High-resolution description of insular and fjordic benthic food webs in Antarctica

Martin DOGNIEZ [1, 2]

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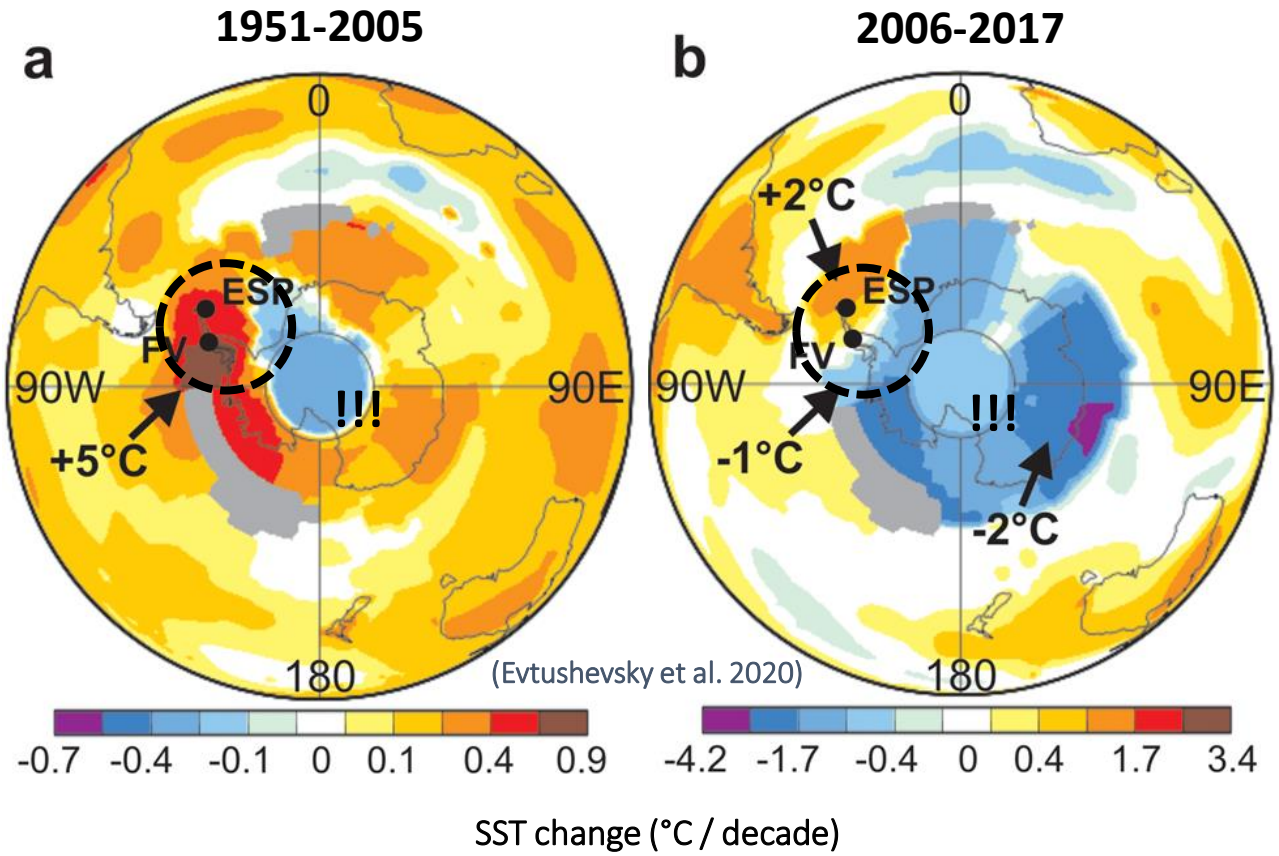
[2] Royal Belgian Institute of Natural Sciences, OD Nature, Brussels – **RBINS**

1) Global change and the Antarctic Peninsula

- Huge impact of climate change on Antarctic coastal environment



(Evtushevsky et al. 2020)

