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Ice-tethered measurement platforms in the Arctic Ocean:^{*} a contribution by the FRAM infrastructure program

(6)

Session CR6.1/OS1.25 EGU2016-8298 **Board X3.283**

Summary

Observational data in the Arctic Ocean are sparse!

Autonomous, ice-based observation platforms (buoys) are a valuable tool to fill this gap: they record data throughout winter, and extend the investigation area of manned expeditions.

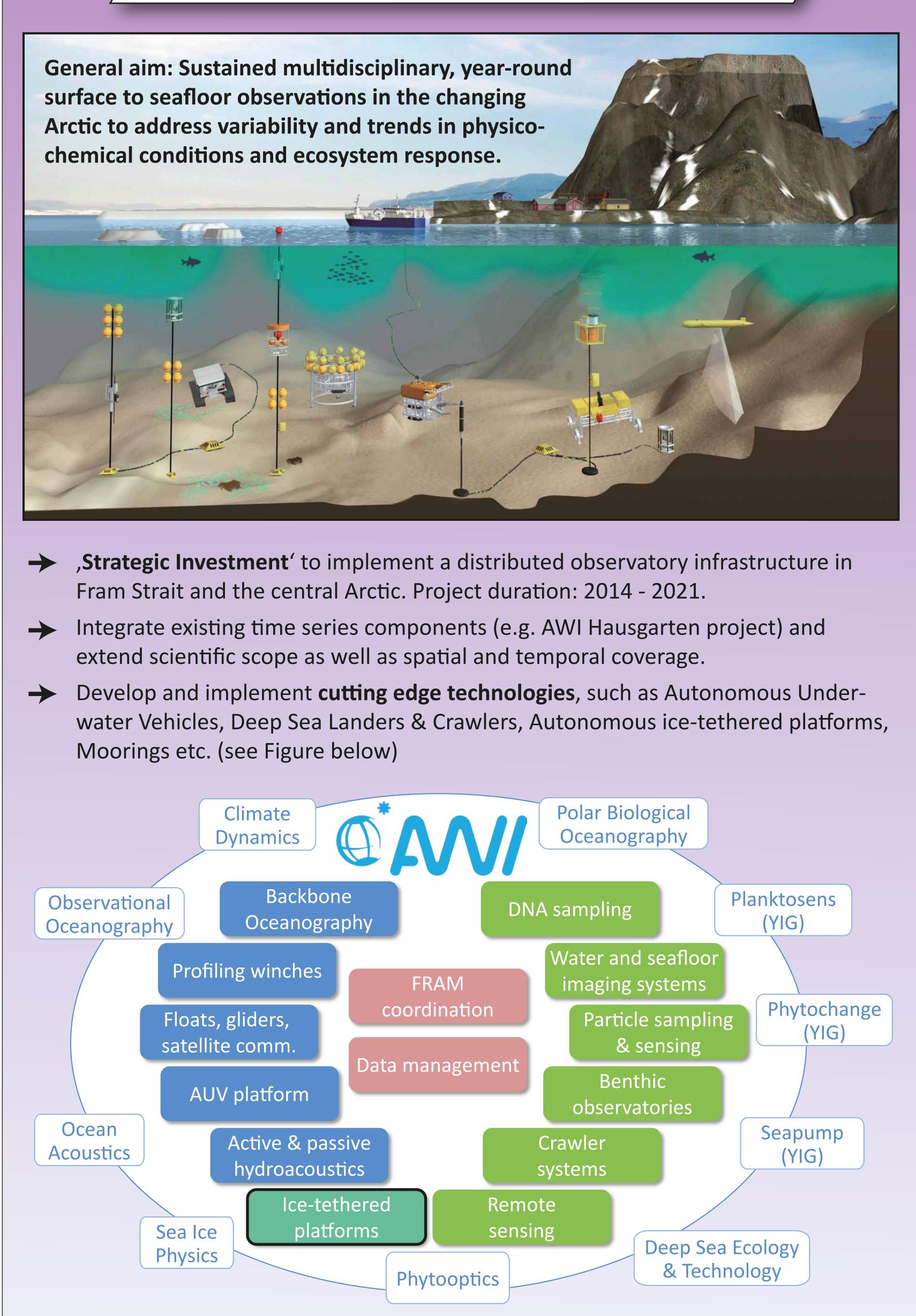
The FRAM (FRontiers in Arctic marine Monitoring) infrastructure project aims to characterize the physical, biological and biogeochemical state of the Arctic Ocean with the help of modern technologies.

