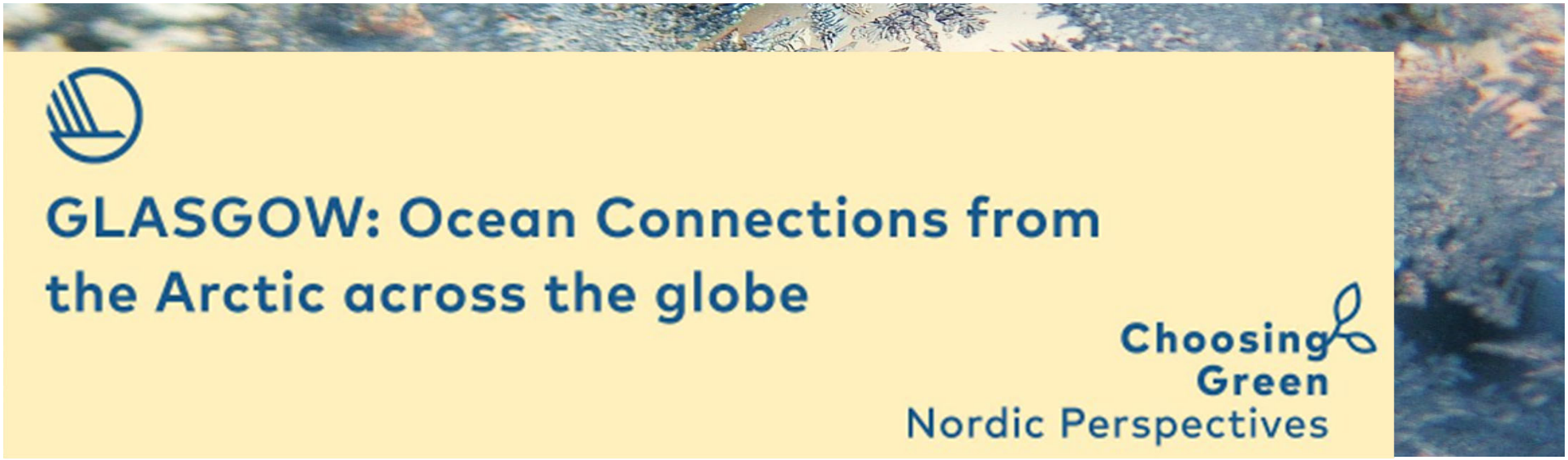

GLASGOW: Ocean Connections from the Arctic across the globe

Choosing Green
Nordic Perspectives

Moderators
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Sian Henley

Panellists
Mark Payne
Jacob Høyer
Noel Keenlyside
Marit Reigstad

THE UNIVERSITY of EDINBURGH

Scottish Government
Riaghaltas na h-Alba
gov.scot
marinescotland

Danmarks Meteorologiske Institut

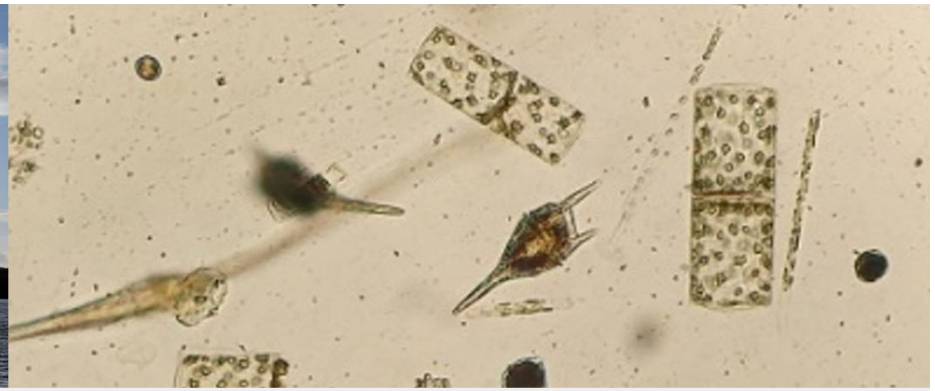
GHRSST
GROUP FOR HIGH RESOLUTION SEA SURFACE TEMPERATURE

BJERKNES CENTRE for Climate Research

UNIVERSITY OF TROMSØ
UiT / THE ARCTIC UNIVERSITY OF NORWAY


The ocean is central in global climate change

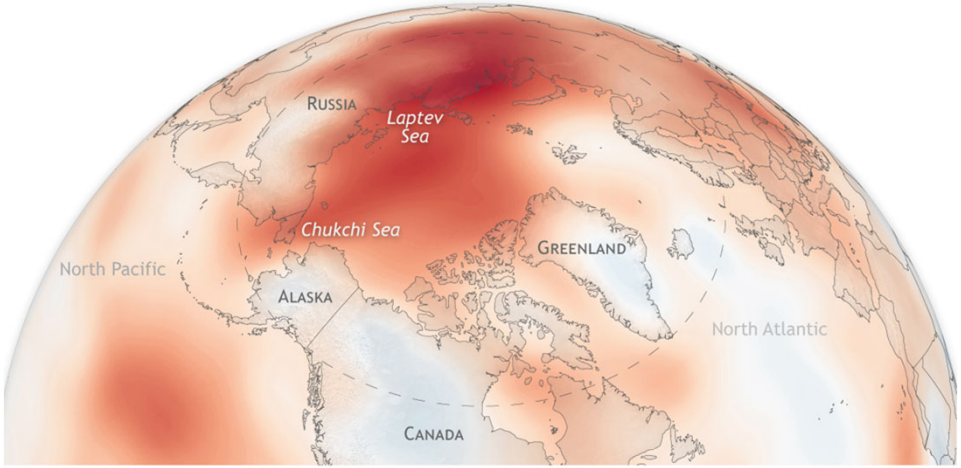

Increased greenhouse gas emissions have created an imbalance and energy has accumulated in the Earth system.
The vast majority of this trapped energy has been taken up and stored by the ocean.
89
1
4
6



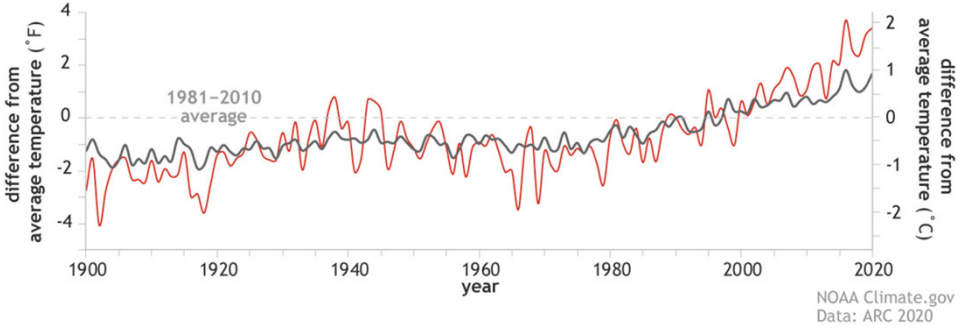
The ocean is central to our own livelihoods.


