The Polar Ocean Mitigation Potential project and the A-DBO

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How to integrate coastal research and monitoring in A-DBO

Greenland Ecosystem Monitoring (GEM)

Polar Ocean Mitigation Potential (POMP)

POMP objective;

to advance the science on climate change impacts on polar ecosystem carbon sinks and biodiversity, with a focus on the capacity of ecosystems to mitigate increasing atmospheric CO_2 concentrations

…and how can this knowledge be built into policy to ensure healthy ecosystems

Arctic data collection and use

Arctic data collection has moved towards more applied applications (climate mitigation (blue carbon), MPA, management and protection of natural resources.

Deliver data and knowledge to appropriate stakeholders

Obligation to increase the cost-efficiency of data collection

Bottleneck is increasingly access, handling and analysis of data

Arctic coastal ecosystems

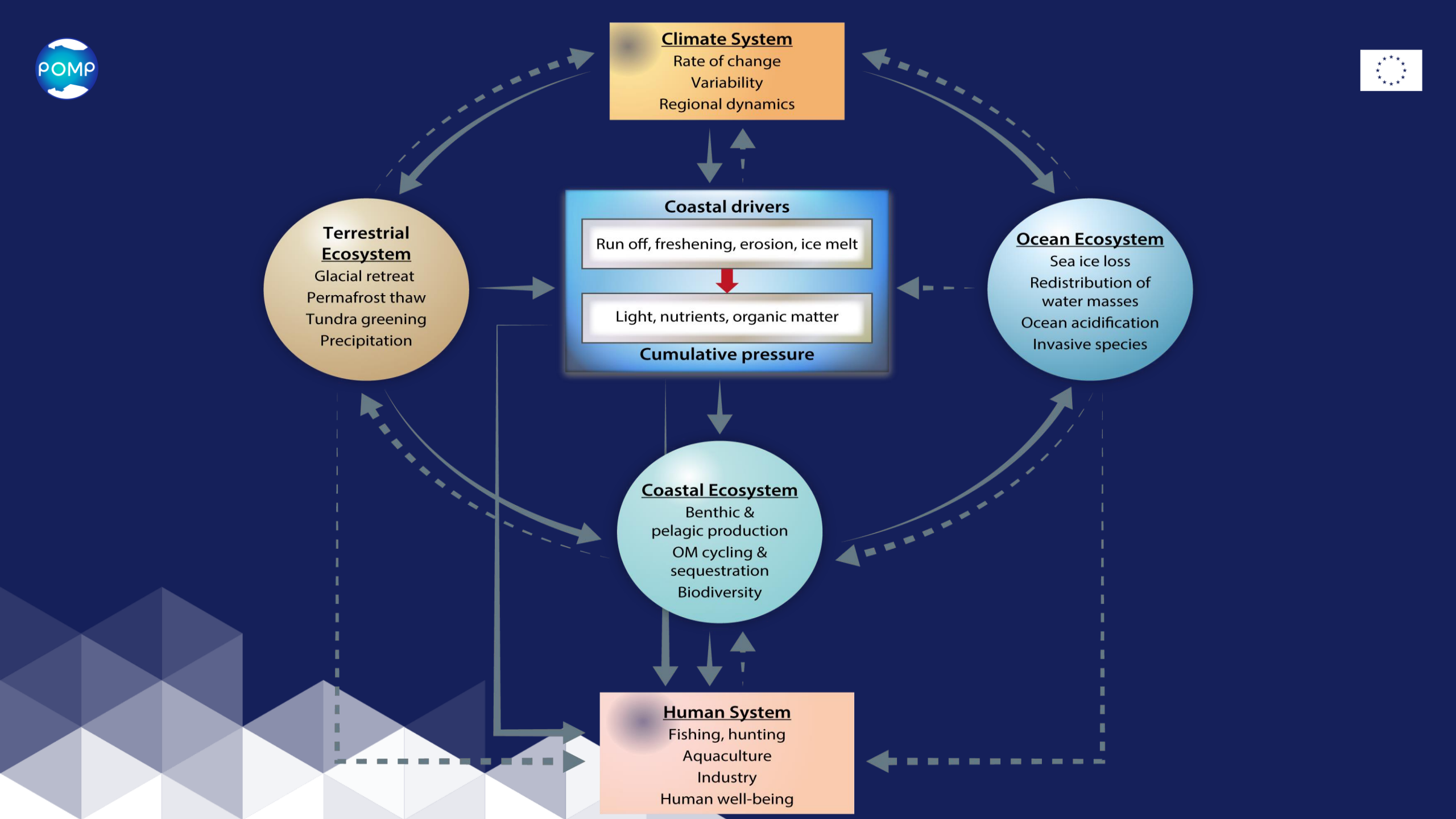
Expansive and globally significant

Elevated biogeochemical rates and strong gradients

Unique ecosystem in terms of structure and function

Large variation within the Arctic in coastal type and catchment

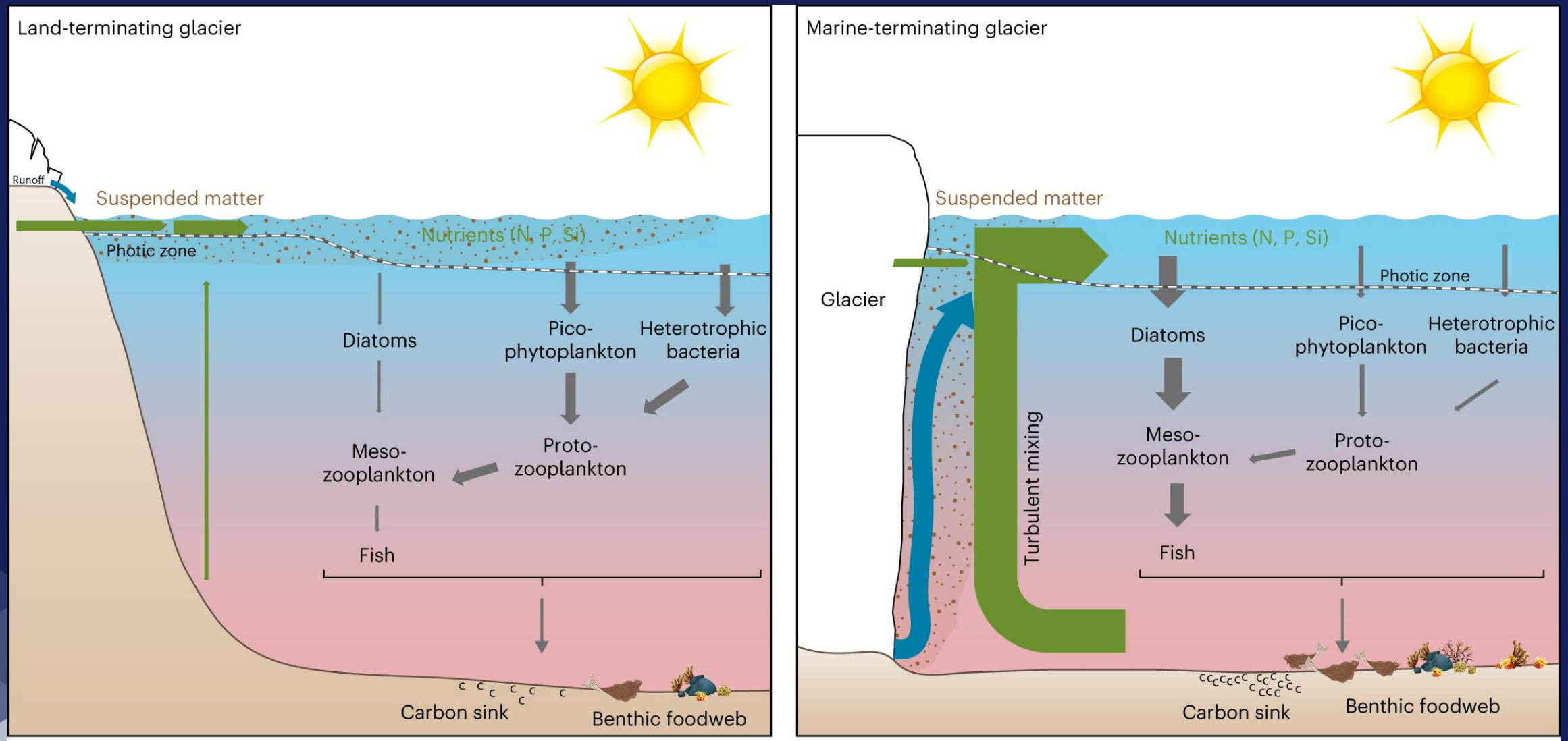
Impacted by a distinct combination of drivers


