

DBO Zooplankton:
Biogeography, population genetics, production, functional
diversity.

John Nelson, Akash Sastri, Beatrix Beisner, Kelly Young, Moira Galbraith,
Corinne Pomerleau



Fonds de recherche
sur la nature
et les technologies



CENTRE DE LA SCIENCE DE LA BIODIVERSITÉ DU QUÉBEC
QUEBEC CENTRE FOR BIODIVERSITY SCIENCE

UQÀM



NSERC
CRSNG



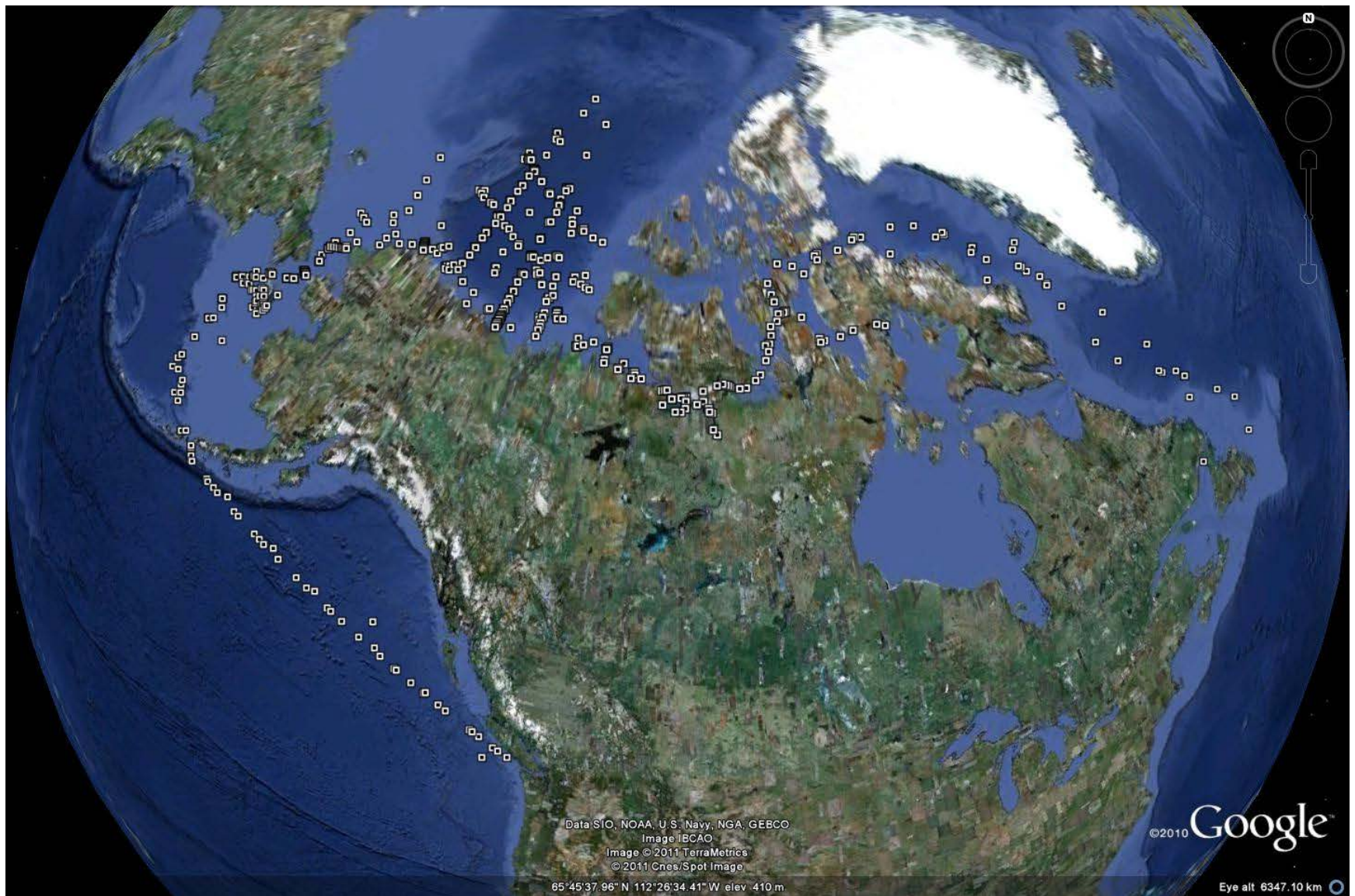
Fisheries and Oceans
Canada

Pêches et Océans
Canada



University
of Victoria

Zooplankton sampling in region since 2000.

