The Pelagic Marine Ecosystem of the Hudson Bay/James Bay region

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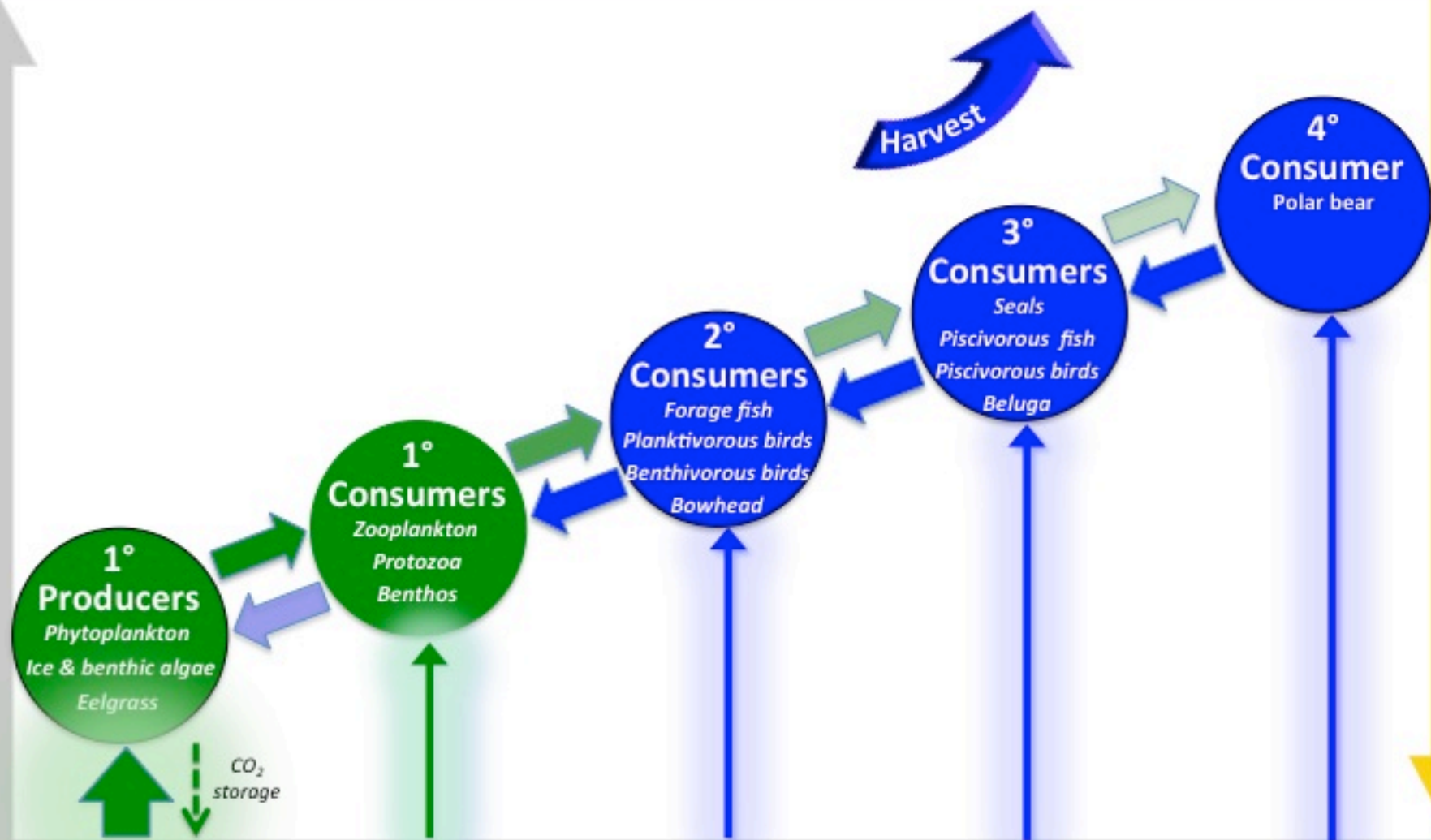
Collaborators
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Eeyou Marine Region Symposium, 26 mars 2014

UNIVERSITÉ LAVAL

Québec Océan

ArcticNet
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Population growth, industry, power generation, nutrition, culture…