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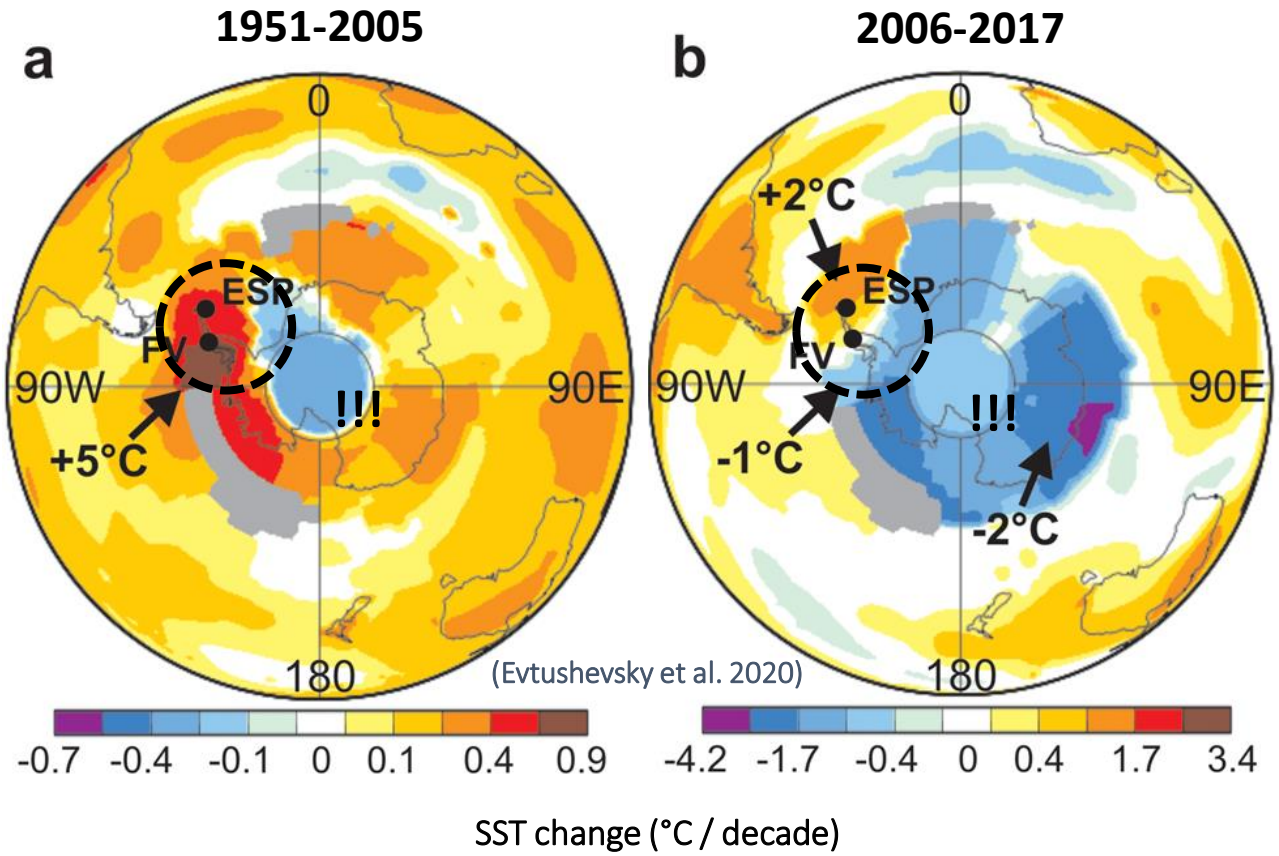