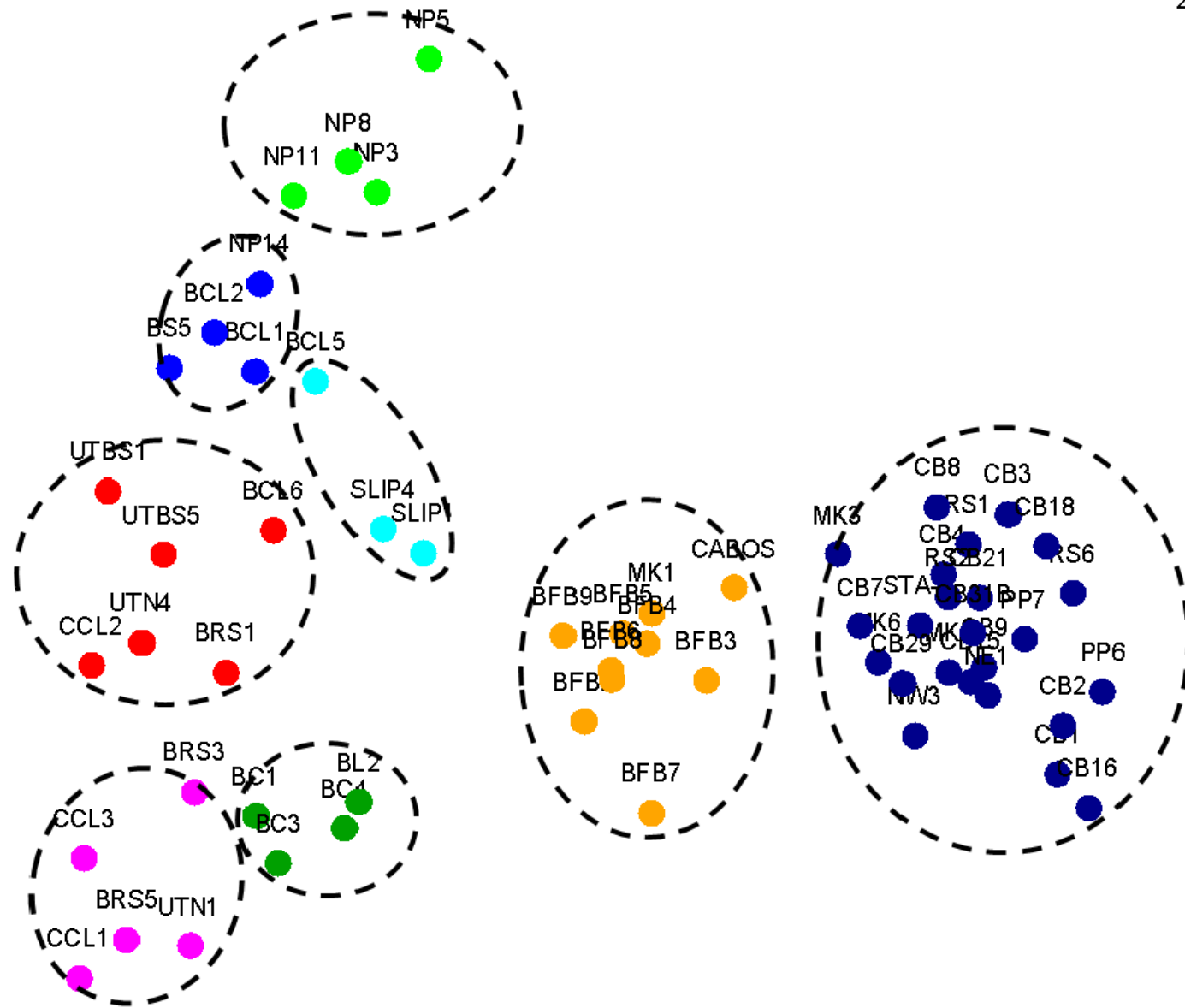


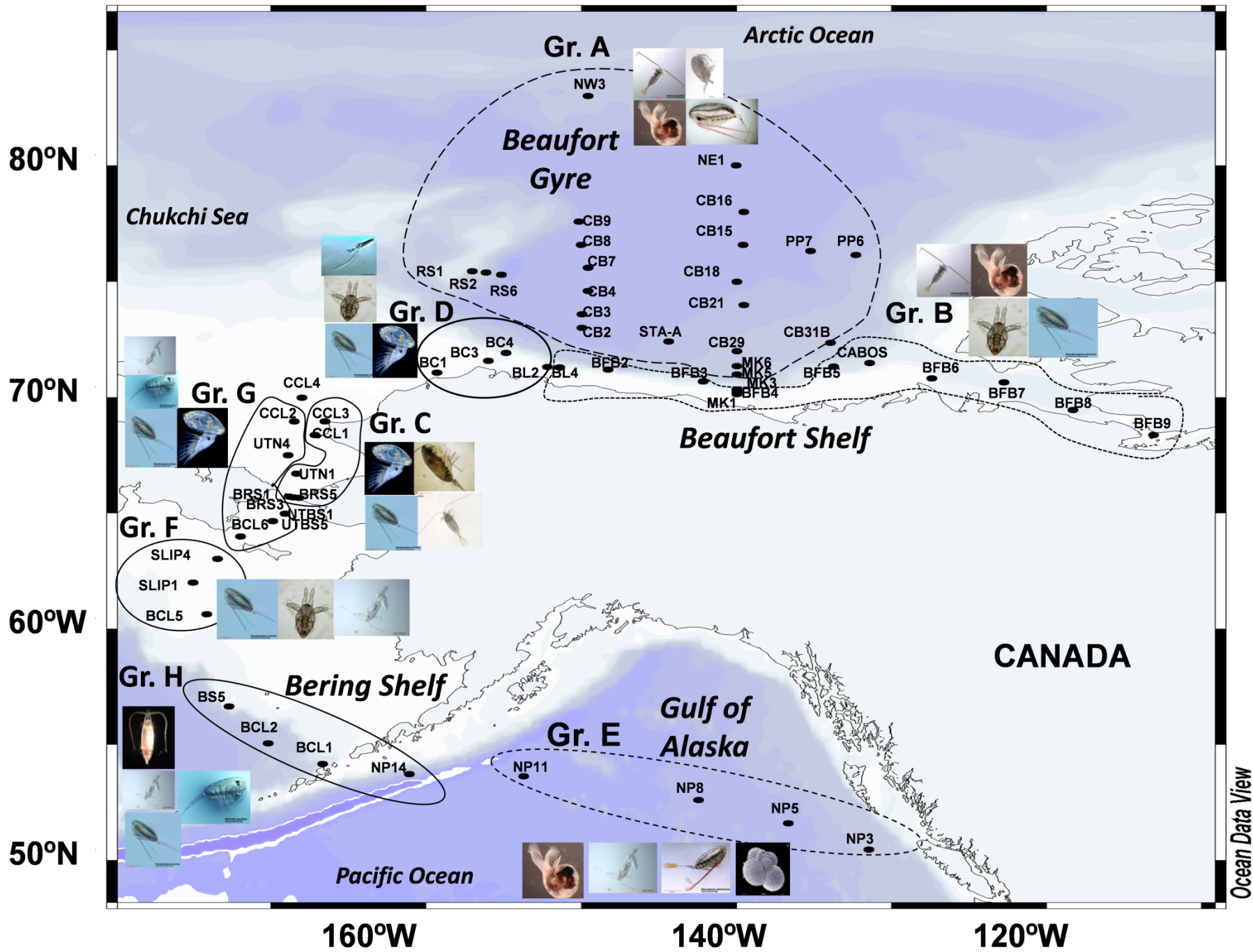
This data is available as context for DBO

