

59. ONLINE-SEMINAR

Research Data Management – a biodiverse MOSAiC

Prof. Dr. Frank Oliver Glöckner

Head of PANGAEA

MARUM - Center for Marine

Environmental Sciences

University of Bremen

Computing and Data Center

Alfred Wegener Institute - Helmholtz

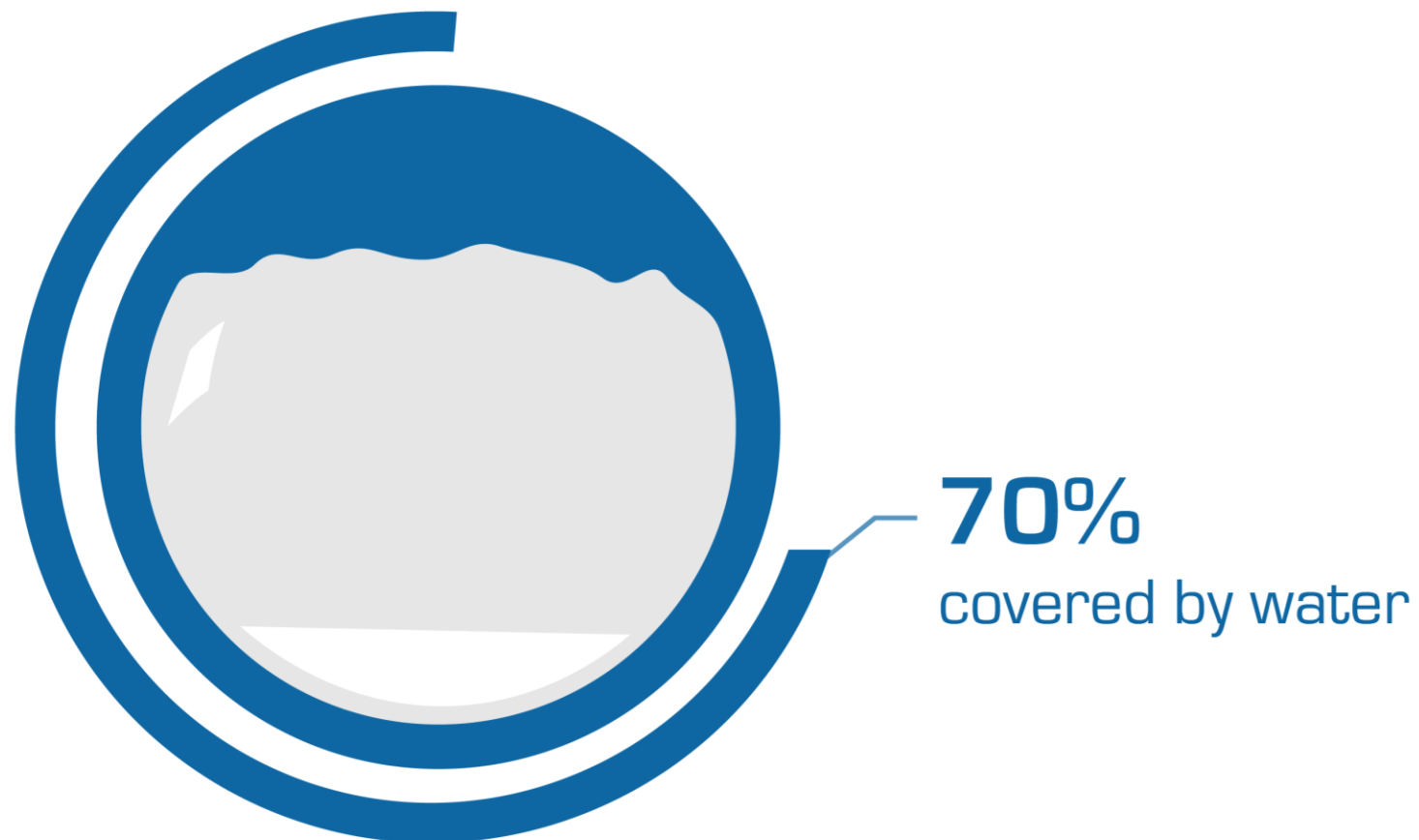
Center for Polar and Marine Research

23. Juni 2021, 15:00 bis 16:00 Uhr
(CEST)

Housekeeping

- Please note that this Online Seminar will **not** be recorded.
- The **slides** and an accompanying **factsheet** will be shared shortly after today's seminar via the event website: <https://os.helmholtz.de/bewusstseins-schaerfen/veranstaltungen/helmholtz-open-science-online-seminare/59-online-seminar/>
- Please **mute** your microphone.
- Please post questions or comments in the **Zoom chat**. We will go through these questions and comments during discussion after the main talk.