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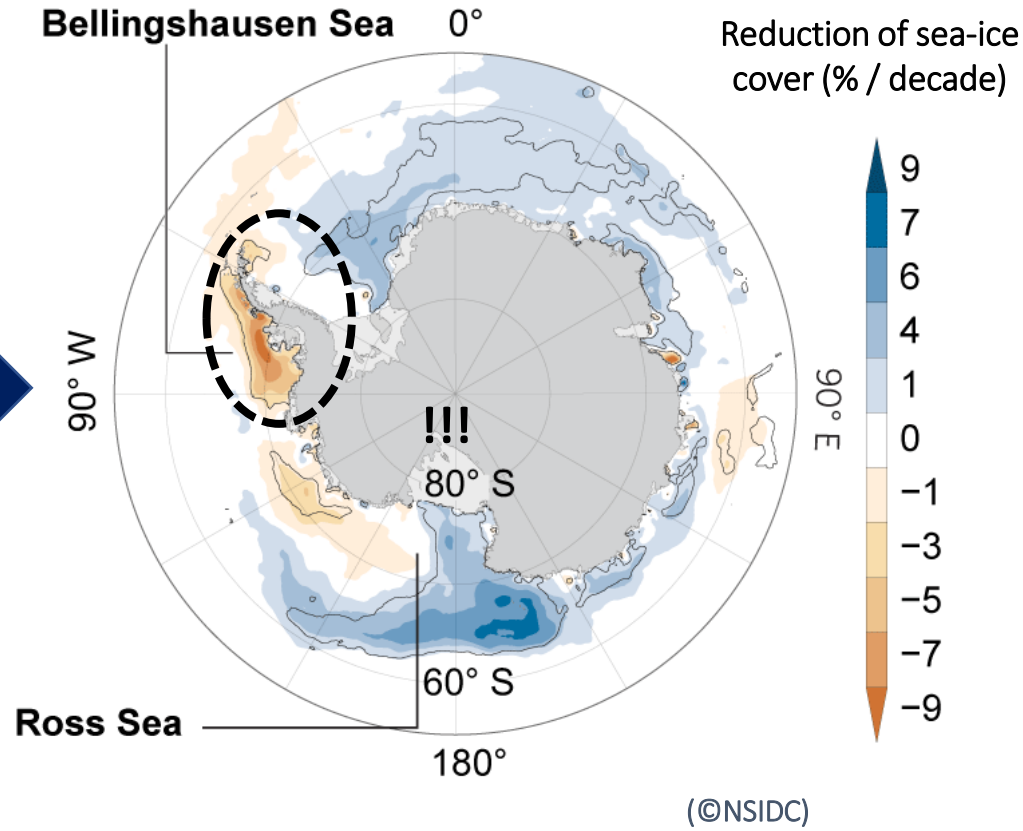

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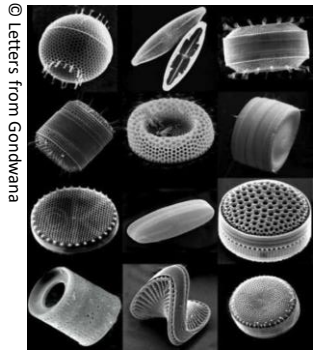
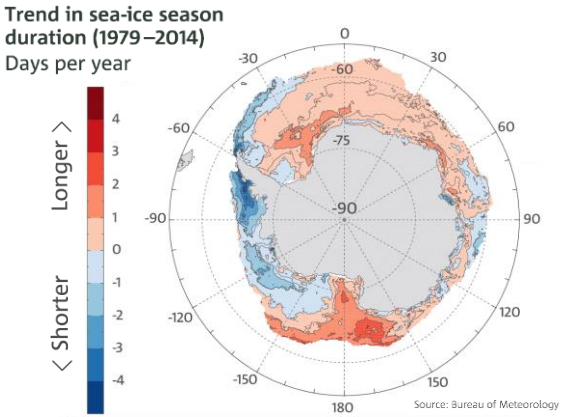
2) Marine communities in a changing environment

Increased ice melting and freshwater input

Diatoms ⋯▸ Cryptophytes



Shift in the phytoplankton community



Shortening of the sea-ice season

Alteration of sea-ice algae dynamics

2) Marine communities in a changing environment

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Increased ice melting and freshwater input