Transform: Fourth root

Resemblance: S17 Bray Curtis similarity

2D Stress: 0.11





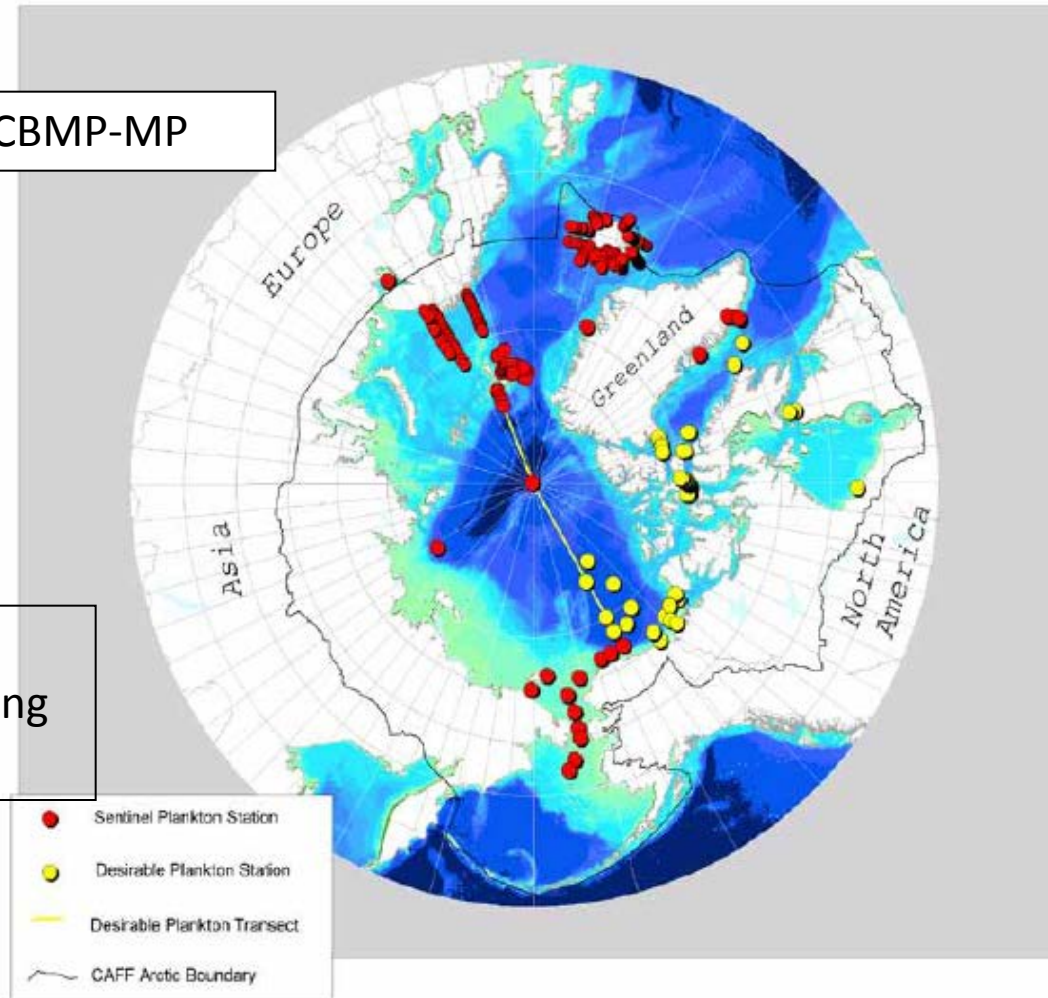
Ocean Data View

Nuts and Bolts.

Gear brought into international consensus as per the Circumpolar Biodiversity Monitoring Program–Marine Plan.

