Changing Arctic Ocean Data Management

Robyn Owen,
BODC Data Manager,
rowen@bodc.ac.uk

Joana Beja,
BODC Data Manager,
joja@bodc.ac.uk

Examples of some of the data types that will be hosted at each data centre:

- Biological samples (trawls, nets)
- Cryosphere
- Bathymetry
- Acoustics

- Physical oceanography
- Non-biology samples (nutrients, chemistry, gases, tracers)
- Sediment samples
- Atmospheric (from ship)

Data funded by the Federal Ministry of Education and Research (BMBF)

British Antarctic Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

BODC British Oceanographic Data Centre
NATURAL ENVIRONMENT RESEARCH COUNCIL

PANGAEA

Please speak to your data manager for other data types.

National Oceanography Centre
NATURAL ENVIRONMENT RESEARCH COUNCIL

noc.ac.uk

NERC SCIENCE OF THE ENVIRONMENT

The role of the NERC Arctic Office in supporting Arctic research

Henry Burgess

We work for you to:
- support UK-based researchers in the Arctic and High North
- provide advice and connections to policy and decision makers
- develop new international collaborations
- manage the UK's Arctic research station in Svalbard

So, come and see us if you need: **information, money, contacts or access!**

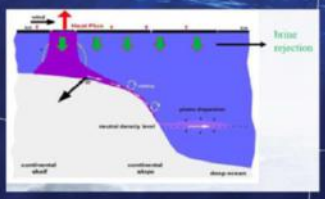
www.arctic.gov.uk @Arctic_Office arctic@bas.ac.uk

NERC SCIENCE OF THE ENVIRONMENT | UK Research and Innovation

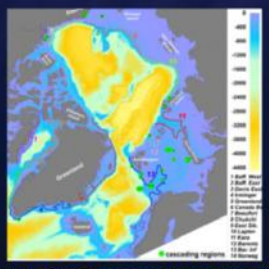
Arctic Office
NATURAL ENVIRONMENT RESEARCH COUNCIL

Evaluation of cascading water mass formation from NEMO-shelf Arctic Ocean model.

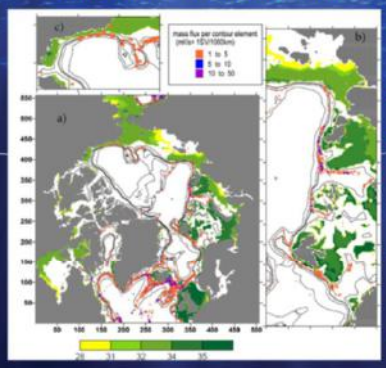
Maria Luneva & Jason Holt

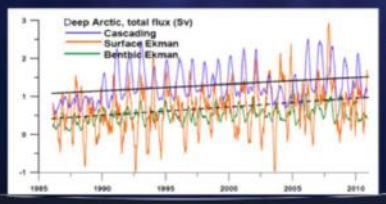


Cascading==shelf convection
– hard to observe under sea ice



Only 24 cascading locations are detected in observations in the Arctic Ocean





- Using numerical model (1980-2010) we find locations favourable to cascading
- In a good agreement with observed
- In the Deep Arctic cascading flux is 1.3 +/- 0.6 Sv across isobath 300m (25 year mean)
- Strongest player of cross-shelf exchange
- Cascading flux is comparable with Bering Strait inflow (0.8-1.1 Sv)
- With ice decline cascading flux increases with the rate of 0.0175 Sv/year
- Ekman surface flux increases nearly with the same rate.

National Oceanography Centre
NATURAL ENVIRONMENT RESEARCH COUNCIL

noc.ac.uk

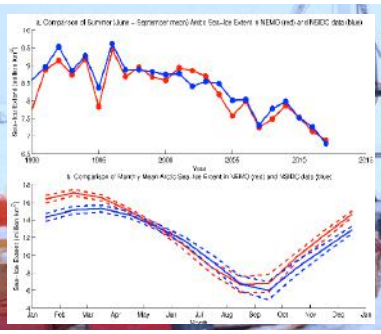
NERC SCIENCE OF THE ENVIRONMENT

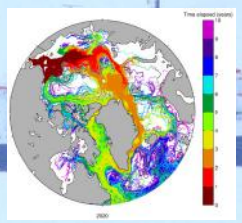
High-Resolution global coupled modelling of biogeochemistry sea ice and ocean circulation

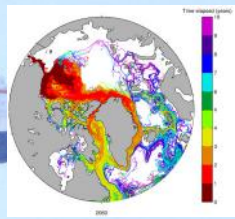
Yevgeny Aksenov, Stefanie Rynders, Maria Luneva, Katya Popova and Andrew Yool

National Oceanography Centre, Southampton, SO14 3ZH, UK, Contact: yka@noc.ac.uk

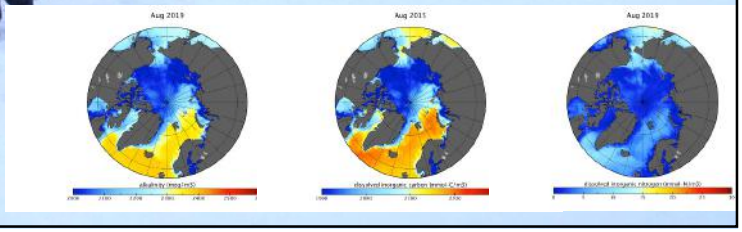
- Changes in the Arctic Ocean and BGC occur faster than elsewhere
- Mitigation of the changes requires detailed projections