Climate Change is impacting the Arctic Ocean and
its ecosystems *more significantly than anywhere else on Earth*
Image: S. Henley

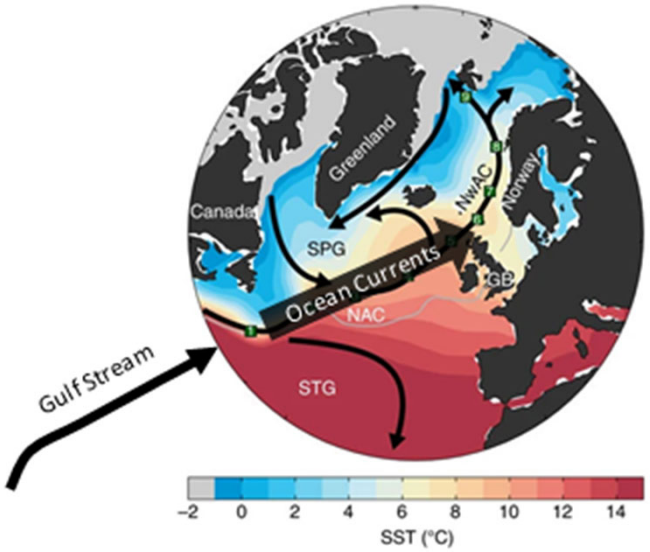
2020 WAS ARCTIC'S SECOND-WARMEST YEAR ON RECORD



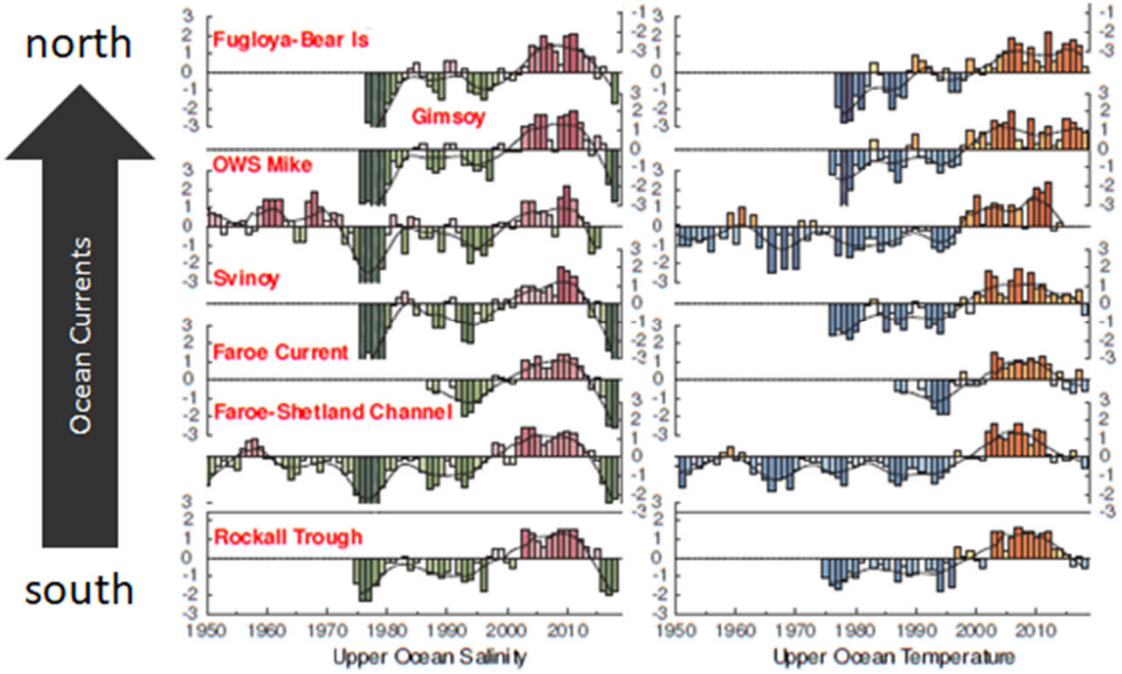
ARCTIC WARMING MORE THAN DOUBLE THE GLOBAL AVERAGE SINCE 2000



Connections via the ocean



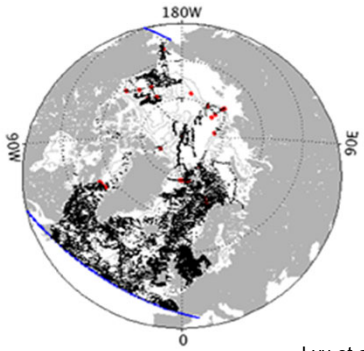
Årthun *et al.* (2017) *Nature Communications*



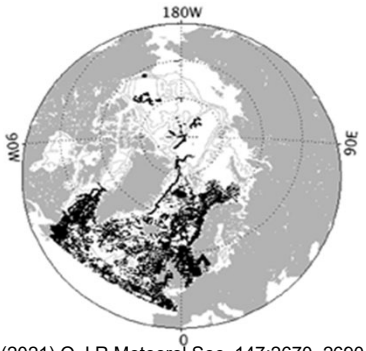
Updated from Holliday *et al.* (2011) *GRL*

Arctic Ocean observations are sparse, but the sustained ocean observing system is improving.

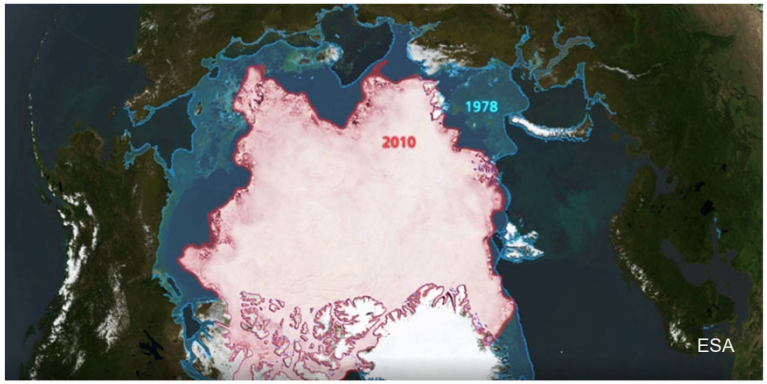
Summer (May-Oct)