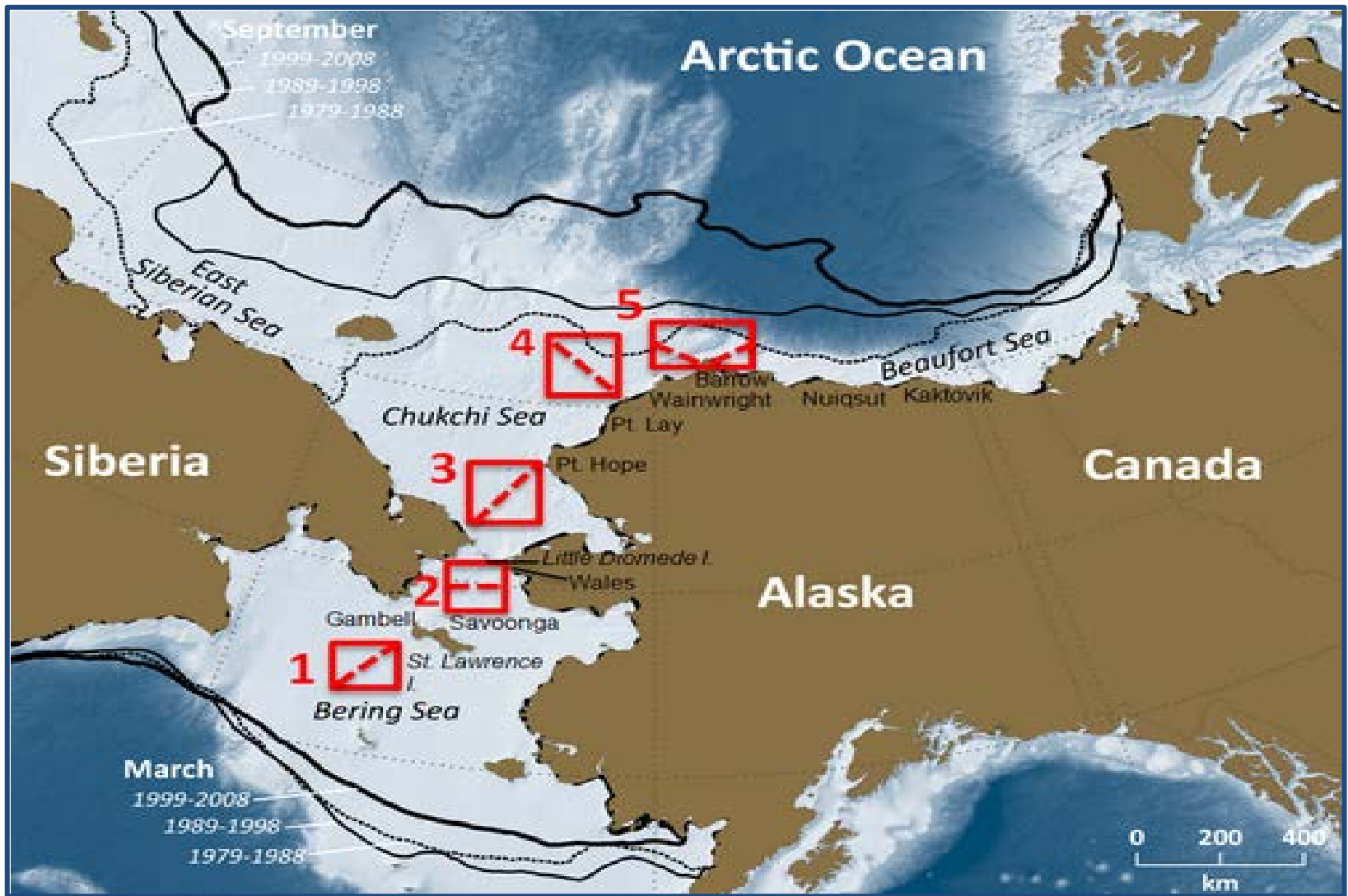
100m tows with 236 μm nets changed to 153 μm nets.