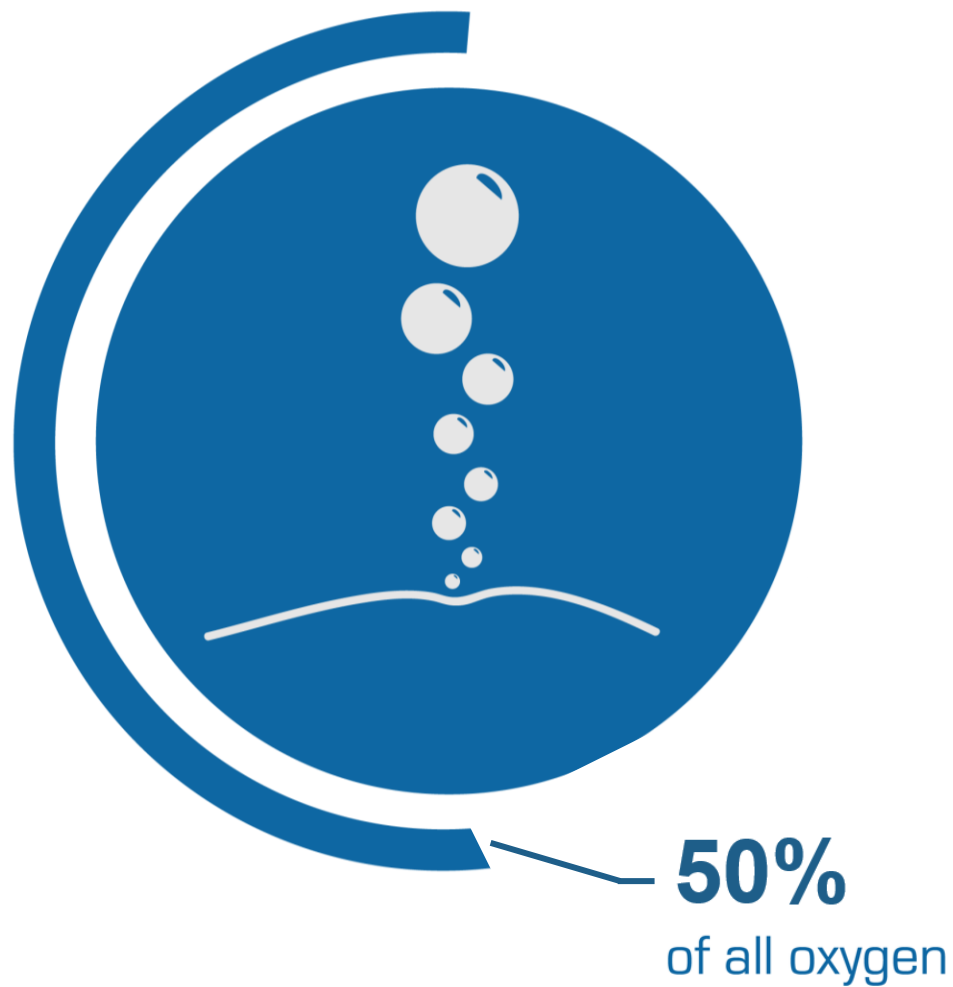


50%

live in coastal areas



80%
of all life on Earth

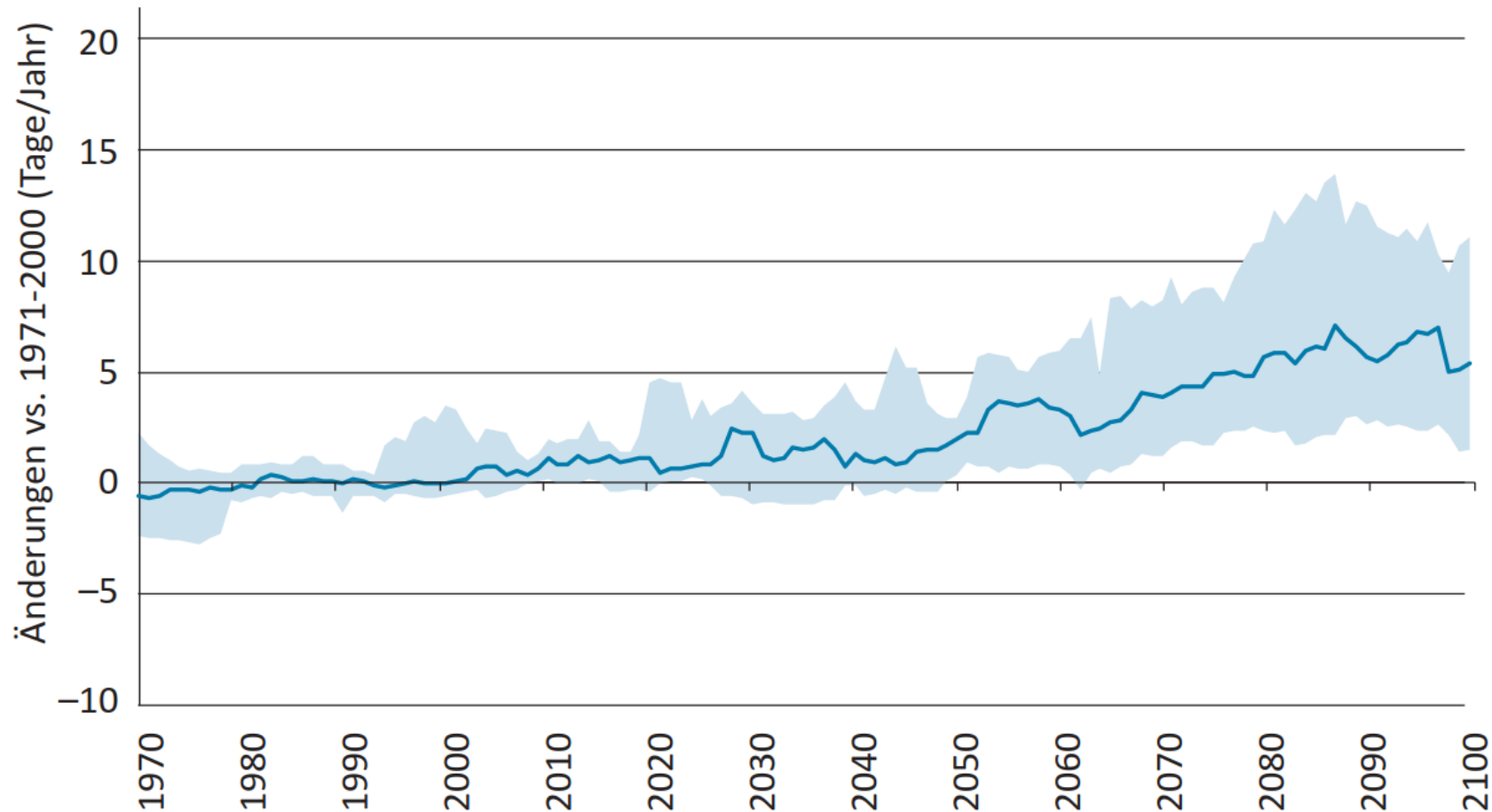




50%
of all man-made CO₂

Climate Change?





https://www.bauumwelt.bremen.de/umwelt/klima_und_energie/klimaanpassung/downloads_zur_klimaanpassung-79173

ABB. 15 Bremerhaven: Anzahl der Hitzetage (Anzahl von Tagen mit Maximaltemperaturen $\geq 30^{\circ}\text{C}$)*



https://www.focus.de/panorama/welt/75-000-haeuser-evakuiert-waldbraende-wueten-in-kalifornien-kuerstenstadt-malibu-bedroht_id_9885263.html



<https://www.augsburger-allgemeine.de/panorama/Unwetter-im-Sueden-der-USA-id54057016.html>

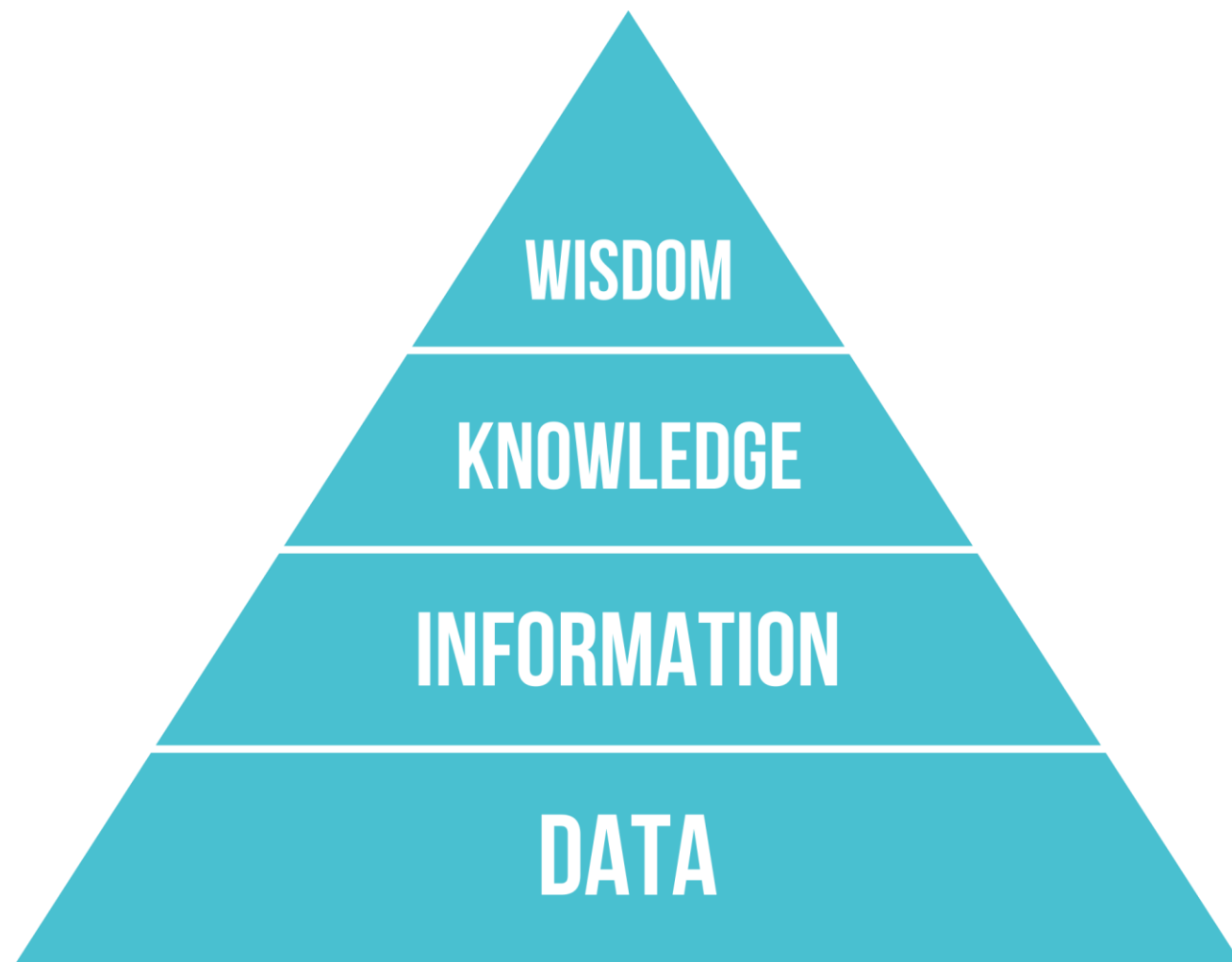


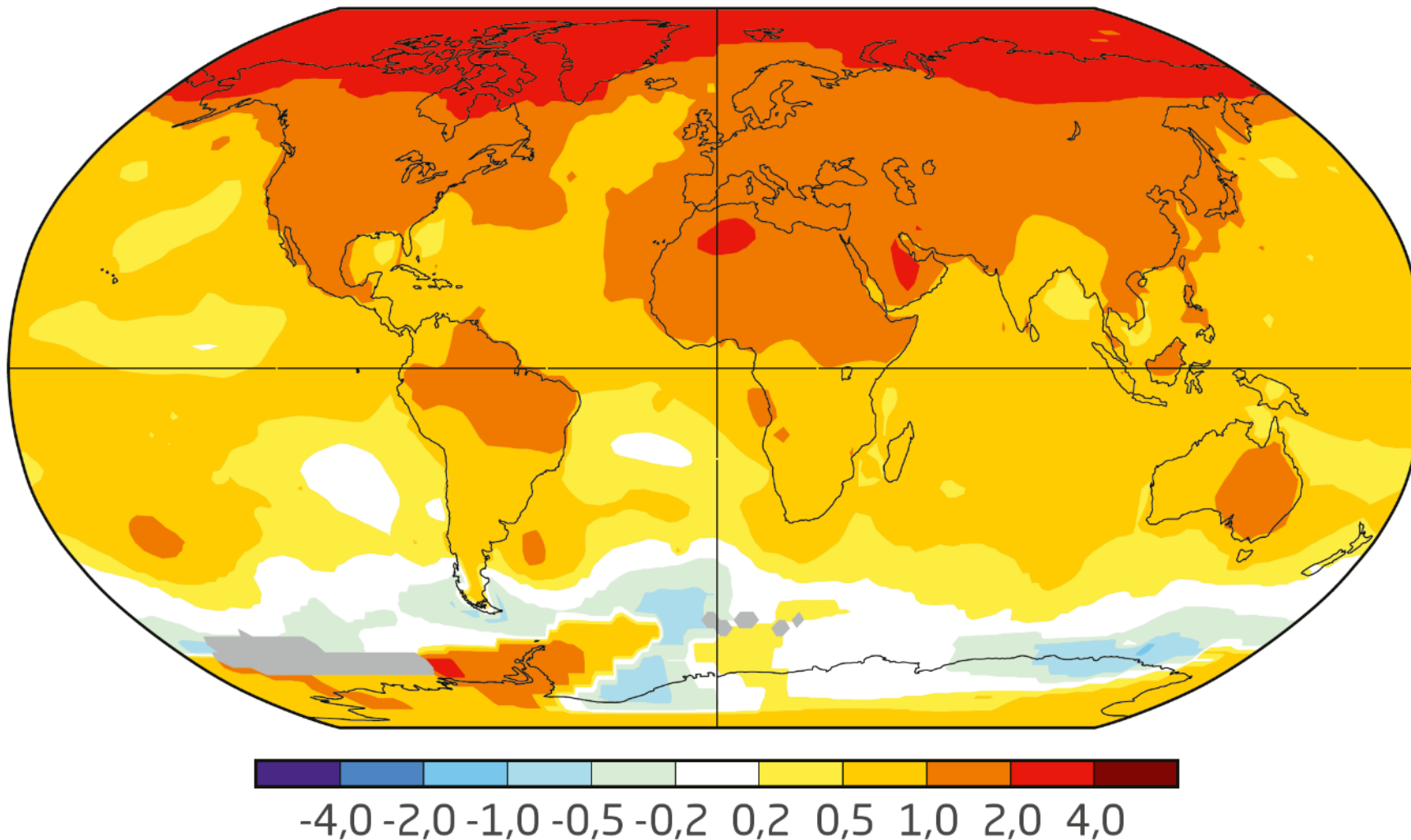
<https://www.wetter.de/cms/blizzard-in-den-usa-schneesturm-legt-die-ostkueste-lahm-es-gibt-mehrere-tote-2658941.html>