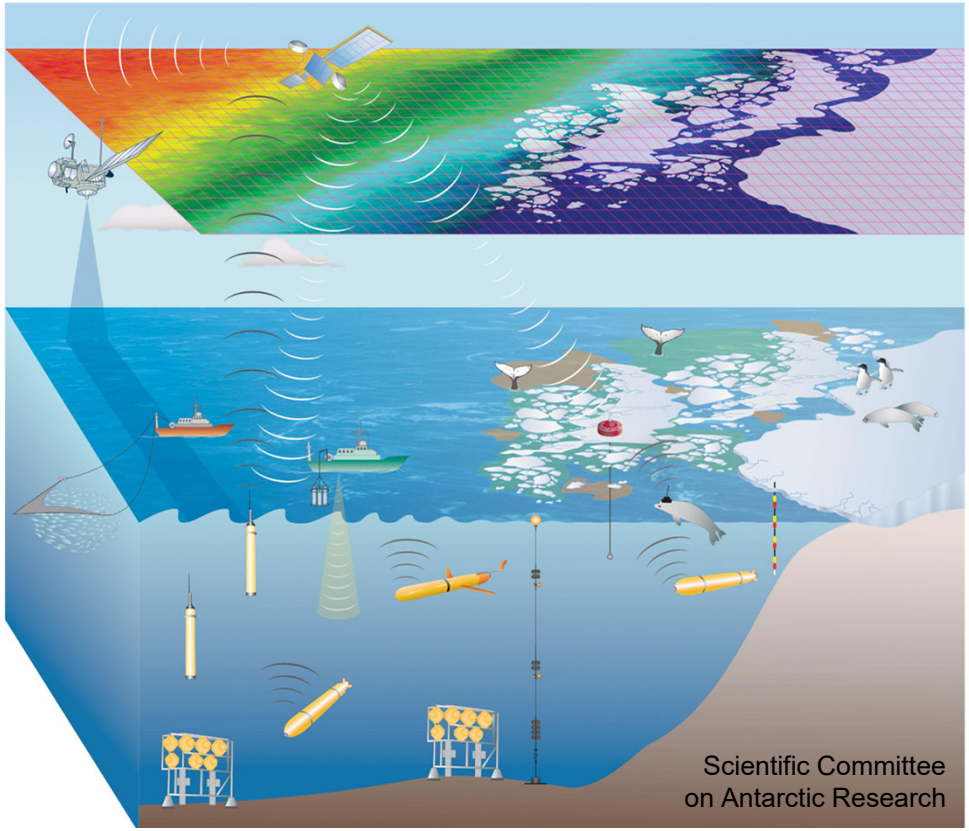


Winter (Nov-Apr)

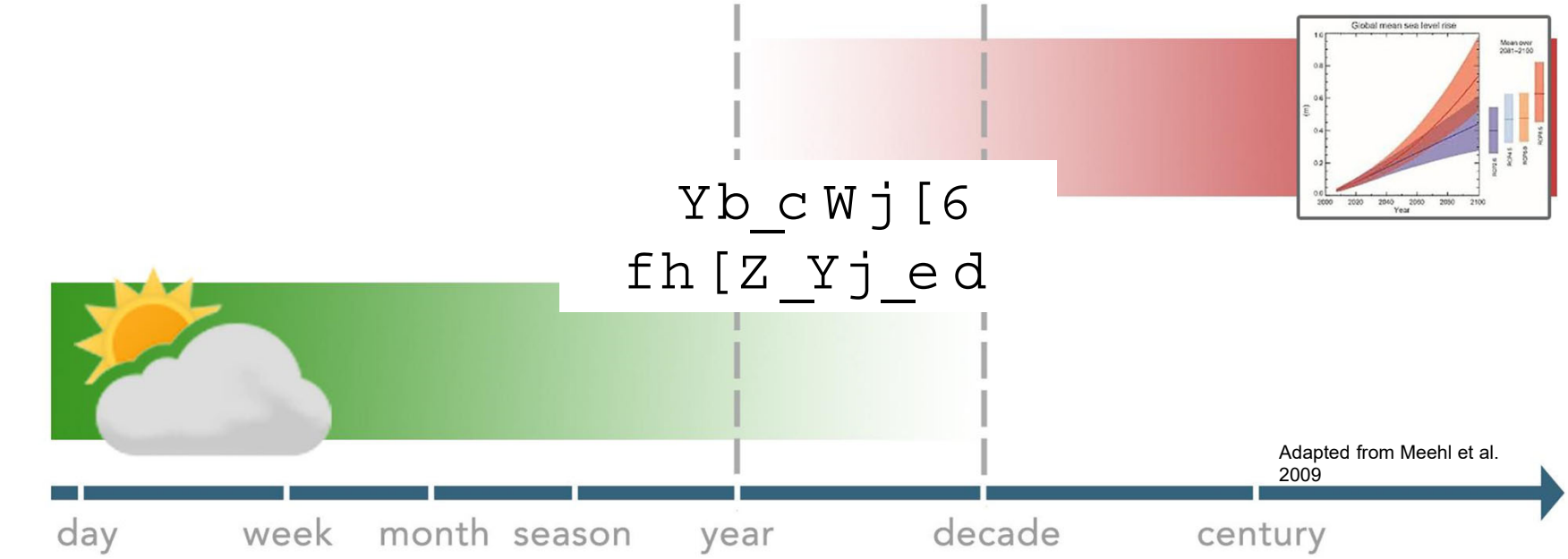


Lyu et al. (2021) Q J R Meteorol Soc. 147:2670–2690





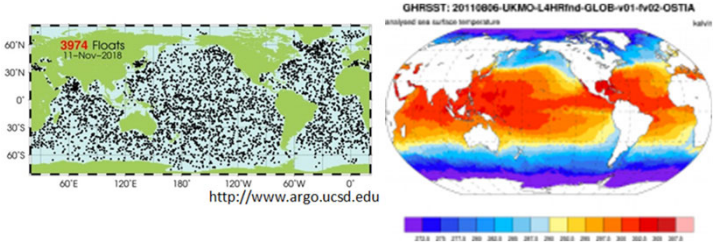
Delivering useful information on near-term change



Comprehensive numerical models

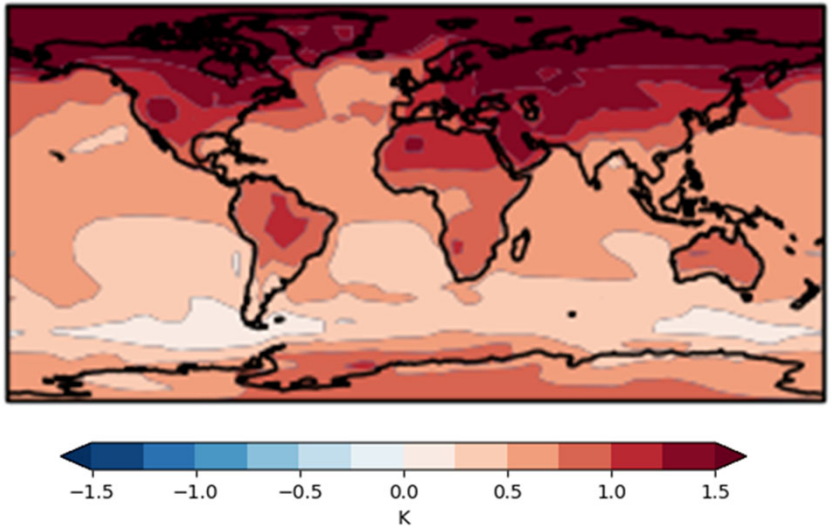
Image source: NOAA.