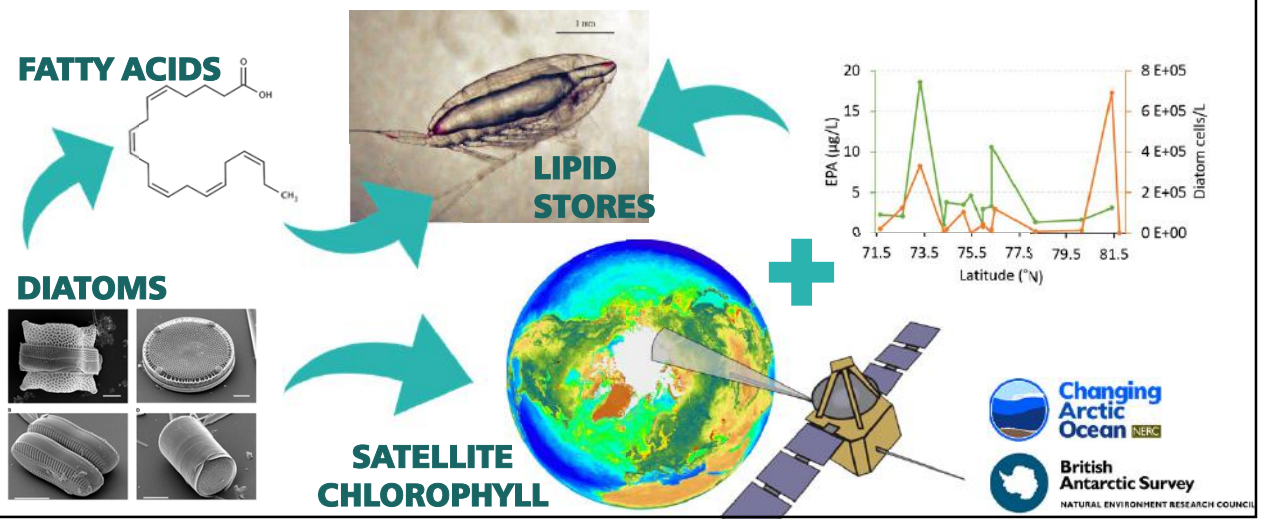
- With sea ice decline oceanic pathways of nutrients change, impacting BGC
- First results from the high-resolution models are examined



- Simulated ocean and ice is in good agreement with data
- Results show delineation between the Pacific and Atlantic provinces with potential shift in the circulation in mid-21 century.

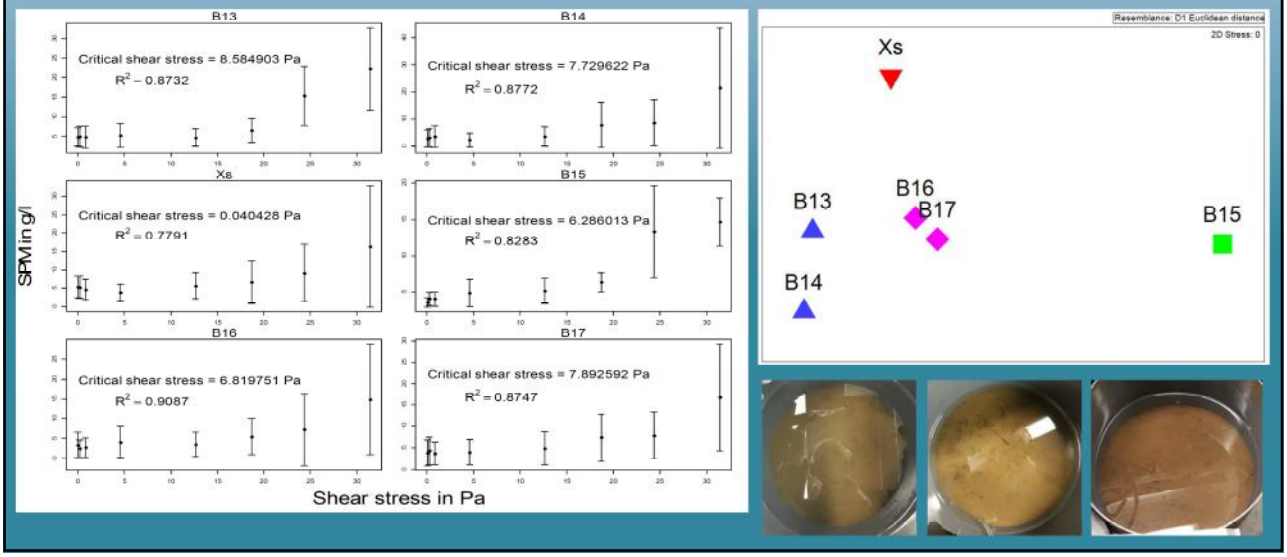
Finding the diatoms amongst the clouds: Can satellites help us understand copepod fitness?

Anna Belcher, Geraint Tarling, Dave Pond, Louise Ireland, Sarah Reed and Elaine Mitchell



Sediment erodibility and resuspension effects along a north-south transect throughout habitats of varying water mass distribution

Saskia Rühl



University of BRISTOL

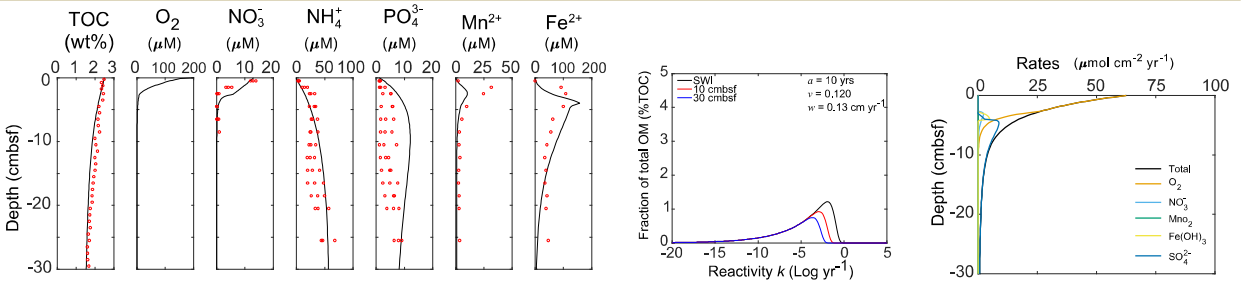
ULB UNIVERSITÉ LIBRE DE BRUXELLES

Patterns of benthic-pelagic coupling across the sea-ice transition in the Barents Sea: a Reaction-Transport model approach