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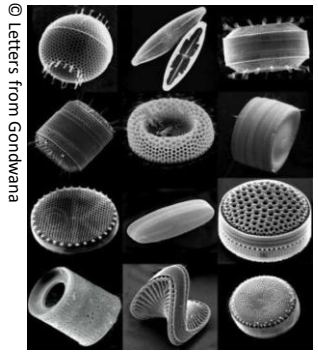
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Shift in the phytoplankton community

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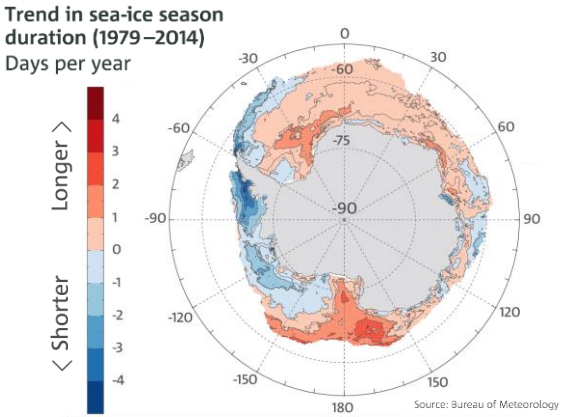
Depletion of benthic food-bank and reduction of OM export



Shortening of the sea-ice season

© Dalman L.

Alteration of sea-ice algae dynamics

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Food scarcity for krill and subsequently megafauna

3) The TANGO framework

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Estimating Tipping points in habitability of ANtarctic benthic ecOsystems under future GlObal climate change scenarios

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WP1

- Individual physiological responses of species
- Dynamic Energy Budget modeling

WP2

- Habitat mapping through ROV imaging
- Food-web structure description

WP3

- Carbon cycling in the ecosystem (production, export, storage, cycling and burial)

WP4

- Integration of WP1-3 results in a mechanistic model of the WAP benthic ecosystem

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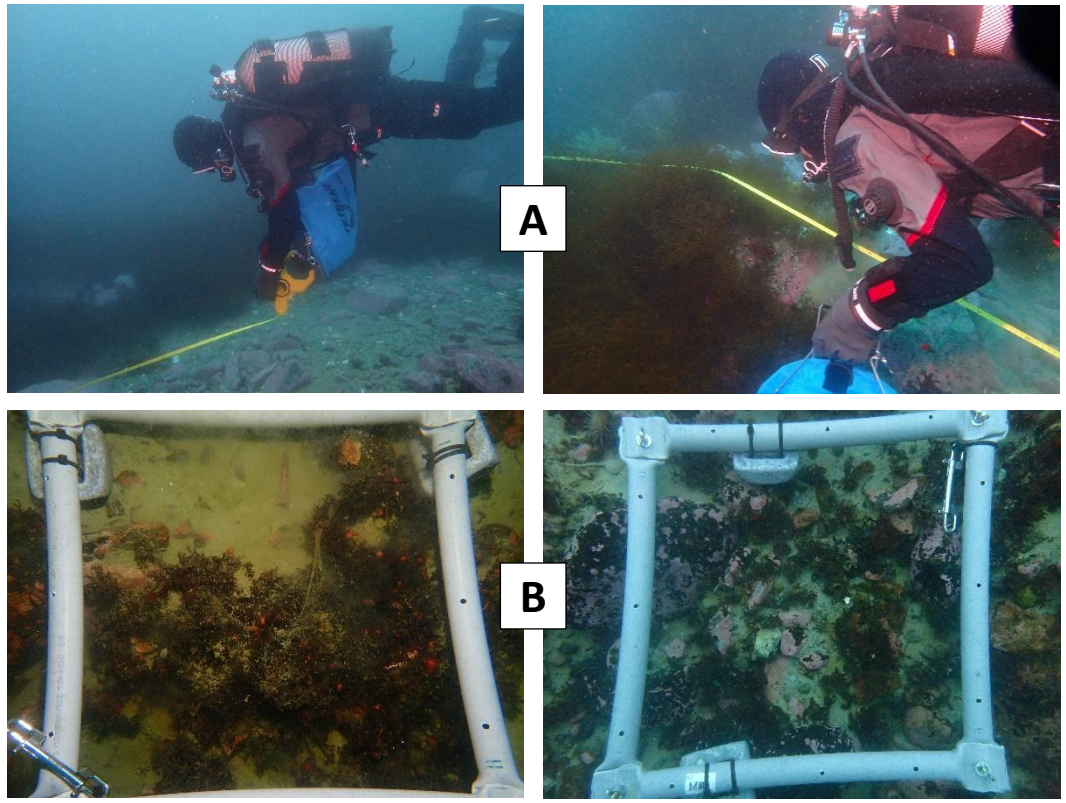
4) Sampling design