Detailed climate observations



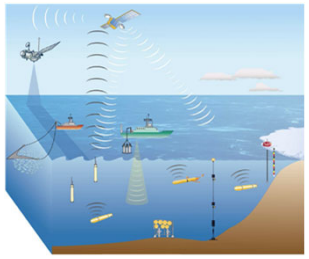
Powerful super computers

Prediction of surface temperature for the 2019-2023

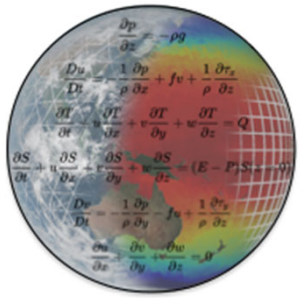


https://hadleyserver.metoffice.gov.uk/wmolc/

Building Marine Ecological Climate Services



Observations

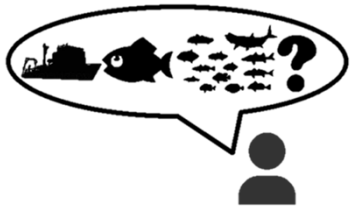


Computer Models

Ocean Physics Forecasts (Temp, Salinity)

Marine Biology

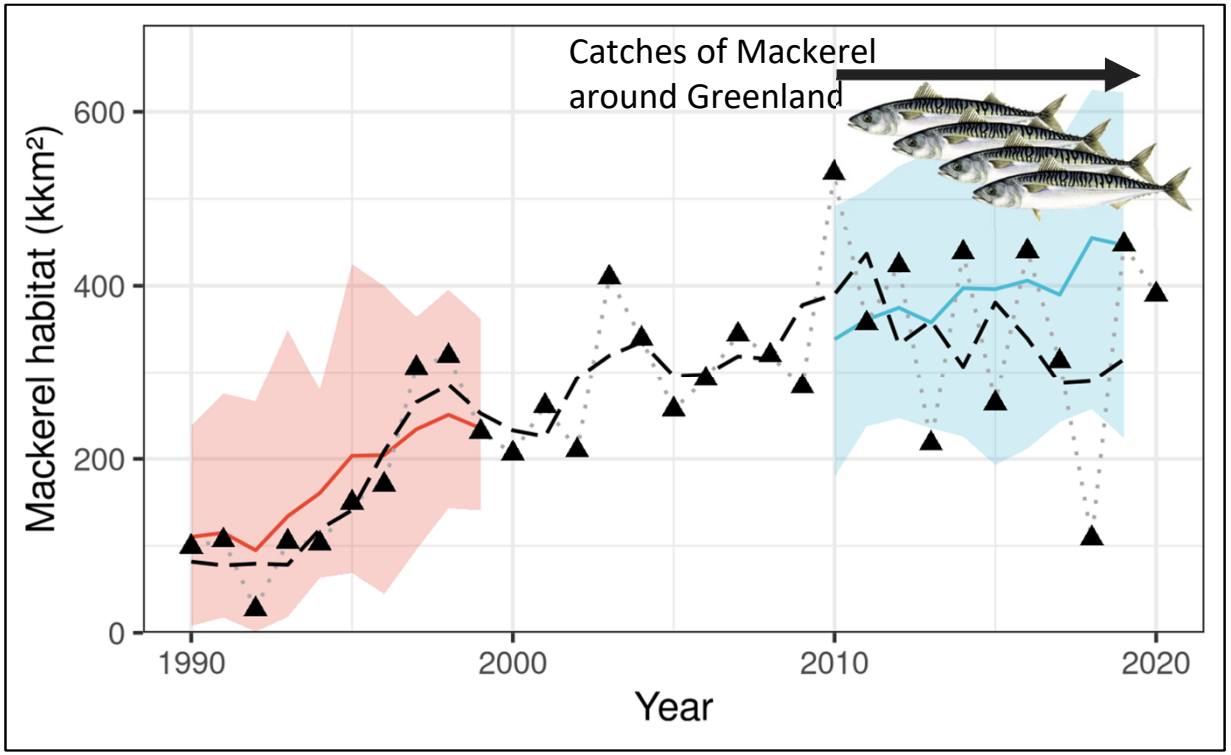
Marine Ecological Climate Services
Societally relevant & tailored forecast products