Plankton Stations CBMP-MP

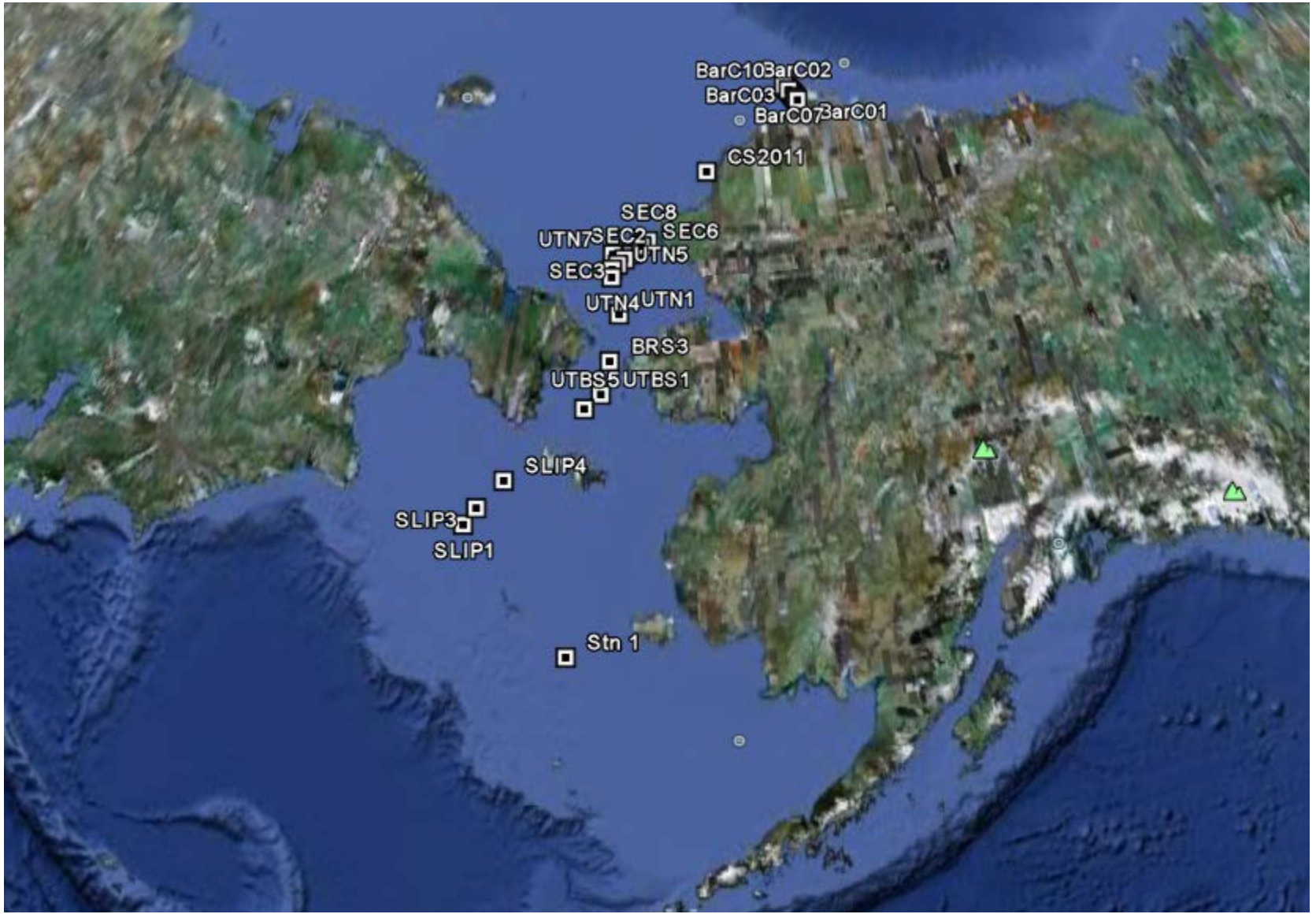


JN developing short list of marine monitoring indicators for Canada

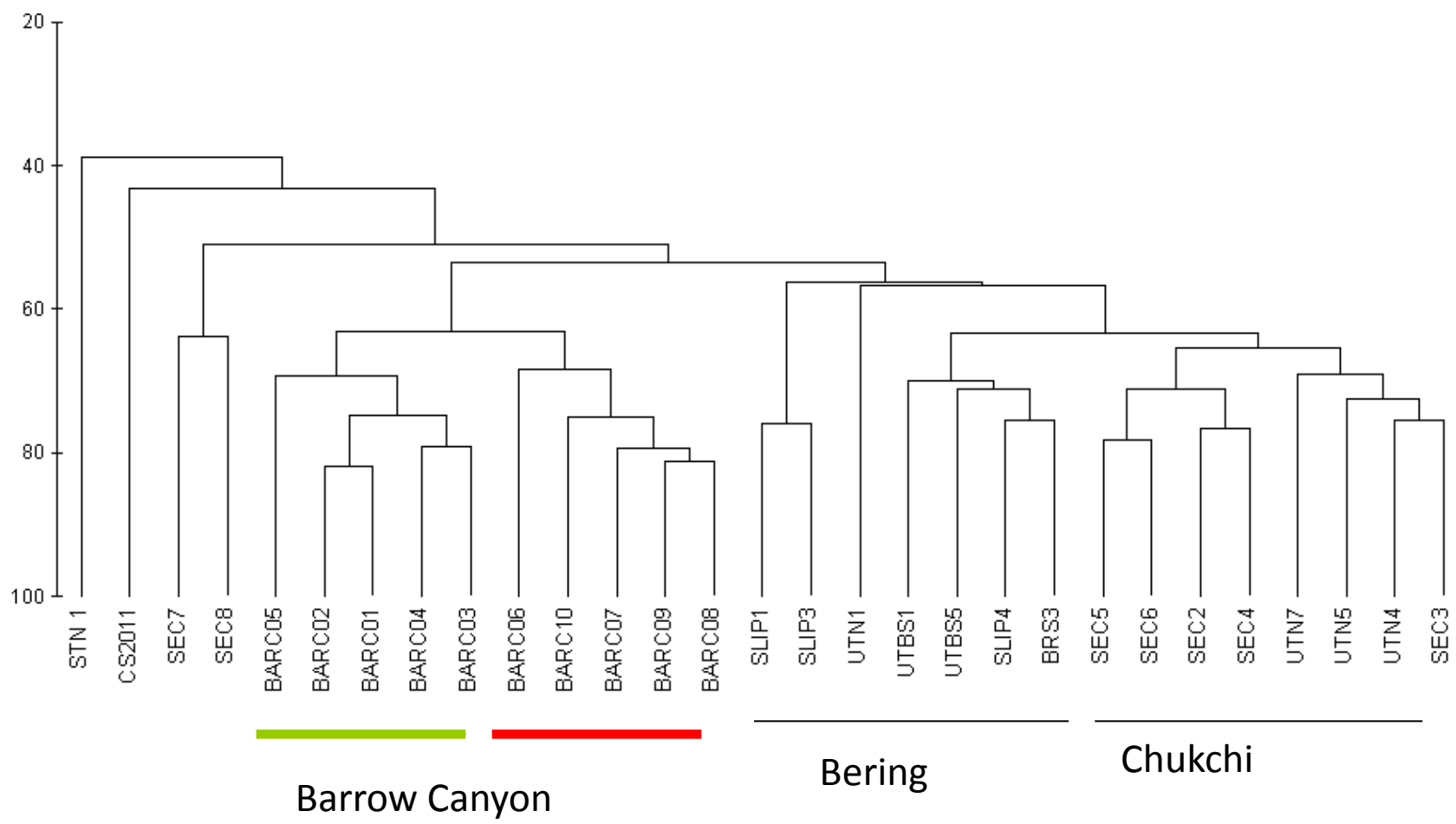
(From Circumpolar Biodiversity Monitoring Program–Marine Plan)