Harvest

4° Consumer
Polar bear

3° Consumers
Seals
Piscivorous fish
Piscivorous birds
Beluga

2° Consumers
Forage fish
Planktivorous birds
Benthivorous birds
Bowhead

1° Consumers
Zooplankton
Protozoa
Benthos

1° Producers
Phytoplankton
Ice & benthic algae
Eelgrass

CO_2 storage

Variability/change in the physical and chemical marine environment
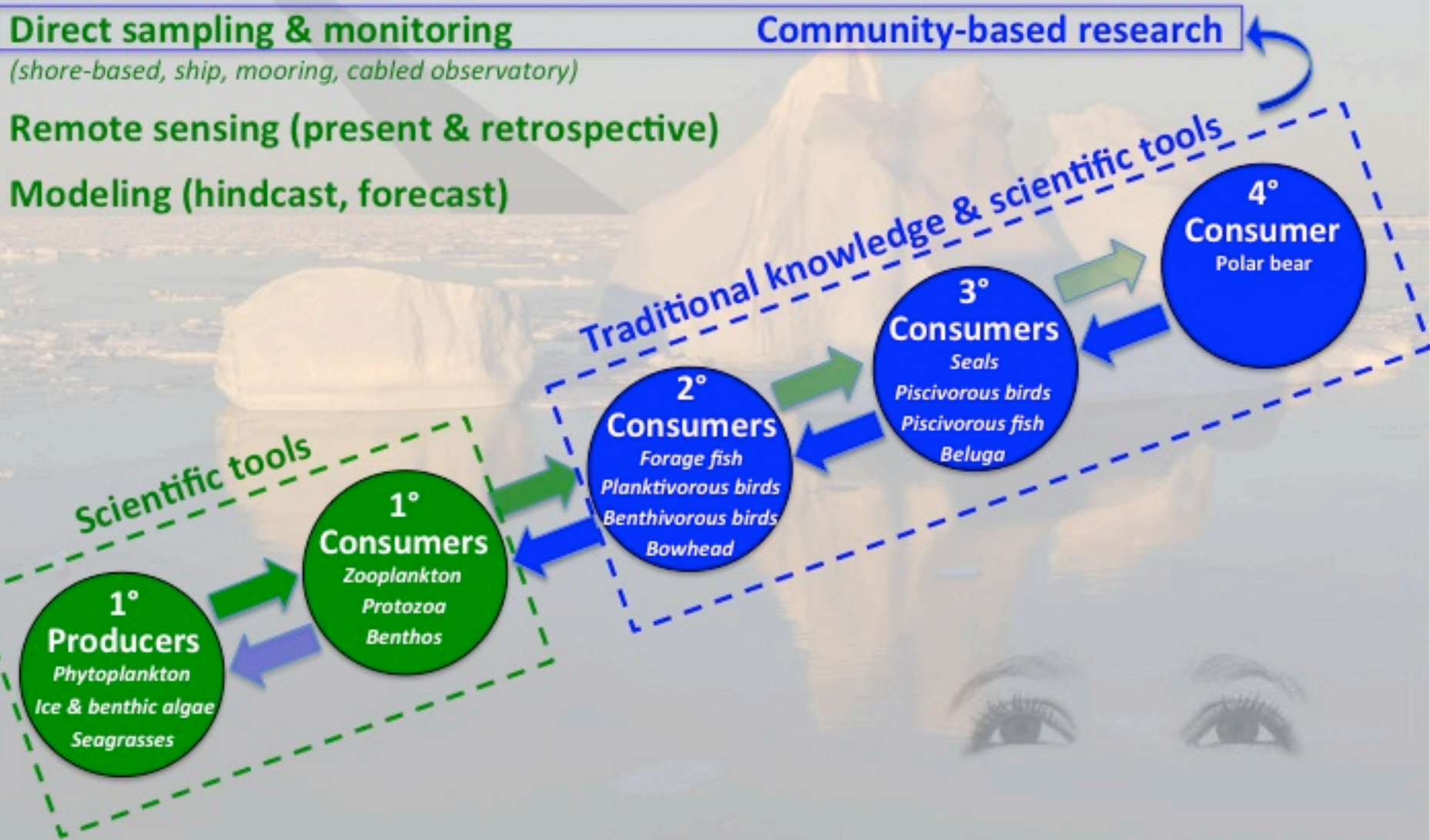(water transparency, nutrients, temperature, salinity, ice, contaminants…)

Approaches

Direct sampling & monitoring   **Community-based research**

(shore-based, ship, mooring, cabled observatory)

Remote sensing (present & retrospective)

Modeling (hindcast, forecast)

