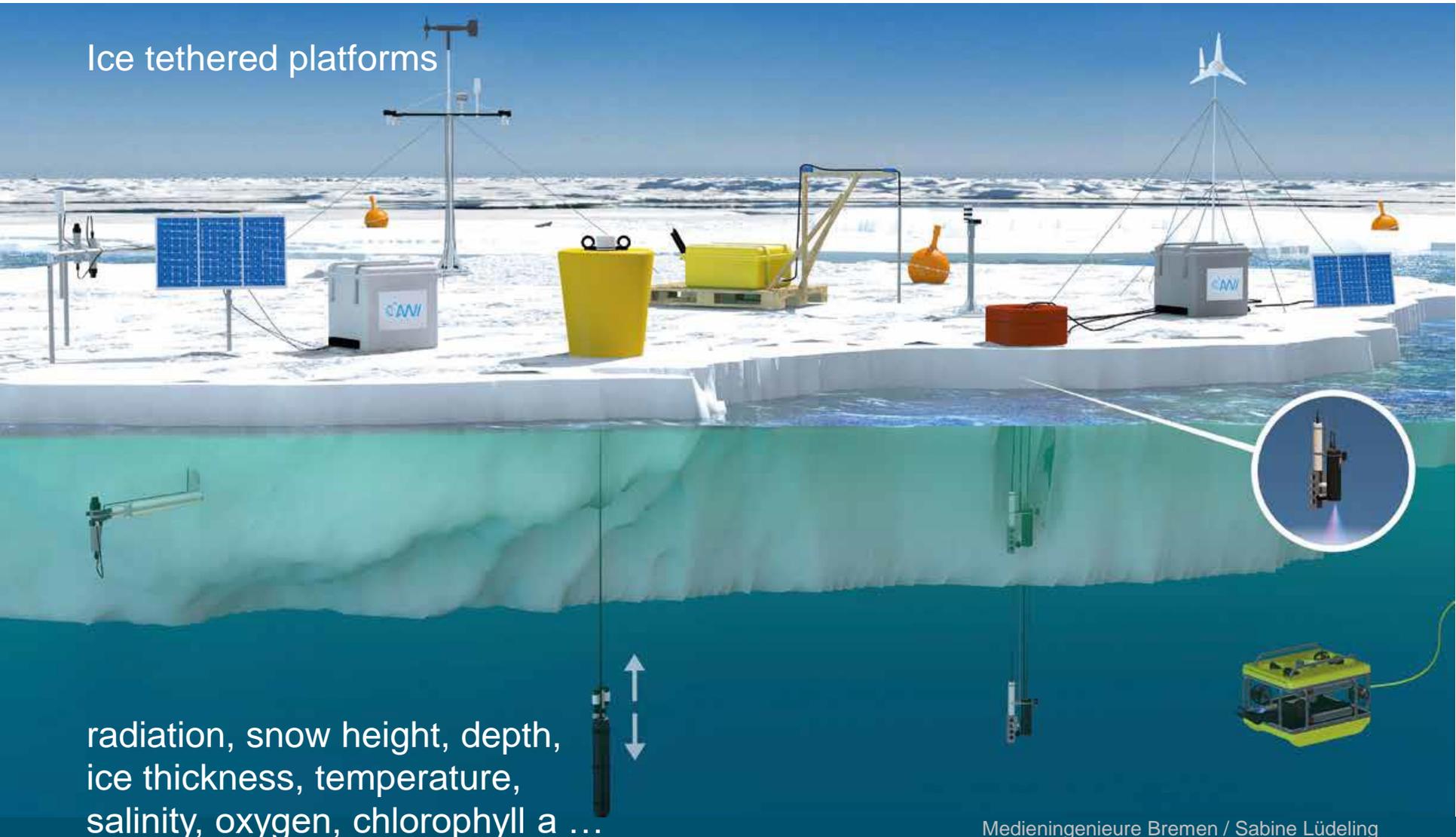


- Heterogeneity of scientific needs and workflows
- Number of different instruments, data sources and formats
- Integration with existing solutions, e.g. for the data flow, but also administrative information
- Effort and limited knowledge on standards

# Use Case: FRAM



Ice tethered platforms



radiation, snow height, depth,  
ice thickness, temperature,  
salinity, oxygen, chlorophyll a ...

# Use Case: FRAM



## Platform networks



# Use Case: FRAM

Water column

fluorescence, nutrients, salinity,  
temperature, conductivity, depth,  
acoustic doppler current profiler,  
water and phytoplankton samples, ...



# Use Case: FRAM



Deeper water column

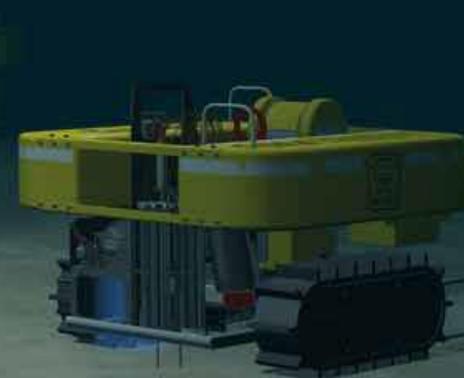
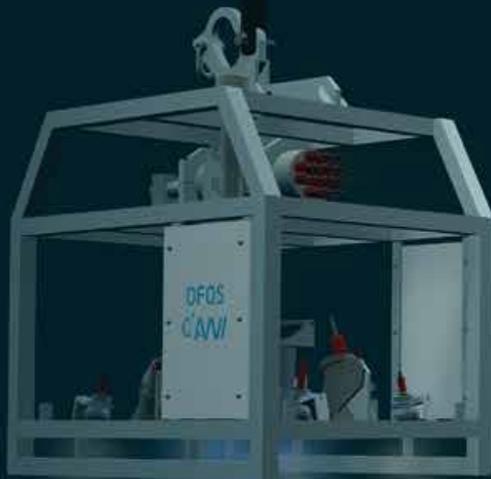
hydroacoustic, sediment samples,  
current meter, conductivity, temperature,  
depth, photo, video, acoustic zooplankton  
recorder, ...



