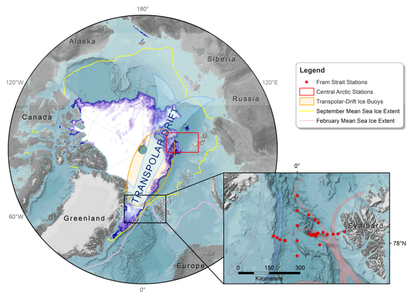
ALFRED-WEGENER-INSTITUT
HELMHOLTZ-ZENTRUM FÜR POLAR- UND MEERESFORSCHUNG

A. Boetius, T. Kanzow, M. Loebl*, W.-J. von Appen, M. Bergmann, A. Bracher, T. Dinter, L. Hehemann, N. Hildebrandt, M. Hoppmann,, M. Iversen, T. Jung, T. Krumpen, N. Lochthofen, A. Macario, K. Metfies, M.Nicolaus, B. Niehoff,I. van Opzeeland, B. Rabe, I. Salter, I. Schewe, D. Scholz, V. Schourup-Kristensen, K. Thomisch, S. Tippenhauer, F. Wenzhöfer, T. Wulff, C. Wekerle

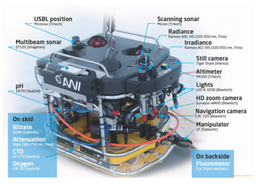


Arctic Observatory FRAM

FRAM (**FR**ontiers in **A**rctic **M**arine **M**onitoring) targets a modern vision of integrated underwater infrastructure. FRAM enhances sustainable knowledge for science, society and maritime economy as it enables truly year round observations from surface to depth in the remote and harsh arctic sea.

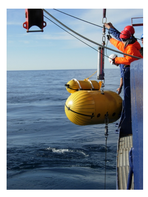
Cutting edge technologies are being (further) developed and used to record essential ocean variables to improve our understanding of the Arctic and it's ongoing processes. Data will be made freely available to the public via the AWI data portal.

Ice buoy work with
R/V POLARSTERN in the background



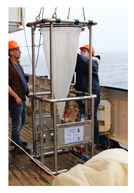
Under Ice ROV "The Beast"