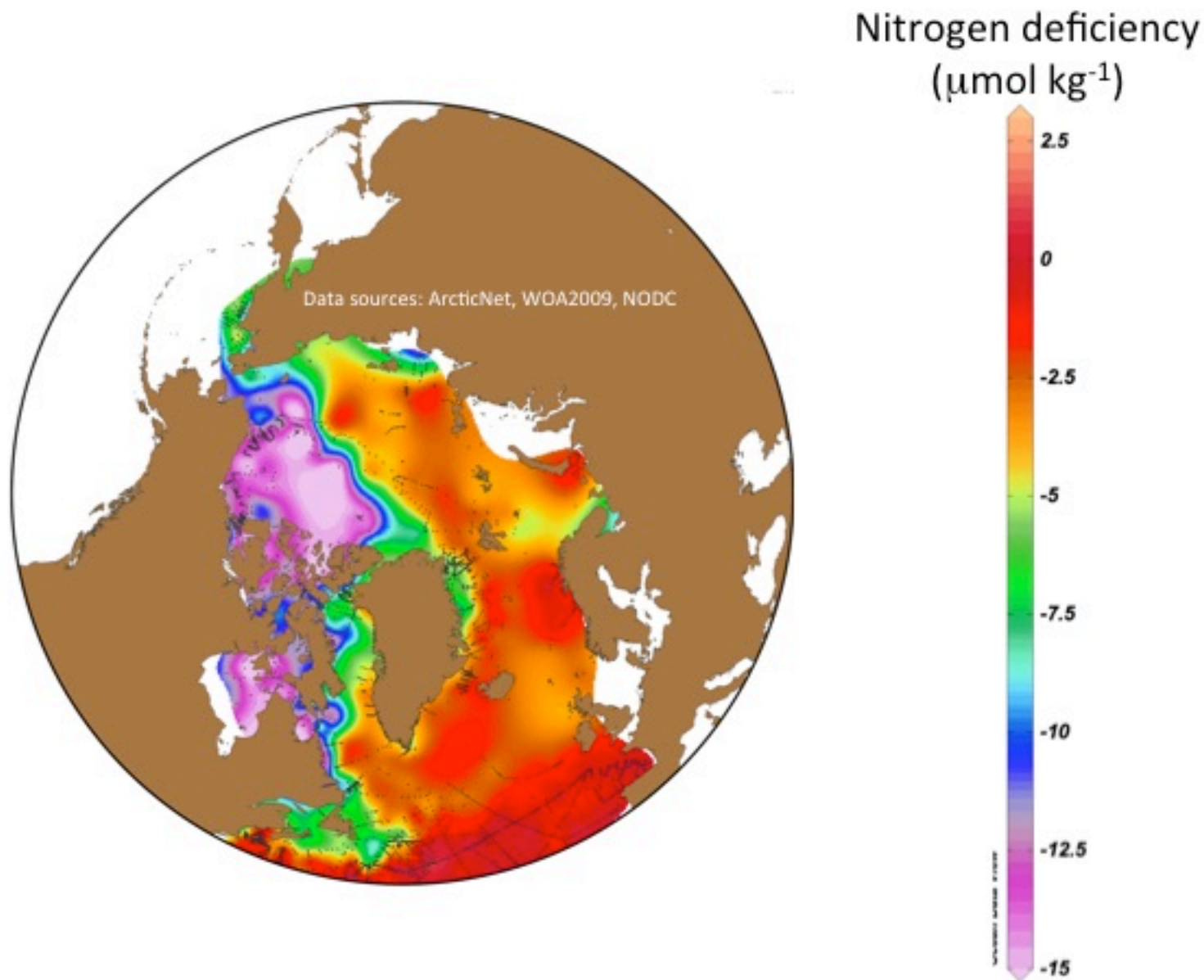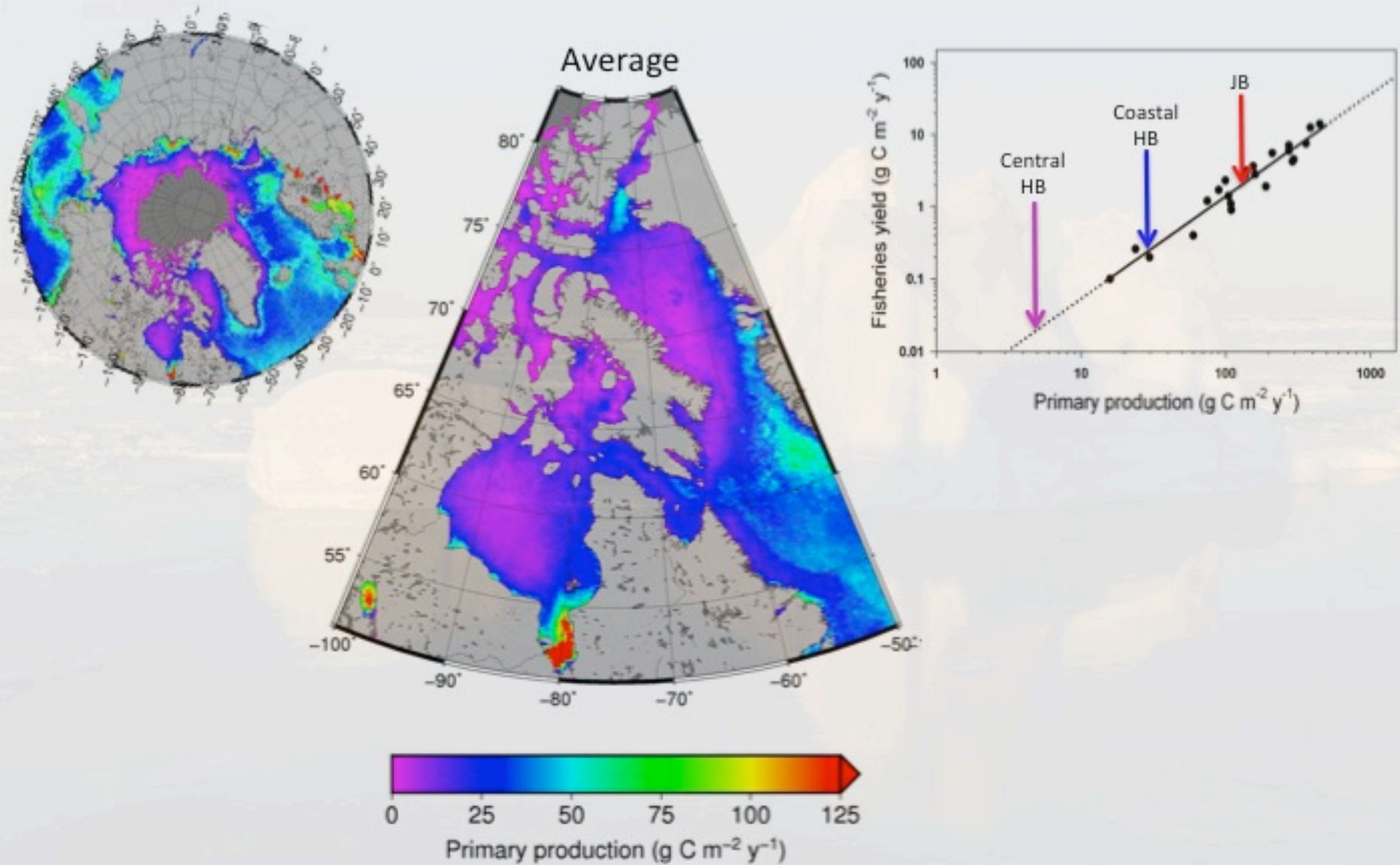*Traditional knowledge & scientific tools*

