Arctic in Rapid Transition (ART): a pan-Arctic Network integrating past, present and future

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1. Background and rationale

ART is an international and cross-cutting network focused on bridging time scales, science disciplines, and geographic regions to better understand the past, present and future response of Arctic marine ecosystems to sea ice transitions and climate change. ART was developed by early-career scientists as a continuation of the International Conference on Arctic Research Planning II (ICARP II) Marine Roundtable, an initiative of the Arctic Ocean Sciences Board (AOSB), now the Marine Working Group of the International Arctic Science Committee (IASC).

ART aims at updating and refreshing the scientific issues raised within the ICARP II reports to a post International Polar Year 2007–2009 perspective. Such an inter-disciplinary initiative is essential to meet the need for increased scientific knowledge of the evolving status of the Arctic Ocean ecosystem and the process-based understanding of the mechanics of change in order to make useful and realistic projections of future conditions throughout the Arctic region.

Please visit us at:
http://www.iarc.uaf.edu/ART

2. Implementation

The first phase of ART (2010-2014) focused on developing a formal network to bring together scientists working in different geographic and disciplines who share a common interest in improving our understanding of the implications of declining sea-ice.

The second phase (2014-2018) will be centered on developing a networked field program and the coordination of active data collection that will feed into a synthesis and reporting phase. The legacy of ART will be a coherent set of knowledge on the impacts of sea-ice transitions on Arctic marine ecosystems, which would translate into physical-biological models at various spatial and temporal scales.

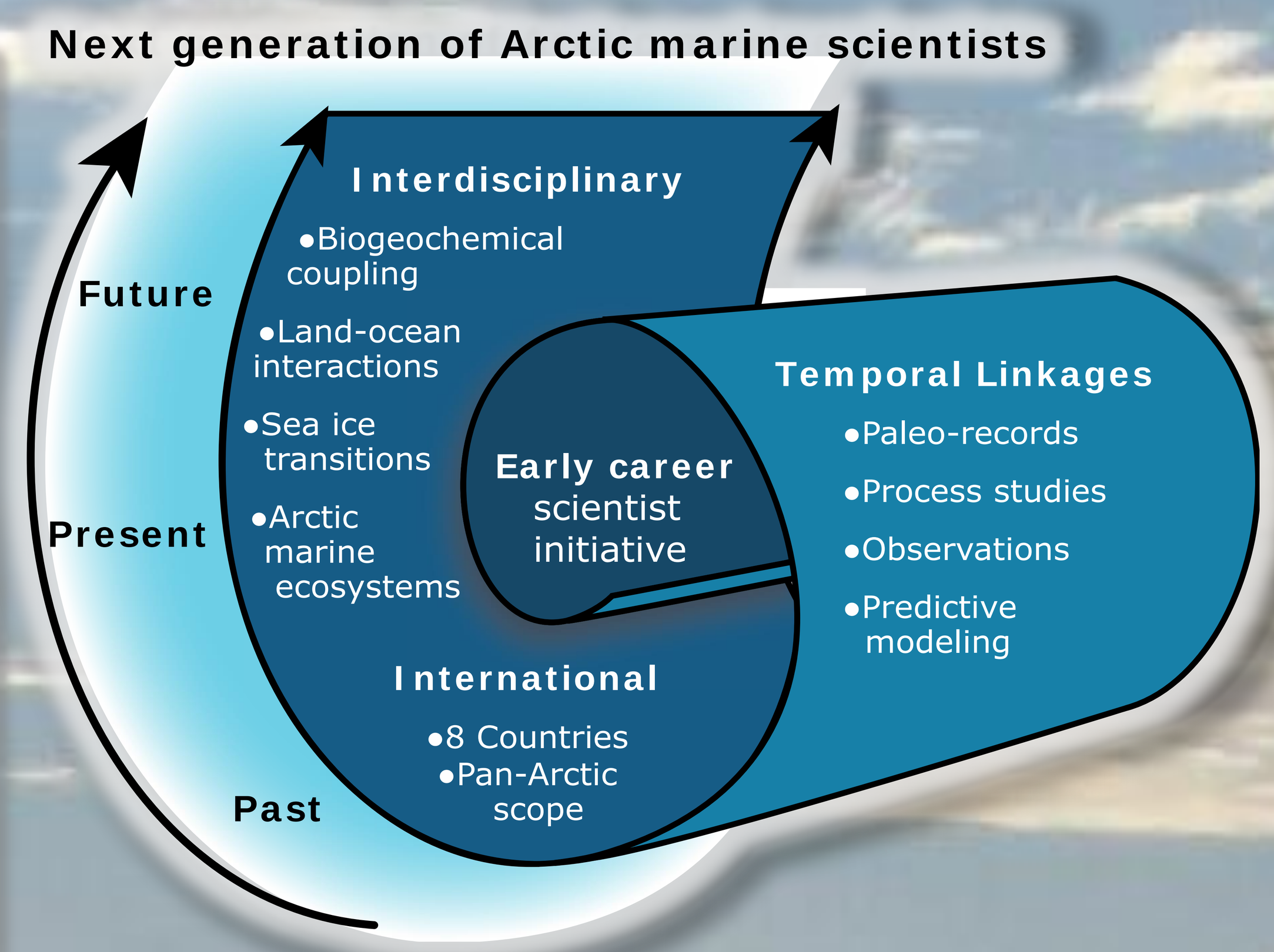
This knowledge will help develop more robust scenarios regarding the future state of Arctic marine ecosystems and their productive capacity, as well as how they impact the exchange of greenhouse gases with the atmosphere. ART will contribute to a reinforcement of Arctic system sciences into impact assessments of climate change and increased human pressures in the Arctic.

