Changing Arctic Ocean NERC

Implications for marine biology and biogeochemistry

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NERC has invested £16 million in a 5-year programme (2017-2022) to understand the effects of climate change on the way the Arctic Ocean functions, and the potential impacts on ecosystem services.

↑ *Multistressors and their impact on processes in the Arctic Ocean*

Aims:

Key research challenges are to develop a quantified understanding of:

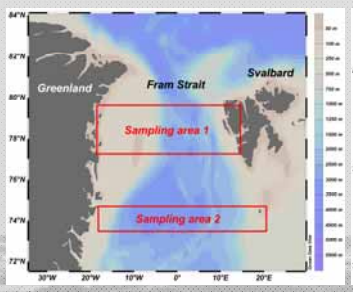
1. The controls on the spatial and temporal structure and functioning of Arctic ecosystems and biogeochemical cycles.
2. The impacts of multiple stressors on Arctic species, biogeochemical cycles and ecosystem structure and functioning.

People in current 4 projects:

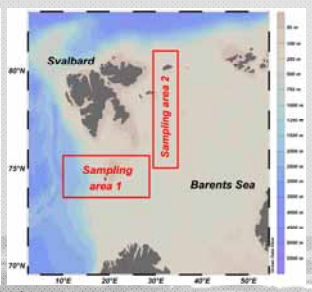
82 investigators in total	12 post-doctoral research associates	10 PhD students	More to join in 2018

2018 summer cruises:

During May-July 2018, three cruises covering the Fram Strait, Greenland Sea and Barents Sea will take place on the RRS *James Clark Ross*.



↑ Sampling areas for DIAPOD and ARISE in 2018.



↑ Sampling areas for ChAOS and PRIZE in 2018.

International Collaboration and stakeholders:

Key science outputs
- Observational data
- Model projections of change

Collaboration
Links with more than 60 international partners.
Aim: to forge engagement with Arctic community beyond lifetime of CAO.

Example policy areas
- Marine conservation
- Commercial fish stocks
- Climate change impacts on ecosystem services
- Adaptation strategies for local communities

If you are interested in collaboration, please get in touch.

Find us on social media: @NERC_CAO
www.changing-arctic-ocean.ac.uk

Photo credit: Dr Johan Faust, ChAOS Project, CAO Cruise to Barents Sea in Summer 2017

Arctic PRIZE

SAMS

Arctic Productivity in the Seasonal Ice Zone

led by Finlo Cottier

How does more light in an ice-free Arctic Ocean affect productivity?

Declining sea ice alters water column properties and the availability of light and nutrients that support productivity.

- ***How will changes in sea ice modify mixing and light in the surface ocean?***
- ***What is the effect on the timing and rates of productivity, taxonomic composition, and pelagic and benthic consumers?***

Arctic PRIZE aims to understand how seasonality, ice cover and ocean properties determine the large-scale ecosystem structure of the Arctic Ocean.

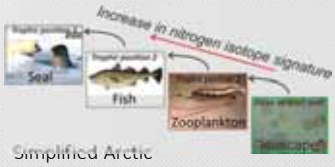
Develop predictive tools to assess how Arctic ecosystems will respond to a reducing sea ice cover

ARISE

UNIVERSITY OF LIVERPOOL

Can we detect change in Arctic ecosystems?

led by Claire Mahaffey



Simplified Arctic food chain

Ocean ecosystems provide key services, e.g. control of climate and nutrient cycling.

To understand how Arctic ecosystems will evolve in response to multiple stressors, it is crucial to evaluate the effects of recent and on-going change.

- ***Are food webs sensitive to Arctic change?***
- ***How have food webs changed in the past, and how will they respond to future change?***

We aim to quantify past and future changes in Arctic ecosystems by identifying the response in food webs.

Develop a new approach to detect past and future change in Arctic ecosystems

ChAOS

UNIVERSITY OF LEEDS

How changing sea ice conditions impact biological communities, biogeochemical processes and ecosystems

led by Christian März

Sea ice retreat and thinning leads to longer, more extensive open water conditions. While these prolong the growing season and influence the amount of primary production, they also change the amount and nature of organic matter reaching the seafloor.

- ***How will changes in the surface ocean influence seafloor processes?***
- ***What are the consequences for carbon sequestration in sediments?***

ChAOS will provide fundamental data and quantify the effects of changing sea ice cover on the resulting ecosystem function on the Arctic seafloor.

Quantify effects of changing sea ice cover on seafloor ecosystem function and services

DIAPOD

SAMS

Mechanistic understanding of the role of diatoms in the success of the Arctic *Calanus* complex and implications for a warmer Arctic

led by David Pond

Calanus comprise up to 90% of zooplankton biomass in Arctic Ocean.

They are central to Arctic food webs, linking phytoplankton to fish and higher predators.

They transport vast quantities of carbon into the deep ocean via the *Calanus* "lipid pump".

- ***How does change in the Arctic Ocean alter the availability of this key Arctic food source?***
- ***How does this influence the cycling of carbon in the Arctic?***

Develop a predictive understanding of how *Calanus* will be affected by climate change

10 smaller projects in Spring 2018:

Bundesministerium für Bildung und Forschung

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