Scientific tools

4°
Consumer
Polar bear

3°
Consumers
Seals
Piscivorous birds
Piscivorous fish
Beluga

2°
Consumers
Forage fish
Planktivorous birds
Benthivorous birds
Bowhead

1°
Consumers
Zooplankton
Protozoa
Benthos

1°
Producers
Phytoplankton
Ice & benthic algae
Seagrasses

Physical forcing of primary production
(light & nutrients)

Sea ice

Ocean

River

Water transparency

Inorganic nutrients (N, P)

? Organic nutrients

Nutrients

diffusion mixing

upwelling

entrainment

Benthic communities
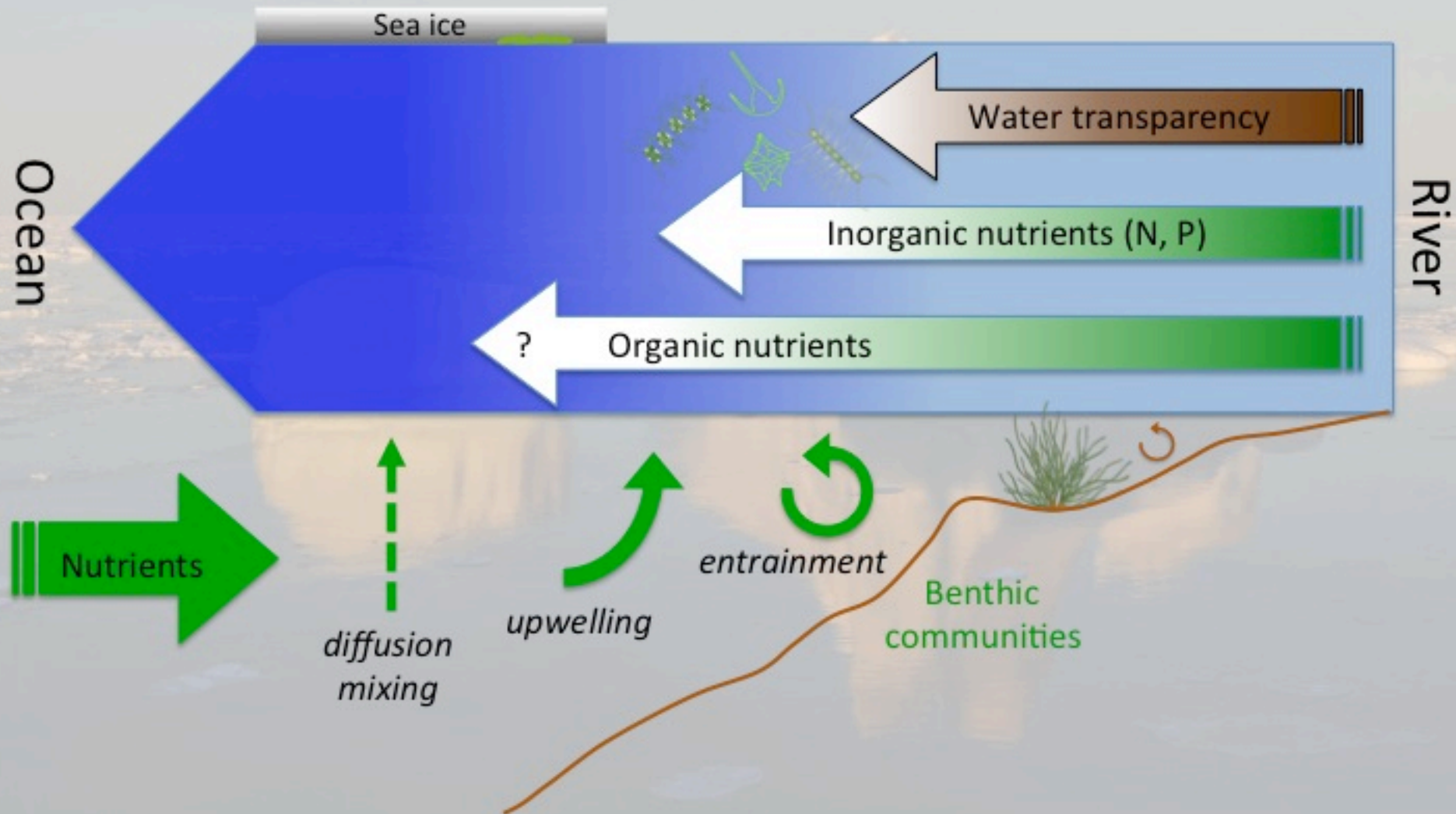
Large-Scale Ocean Connectivity

Nitrogen deficiency
(μmol kg⁻¹)

Data sources: ArcticNet, WOA2009, NODC

Satellite-Based Primary Production (1998-2010)

Average

Primary production (g C m⁻² y⁻¹)