Felipe S. Freitas, James Ward, Kate Hendry, Sandra Arndt

Changing Arctic Ocean Seafloor - ChAOS

Inverse modelling | OM Reactivity | OM Degradation

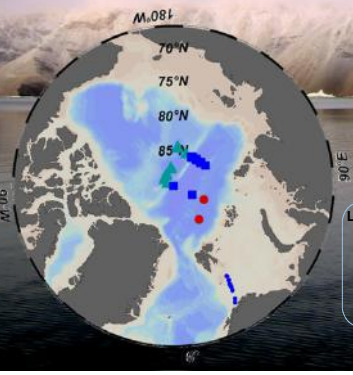


Water column biogeochemistry in the Central Arctic – a tale of 3 basins Insights from nitrate stable isotopes

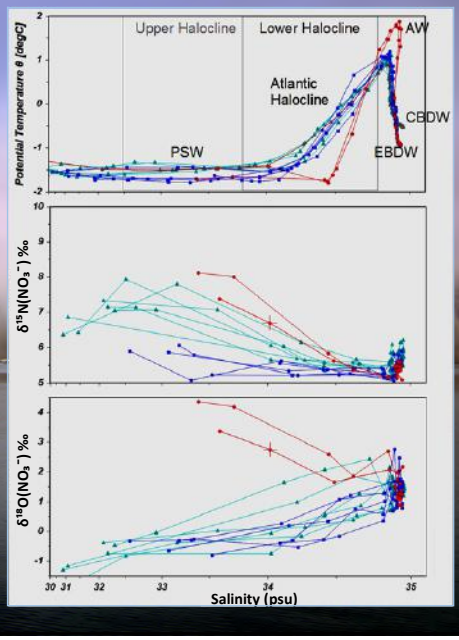
Antonia Doncila[1], Raja Ganeshram[1], Robyn Tuerena[1], Sian Henley[1]

[1]School of Geosciences, University of Edinburgh, antonia.doncila@ed.ac.uk

THE UNIVERSITY of EDINBURGH | E3 DTP | NERC | GEOTRACES | Changing Arctic Ocean



Left: map shows location of stations analysed (PS94) from Nansen, Amundsen and Makarov basins
Right: water masses and corresponding profiles of nitrate stable isotopes in the 3 basins

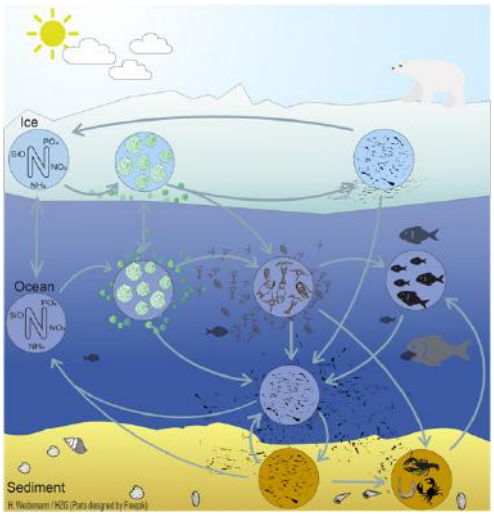


Implementing sea-ice algae into the biogeochemical model ECOSMO-E2E

Helmholtz-Zentrum Geesthacht
Zentrum für Material- und Küstenforschung

Déborah Benkort[1], Ute Daewel[1], Richard Hofmeister[1] and Corinna Schrum[1]
[1] Helmholtz-Zentrum Geesthacht, Geesthacht, Germany

ECOSMO-E2E food web model



How is the sea-ice algae phenology affected by the physical environment?

To what extent will these changes interact with the pelagic ecosystem in the Arctic?

MiMeMo Project
Microbes to Megafauna Modelling of Arctic Seas
www.changing-arctic-ocean.ac.uk/project/mimemo/

Spatial patterns in bulk $\delta^{15}N$ values of *Calanus finmarchicus* in the Eastern Barents Sea

Elliott Price, Rachel Jeffreys, Claire Mahaffey, Rowena Stern, Claudia Castellaini, Louisa Norman, Jo Hopkins

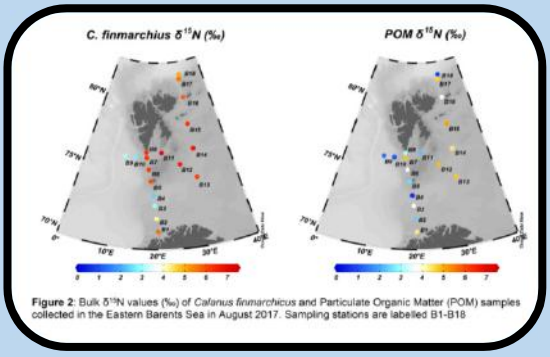


Figure 2: Bulk $\delta^{15}N$ values (‰) of *Calanus finmarchicus* and Particulate Organic Matter (POM) samples collected in the Eastern Barents Sea in August 2017. Sampling stations are labelled B1-B18.

Relationship between:

- *C. finmarchicus* $\delta^{15}N$ values and temperature, salinity and chlorophyll-a.
- *C. finmarchicus and Particulate Organic Matter* $\delta^{15}N$ values.
- Variation in *C. finmarchicus and Particulate Organic Matter* $\delta^{15}N$ values.