<https://www.bmbf.de/de/klimawandel-erhoeht-druck-auf-landwirtschaft-9301.html>

How much do we know?





Observed change of temperature 1970 – 2017 [°C]

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

1992



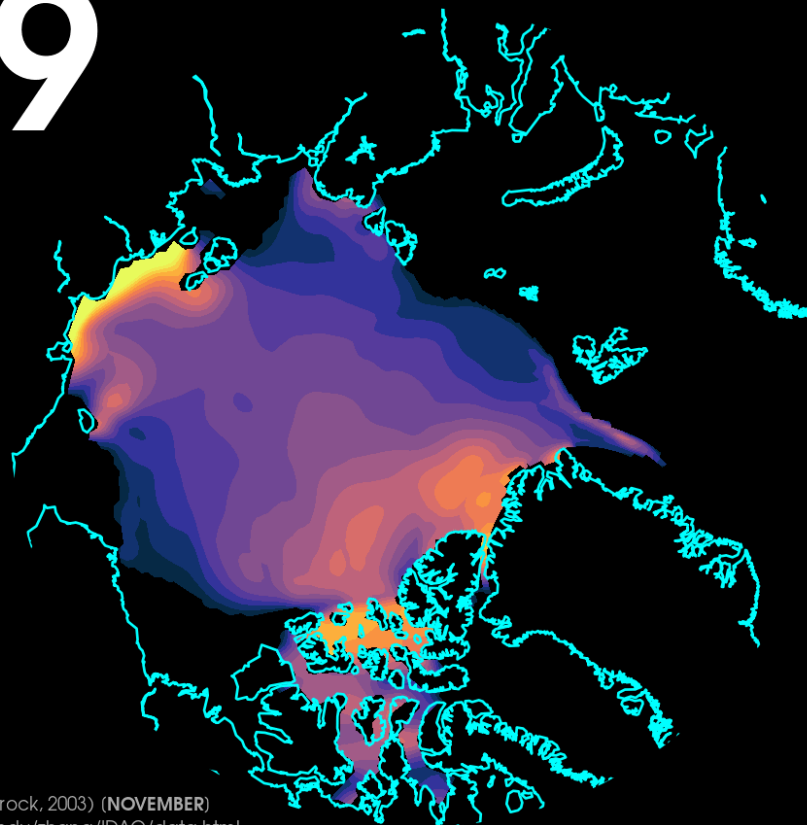
2018



March / April, Kongsfjord, Svalbard

Disappearance of thick sea ice

1979

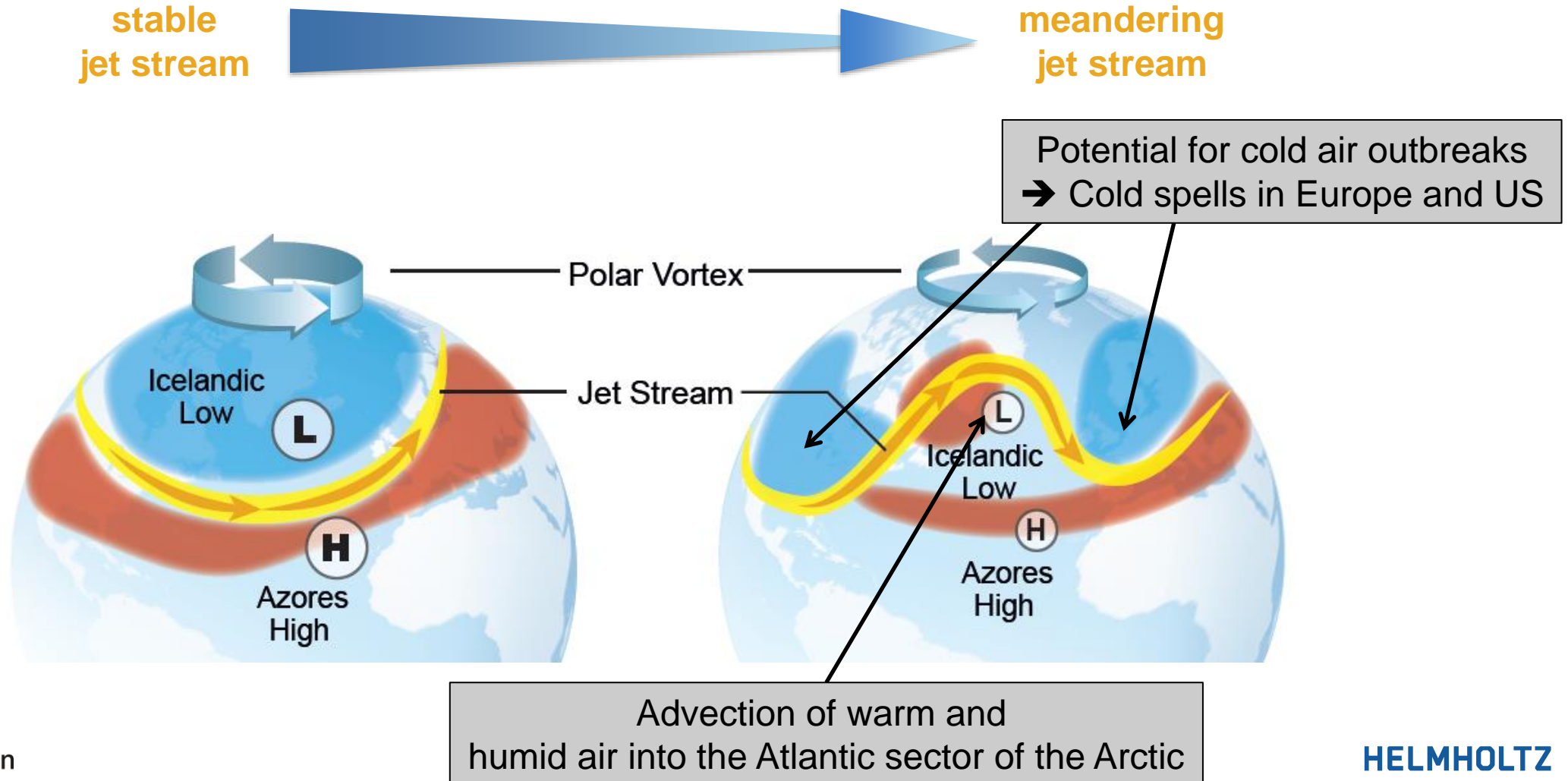


DATA: PIOMAS v2.1 (Zhang and Rothrock, 2003) (NOVEMBER)
SOURCE: <http://psc.apl.washington.edu/zhang/IDAO/data.html>
GRAPHIC: Zachary Labe (@ZLabe)