One critical aspect is presented here: the development and deployment of a network of autonomous, multi-disciplinary drifting observatories in the central Arctic Ocean.

Simultaneous observations of atmosphere, sea ice/snow and upper ocean, with an emphasis on the interaction between physics and biology/biogeochemistry.

The first wave of 32 buoys was deployed in September 2015 from onboard RV Polarstern.

FRAM (FRontiers in Arctic marine Monitoring)



Scope of FRAM (colored boxes) and involved AWI working groups (white boxes).

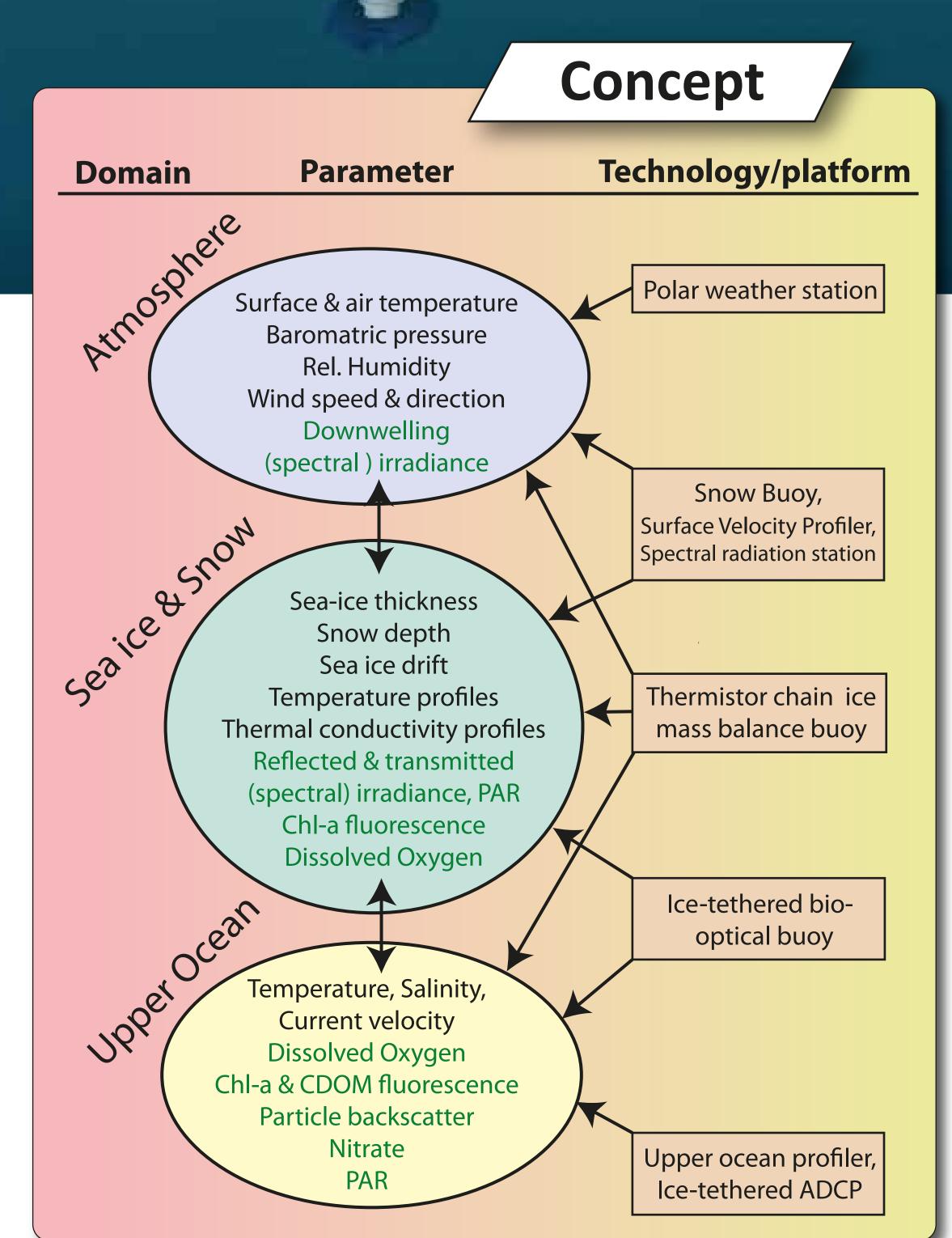
M. Hoppmann, M. Nicolaus, B. Rabe, F. Wenzhöfer, C. Katlein, D. Scholz

Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung, Bremerhaven, Germany

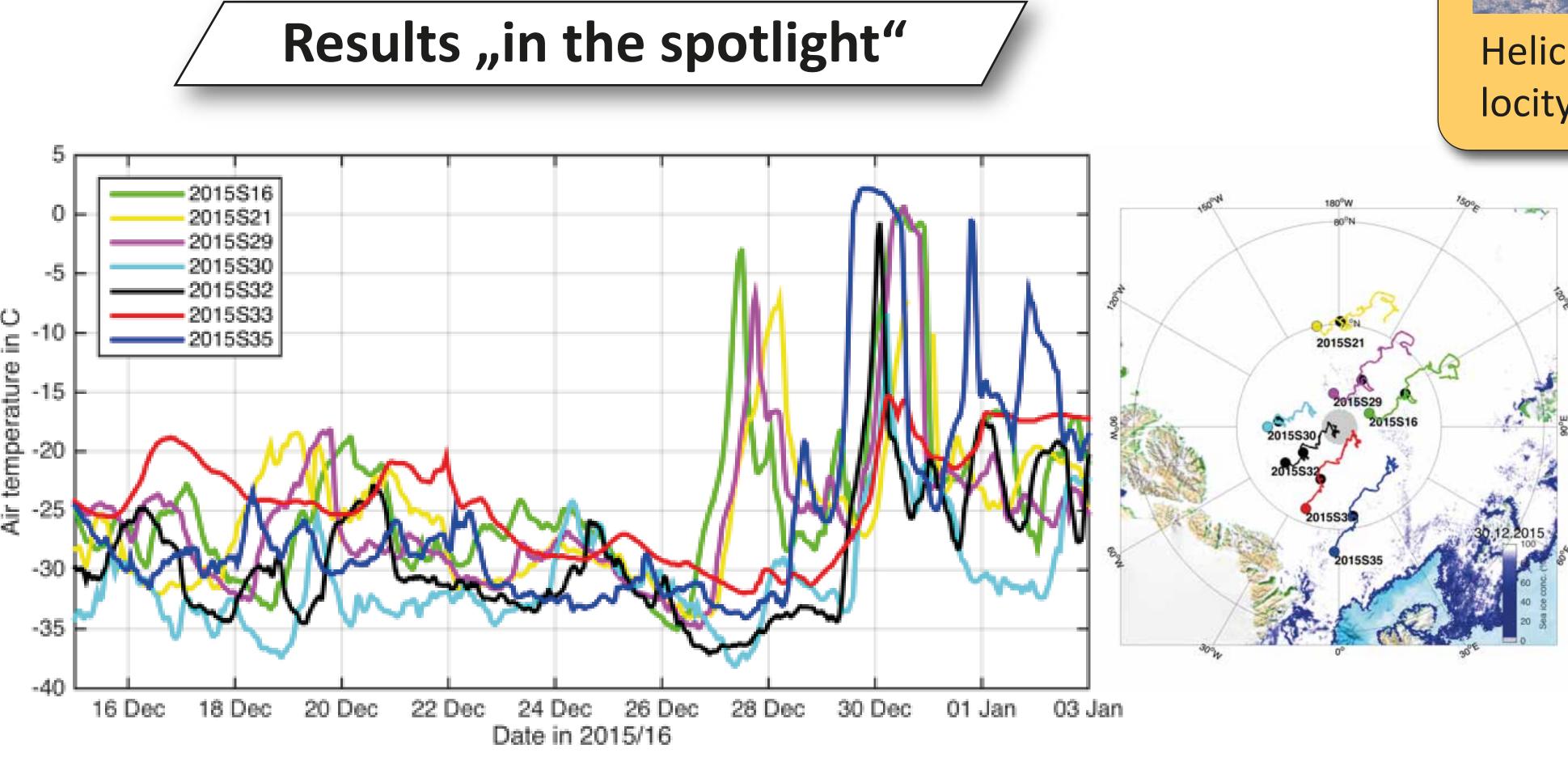
Contact: Mario.Hoppmann@awi.de

Aim: Fill the gap of in-situ observations in the central Arctic Ocean, in order to gain a better understanding of the physical, biological, and chemical processes governing its current evolution.