CHronobiology of Changing Arctic Sea Ecosystems (CHASE) 2018 - 2021

Grigor J. J.[1], Cohen J. H.[2], Last K. S.[1]

1. SAMS, Scottish Marine Institute, Oban, Scotland, UK; 2. University of Delaware, Lewes, Delaware, USA

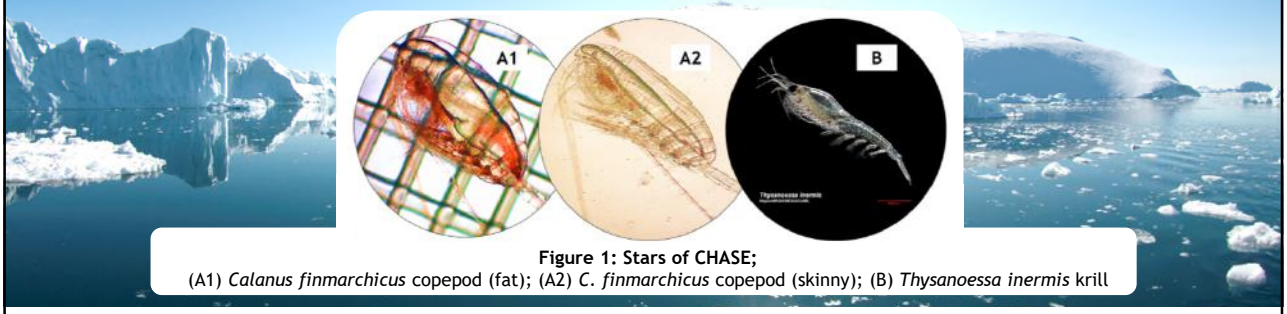


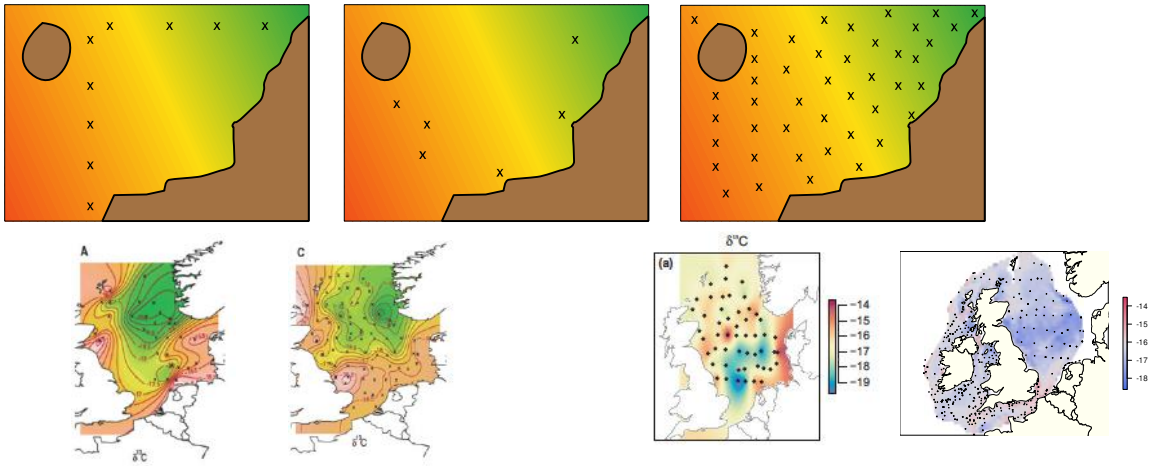
Figure 1: Stars of CHASE;
(A1) *Calanus finmarchicus* copepod (fat); (A2) *C. finmarchicus* copepod (skinny); (B) *Thysanoessa inermis* krill

As the Arctic Ocean is warming, zooplankton including the copepod *Calanus finmarchicus* and the krill *Thysanoessa inermis* are undergoing range extensions into the Arctic Ocean, where they encounter a very different light regime.

Our aim is to investigate the behavioural and physiological responses of *C. finmarchicus* and *T. inermis* to their "natural" (Scottish fjord) and new (Arctic fjord) photoperiodic environments.

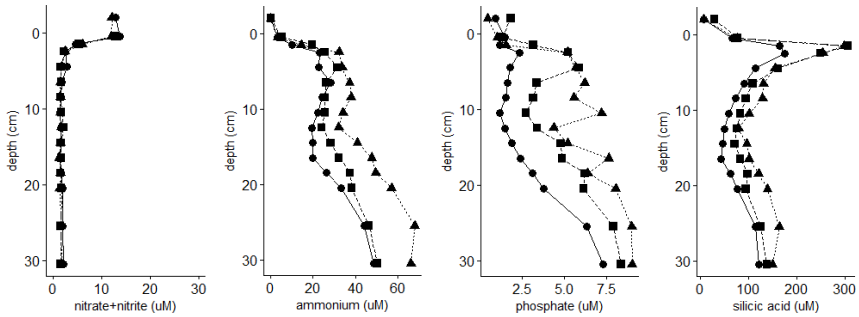
Generating isoscape models from reference samples: some practical and statistical considerations.

Clive N. Trueman Kirsteen M. MacKenzie Matthew Cobain



Macronutrient cycling in Arctic sediments and benthic-pelagic coupling

Photo: Johan Faust

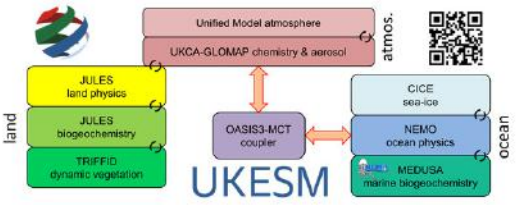


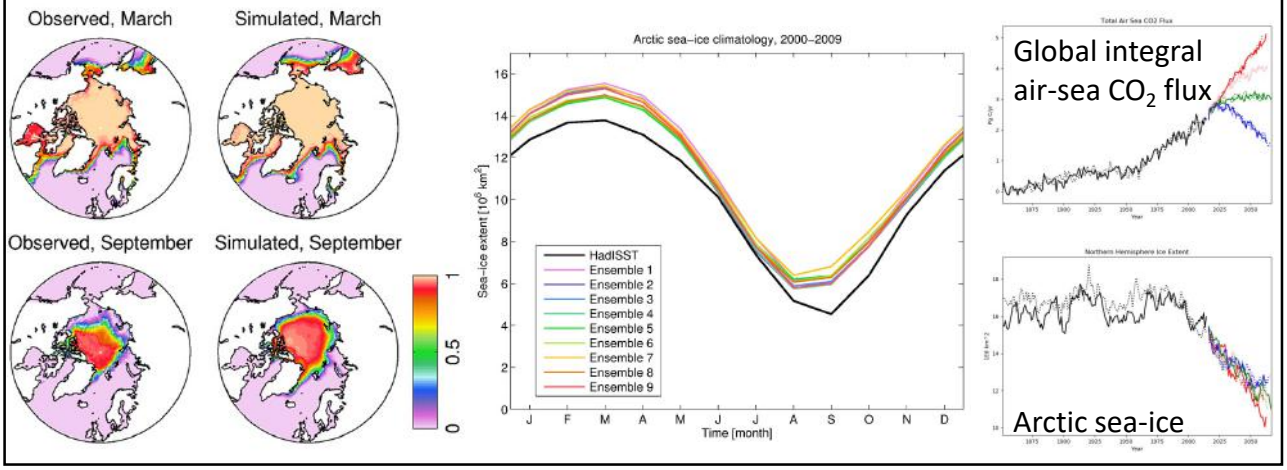
SIAN F. HENLEY, JOHAN C. FAUST, MARK STEVENSON, ALLYSON TESSIN, TIM BRAND, KATE HENDRY, CHRISTIAN MÄRZ