2011 Integrated C3O and DBO Zooplankton Analysis



2011 Integrated C3O and DBO Zooplankton Analysis

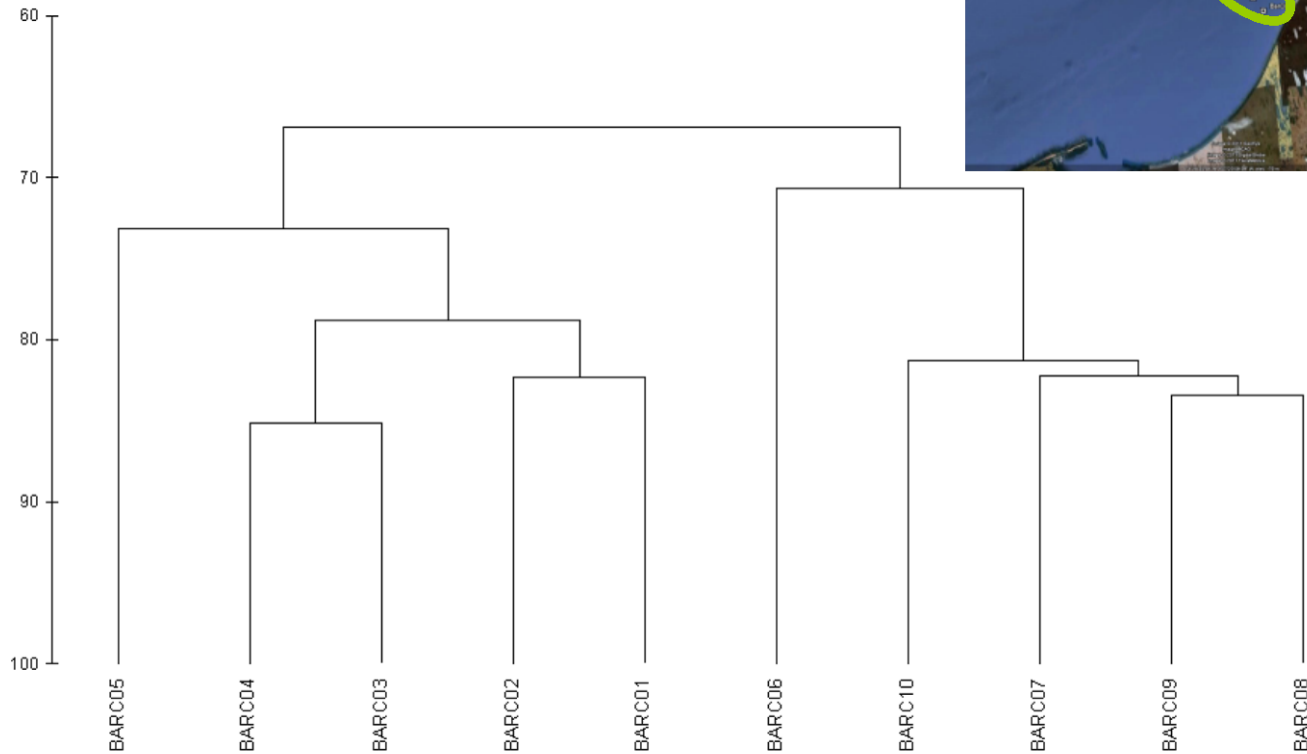


2011 Integrated C3O and DBO Zooplankton Sampling



Barrow Canyon - 2011

2011 DBO- results



Neocalanus
C. hyperboreus

— —

— — — — —

– 4th root transformed Bray-Curtis similarity based on abundance

[John Nelson]

Biogeography Synopsis.

Have collected samples in the region since 2000. Many yet to be analysed.

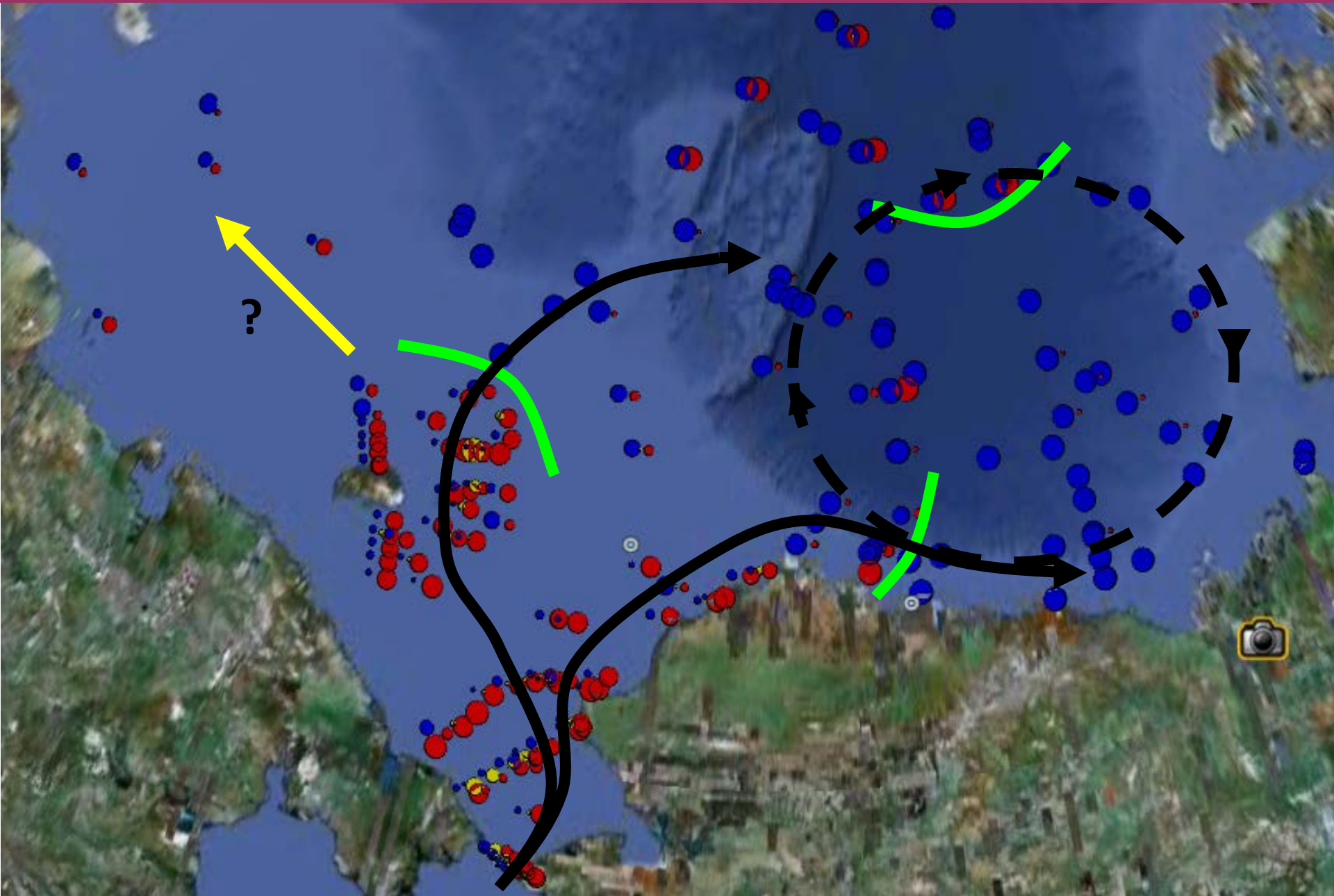
Have 2007 to 2011 analysed (2 years of DBO dedicated samples). 2012 on deck.

Working to establish description of zooplankton communities across the region with environmental determinants. Temporal stability of communities of interest

Species specific and community abundance trends (*limacina* for example) are of interest.