Bélanger, Babin & Tremblay (2013), Biogeosciences 10

The Eeyou region

1 pixel = 9 x 9 km

Great Whale

La Grande

Eastmain

Primary production (g C m^{-2} y^{-1})
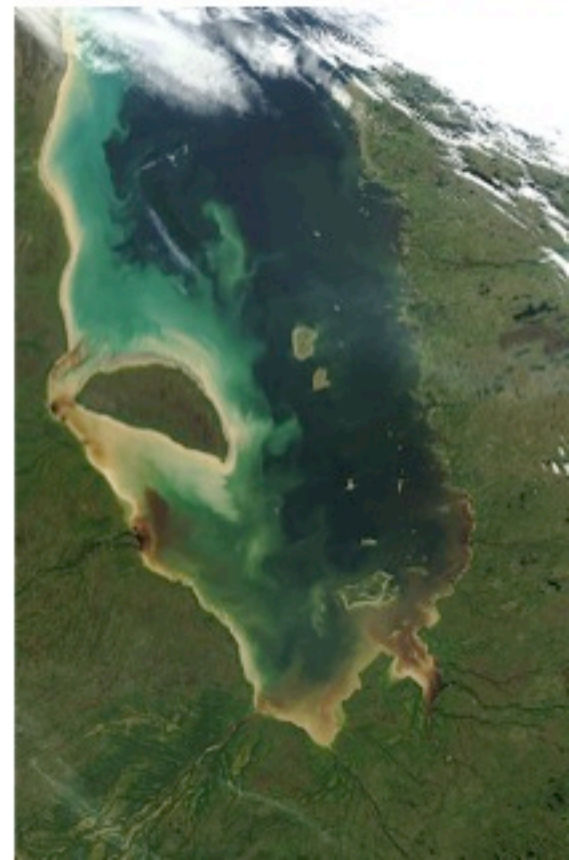