UKESM1, CMIP6 and the Arctic

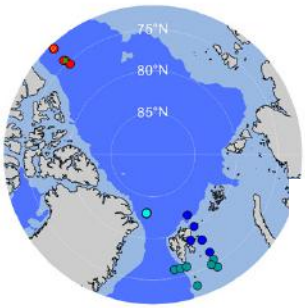
A. Yool [1], J. Palmiéri [1], L. de Mora [2], C. Jones [3], A. Sellar [4], Y. Aksenov [1], S. Rynders [1], and the UKESM1 core team [5]
[1] NOC; [2] PML; [3] NCAS; [4] UKMO; [5] Lots of other places

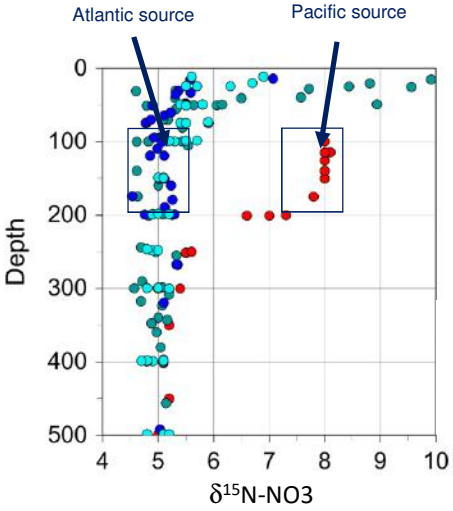
Projects: ARISE, Arctic PRIZE, DIAPOD, APEAR



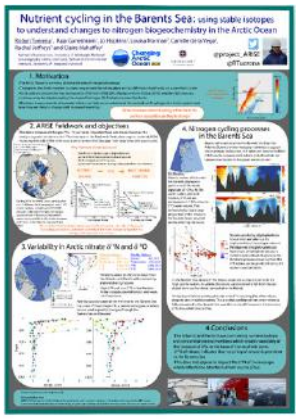


Nutrient cycling in the Barents Sea: ARISE project
R. Tuerena





Blue/Green: This study
Red: Granger et al., 2018
Cyan: Fripiat et al., 2018



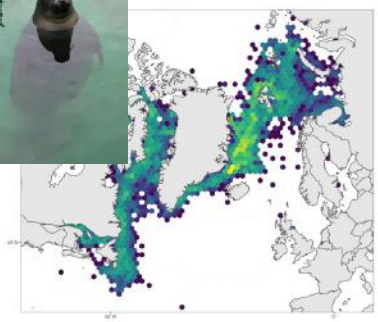
Harp Seals and Stable Isotopes: ARISE

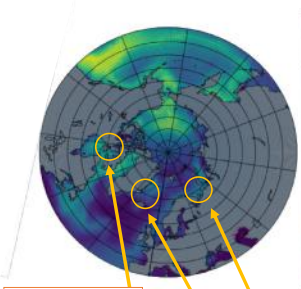
Sophie Smout[1], Jo Kershaw[1], James Grecian[1]

[1.] SMRU, University of St Andrews

University of St Andrews

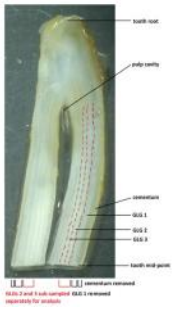
Changing Arctic Ocean NERC



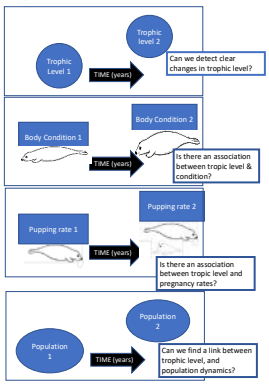


Canadian samples from 1980, 1990 & 2000
Male and female, 4 to 6 years old

East Atlantic samples from multiple years between 1980 to 2010.
Male and female, 4 to 6 years old



Importance



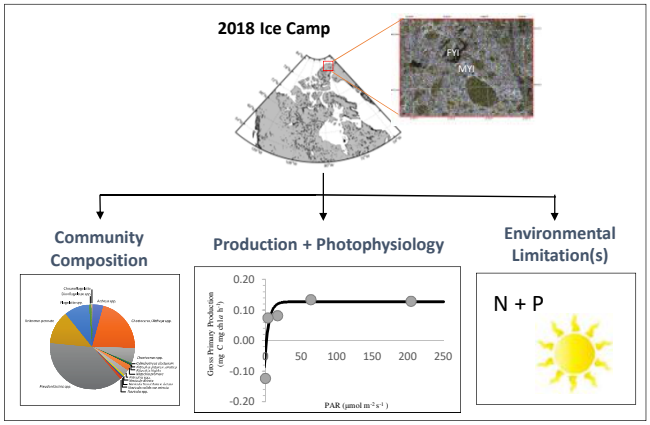
Characterizing the diatom bloom of contrasting sea ice habitats in the Lincoln Sea

K. Campbell[1] • C. Michel[2] • B. Lange[2] • J.C. Landy[1] • J. Charette[2] • S. Duerksen[2] • P. Tremblay[2] • M. Nicolaus[3] • P. Anhaus[3] • C. Carlyle[2] • P. Coupel[4] • C.J. Mundy[5] • S. Rysgaard[5,6] • M. Tranter[1]