What happens in the Arctic does not stay in the Arctic

Arctic climate change & decreasing sea ice



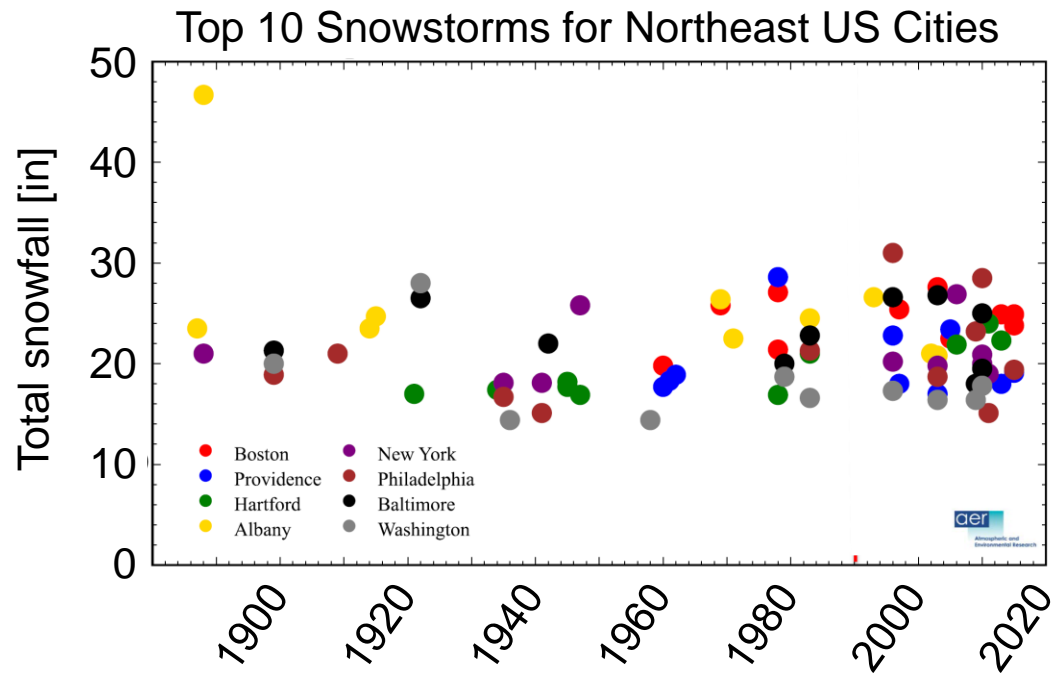
What happens in the Arctic does not stay in the Arctic

Arctic climate change & decreasing sea ice

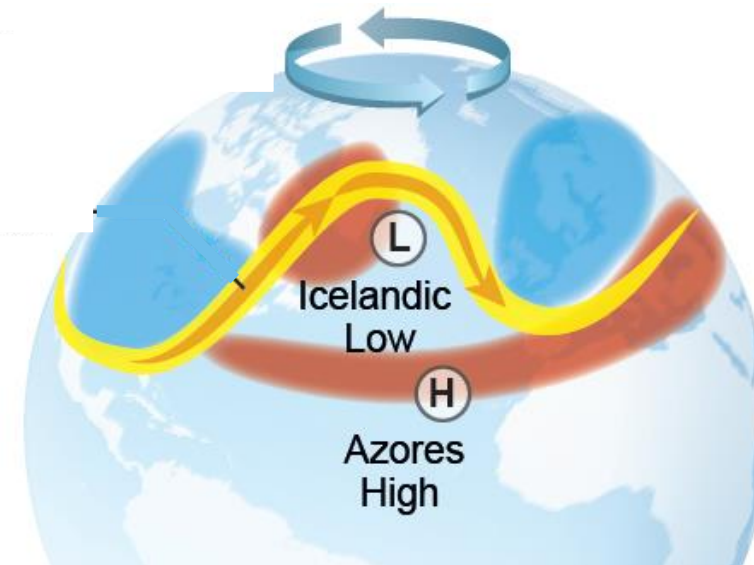
stable
jet stream



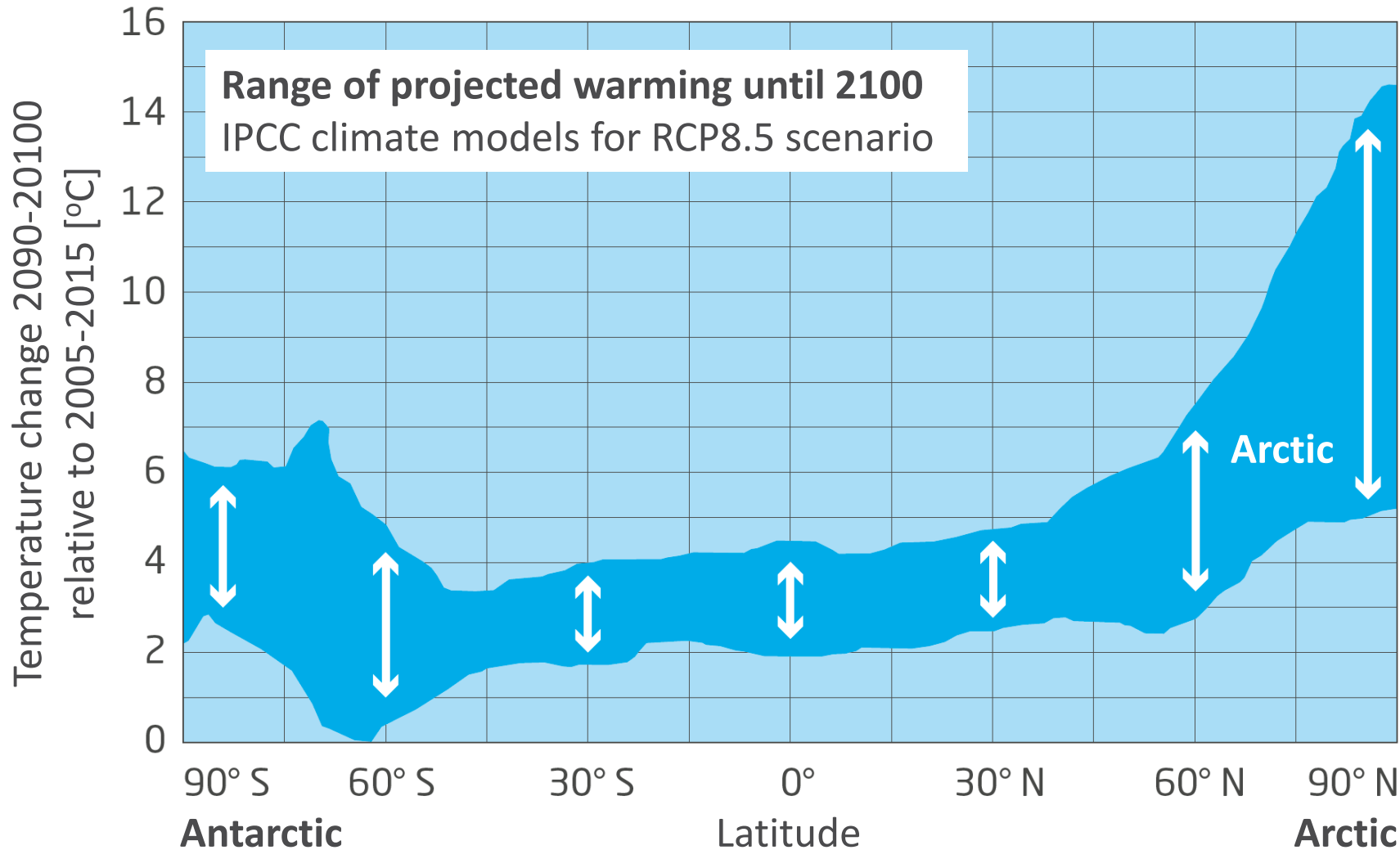
meandering
jet stream



Cohen et al., 2016



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!



The largest Arctic research expedition ever:

-  First year-round operation of research icebreaker near north pole
-  5 icebreakers
-  Polar 5 & 6 research aircraft
+ support helicopters
+ support aircraft
-  20 nations
-  More than 70 institutions
-  A total of ~600 people will operate in the central Arctic
-  > € 140 Mill. budget