3. What makes ART unique?

- ***International***:
ART is an international effort both in terms of geographic scope (pan-Arctic) and of the nationalities of the founding and participating scientists.

- ***Interdisciplinary:***
ART fosters communication and data exchange among disciplines and will improve our understanding of the response of the marine realm as a whole to changes in climate and Arctic sea ice.

- ***Temporal Linkages***:
ART focuses on bridging temporal aspects, including paleo-records, current observational studies and modelling efforts



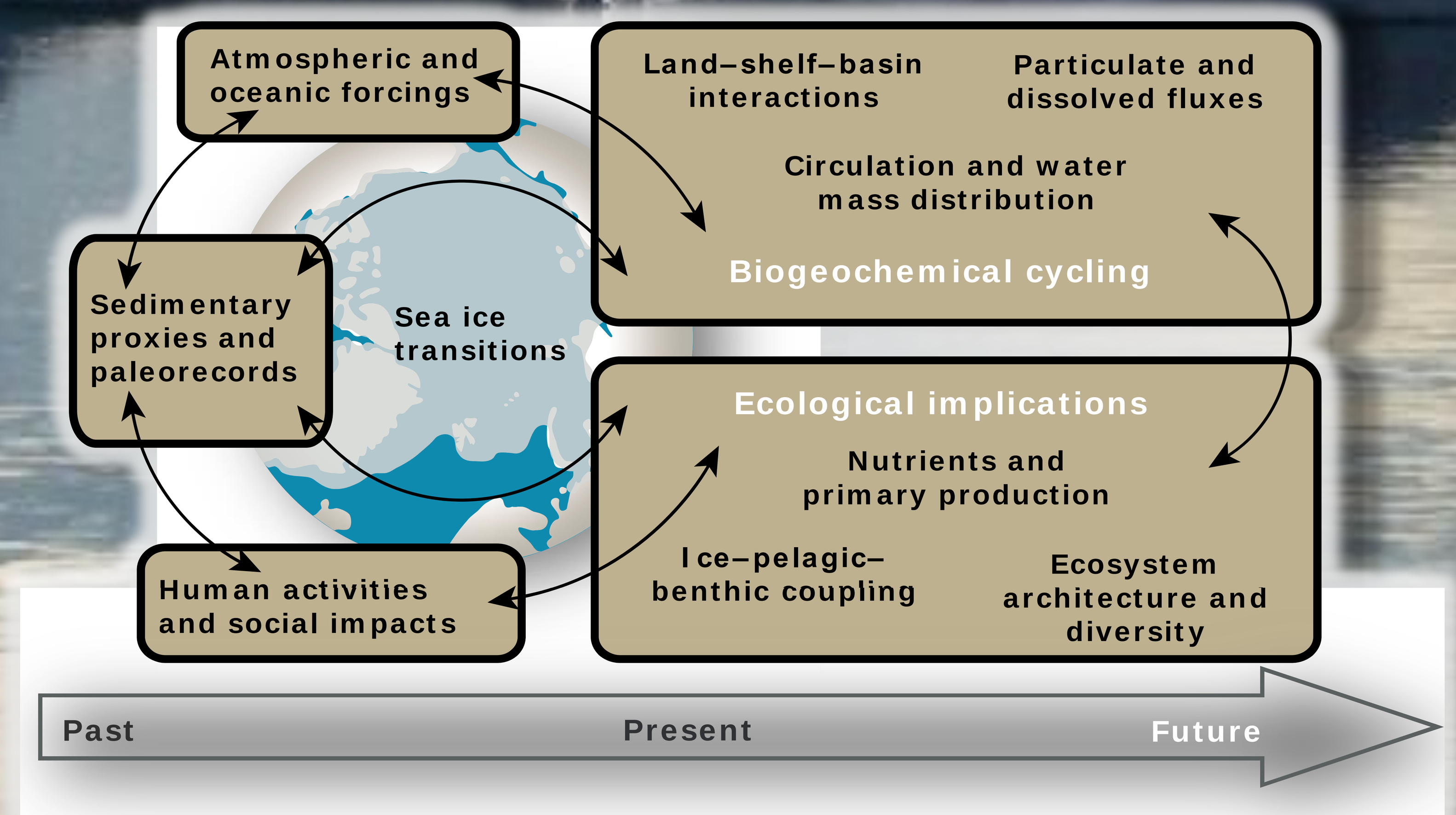
- ***Early Career Involvement:*** ART was conceived, developed and remains steered by early-career scientists, with ongoing support from dedicated senior scientists who serve an advisory role.