# Use Case: FRAM



Ocean floor



photo, video,  
benthic flux, physico-chemical,  
...

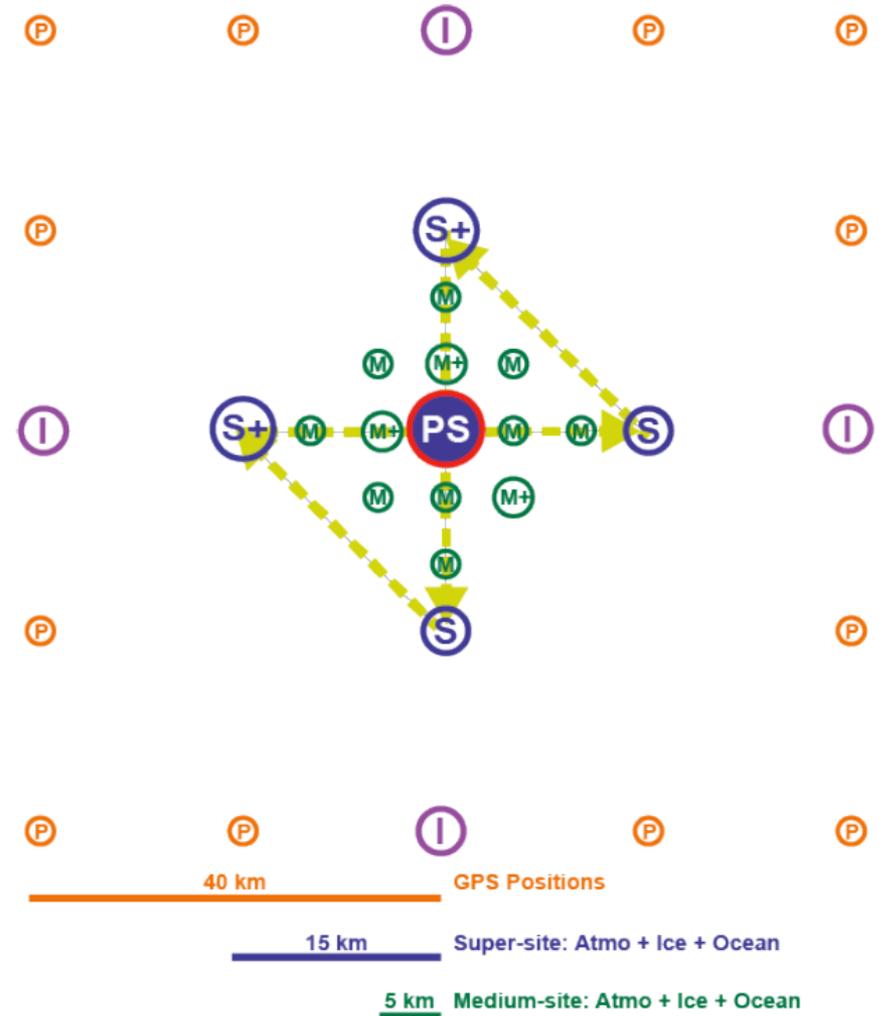
# Use Case: MOSAiC



# Use Case: MOSAiC

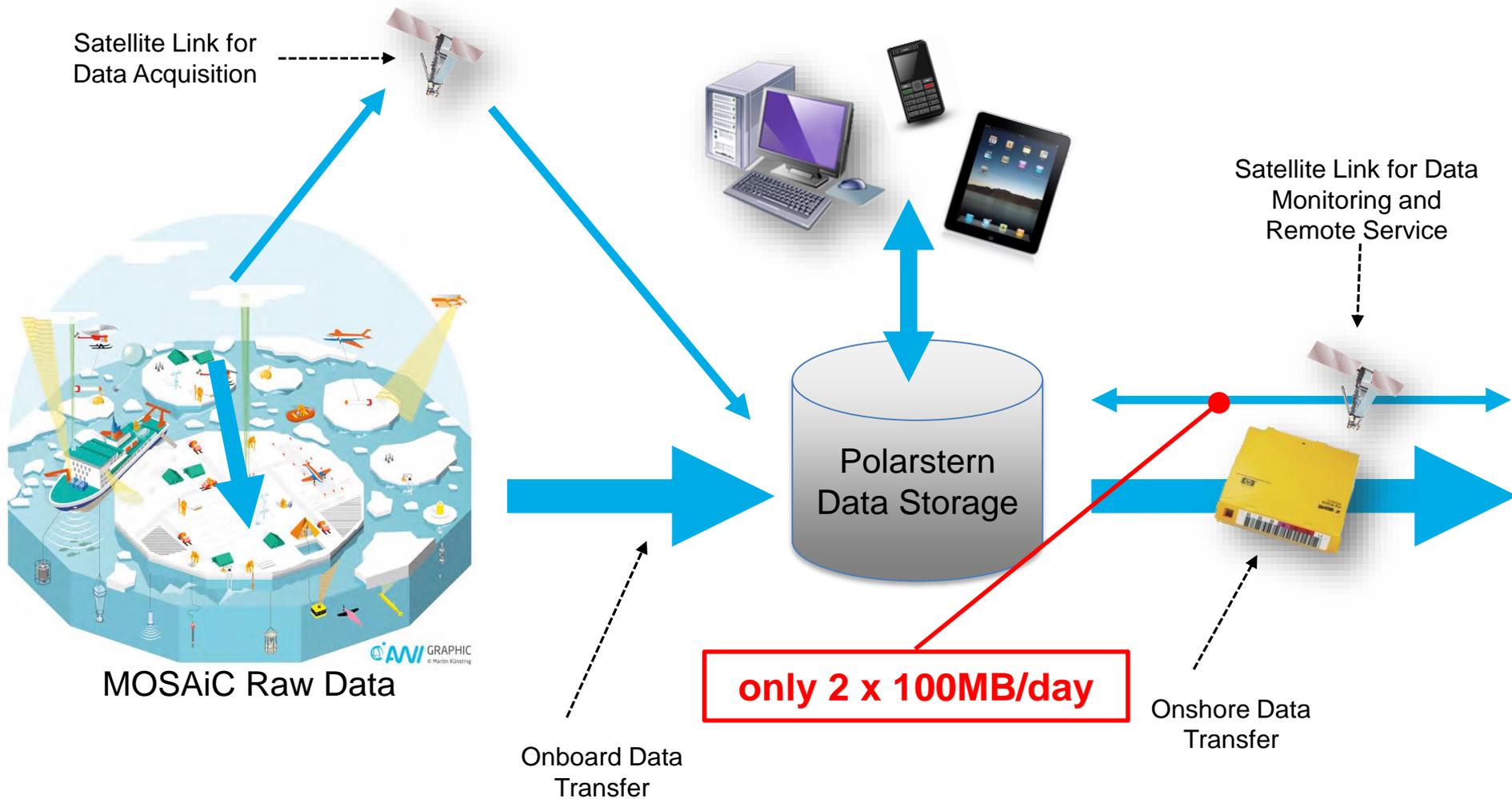


- Different sites in a distributed network around Polarstern



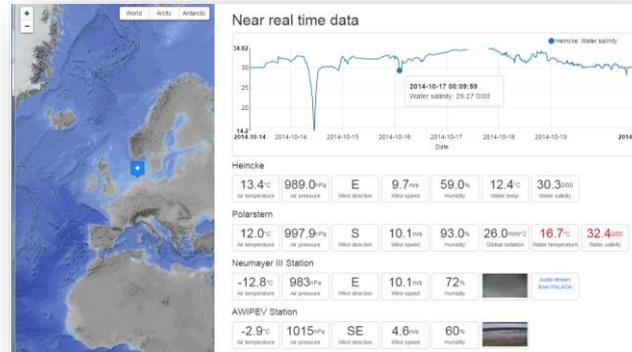
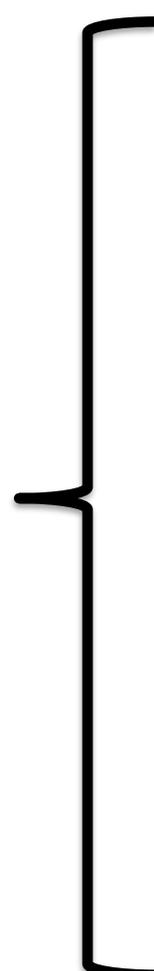
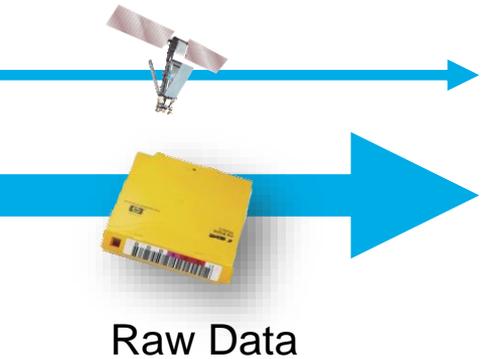
Chlorophyll a, nitrate, oxygen, ice thickness, snow depth, pressure, temperature, radiation, velocity, acoustic, bio sampling, photo, video, ...

# Use Case: MOSAiC



AWI GRAPHIC  
© Martin Kästing

# Use Case: MOSAiC



Snow Buoy 2015S16

Snow buoys measure relative changes in snow height around the instrument by means of 4 ultrasonic range finders. Calibrated against the initial snow depths during deployment, these relative changes translate into absolute values. In addition, standard meteorological parameters are recorded, and the data along with the GPS position is sent via Iridium in hourly intervals.