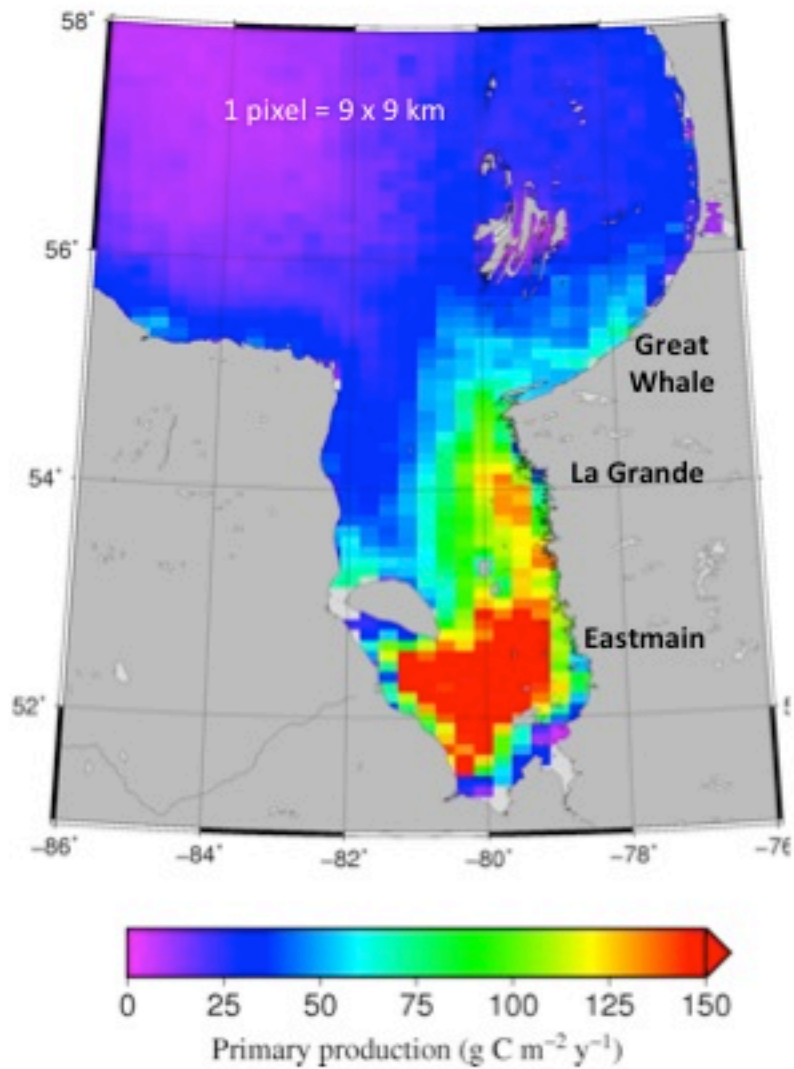
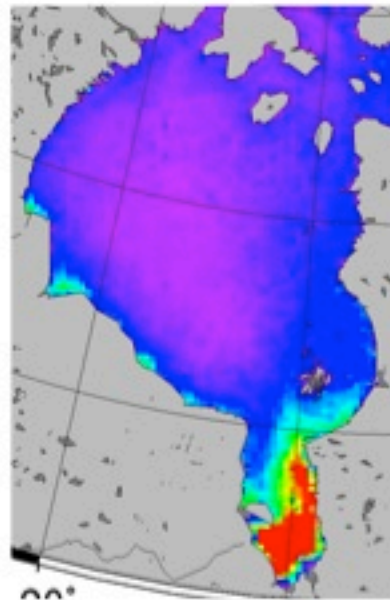# Temporal trends in satellite-based productivity
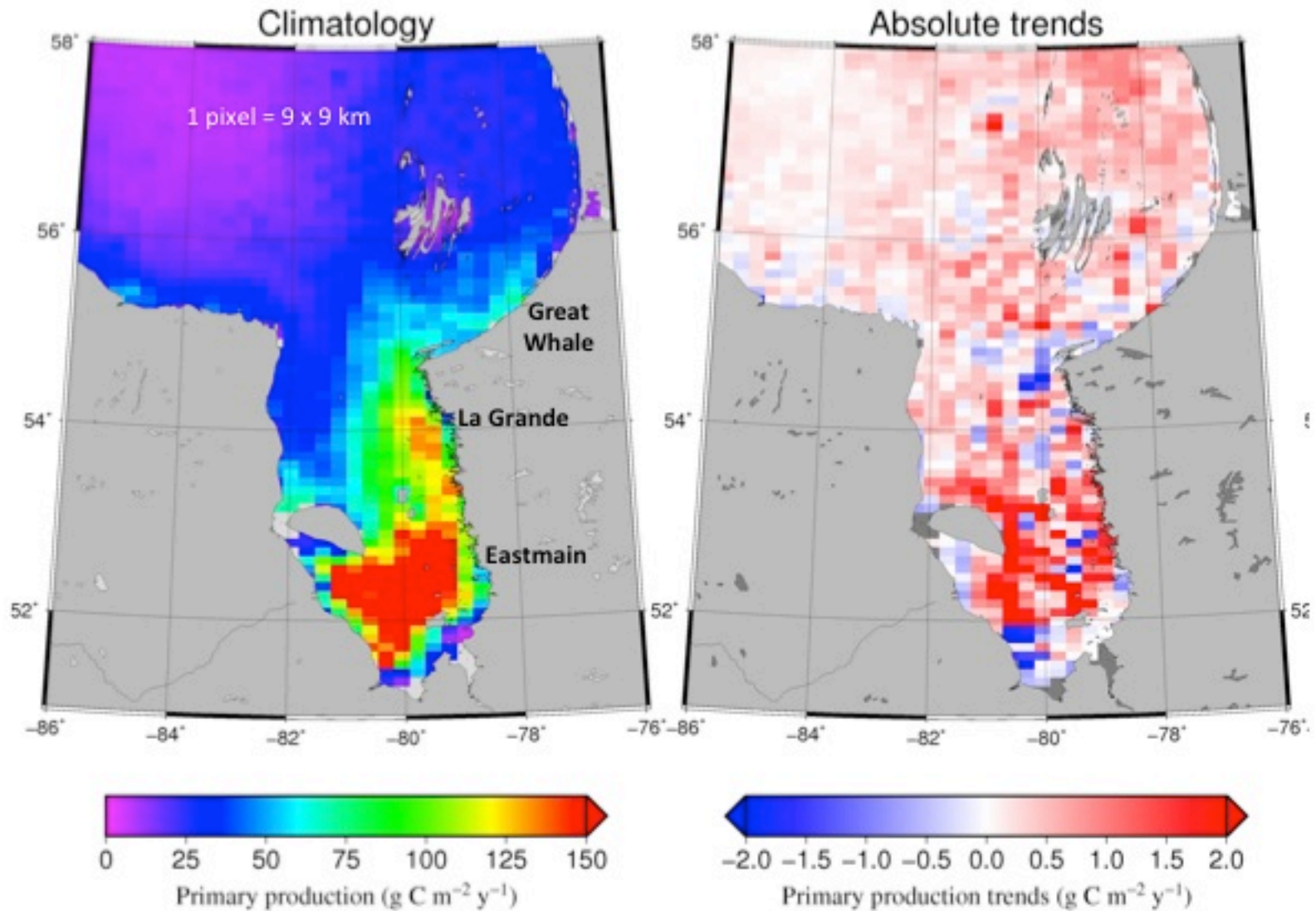
Different approaches = partly different answers