Climate System
Rate of change
Variability
Regional dynamics
Coastal drivers
Run off, freshening, erosion, ice melt
Light, nutrients, organic matter
Cumulative pressure
Terrestrial Ecosystem
Glacial retreat
Permafrost thaw
Tundra greening
Precipitation
Ocean Ecosystem
Sea ice loss
Redistribution of water masses
Ocean acidification
Invasive species
Coastal Ecosystem
Benthic & pelagic production
OM cycling & sequestration
Biodiversity
Human System
Fishing, hunting
Aquaculture
Industry
Human well-being

Terrestrial drivers of coastal change; Glacial melt

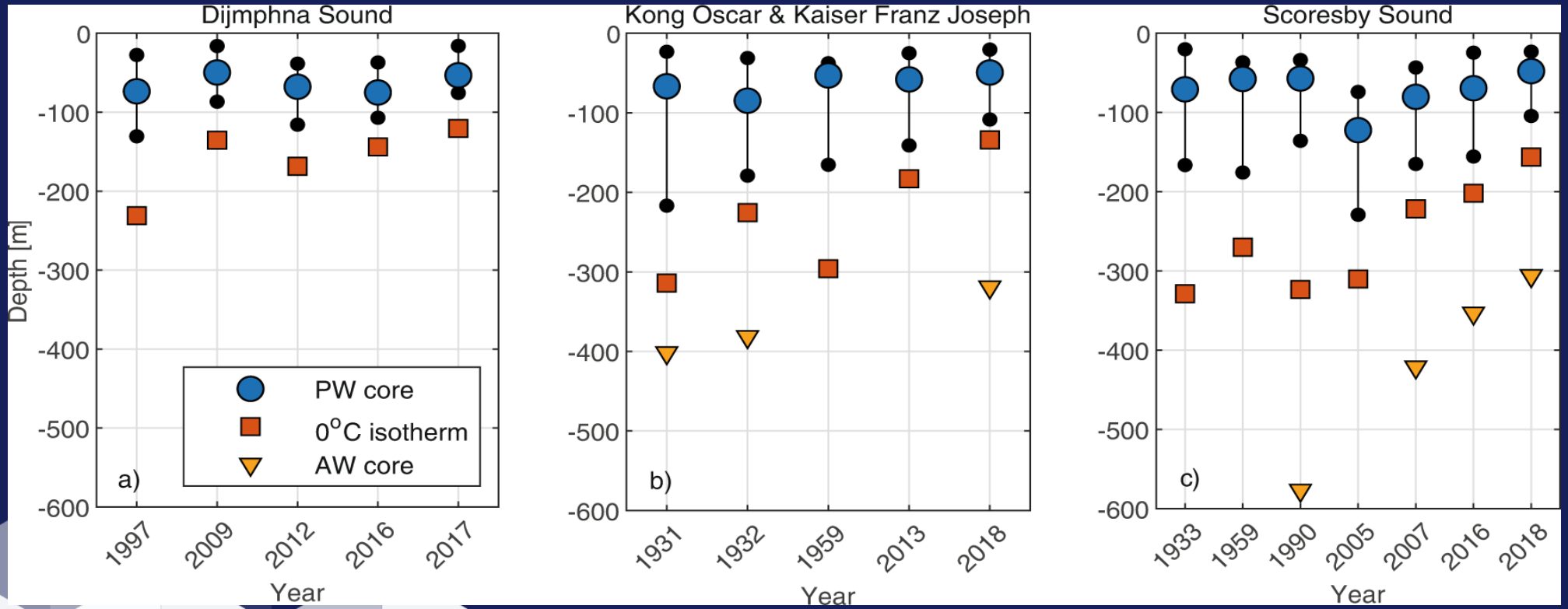
Anders Bjørk

Terrestrial drivers of coastal change; Glacial melt



Meire et al. 2023

Re-distribution of water masses on NE Greenland Shelf



Gjelstrup et al. 2022

Arctic coastal ecosystem

Impacted by different drivers
Change along different trajectories and pace
More direct anthropogenic impact
Close socio-ecological coupling

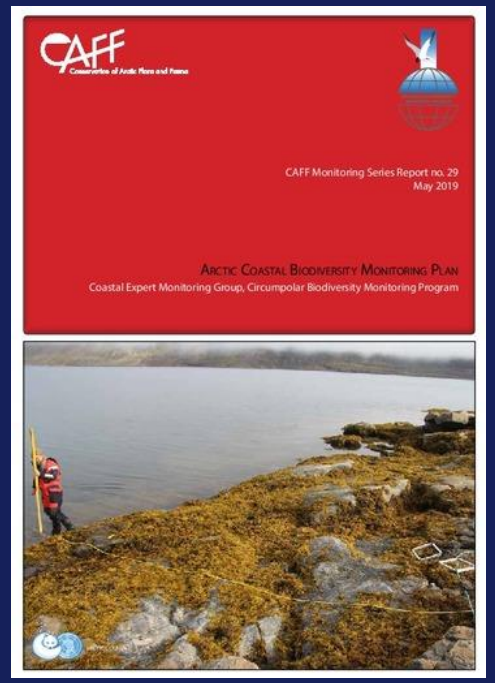
A distributed biological observation system must incorporate a component dedicated to the coastal ecosystem.

Possible components of a Coastal A-DBO

- CAFF Arctic Coastal Biodiversity Monitoring Plan
  Defines Focal Ecosystem Components, 7 coastscapes
  2020 implementation plan including;
    - Establish Coastal Expert Networks for Each Arctic Coastal State
    - Coastscape Map Layer and Report
    - Geospatial Metadata Map Layers

  EU projects (INTAROS, Arctic Passion, Face-it, EcoTip, OBAMA NEXT)

Build on existing programs Greenland, Norway, Iceland, Faroe Is. Svalbard



Working towards a A-DBO

1. Identify and involve established (coastal) monitoring programs
2. Provide an overview of existing capacity and efforts in terms of physical, chemical and biological components being monitored
3. Identify key gaps in observations and knowledge
4. Exchange best practices for biological monitoring
5. Discuss key steps towards standardization and shared data access
6. Synoptic data products and predictions