4. Scientific focus

The ART Network investigates the past, present and future changes and feedbacks among the physical drivers, ecosystem structure & function, and biogeochemical processes related to sea ice transitions in the Arctic Ocean.

Key science questions:

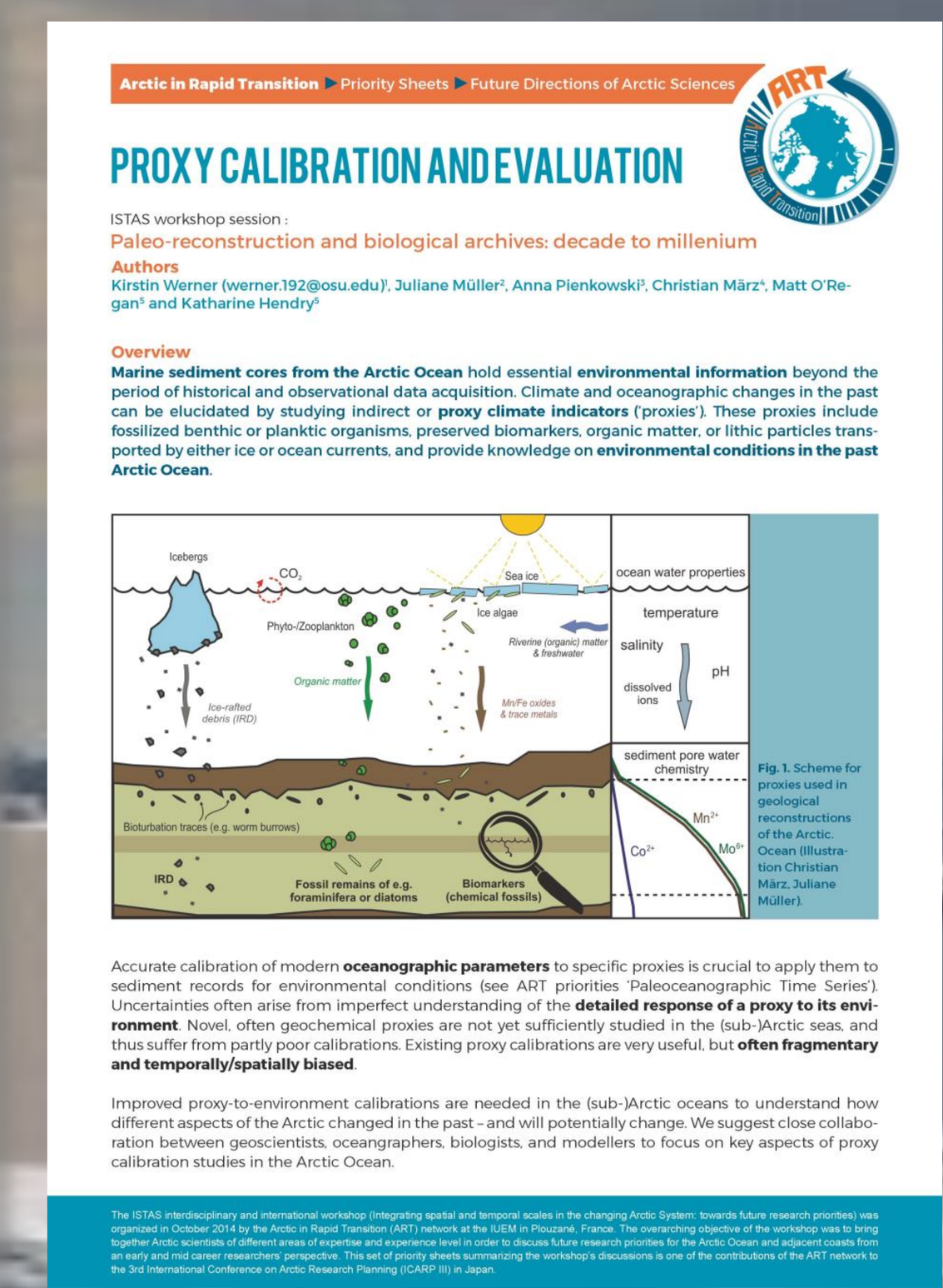
1. *How were past transitions in sea ice connected to energy flows, elemental cycling, biological diversity and productivity, and how do these compare to present and projected shifts?*
2. *How do temporal and spatial variability in sea ice transitions affect biogeochemical fluxes in coastal, ocean-gateway and shelf-to-basin environments?*
3. *How does the Arctic marine biota respond to sea ice transitions, and what are the implications for productivity, ice-pelagic-benthic coupling, trophic transfer and air-ice-sea exchange?*