Model
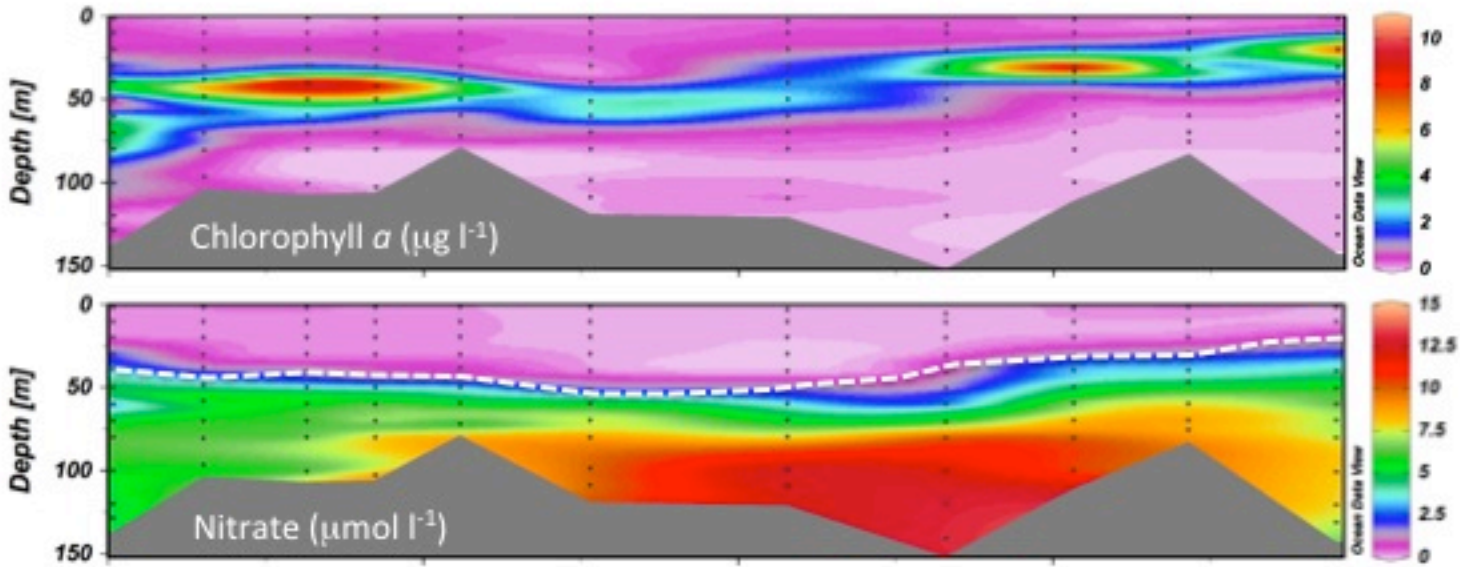(Sibert et al. 2011)