Quantitative sampling of benthos



Transects (A) & Quadrates (B)

4) Sampling design

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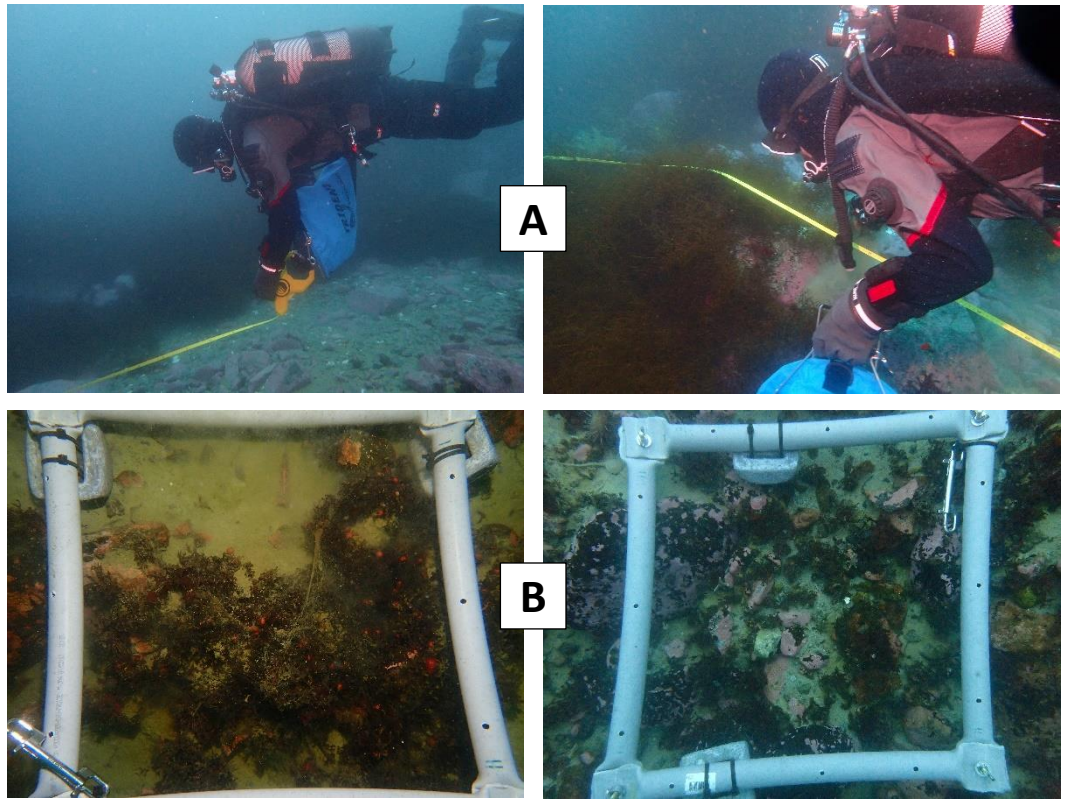


Transects (A) & Quadrates (B)