- Resources
  - SB Datasheet
- Devices
  - Explore devices available on Snow Buoy 2015S16

PUBLICATIONS	REPORTS
Find platform related publications	Find platform related reports
DATA	EXPEDITION
Find platform related datasets and data products	Find platform related expeditions, flights, dives

# Solutions



**sensor.awi.de**  
**dashboard.awi.de**  
**maps.awi.de**  
**pangaea.de**  
**data.awi.de**

# Sensor Description



AWI [Browse](#) [Search](#) [Device Store](#) [My Devices](#) User: rlang.koppe@awi.de

Platforms -> Vessel -> Polarstern

+ Add Item

Show  entries

Info	Device (Short Name)	Tools
	Acoustic Doppler Current Profiler (ADCP)	
	Anschütz Gyrocompass (Gyrocompass)	
	Automated Filtration for Marine Microbes (AUTOFIM_10001.125)	
	Cloud Camera (Cloud Camera)	
	Conductivity-Temperature-Depth Probe with carousel water sampler (CTD)	
	Conductivity-Temperature-Depth Probe (Underway CTD)	
	DESY Myon Detector (Myon Detector)	
	Differential Optical Absorption Spectroscopy (DOAS)	
	Electromagnetic Log (EM-Log)	
	Ferrybox (FB_PS)	
	Fishing Echo Sounder (Simrad EK 60 / EK 80)	
	GAPS (GAPS)	
	GPS Wave Buoy (GPS Waverider)	
	Ice radar (sigma S6 ice radar)	
	Magnetometer System (Magnetometer)	

- Platform and device descriptions for provenance information and reduced data integration effort
- Versioning and citability
- Interoperability and standards
- ~1200 descriptions available and counting

# Dashboard



Dashboards ▾

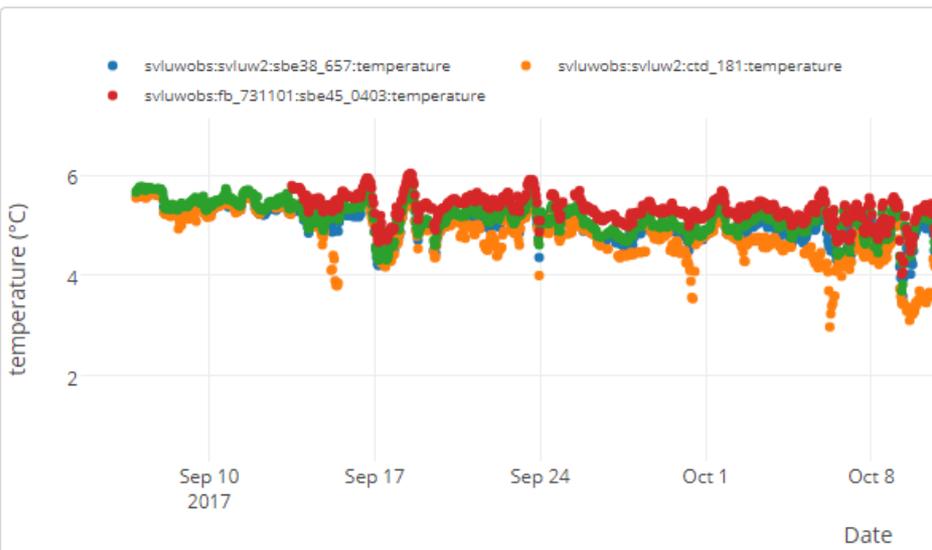
AWIPEV-COSYNA Underwater Observatory in NyÅlesund/Svalbard

Login



## Water temperatures - NyÅlesund/Svalbard - 78°09'N, 9°11'E

Focus on specific dates or values by horizontal or vertical click for focus reset.



Value: sbe38\_657:temperarture

The variable "#sbe38\_657:temperarture" is measured by a temperature probe (SBE38, Company SeaBird) located in 11m water depth (+/- tide) at the base of the underwater observatory.

Value: ctd\_181:temperarture & ctd\_181:pressure (lower graph)

The variable "#ctd\_181:temperarture" is measured by a combined conductivity - temperature - density probe (CTD90, Company Sea&Sun) which is profiling between 11m (+/- tide) and the surface. The probe is located close to the base of the underwater observatory. The depth where the sensor was positioned at a certain time is displayed in the lower graph as variable "#ctd\_181:pressure".

- User-customizable, flexible dashboards for data monitoring

- Automatic data streaming of near-real time and delayed-mode data

- Based on sensor descriptions and configurations

Value: adcp\_23789:temperarture

The variable "#adcp\_23789:temperarture" is measured by an acoustic current doppler profiler probe (ADCP WH1200, Company Teledyne) located in 13m water depth (+/- tide) close to the underwater observatory.

Value: fb\_731101:sbe45\_0403:temperarture

The variable "#fb\_731101:sbe45\_0403:temperarture" is measured by a land based FerryBox system (Sensor SBE45, ADM) getting its water from a pumping station in a depth of 11m (+/- tide) close to the base of the underwater observatory.

2017-11

Related sites

- Project descrip
- Cooperation p
- AWIPEV resear

Related data

- Current and ti
- pCO<sub>2</sub>, TA and
- Hydrograpical
- PAR data (in p

4.