Following a ROV dive

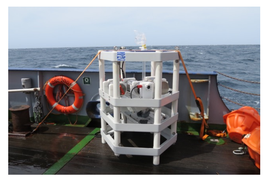


Winch Mooring
SWIPS
being released

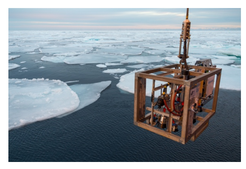
Mooring recovery



Zooplankton Camera
LOKI

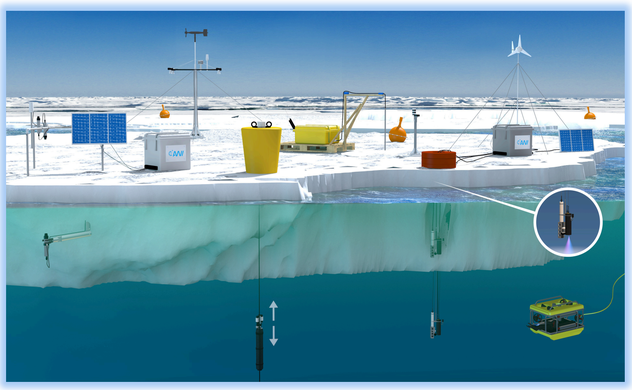


Particle Camera
BOP



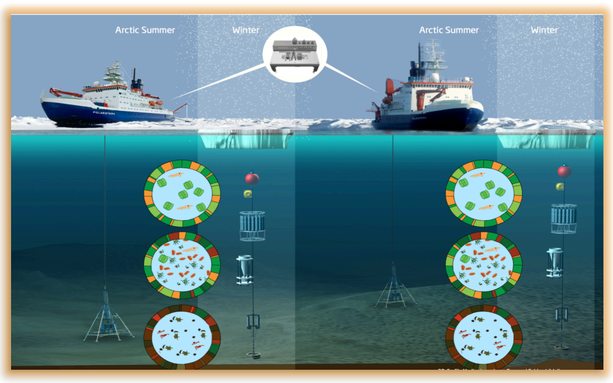
Ocean Floor
Observation System OFOS

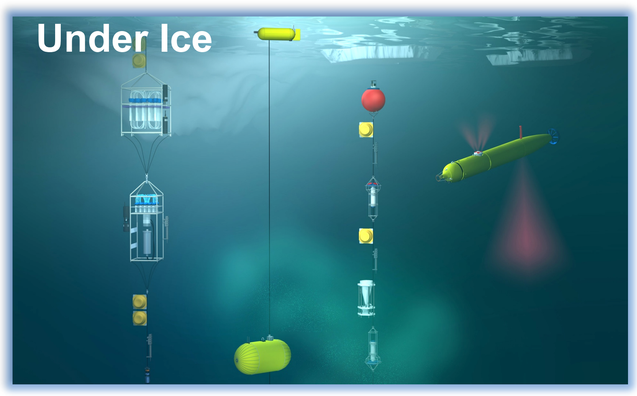
IceGIS - on bridge control desk
of R/V POLARSTERN



Ice buoys and ice-tethered platforms installed on ice floes in the central Arctic Ocean measure solar radiation, albedo, snow height, ice thickness, temperature, and algal activity. The data are delivered year round in partly near real time. The AWI sea ice buoy network is part of an international effort.
An newly developed **under ice ROV** with extensive sensing capabilities provides unique pictures of the under ice world and can be used for many manipulation / intervention tasks.

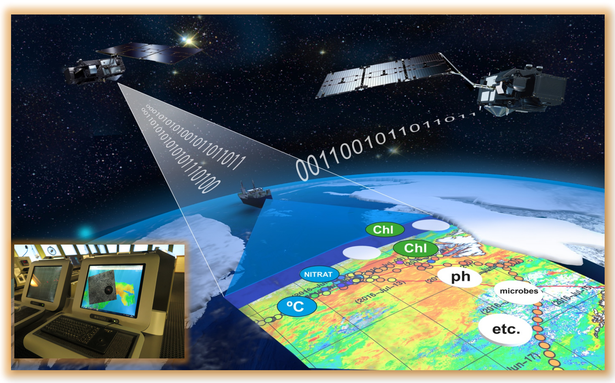
A **molecular microbial observatory** investigates the effect of ongoing environmental changes on marine microbial communities and how these changes will alter their role in global element cycling. Innovative and **remotely controlled automated water sampling and filtration techniques with cutting edge molecular analyses** are used to gain highly resolved information on microbial communities in the Arctic Ocean throughout the year.

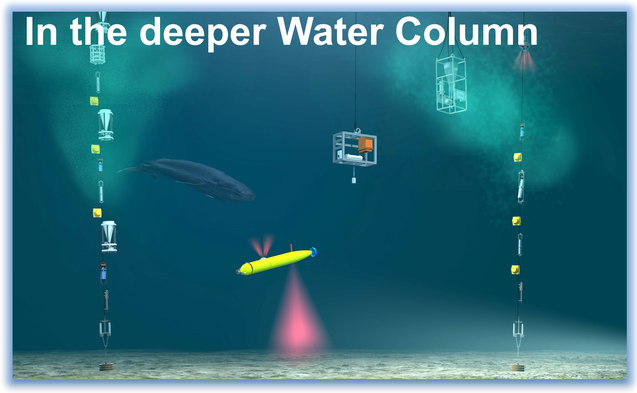




An **innovative mooring concept** studies the interplay between physical and biogeochemical processes and their effect on the food web:
the mooring concept consists of a near surface mooring with water and sediment samplers and multiple biogeochemical sensor suites, a novel profiling winch unit (SWIPS), and a traditional mooring with sediment samplers and sensor suites.
The **P**olar **A**utonomous **U**nderwater **L**aboratory **PAUL** is designed to study physical and biogeochemical processes below the ice edge.