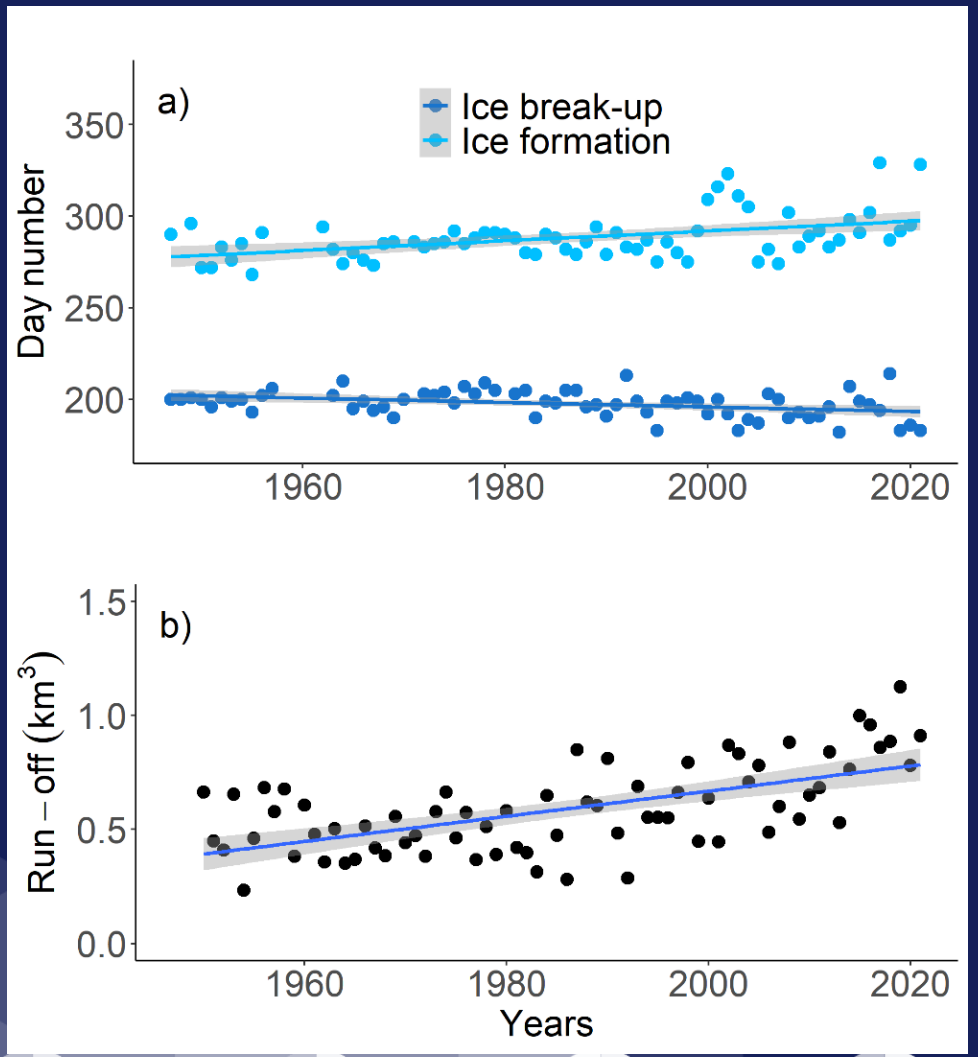
Synoptic data products and predictions

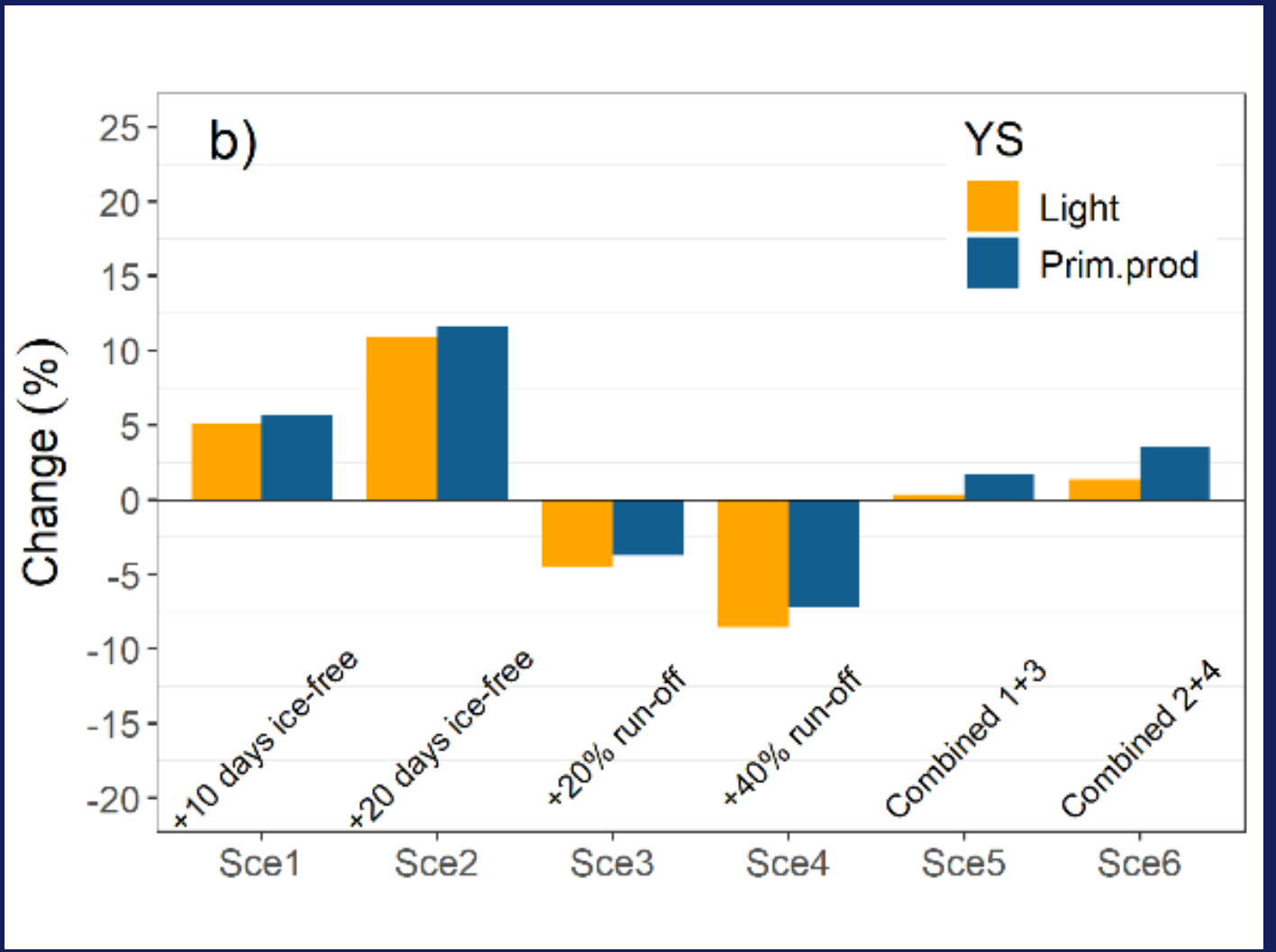
From data points to a site response
Key system indicators (ecosystem services)

- State of the cryosphere
- Coastal ”climate”
- Annual productivity
- Uptake of ghg or sequestration of carbon
- Invasive species or borealization

Data interpolation, remote sensing and ecosystem modeling are all essential components to get from “data points” to “ecosystem response” and to improve relevance for stakeholders.
Dedicated coastal models are essential for exploring impacts of multiple drivers and prediction

Ecosystem models and predictions





Maar et al in prep.

Take-home messages

- Changes directly influence local communities and their knowledge, perspective and engagement is essential to incorporate
- The coastal ecosystem is impacted by a combination of drivers on land and in the ocean leading to changes at a rapid pace and in different directions compared to the open ocean
- If our ambition is to move from single data points to demonstrating ecosystem response and ultimately socio-ecological impacts at the circum-arctic scale we need a dedicated and coordinated coastal system
- Effort to coordinate national programs are behind similar marine, terrestrial and limmic efforts, but with obvious potential for knowledge exchange and synergy.
- Integration of local observations and knowledge, remote sensing and modelling is essential