The MOSAiC-Expedition

September 2019  October 2020

Central observatory:
RV Polarstern



Network of camps on the ice



Operations of research
aircraft and helicopters

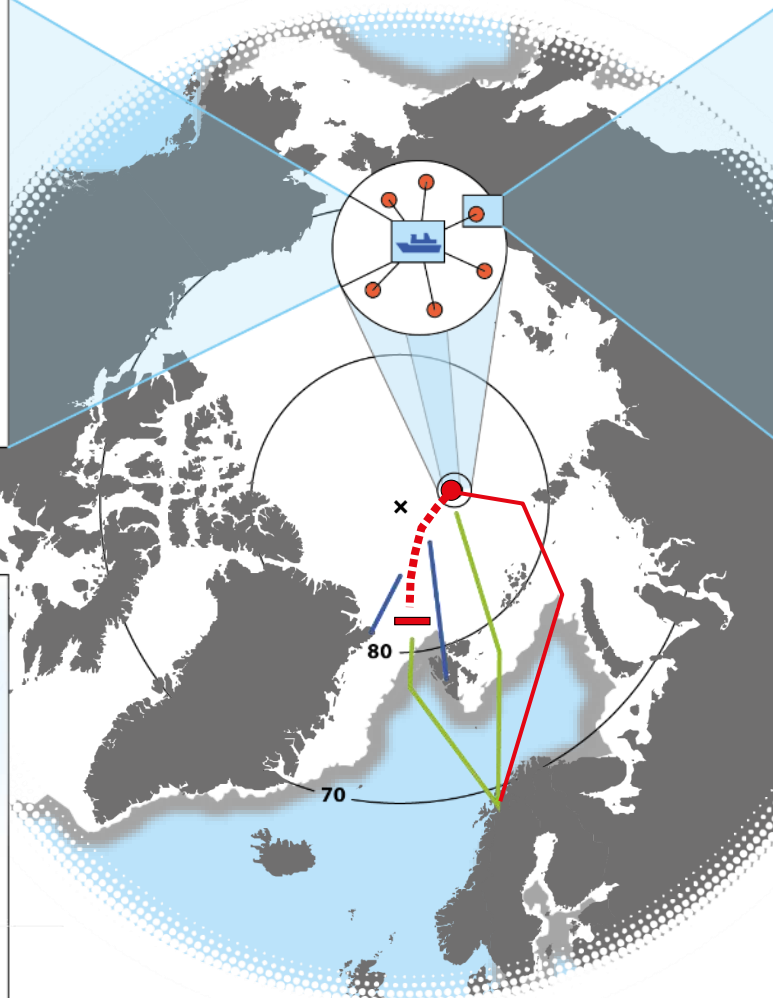


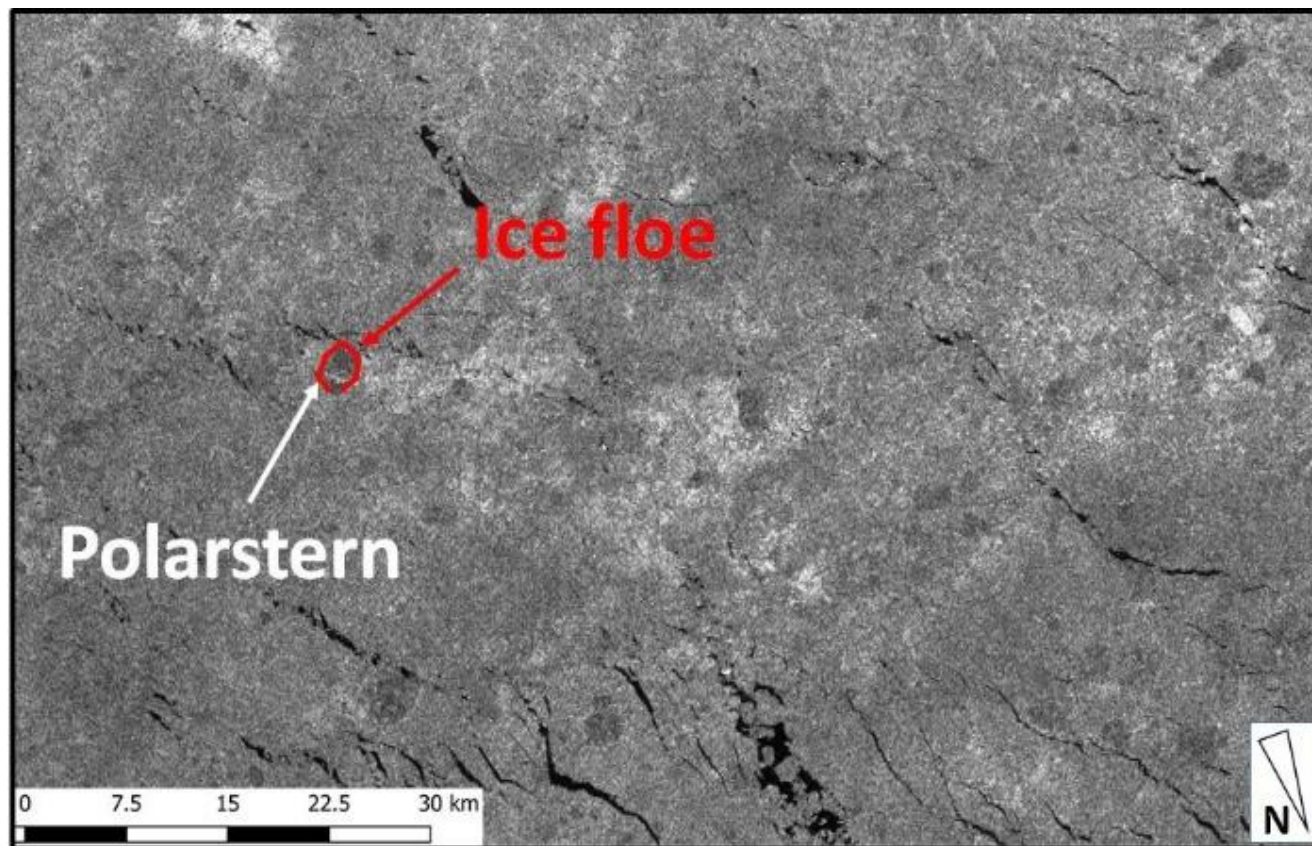
► Extended vertical and geo-
graphical coverage

Visits by four icebreakers from
MOSAiC partners



► Broader geographic coverage
and supply





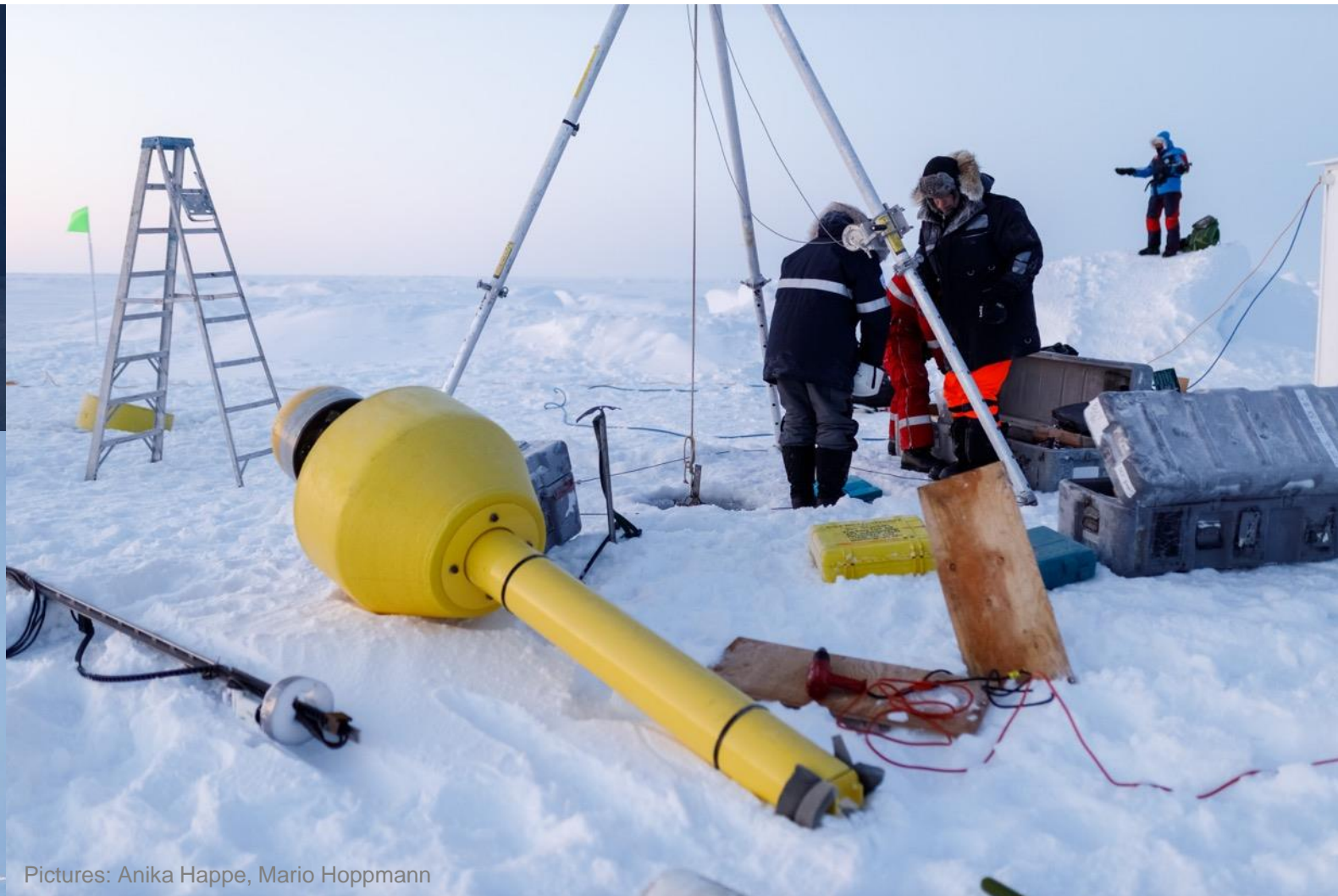
“A fortress of ice and snow”: suitable ice floe found at 85°N / 137°E