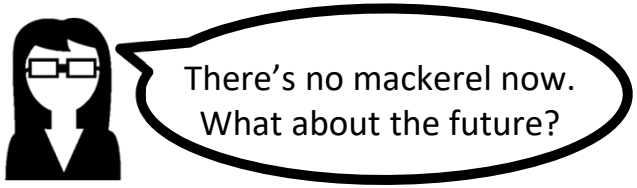


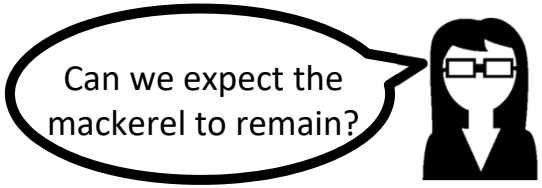
Data

Information

Ecological forecasts of important fish stocks







Observations

Habitat

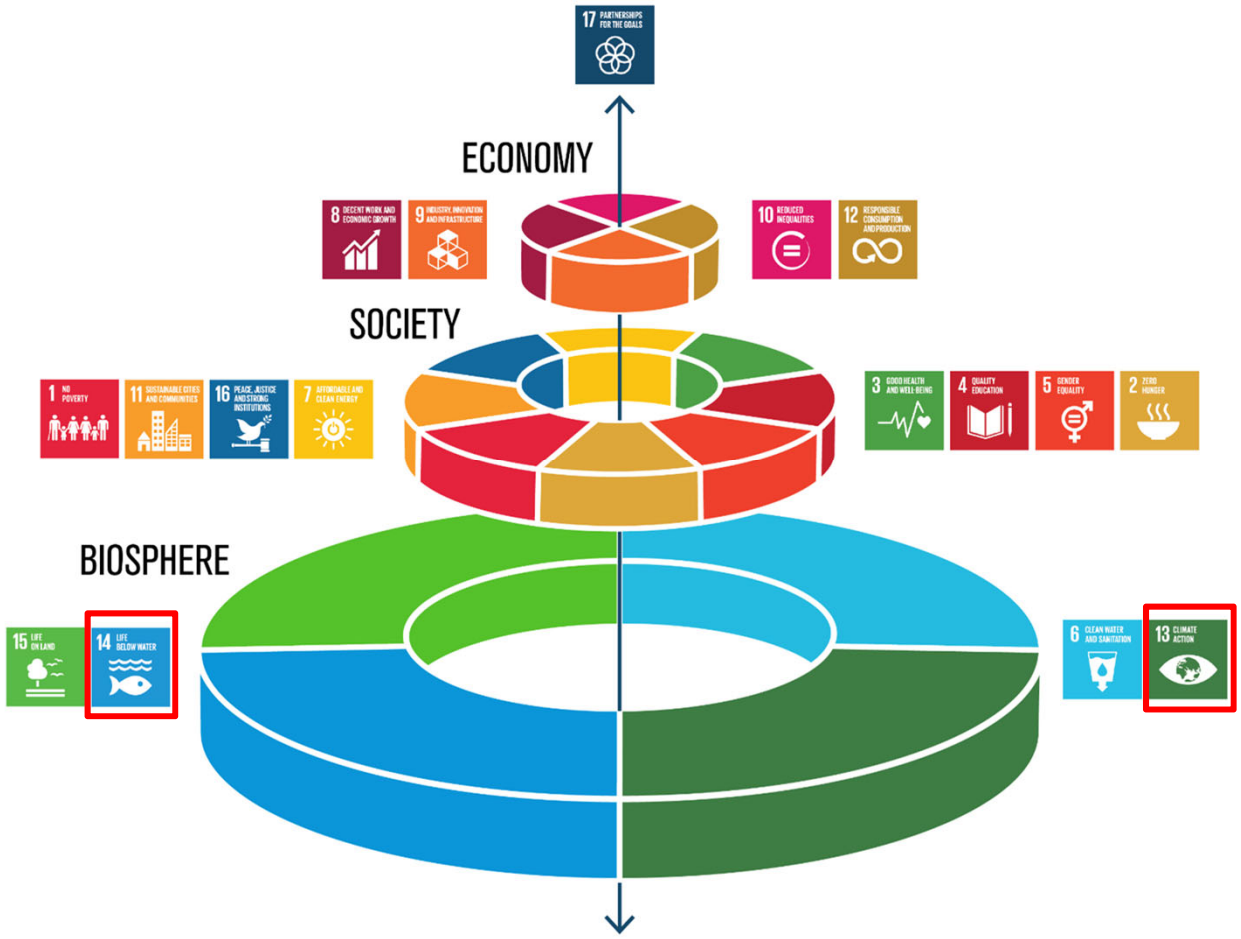
Rolling mean

Forecast

1990

2010

Ecological forecasts can support decision making in a changing climate



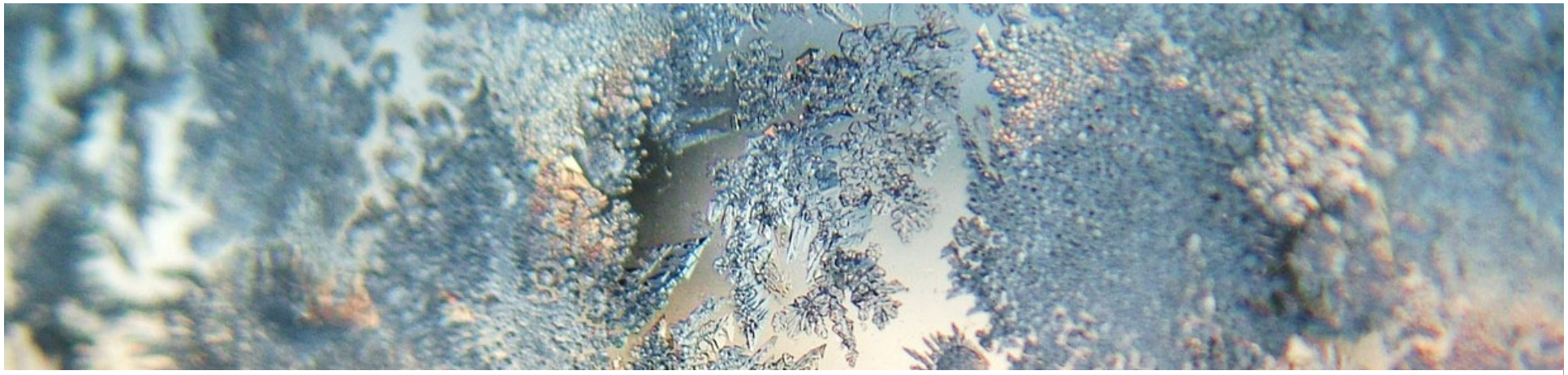
Rockstrom, Azote Images for Stockholm Resilience Centre


Go to **www.menti.com** and use the code **8120 4946**
Image: S. Henley

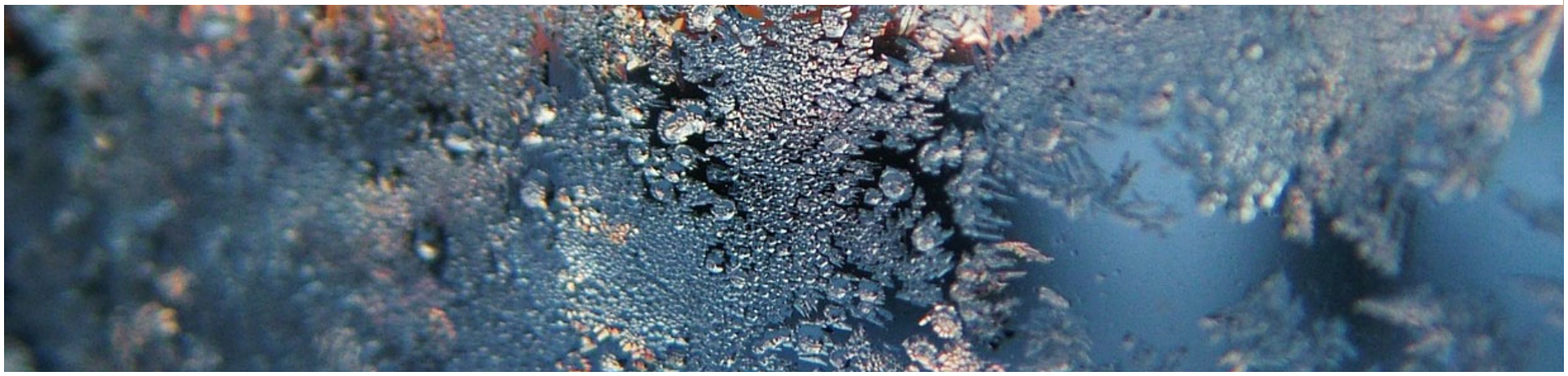
The ocean is central to humankind, providing us with food and economic wealth as well as regulating climate and buffering anthropogenic global warming.

The ocean and its ecosystems are increasingly impacted by global warming and CO_2 in the atmosphere. These impacts occur globally, but the changes in the Arctic ocean are 2-3 times the global average and stark.