Remote sensing
(Bélanger et al. 2013)
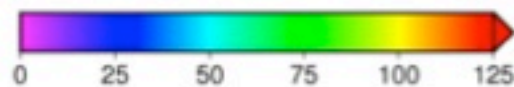
Sampling
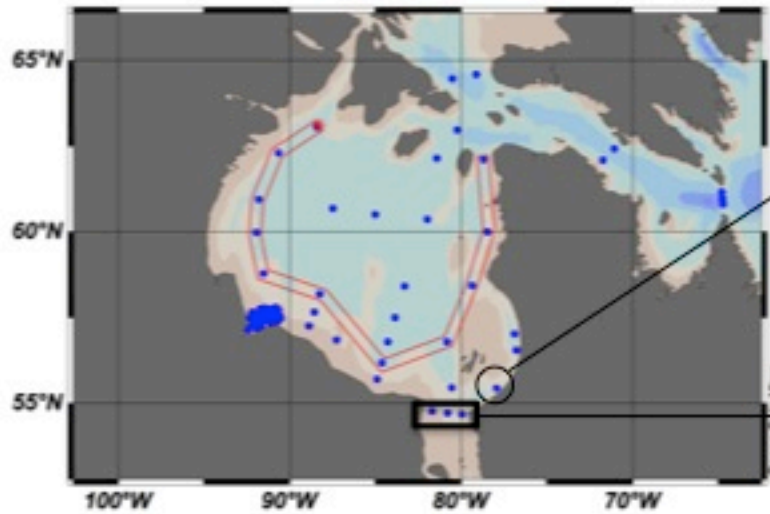(Anderson & Roff 1980)

Figure 18. Surface chlorophyll a (mg·m⁻³) distribution in Hudson Bay, August-September 1975. Station location is base of bar (from Anderson and Roff 1980a:2247).

Primary production (g C m⁻² yr⁻¹)

The deep phytoplankton maximum in Hudson Bay

Suggestion of a framework for future projects

Merci!