Setting up the MOSAiC ice camp

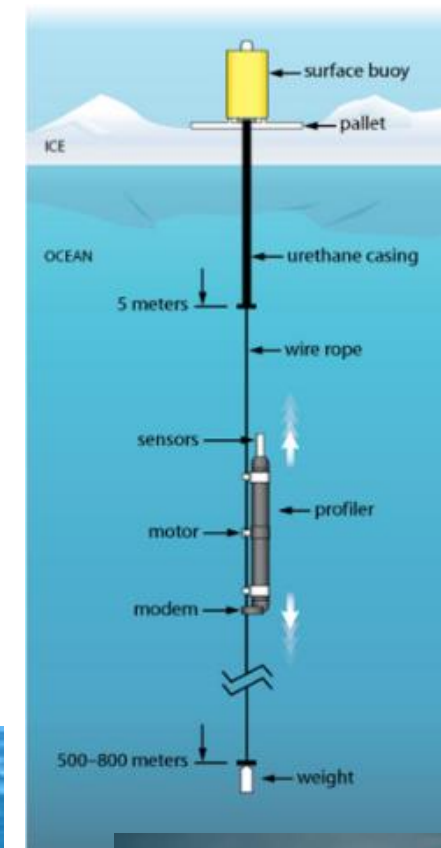
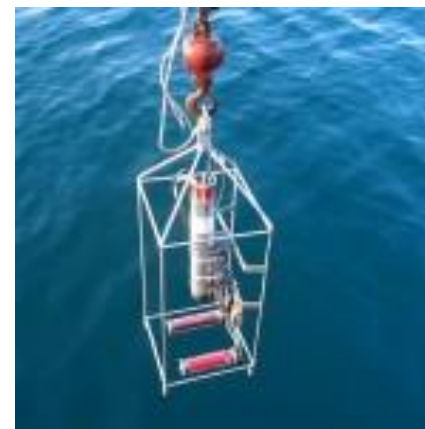


Pictures: Sebastian Grote, Stefan Hendricks

Setting up the “Distributed Network”



Pictures: Anika Happe, Mario Hoppmann





Measurements



- 100t scientific equipment, 2km power lines, 70kW electrical power on ice.
- Continues measurements of over 100 climate parameters to support modelling of dozens of climate processes.
- Dozens of first observations



Central Observatory

Illustration of the major infrastructures

Sounding
Program



Ship based
Measurements



Airborne
Measurements



ROV
City



Ocean
City



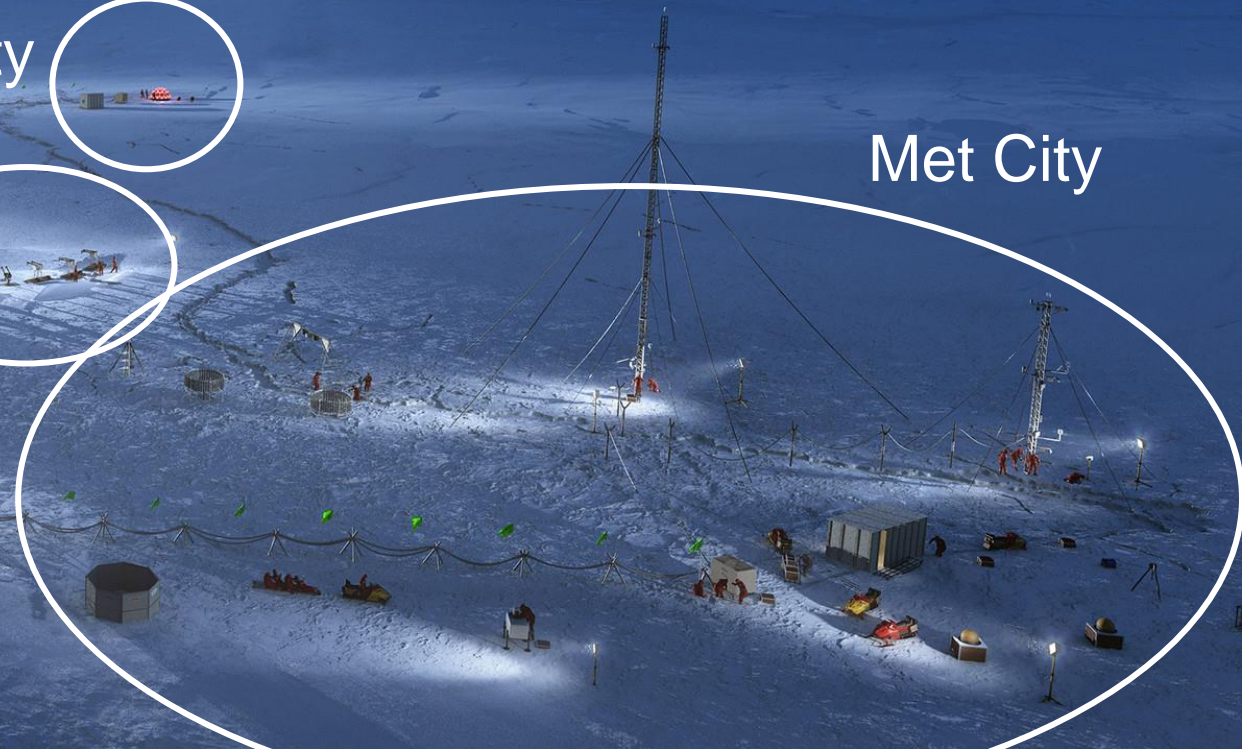
Remote
Sensing Site

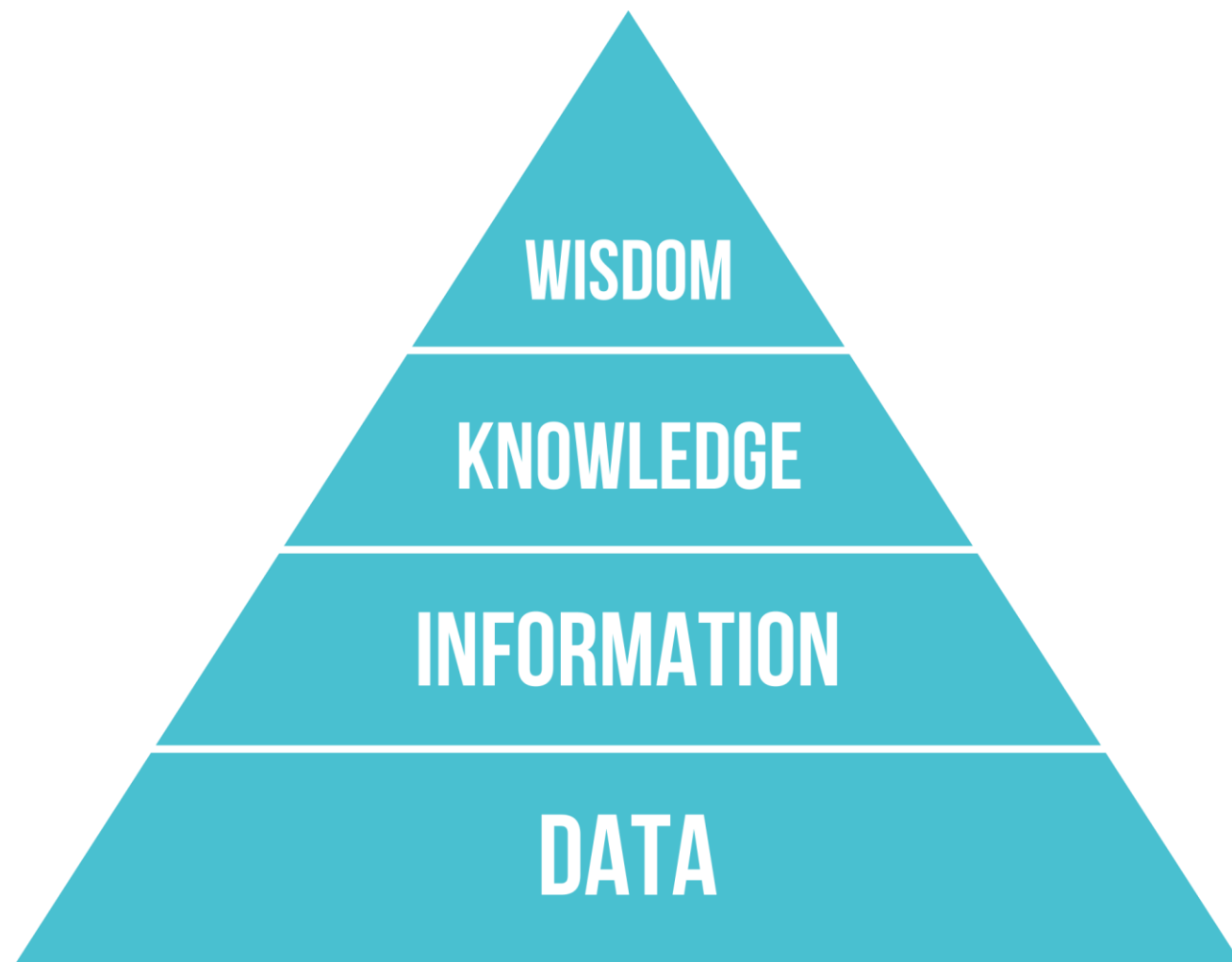


Balloon
Town



Met City







- **Metadata**
 - Metadata must be machine-readable and interpretable as well as human understandable. Metadata for each data set should follow the **FAIR data principles** in terms of fitness for purpose and fitness for re-use.
- **Data ingest, transfer, storage and archiving**
 - The MOSAiC Central Storage (MCS) aboard Polarstern is the basis for gathering data during the year of operation.
 - The 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** is the primary long-term archive for the MOSAiC data sets.
 - Exceptions need to be documented in written agreements between the data provider and the MOSAiC Project Board and data manager.