# Dashboard



Dashboards ▾

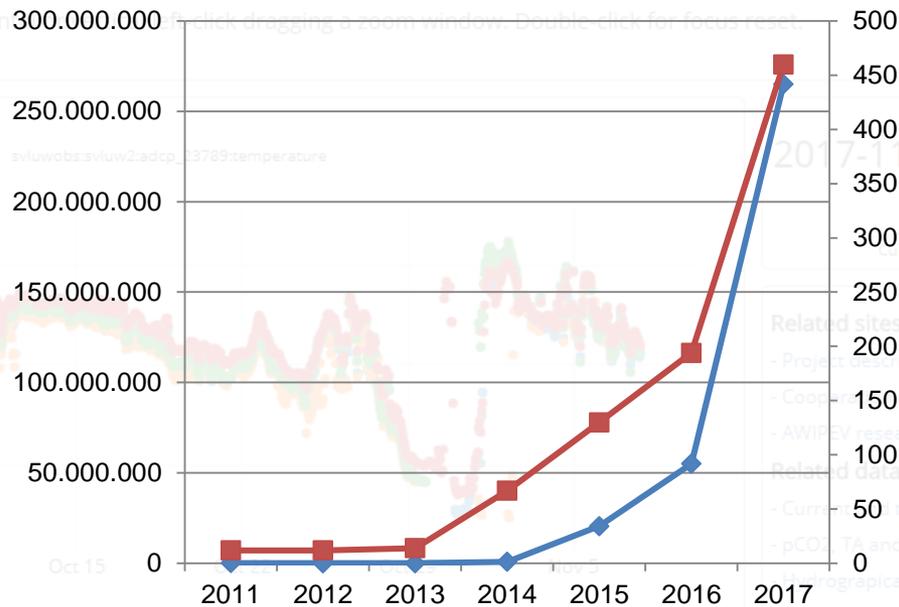
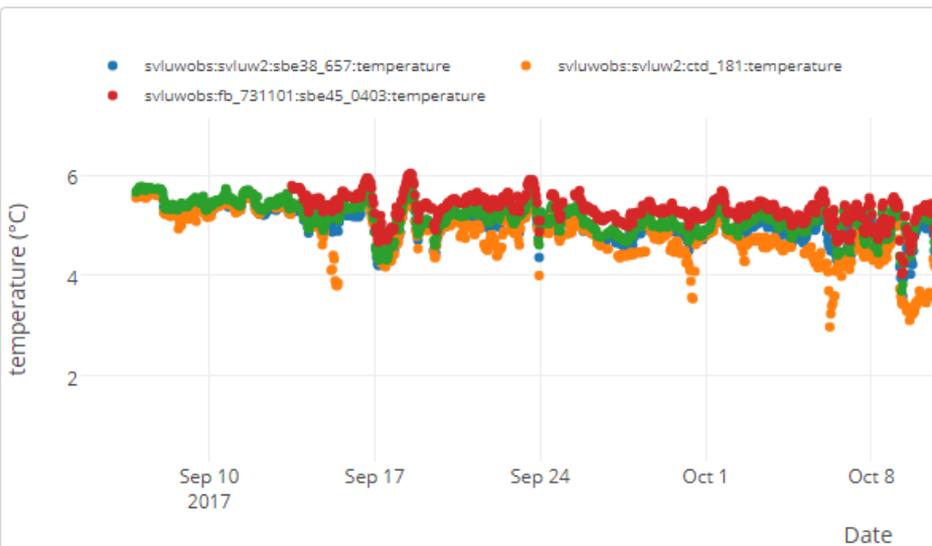
AWIPEV-COSYNA Underwater Observatory in NyÅlesund/Svalbard - Temperature

Login



## Water temperatures - NyÅlesund/Svalbard 78°54'N, 15°11' E

Focus on specific dates or values by horizontal zooming. Click dragging a zoom window. Double click for focus reset.



### Value: sbe38\_657:temperature

The variable "#sbe38\_657:temperature" is measured by a temperature probe (SBE38, Company SeaBird) located in 11m water depth (+/- tide) at the base of the underwater observatory.

### Value: ctd\_181:temperature & ctd\_181:pressure (lower graph)

The variable "#ctd\_181:temperature" is measured by a combined conductivity - temperature - density probe (CTD90, Company Sea&Sun) which is profiling between 11m (+/- tide) and the surface. The probe is located close to the base of the underwater observatory. The depth where the sensor was positioned at a certain time is displayed in the lower graph as variable "#ctd\_181:pressure".

### Value: adcp\_23789:temperature

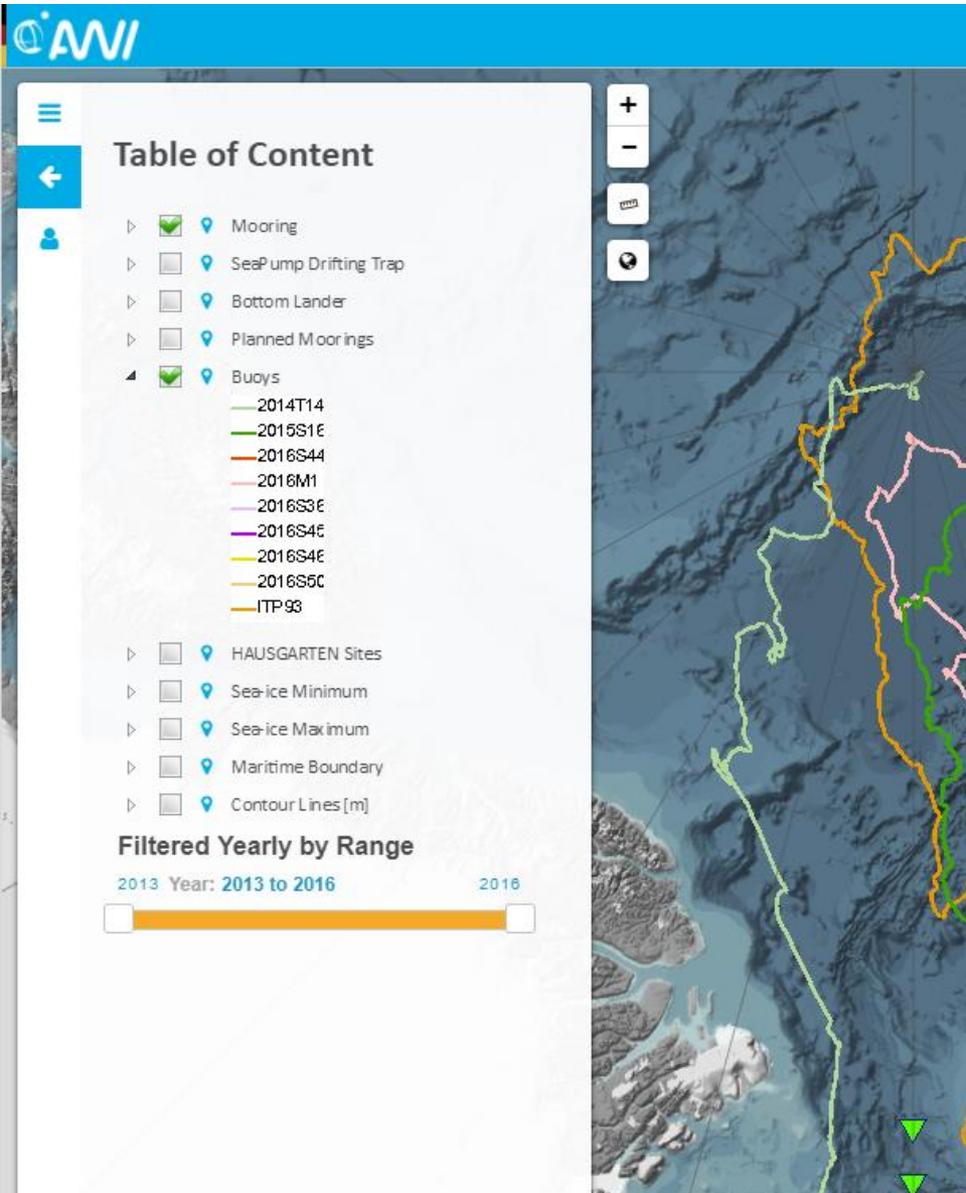
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4.