We need to use the tools and information we have to ensure we prepare, adapt and take action to limit the consequences of climate change.



Extra Material



Challenges for improving Sea-Surface Temperature

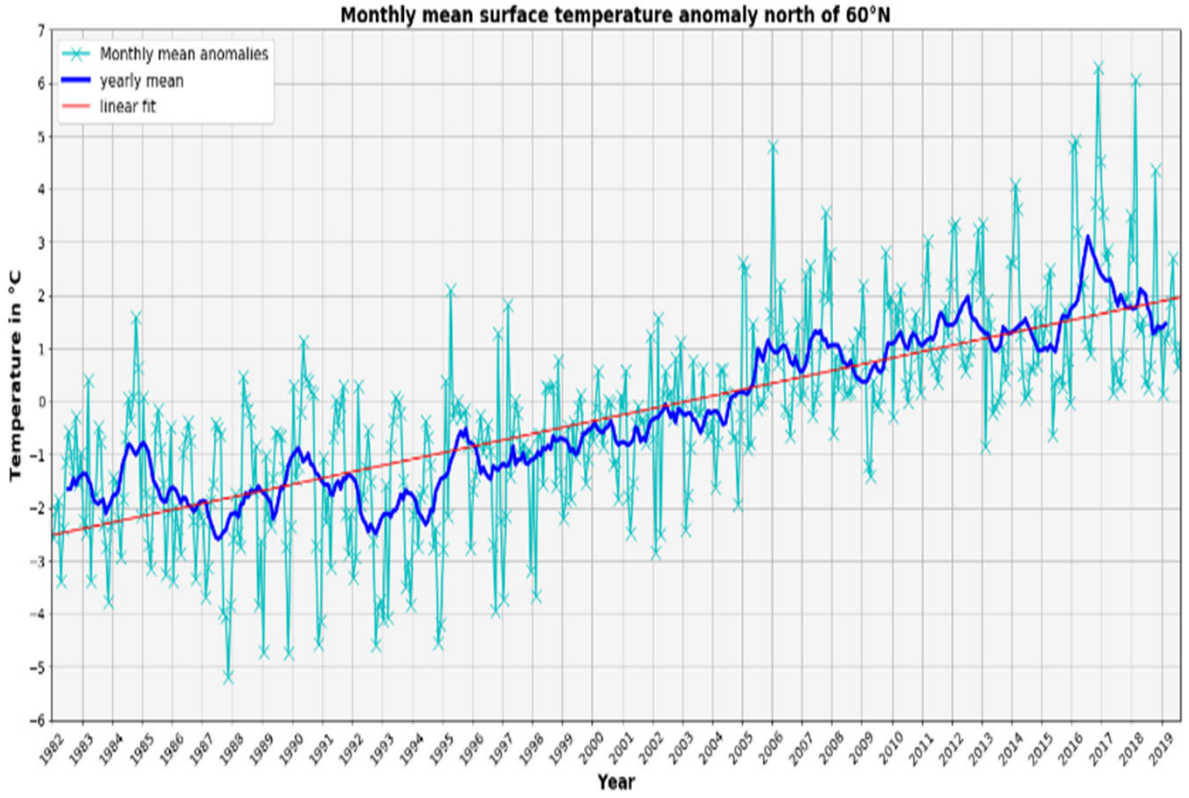
Improving SST data quality in the Arctic

4ºC increase in Arctic Ocean (>60 ºN) surface temperature

SST and Ice-Surface Temperature products enable Arctic monitoring

Challenges? Lack of in situ data, accurate identification of sea-ice

Need: Improvement of Passive Microwave (PMW) data availability in Arctic



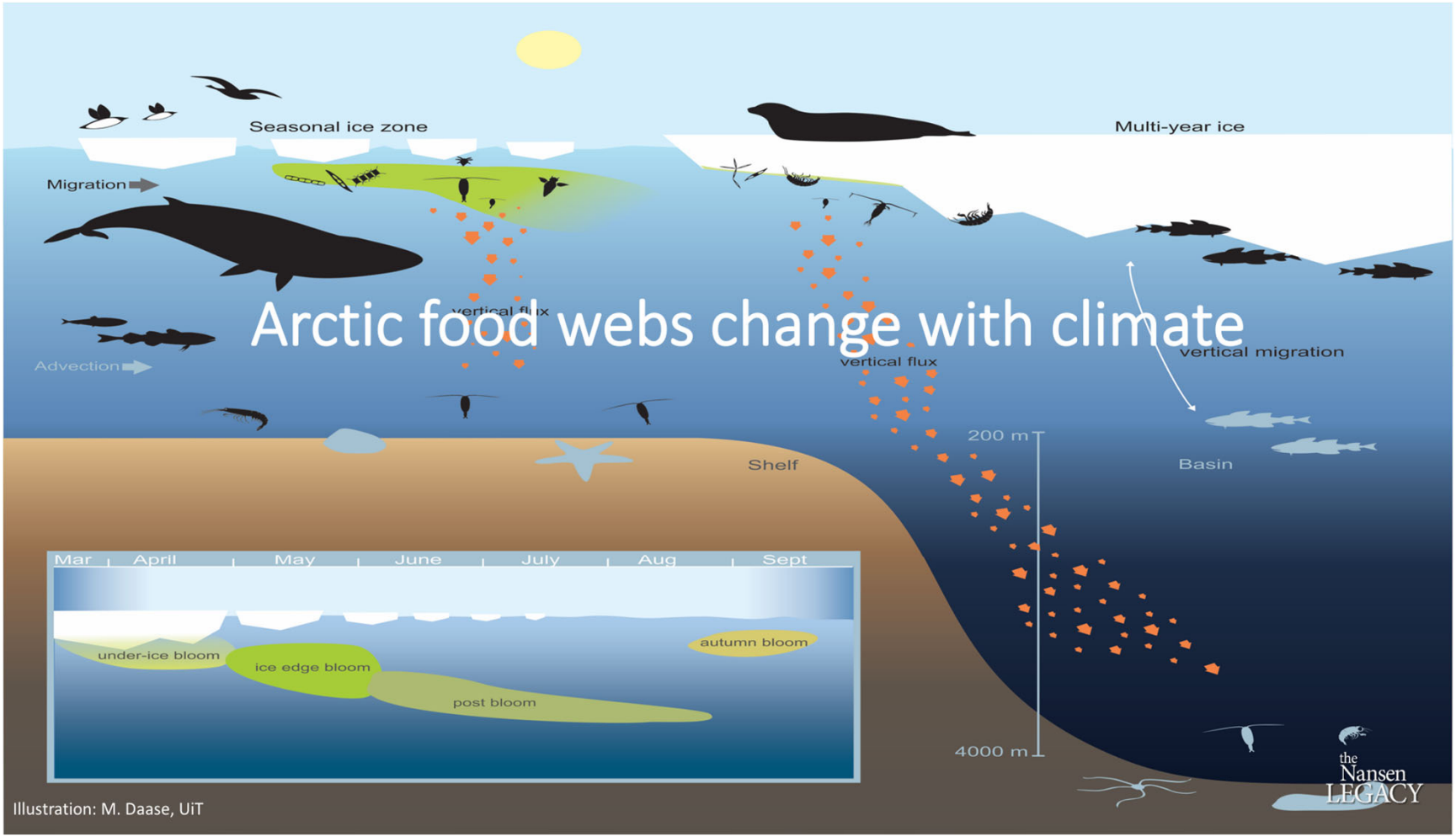
Thinner sea ice in the northern Barents Sea is fragmented by waves from open water storms, March 2021