[1]Bristol Glaciology Centre, University of Bristol; [2]Department Fisheries and Oceans Canada; [4]Alfred Wegener Institute; [5]Bedford Institute of Oceanography; [6]Centre for Earth Observation Science,, University of Manitoba,; [7]Arctic Research Centre, University of Aarhus

The **Diatom-ARCTIC** project seeks to identify autecological (species-specific) responses of ice algae to growth conditions

- Highlights from our first field season in spring 2018 lead by Canadian DFO collaborators as part of the Multidisciplinary Arctic Program – Last Ice
- Comparison of ice algal community composition and primary production from contrasting first-year and multi-year ice habitats

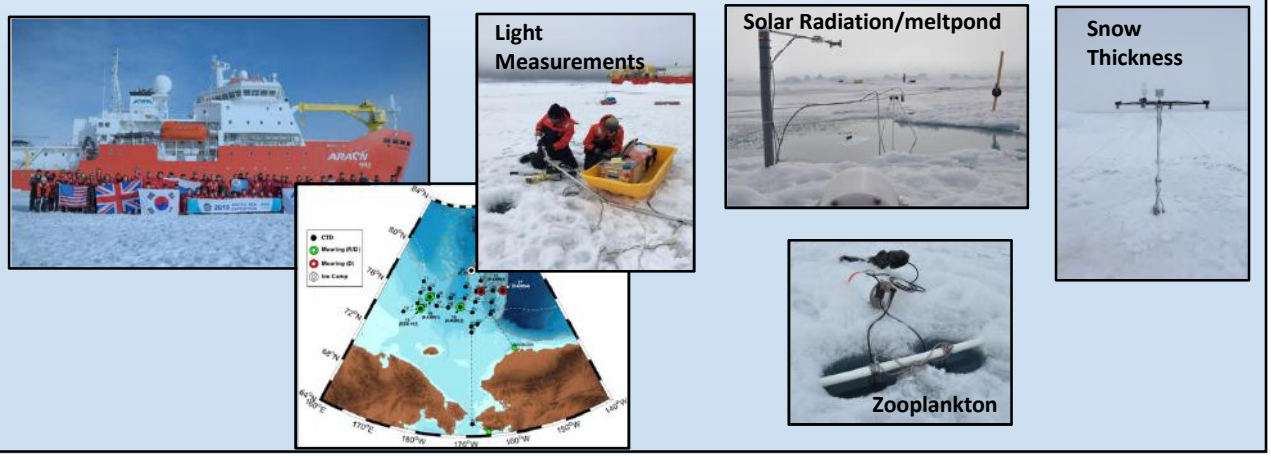


Eco-light: Field and robotic observations in 2018

By the Eco-Light team

Our poster describe the recent KOPRI *Araon* cruise (August 4-26, 2018) to the Chukchi Sea. Our poster summarises both the shipborne and long-term robotic deployments that were performed. We also introduce next year's Arctic campaign.

If you are interested in hearing more, please pop along ☺



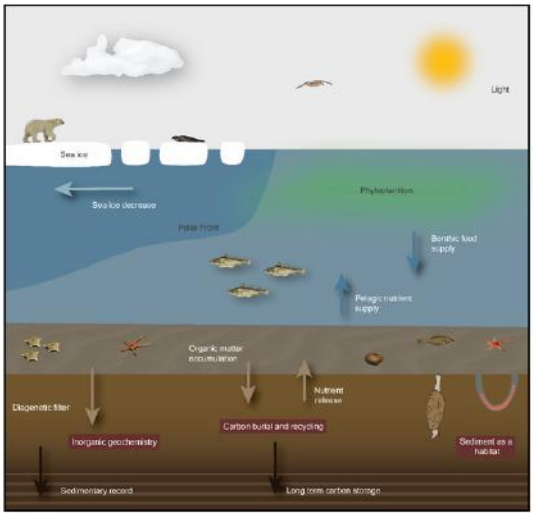
Changing Arctic Ocean NERC

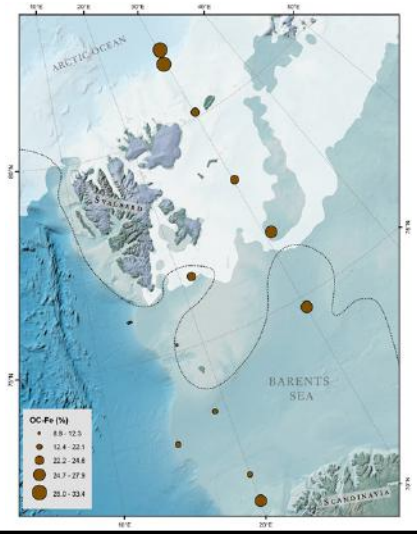
Does sea ice reduction enhance preservation of organic carbon in Arctic marine sediments?

Johan C. Faust, Allyson Tessin, Mark A. Stevenson, Geoffrey D. Abbott, Christian März

Newcastle University

UNIVERSITY OF LEEDS





EISPAC - Effects of ice stressors and pollutants on the Arctic marine cryosphere

Mechanistic insight into the uptake and fate of persistent organic pollutants in sea ice

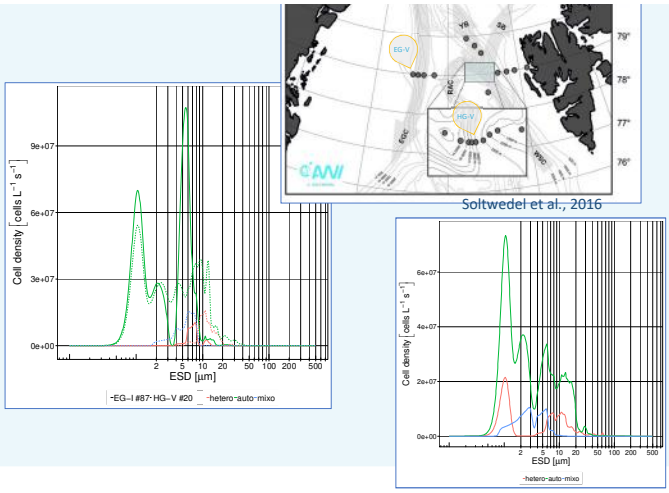
Lancaster University | UEA University of East Anglia | Cefas | NERC Science of the Environment | Helmholtz-Zentrum Geesthacht Zentrum für Material- und Küstenforschung | EISPAC | Changing Arctic Ocean