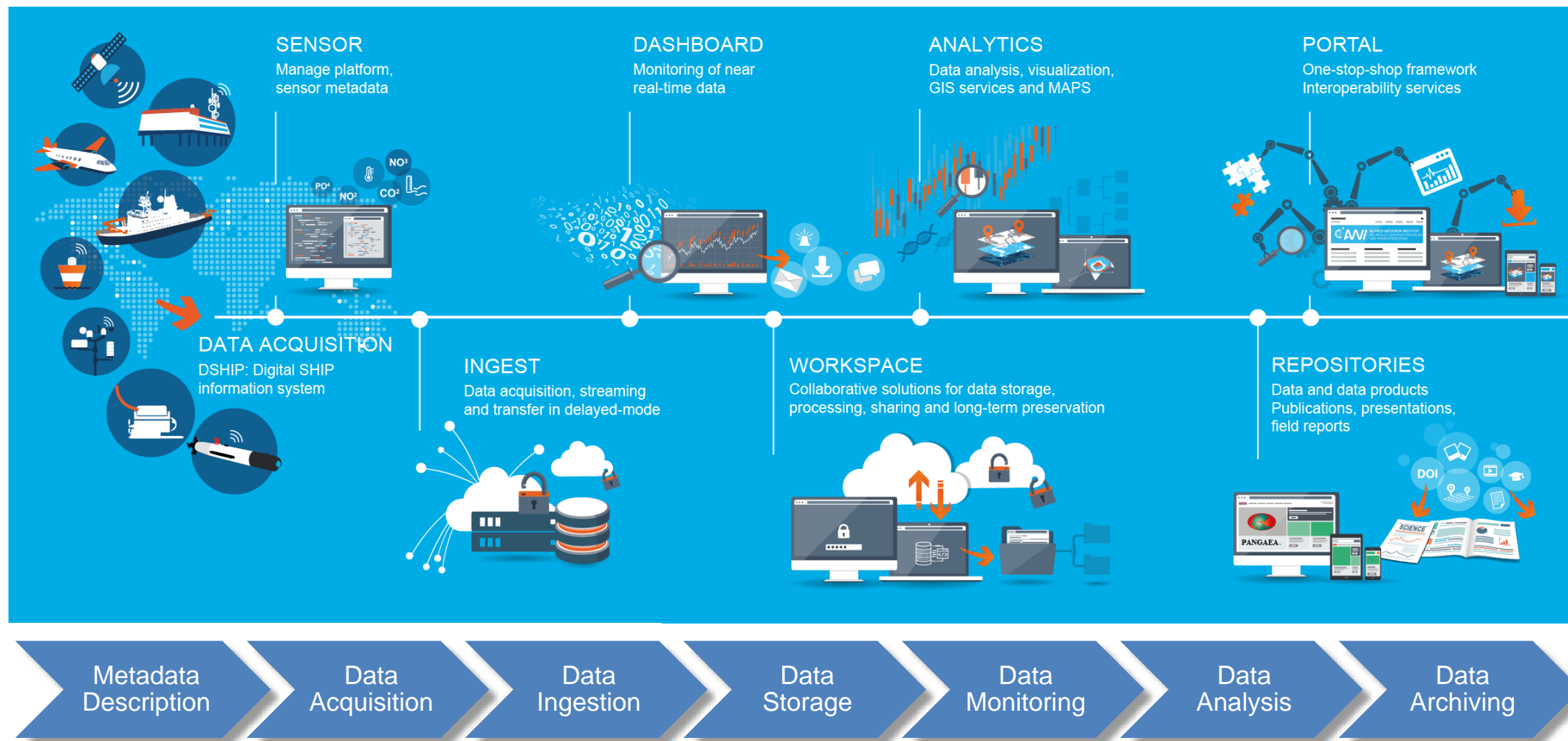
- **Data Provision, Access and Sharing**

- All MOSAiC raw and primary data are freely available to all MOSAiC consortium members as soon as they are stored in the on-board MCS or the land MCS.
- For using data from the MCS for publications, the *data provider* or *data PI* must be informed and offered collaboration on the scientific analysis

- **Public Release of Data**

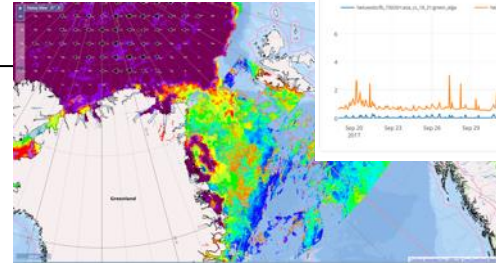
- MOSAiC data will be freely and publicly available on the open MCS or PANGAEA and/or alternate public archives on **1 Jan 2023**.
- From this date on there are no restrictions on data usage, but data users are encouraged to communicate with *data providers* or *data PIs* during early stages of all scientific analyses to ensure accurate usage and interpretation of data.

Observation to Archives & Analysis (O2A)



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'
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



Sensor Metadata Description

Data Acquisition

Data Ingestion

Data Storage

Data Monitoring

Data Analysis

Data Archiving



PANGAEA
Data Publisher for Earth & Environmental Science

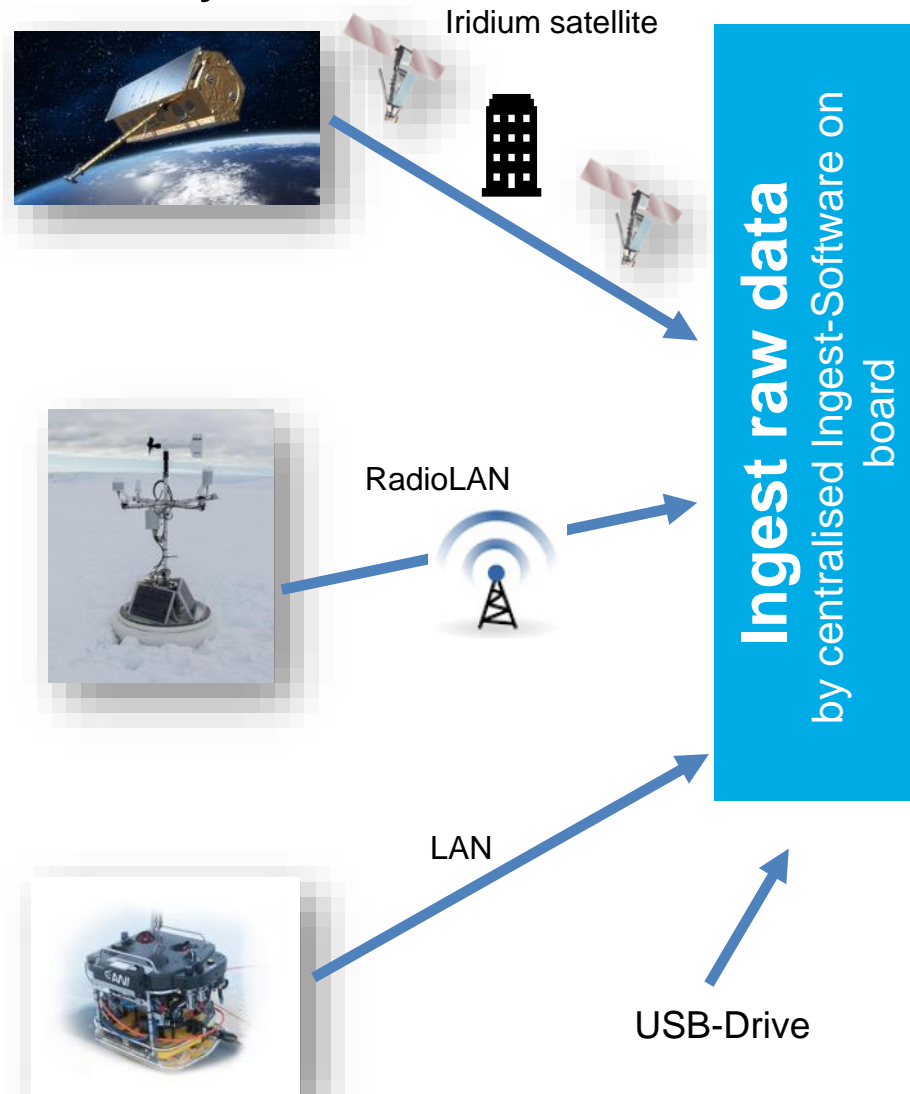
Data transfer via satellite, local LAN, radio LAN as stream and/or in delayed mode

MOSAic Central Storage and workspace

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



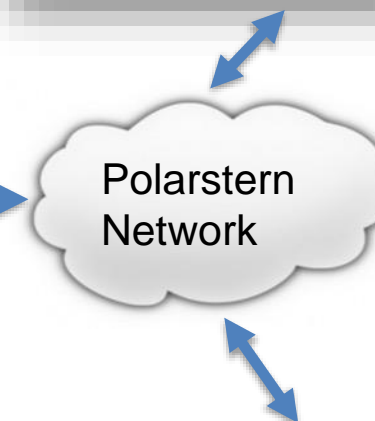
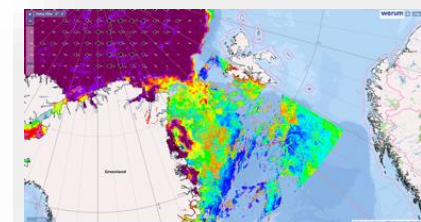
Ice City/Aircraft/Satellite