New research: New scenarios of future climate responses identifies the Barents Sea as likely ice free also during winter by the end of this century, given business as usual

Årthun et al. 2021 , GRL

Photo: Sebastian Gerland, Norwegian Polar institute/ Nansen Legacy

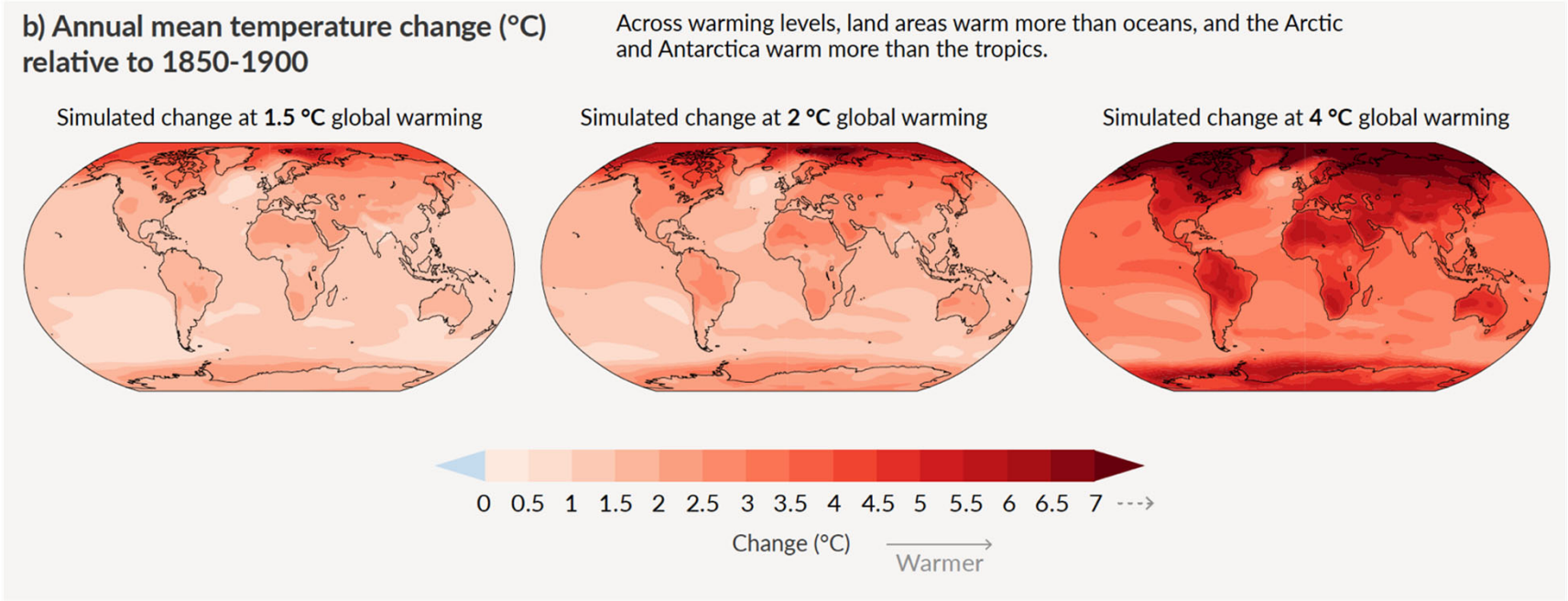
the Nansen LEGACY



Arctic food webs change with climate

Illustration: M. Daase, UiT

A changing climate warm the Arctic



IPCC AR6 WGI, 2021

the Nansen LEGACY

Very likely sea ice free summers

and a more acidic Arctic Ocean

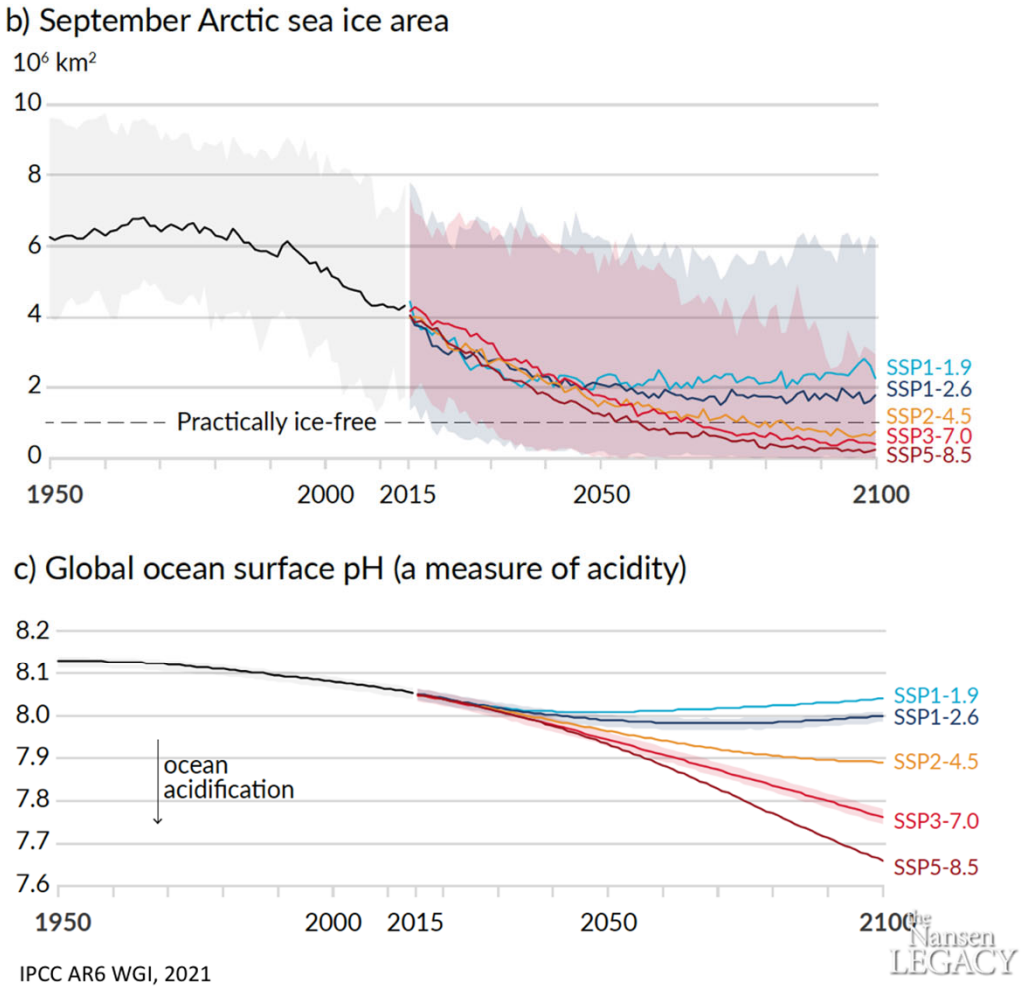


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Image source: NOAA.