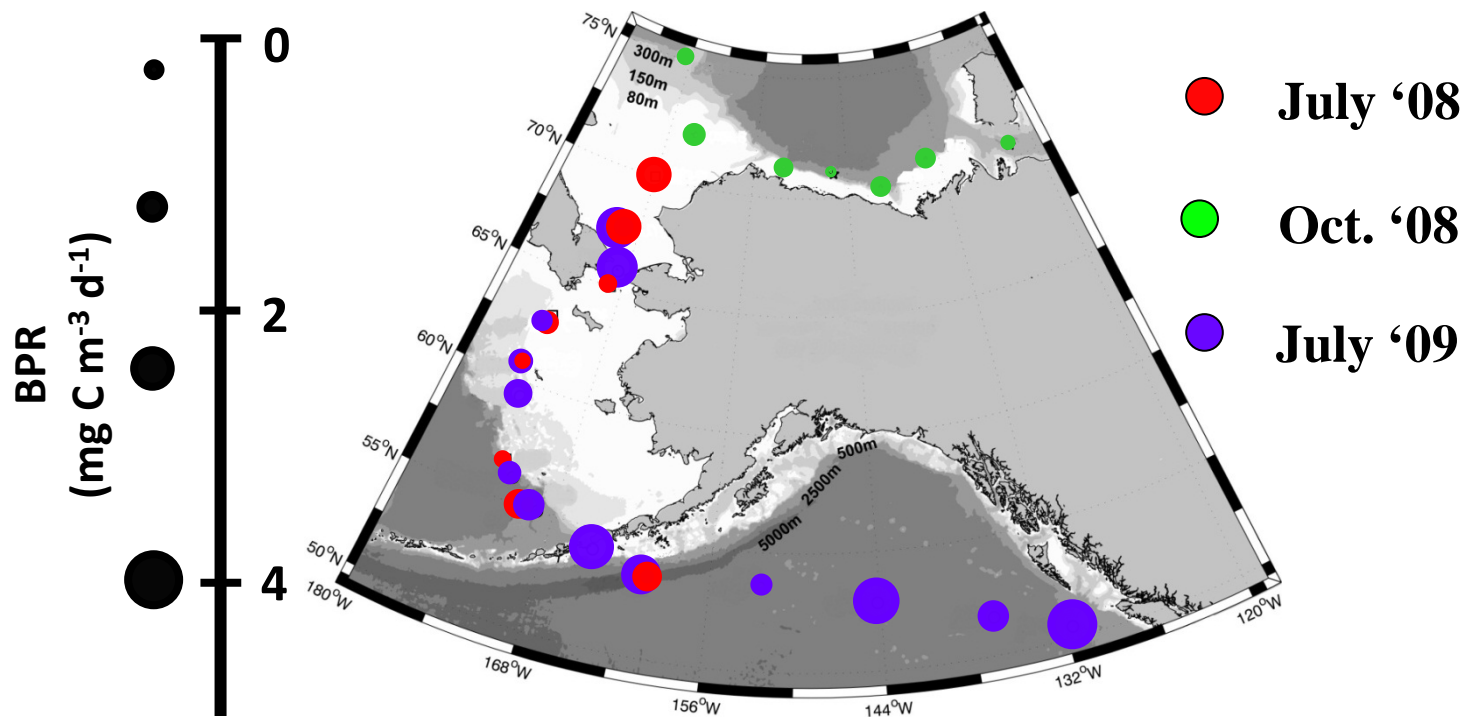
Genetics

Three fronts of Pacific *glacialis* lineage penetration.



- PRODUCTION AND FUNCTIONAL DIVERSITY

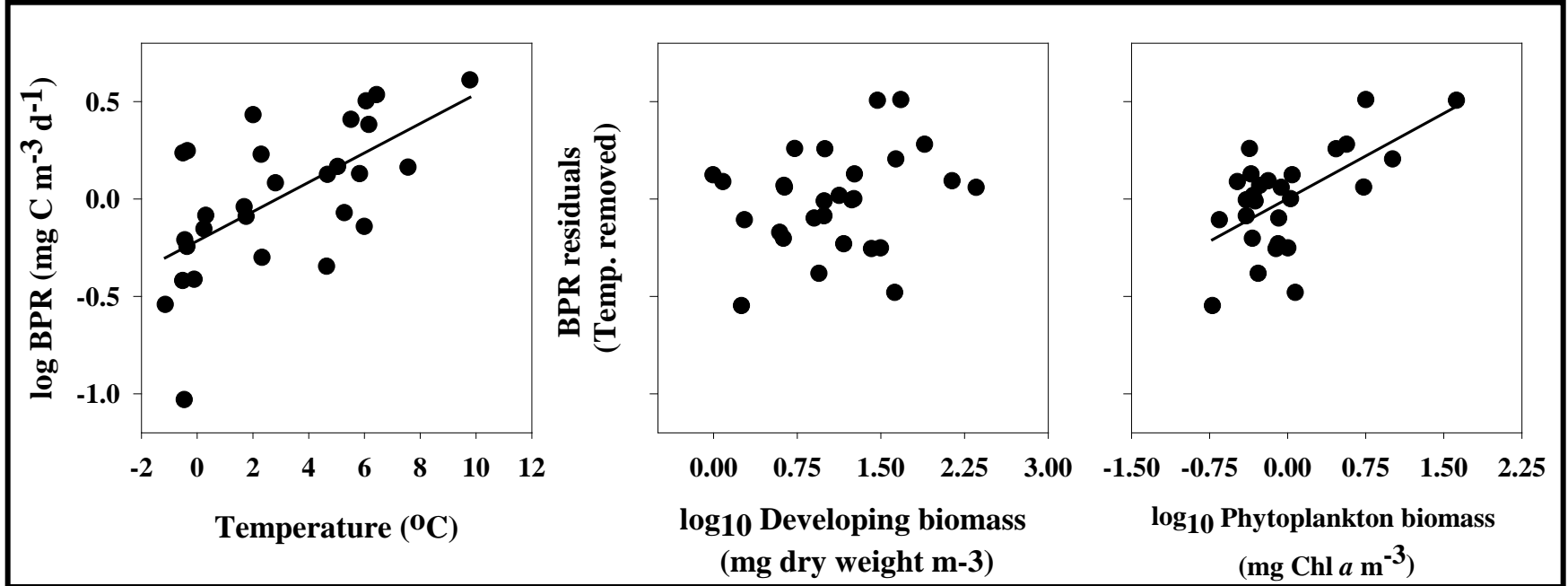
Chitobiase-based Crustacean Zooplankton Biomass production rates: Spatial Patterns (2008-2009)