→ Continue measurements of physical properties of atmos- → Use of similar sensor types and data processing routines across phere, sea ice, and upper ocean in a changing Arctic. Provide simultaneous observations of biological and biogeochemical parameters, e.g. for process studies. Development of new platforms and procedures to form the basis for a modern, innovative, and multi-disciplinary buoy programme.



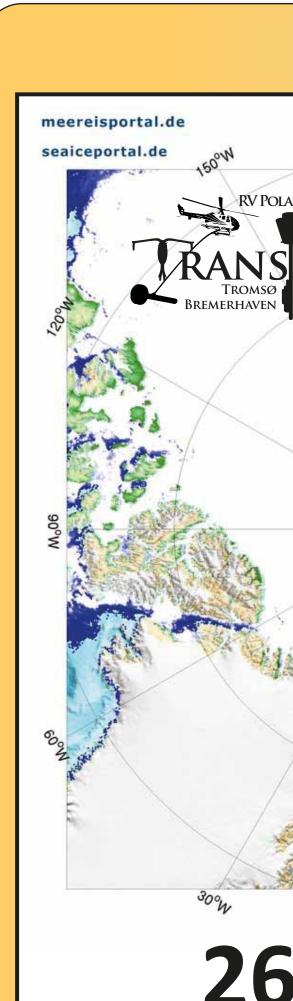
*actual deployments may vary

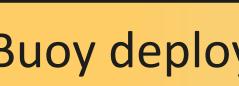


- different observational platforms
- (e.g. Remotely Operated Vehicle, X3.281; EGU2016-12879).
- Provide logistics and funding for deployments of multidisciplinary observatories within the Arctic Ocean.
 - Optimize dataflow and provide quality-controlled data for the community.

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- 1 Snow Buoy **2** Ice-tethered ADCP **3** Spectral radiation station **4** Surface velocity profiler **5** Ice mass balance buoy
- 6 Polar weather station 7 Ice-tethered bio-optical buoy
- 8 Upper ocean profiler









Helicopter deployment of a Surface Velocity Profiler.

Buoy data are available in near real time on http://data.seaiceportal.de. These buoys also contribute to the Global Telemetry System (GTS). Data recorded by buoys associated to FRAM will be collectively sented in near-real time on a dedicated data portal (http://expedition.awi.de/). The data of all buoys are published and distributed through the online database PANGAEA.

Arctic warming event in December 2015, captured by several Snow Buoys.



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*But we also have Antarctic buoys! Check Poster EGU2016-7840 on Board X3.277

First deployments A CONTRACTOR E Ice Mass Balance Ice Mass Balance Snow Depth TROMSØ BREMERHAVEN 15 OCTOBER 2015 Sensor: AMSR2 13.04.2016 26.10.2015

Buoy deployments during the Polarstern expedition PS94 (www.seaiceportal.de).

Thermistor chain ice mass balance buoy (yellow pelicase) and snow height beacon (mast on right side).



Ice-Atmosphere-Arctic Ocean Observing System (IAOOS) with upper ocean profiler, LIDAR and ice mass balance buoy.



Deployment of Ice-Tethered Profiler with bio-optical sensor suite.

Data availability

The authors highly appreciate the help of the crew and scientists onboard Polarstern expedition PS94 with the buoy deployments, and the support by the Woods Hole Oceanographic Institution, SAMS Research Services Ltd, Oban, Scotland and MetOcean, Halifax, Canada. We acknowledge the contribution of Christine Provost, LOCEAN and the IAOOS program to the buoy programme during PS94. We are especially grateful for the field support by J.-P. Savy, Nicolas Villacieros, Sergey Pisarev, Meri Korhonen, Hendrik Hampe, Rainer Graupner, Myriel Horn,

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