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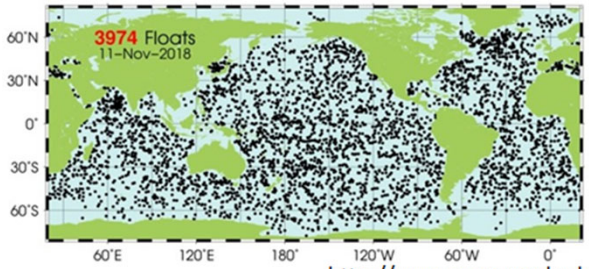
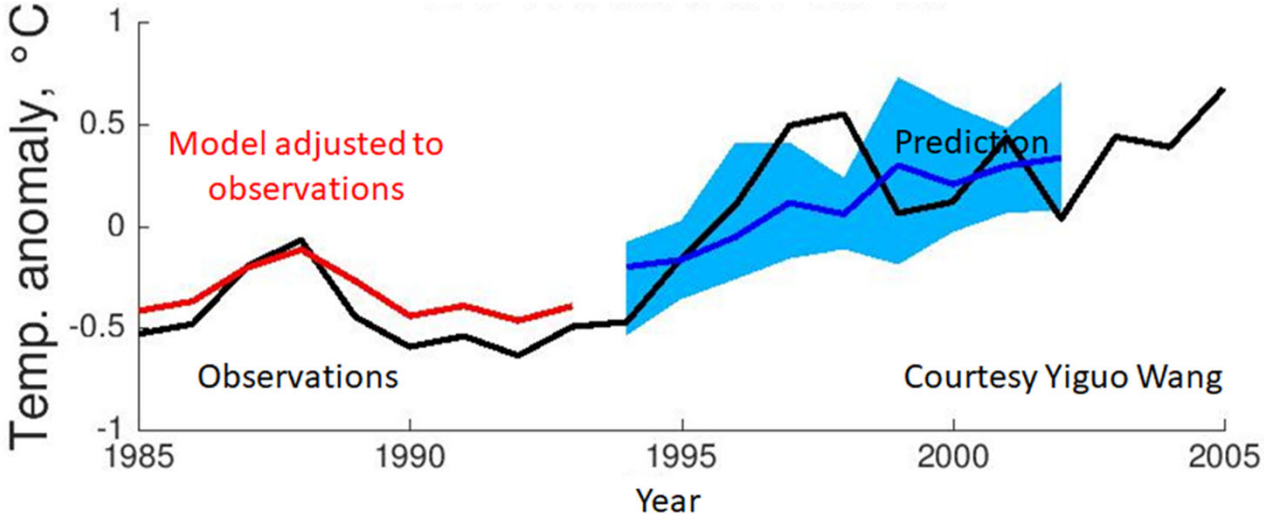
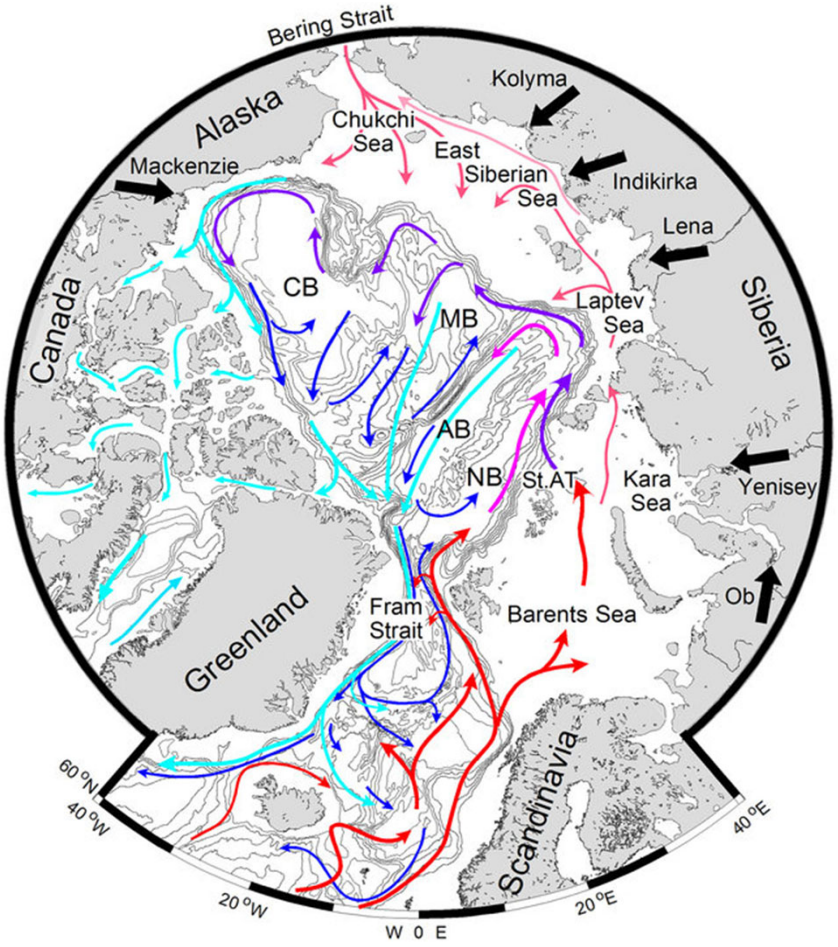


http://www.argo.ucsd.edu

Powerful super computers

Prediction of North Atlantic Sea Surface Temperature, starting in October 1993





Connections via the Ocean

Dominating Arctic Ocean currents with inflowing relative warms surface currents (red) and colder surface currents (light blue) together with intermediate and deep currents (magenta and dark blue).

Anderson & Macdonald (2015) Polar Research, 34. doi:10.3402/polar.v34.26891 (CC BY-NC 4.0)

Thank you!

This event has been co-organized by the Scottish Government, with the support of H2020 Blue-Action and GHRSST (Copernicus), H2020 TRIATLAS, H2020 ARCTIC PASSION and AMOC-ASAP