- Similar spatial pattern of BPR 2008 and 2009
- Spatial patterns of BPR meets with expectations from earlier studies:
- Bering Strait-S.Chukchi Shelf > Shelf Break > Outer-N. Middle Shelf

(Sastri et al. 2012 *J. Exp. Mar. Ecol. Biol.*)

Variation of Zooplankton Production Rates (BPR)



$r^2 = 0.38, p < 0.001$

NS

$r^2 = 0.37, p < 0.001$

$$\log_{10} BPR = (0.0812 \text{ Temp}) + (0.312 \log_{10} \text{ Phyto}_{\text{MAX}}) - 0.247, r^2 = 0.67, p < 0.001$$

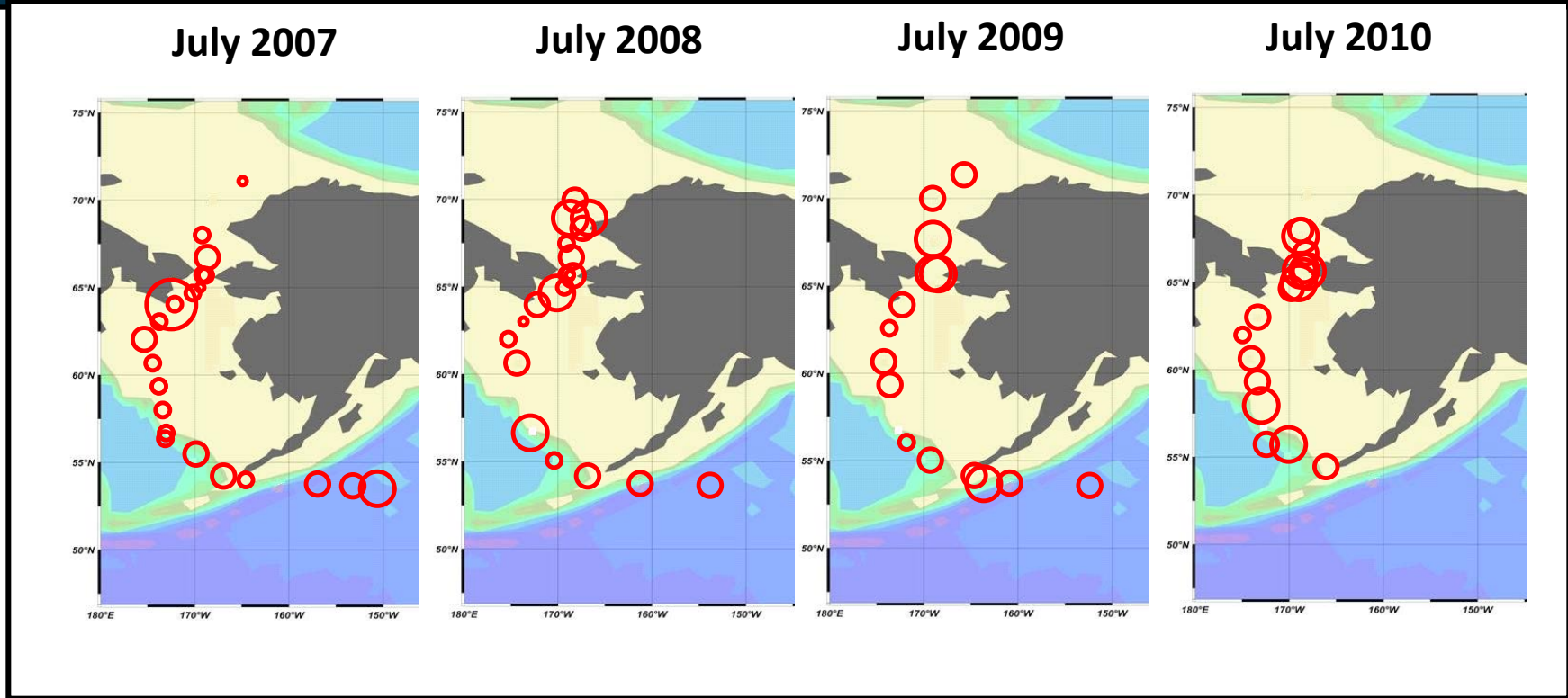
(Sastri et al. 2012 *J. Exp. Mar. Ecol. Biol.*)

Methods: Functional Trait Diversity (FD)

FD = “the extent of functional differences among the species in a community” (Petchey and Gaston 2002, *Ecol. Letters*.)

1. Assembled species-specific functional traits for all crustacean zooplankton in our regional pool from the literature
2. Analyzed 3 traits associated with productivity:
 - a) Female body length
 - b) Trophic group (i.e. Herbivore, Herbivore-Omnivore, Omnivore, Omnivore-Carnivore, Carnivore)
 - c) Reproduction (i.e. Brooder, Broadcaster or Sac Spawner)

Spatial patterns of Functional Group Richness (FGR)



- FGR → “functional” analogue to species richness
- Bering Strait-S. Chukchi > Shelf Break > Outer-N. Middle Shelf
- $FGR = 5.183 + (0.122 * T) + (0.777 * \log ZB)$, $r^2 = 0.25$, $p < 0.001$

- PLANS FOR FUTURE.
 - Biogeography
 - Genetics
 - Functional traits
 - Estimation of secondary production.