RV Polarstern
700 TB
with backup

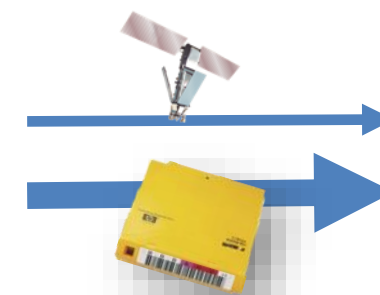


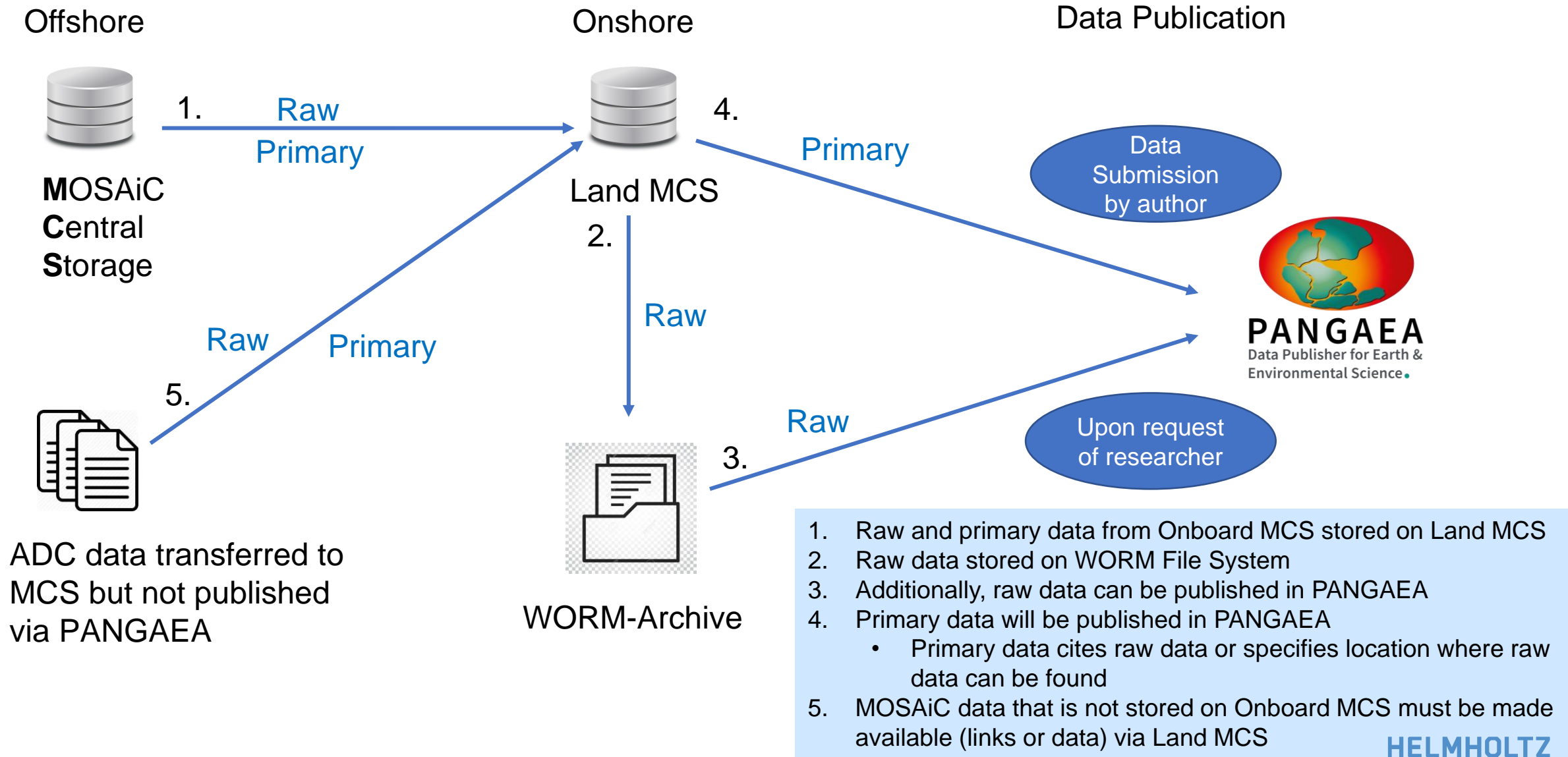
**MOSAic
Central
Storage**



Info	Device (Short Name)
Acoustic Doppler Current Profiler (ADCP)	
Acoustic Doppler Current Profiler (ADCP)	
Acoustic Doppler Current Profiler (ADCP)	
Acoustic Doppler Current Profiler (ADCP)	
Acoustic Doppler Current Profiler (ADCP)	
Acoustic Doppler Current Profiler (ADCP)	
Acoustic Doppler Current Profiler (ADCP)	
Acoustic Doppler Current Profiler (ADCP)	
Acoustic Doppler Current Profiler (ADCP)	
Acoustic Doppler Current Profiler (ADCP)	

Transfer
Onshore





BMBF-Aktionsplan Forschungsdaten

Impulse für eine Kultur der Datenbereitstellung und -weiterverwendung
in Bildung, Wissenschaft und Forschung

1

**Datensouveränität schaffen,
Dateninfrastrukturen aufbauen**

- Die Erforschung und Entwicklung neuer Technologien fördern
-
- Dateninfrastrukturen aufbauen, betreiben und vernetzen
-
- Rahmenbedingungen für die Datennutzung verbessern

2

**Aus Daten Erkenntnisse, Ideen
und Innovationen machen**

- Bereitstellung und Nutzung von Daten verbessern
-
- Methoden, Standards und Formate zum Austausch von Daten definieren
-
- Zugang zu neuen Datenquellen schaffen

3

**Datenkompetenzen
in der Wissenschaft fördern**

- Datenkompetenzen in allen Fächern vermitteln
-
- Technologiespezifische Qualifizierung fördern

Der Aktionsplan Forschungsdaten trägt zur Stärkung der Datensouveränität und Dateninfrastrukturen anhand folgender Maßnahmen bei:

[Nationalen Forschungsdateninfrastruktur \(NFDI\)](#) ▼

[Cloud- und Dateninfrastruktur GAIA-X](#) ▼

[European Open Science Cloud \(EOSC\)](#) ▼

[Schlüssel- und Datentechnologien](#) ▼

[FAIR-Prinzipien](#) ▼

[FAIR-Datenpublikationen als Publikationsleistung](#) ▼

[Ausgaben für das Forschungsdatenmanagement](#) ▼

[Unterstützung von kleinen Hochschulen beim Forschungsdatenmanagement](#) ▼

DAM DEUTSCHE
ALLIANZ
MEERESFORSCHUNG

[Bessere Datenauswertung und -nutzung in der Meeres-, Küsten- und Polarforschung](#) ^

Die **Datenauswertung und -nutzung von Meeres-, Küsten- und Polarforschung** soll verbessert werden. Die Deutsche Allianz Meeresforschung (DAM) schafft hierfür ein integriertes, verlässliches und nachhaltiges Datenmanagementkonzept sowie einen offenen und einheitlichen Zugang zu den erhobenen Daten nach den FAIR-Prinzipien.

[Klimarelevante Daten erheben](#) ^

Im Rahmen der größten Arktisexpedition aller Zeiten, MOSAiC, werden derzeit große Mengen an **klimarelevanten Daten** erhoben. Um diesen Datenschatz möglichst zeitnah in Erkenntnisse und damit Handlungswissen zu überführen, unterstützen wir gezielt die wissenschaftliche Auswertung dieser Forschungsdaten.



<https://bant.io/blog/articles/why-data-is-the-new-oil-and-what-this-means-for-lead-generation/>

VIELEN DANK FÜR IHRE BETEILIGUNG!

frank.oliver.gloeckner@awi.de

 <https://orcid.org/0000-0001-8528-9023>

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Thanks for your Attention

Keep in touch...

- Email – open-science@helmholtz.de
- Website – www.os.helmholtz.de
- Mailing list (only for members of Helmholtz) – [Helmholtz Open Science Professionals](#)
- [Open Science Newsletter](#)
- Twitter – [@helmholtz_os](https://twitter.com/helmholtz_os)



Many thanks for your participation!

Prof. Dr. Frank Oliver Glöckner

E-Mail: frank.oliver.gloeckner@awi.de

ORCID ID: <https://orcid.org/0000-0001-8528-9023>

Lea Maria Ferguson, Helmholtz Open Science Office

<https://orcid.org/0000-0002-7060-3670>

Antonia C. Schrader, Helmholtz Open Science Office

<https://orcid.org/0000-0001-7080-634X>

Nina Leonie Weisweiler, Helmholtz Open Science Office

<https://orcid.org/0000-0001-6967-9443>

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