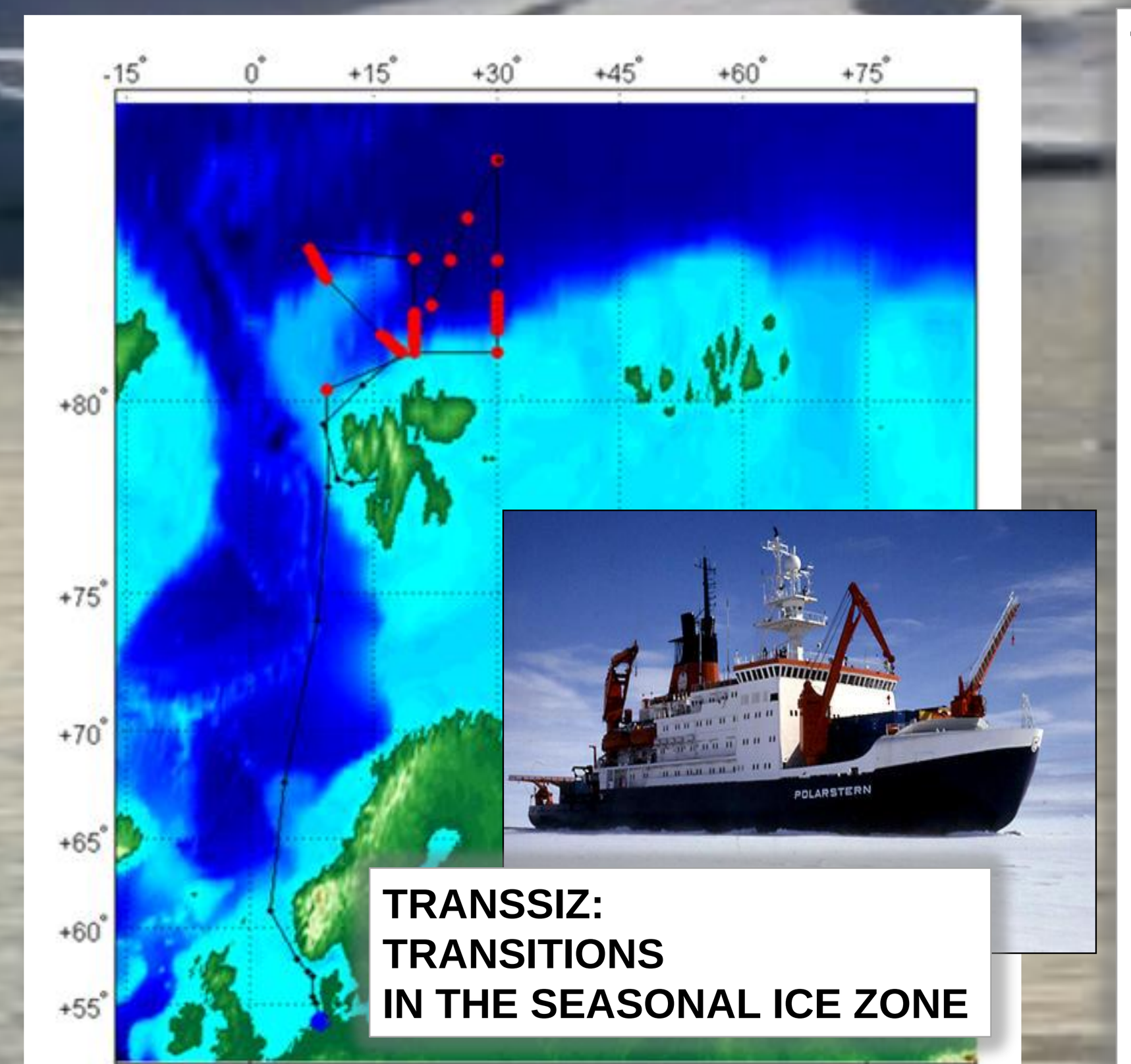
5. The second ART Science Workshop, Brest, France, October 2014

The second ART Science Workshop entitled "Integrating spatial and temporal scales in the changing Arctic System: towards future research priorities" (ISTAS) was held on 21-24 October 2014 in Brest, France in collaboration with the Association of Polar Early Career Scientists (APECS), the Permafrost Young Researchers Network (PYRN) and the European Institute for Marine Studies.

This international workshop provided an opportunity to discuss the integration of spatial and temporal scales to better understand the changing Arctic system as a whole.
The overarching objective of the workshop was to bring together Arctic scientists of different areas of expertise and experience level in order to discuss future research priorities for the Arctic Ocean and adjacent coasts from an early and mid career researchers' perspective. This set of priority sheets summarizing the workshop's discussions is one of the contributions of the ART network to the 3rd International Conference on Arctic Research Planning (ICARP III) in Japan.
Priority sheets themes reflect discussion groups and include: Proxy Calibration and Evaluation, Arctic Land-Ocean Interactions, Arctic Biodiversity, Law in the Arctic, Arctic Oceanography, Physical Processes in Arctic Sea Ice and Paleaoceanographic Time Series from Arctic Sediments.



6. R/V Polarstern cruise TRANSSIZ (19.05-28.06.2015)



TRANSSIZ cruise research questions:

- Investigate the cryo-pelagic -benthic coupling from the Barents shelf to the Nansen Basin and develop, validate and compare proxies of sea ice and water masses.
- Quantify the environmental preconditions (e.g. nutrients, stratification) for productivity along shelf-to-basin transects to improve predictions of the potential annual primary production in a future ice-free ocean.
- Study the transition of spring to summer on ecosystem functioning and biogeochemical cycles as well as transitions in productivity, sea ice and ocean circulation across the last glacial cycle

Workshop sponsors