Resolving phytoplankton size spectra in a Changing Arctic Ocean

Vanessa Lampe*, Eva-Maria Nöthig◦, and Markus Schartau*
* GEOMAR Helmholtz-Centre for Ocean Research | ◦ Alfred-Wegener-Institute Helmholtz-Centre for Polar and Marine Research

Kernel-Density Estimations yield non-parametric size spectra

- Physiological and predator-prey interactions are size dependent
- Changes in the community size structure are resolved using a Kernel-Density-Estimation approach
- Spectra will be used to devise a novel size-based plankton ecosystem model

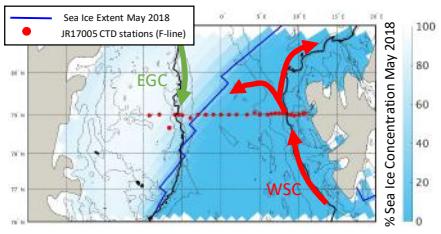


Hydrography and circulation across the Fram Strait and East Greenland Shelf in early summer

Jo Hopkins[1], Richard Abell[2], Robyn Tuerena[3], Louisa Norman[4], Raja Ganeshram[3], Claire Mahaffey[4]

Project ARISE

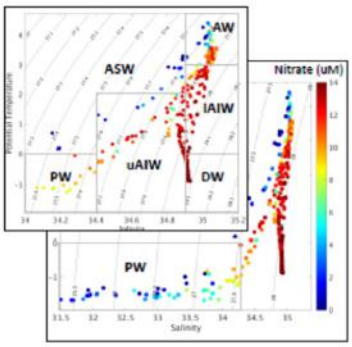
JR17005 May 2018 stations and sea ice cover



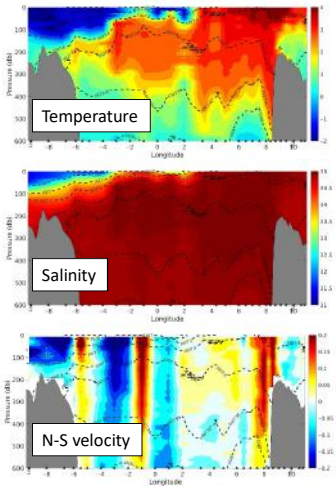
Isotopic values at the base of the food chain are sensitive to a range of environmental factors

*Interpretation of the dissolved and particulate isotopic signatures will be informed by our understanding of the **hydrography** and **circulation***

Fram Strait water mass classification and nutrient concentrations



Fram Strait circulation and hydrography



Well-known, yet uncertain: Carbon Monoxide & Dimethyl Sulfide in a Changing Arctic Ocean

CO

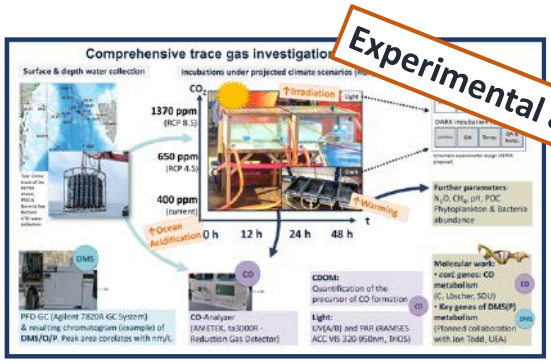
DMS

Hanna Campen
GEOMAR Helmholtz Centre for Ocean Research Kiel, hcampen@geomar.de

D. Arévalo-Martínez[1], M. Baumann[1], I. Brown[2], G. Tarran[2], J. Maud[2], C. Löscher[3], A. Rees[2], H. Bange[1]
[1]PML Plymouth Marine Laboratory, UK [2]SDU University of Southern Denmark, DK

! Ubiquitous
! Climate active

? Pathways & Emissions
? Future



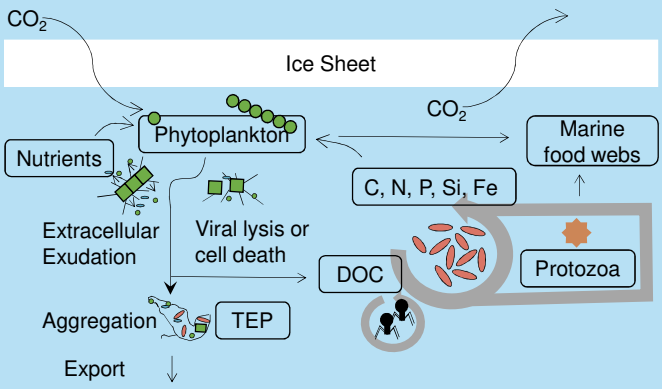
Experimental approach

= Pathways and Emissions of climate relevant TRace gases in a changing Artic Ocean

The Arctic Ocean - A Bacterial Perspective

Anabel von Jackowski, Julia Grosse, Anja Engel

GEOMAR



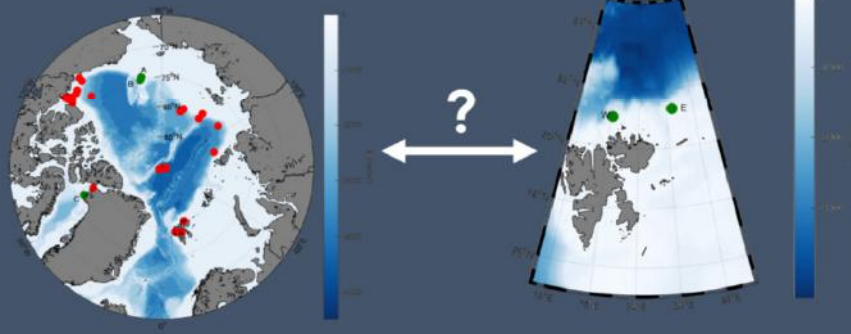
Our goal within Micro-ARC is to:

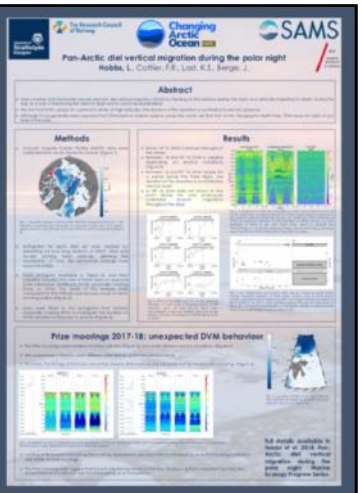
- Understand the **microbial activity** within the **Arctic basin** using available data
- Understand the microbial **cycling of organic matter** on seasonal scales using newly acquired data (cruises 2018, 2019/2020)

Figure 1 | Sampling locations for bacterial production within the Arctic Circle (66°N) from 1988-2014.

Pan-Arctic diel vertical migration during the polar night

Hobbs, L., Cottier, F.R., Last, K.S., Berge, J.

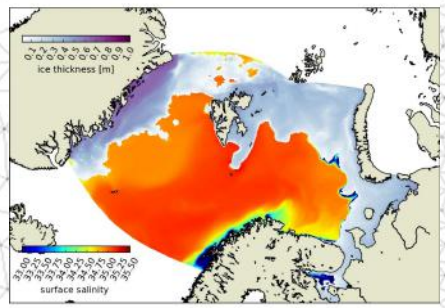


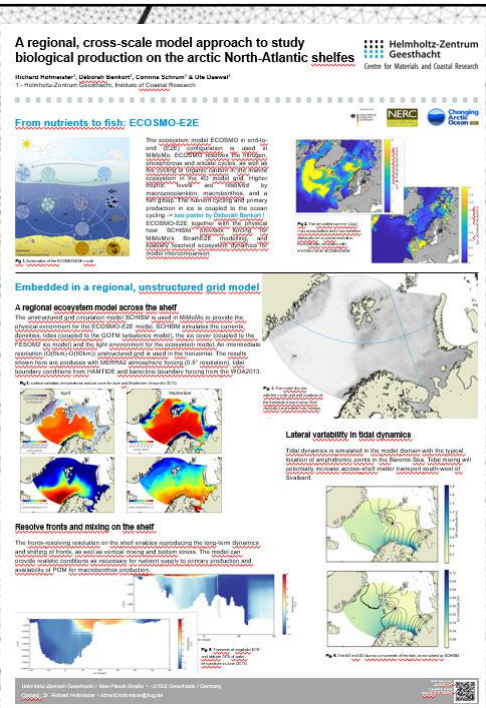


3D end-to-end ecosystem modelling in MiMeMo

Richard Hofmeister, Ute Daewel, Déborah Benkort & Corinna Schrum

- present downscaling approach & model system
- SCHISM water physics
- FESOM2 ice
- ECOSMO-E2E ecosystem
- first results of the new setup





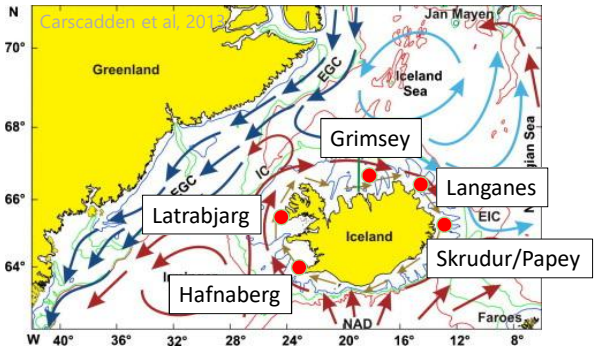
Project LOMVIA

Characterizing dietary niches between two competing seabird species with bulk and compound specific isotope biomarkers

Capelin

Lesser sand-eel

Northern krill



Herring

Atlantic cod

Mackerel

Max-Planck-Institut für Menschheitsgeschichte

Náttúrustofa Norðausturlands

British Antarctic Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

Bundesministerium für Bildung und Forschung

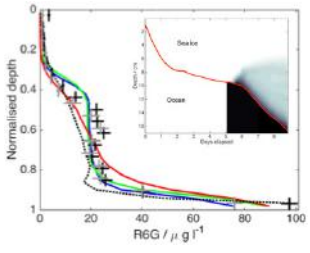
Changing Arctic Ocean

First results on biogeochemical tracer transport and photochemistry from the Roland von Glasow Air-Sea-Ice Chamber (RvG-ASIC)

Jan Kaiser[1] (j.kaiser@uea.ac.uk), Roland von Glasow[1,†], Odile Crabeck[1], Max Thomas[1], James France[1], Josué Bock[1], Karen Heywood[1], Martin Wadley[1], Ben Wadley[1], Tim Wadley[1], Rowan Cox[1], Carla Webb[1], Crispin Halsall[2], Jack Garnett[2], Catherine Larose[3] Rose Layton[3], Ellen Damm[4], Josefa Verdugo[4], Dirk Notz[5],Verena Hof[5], Leif Riemenschneider[5], Jean-Louis Tison[6], Bruno Delille[7], Marie Kotovich[7], Fanny van der Linden[7]

[1]Centre for Ocean and Atmospheric Sciences, School of Environmental Sciences, University of East Anglia, Norwich, UK
[2]Lancaster Environment Centre, Lancaster University, Lancaster, UK [3]Ecole Centrale de Lyon, Ecully, France
[4]Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany [5]Max Planck Institute for Meteorology, Hamburg, Germany
[6]Laboratoire de Glaciologie, Université de Bruxelles, Bruxelles, Belgium [7]Unité d'Oceanographie Chimique, Université de Liège, Liège, Belgium

From testing gravity drainage parameterisations …



Apply for free TNA.

EUROCHAMP 2020

T&Cs apply.

… to microbial seeding of frost flowers.