# Maps



- Map visualization and composition of data products
- Maintaining world base maps in different projections
- Providing standard products, e.g. chlorophyll a and sea ice

# Data Publication



PANGAEA.

Data Publisher for Earth & Environmental Sciences

- Data archiving and publication including curation and harmonization

Linking with articles, platforms and expeditions

Semi-automatic data flows when using O2A

Citation:

**Kaleschke, Lars; Nicolaus, Marcel; Maas, Nina** (2017): Snow height on sea ice and sea ice drift from autonomous measurements from buoy 2015S27, deployed during the Norwegian Young sea ICE cruise N-ICE 2015. Alfred Wegener Institute, Helmholtz Center for Polar and Marine Research, Bremerhaven, PANGAEA, doi <https://doi.org/10.1594/PANGAEA.875638>

*In:* **Nicolaus, Marcel; Hoppmann, Mari; Hendricks, Stefan; Katlein, Christian; Nicolaus, Anja; Rossmann, Leonard; Schwegmann, Sandra; Langevin, Danielle; Annekathrin** (2017): Snow height and air temperature from autonomous measurements from buoy 2015S27, deployed during the Norwegian Young sea ICE cruise N-ICE 2015. Alfred Wegener Institute, Helmholtz Center for Polar and Marine Research, Bremerhaven, PANGAEA, doi <https://doi.org/10.1594/PANGAEA.875638>

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

[RIS Citation](#) [BibTeX Citation](#) [Text Citation](#) [Facebook](#) [Twitter](#) [Google+](#) [Show Map](#) [Google Earth](#)

Abstract:

Snow height was measured by the Snow Depth Buoy 2015S27, an autonomous platform, drifting on Arctic sea ice, deployed during the Norwegian Young sea ICE cruise (N-ICE 2015) project. The resulting time series describes the evolution of snow depth as a function of place and time between 23 Apr 2015 and 09 Jun 2015 in sample intervals of 1 hour. The Snow Depth Buoy consists of four independent sonar measurements representing the area (approx. 10 m<sup>2</sup>) around the buoy. In addition to snow depth, geographic position (GPS), barometric pressure, air temperature, and an internal ice temperature were measured. Negative values of snow depth occur if surface ablation continues into the sea ice. Thus, these measurements describe the position of the sea ice surface relative to the original snow-

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Citation:

**Hehemann, Laura; Purser, Autun; Schramm, Fabian; Boetius, Antje (2017):** Sea-bottom video taken along TVMUC deployment

PS101/212-1 during POLARSTERN cruise PS101. PANGAEA, doi <https://doi.org/10.1594/PANGAEA.878014>

*In:* Hehemann, L et al. (2017): Multicore video and still images collected during POLARSTERN cruise PS101. *Alfred Wegener Institute Helmholtz Center for Polar and Marine Research, Bremerhaven, PANGAEA*, doi <https://doi.org/10.1594/PANGAEA.878014>

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Related to:

**Boetius, Antje; Purser, Autun (2017):** The Expedition PS101 of the Research Vessel POLARSTERN to the Arctic Ocean in 2016. *Berichte zur Polar- und Meeresforschung = Reports on Polar and Marine Research*, 706, 230 pp, doi [https://doi.org/10.2312/BzPM\\_0706\\_2017](https://doi.org/10.2312/BzPM_0706_2017)

**Hehemann, Laura; Purser, Autun; Schramm, Fabian; Boetius, Antje (2017):** Seabed photographs taken along TVMUC deployment PS101/212-1 during POLARSTERN cruise PS101. PANGAEA, doi <https://doi.org/10.1594/PANGAEA.878014>

Project(s):

**FRontiers in Arctic marine Monitoring (FRAM)**

Coverage:

Latitude: 86.765170 \* Longitude: 61.770330

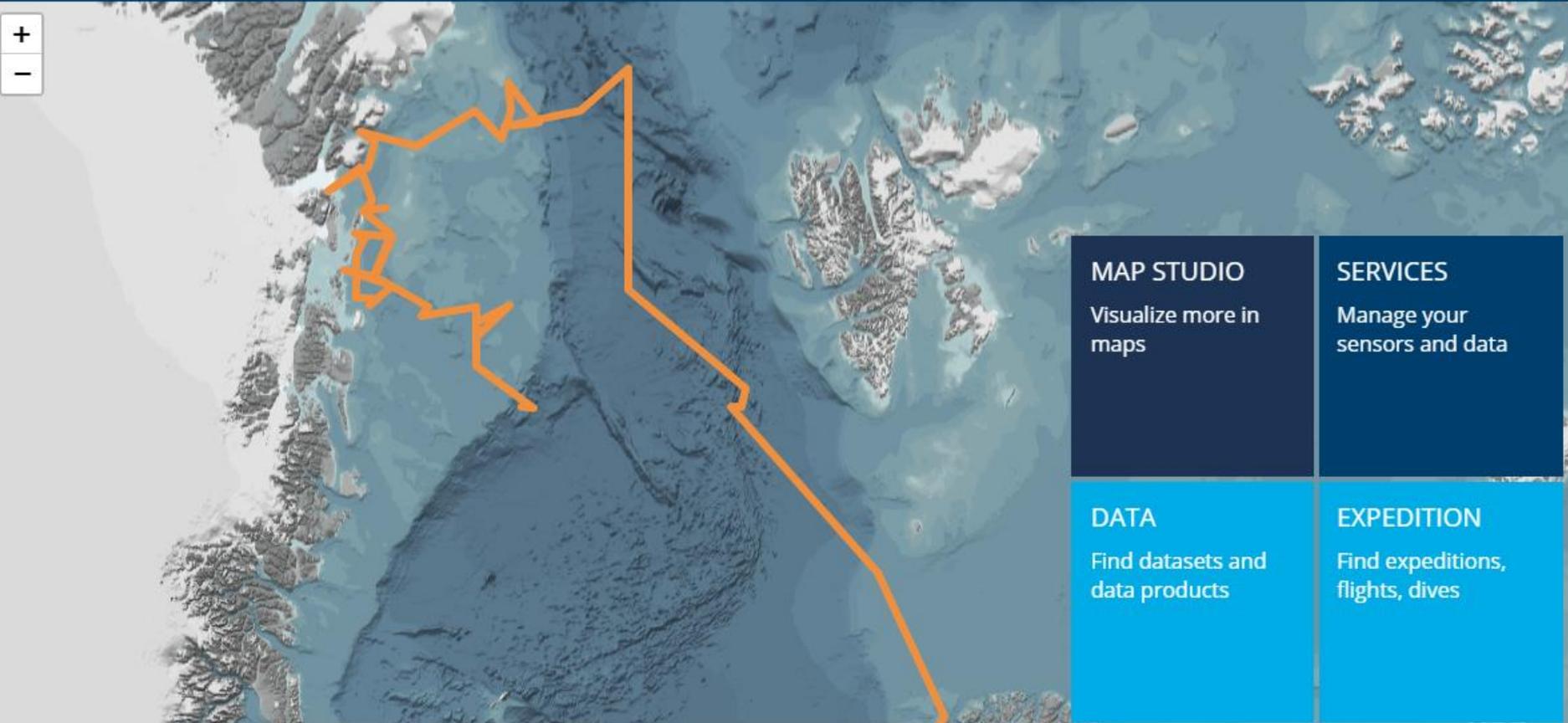
Date/Time Start: 2016-10-07T18:36:00 \* Date/Time End: 2016-10-07T18:36:00

Video

# Portal – data combined



Search for author, expedition, project ...



**MAP STUDIO**  
Visualize more in  
maps

**SERVICES**  
Manage your  
sensors and data

**DATA**  
Find datasets and  
data products

**EXPEDITION**  
Find expeditions,  
flights, dives

## Latest expeditions:

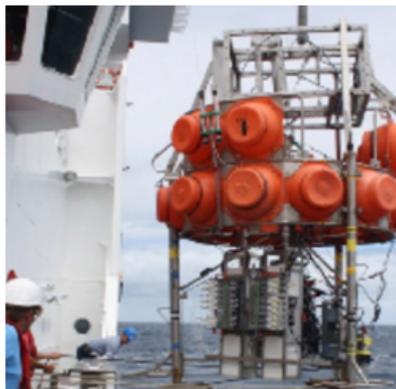
PS109 with Polarstern	2017-09-12 - Tromsø	HE500 with Heincke	2017-10-30 - Bremerhaven
	2017-10-14 - Bremerhaven		2017-11-12 - Bremerhaven

## Latest news:

Swoosh | Peter and I could hear the swoosh of our ocean sensors breaching

## COLLECTIONS

Explore data and products thematically grouped



### FRAM - FRontiers in Arctic Marine Monitoring

Large-scale Ocean Observation Infrastructure designed to support various types of long-term time series observations in the Arctic Ocean



## NEAR REAL TIME DATA

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

### Air temperature

18.10 °C  
Polarstern

14.20 °C  
Heincke

-5.35 °C  
Neumayer III

### Water temperature

9.52 °C  
Polarstern

14.26 °C  
Heincke



Show next / previous

## LATEST PUBLICATIONS

Datasets, publications and reports from AWI repositories

### Publish your data

#### Dataset

Jessen, Gerhard L et al.