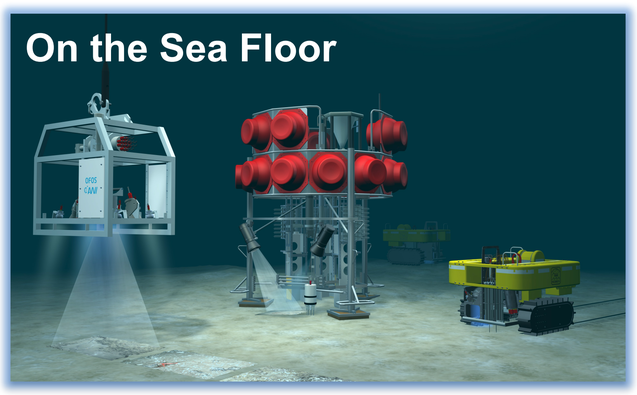
3-dimensional sampling in the Arctic: Groundtruthing of space borne **Sentinel satellite data** (on e.g. chlorophyll-a) by **underway measurements** on board of R/V POLARSTERN and additional **traditional chemical sample analysis** provides best possible data verification and validation for the Arctic. The data output assists in environmental and climate modelling.
The geographical information system **IceGIS** is developed **to improve economic and ecological ship efficiency.**





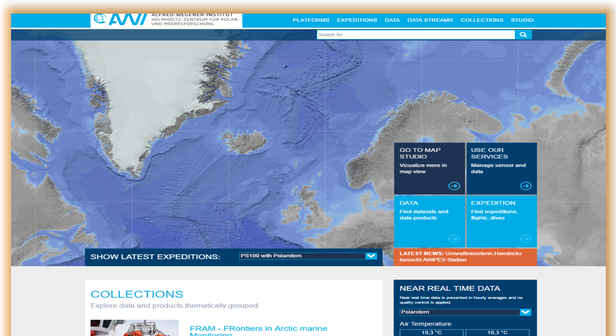
Multidisciplinary techniques are combined to study particle biogeochemistry, zooplankton ecology, marine mammals, and the physical and environmental characteristics: Moored **BioOptical Platforms** are completed by ship based particle cameras and traditional traps.
The **high resolution zooplankton camera LOKI** is operated from ship to investigate spatial distribution. Highly **precise hydro-acoustic recorders** locate marine mammal sound.

AWI scientists are developing **the world's first multiresolution Ocean General Circulation Biogeochemical Model.** Ocean and sea-ice simulations are performed on a mesh resolution of 5 km or smaller and allows local refinement of the mesh in areas of interest. The Model is a combination of the Finite Element Sea Ice-Ocean Model (FESOM) and an Regulated Ecosystem Model 2 (REcoM2).



The **modular benthic observatory** consists of a **towed camera system (OFOS),** a **benthic lander** system and an **autonomous crawler (TRAMPER).** Visual observations, biogeochemical flux studies and ecological experiments give long term information on so far unknown processes at the deep seabed.
The towed camera system is part of the Pollution Observatory, photographs of the sea floor have shown a strong increase of plastic litter on the Arctic Sea floor.

The **AWI data portal** will support scientists and other stakeholders in bringing them all together in a user-friendly one-stop-shop framework, which will be freely offering comprehensive information on individual research platforms and respective devices/ sensors, near real time data streams and a map-based "Studio" in which users can put together maps tailored to their needs, e.g. to follow the output of dives from small vehicles (e.g. OFOS, PAUL, ROV) or track R/V POLARSTERN data.



*Contact:
Martina Loebl (Coordination),
Martina.Loebl@awi.de

Map: AWI/ Laura Hehemann
Photos: AWI/ Sea Ice Physics/ T. Soltwedel/ A. Purser/ F. Schramm/ S. Dreutter/ M. Iversen/ T. Krumpen,
Graphics: AWI/ Sabine Lüdeling (Medieningenieure Bremen)

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

BREMERHAVEN

Am Handelshafen 12
27570 Bremerhaven
Telefon 0471 4831-0
www.awi.de