Biogeochemical measurements of sediments collected in the Black Sea during the MSM15/1 cruise in 2010 (2017)

#### Article

Fortelius, Carl et al.

New methodologies to observe wind gusts: research aircraft and Doppler lidar measurements (3201)

#### Report

Boebel, Olaf

The Expedition PS103 of the Research Vessel POLARSTERN to the Weddell Sea in 2016/2017 (2017)

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<https://doi.org/10.1594/PANGAEA.855872>

### Article

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[hdl:10013/epic.51616](https://hdl.handle.net/10013/epic.51616)

### Report

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[hdl:10013/epic.51699](https://hdl.handle.net/10013/epic.51699)

1523

EXPEDITIONS

367700

DATASETS

39392

PUBLICATIONS

1691

REPORTS



SENSOR



DASHBOARD

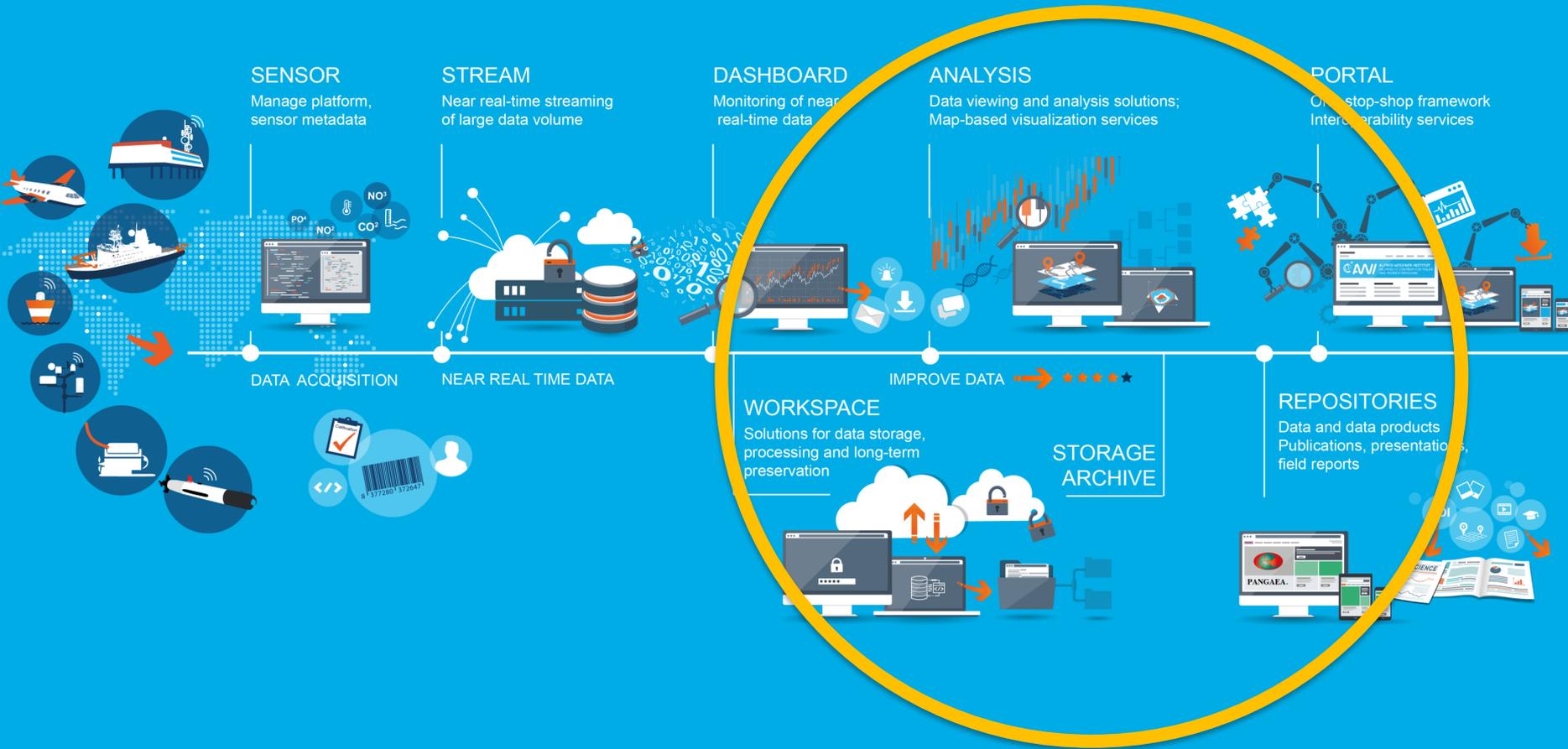


WORKSPACE



MAP

# Data Flow Framework



# Current work



- Developing a science community workspace for data sharing and data analyses within the **Helmholtz Data Federation (HDF)**
- State-of-the-art storage, replicated between Bremerhaven and Potsdam
- User-friendly “one-click” compute solutions with virtual machines and containers
- Hadoop big data analysis based on Hortonworks data flow and data platform
- Raster data management and analysis with rasdaman



# Resources



- Solutions need manpower for data **curation**, **organization** and technology **development** and **maintenance**
- 4.5 funded through FRAM
- 3.0 funded for PANGAEA developments – offers available
- 5.0 funded through HDF – offers available
- plus permanent staff
- Still gaps for ingest, PANGAEA curation, and further developments e.g. of SENSOR

**Thank you very much for your attention!**