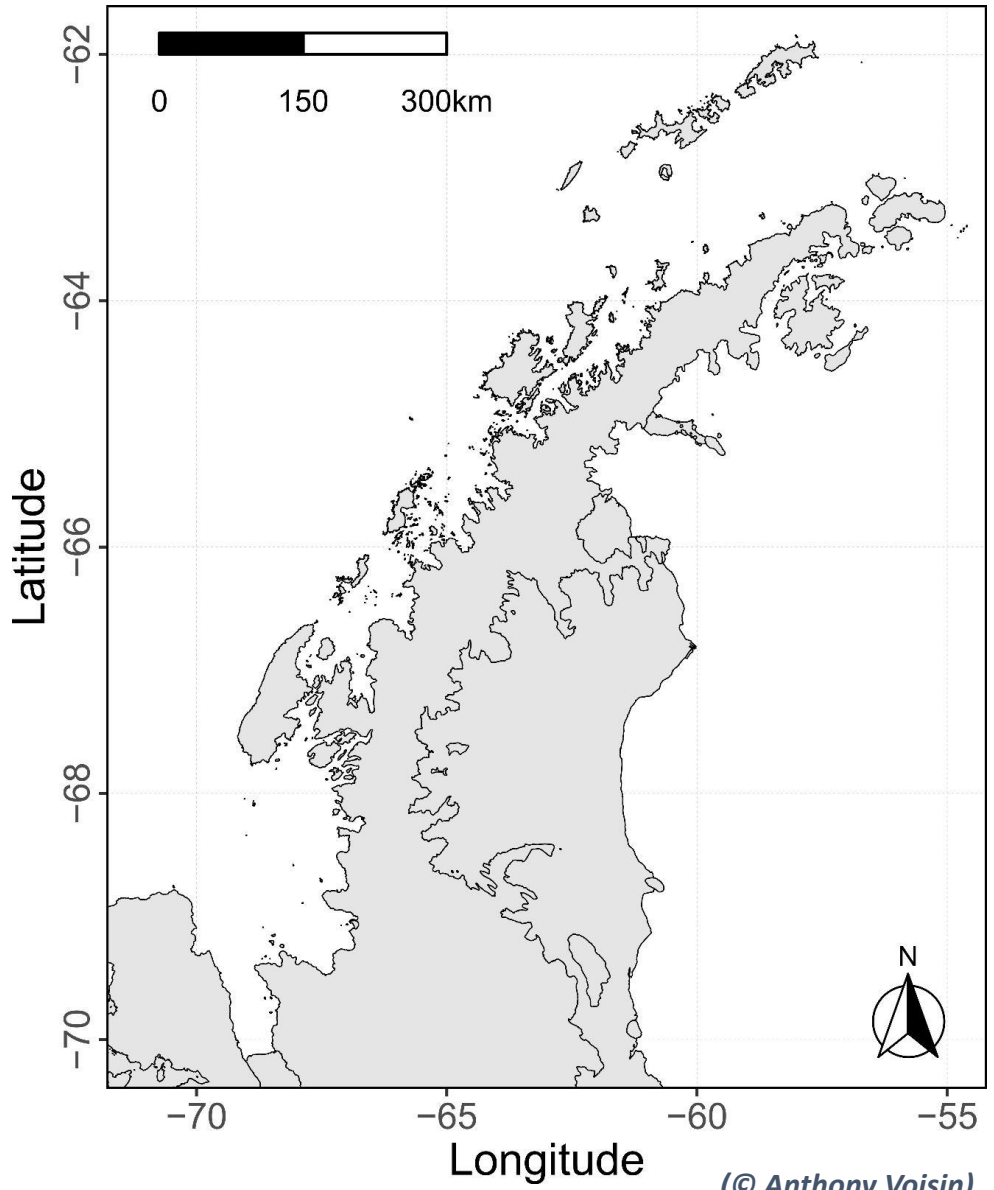
+

Sampling of pelagic food sources

Niskin samples (C) filtered on GFF filters (D) & eDNA capsules (E)

4) Sampling design

TANGO 2023 sampling stations



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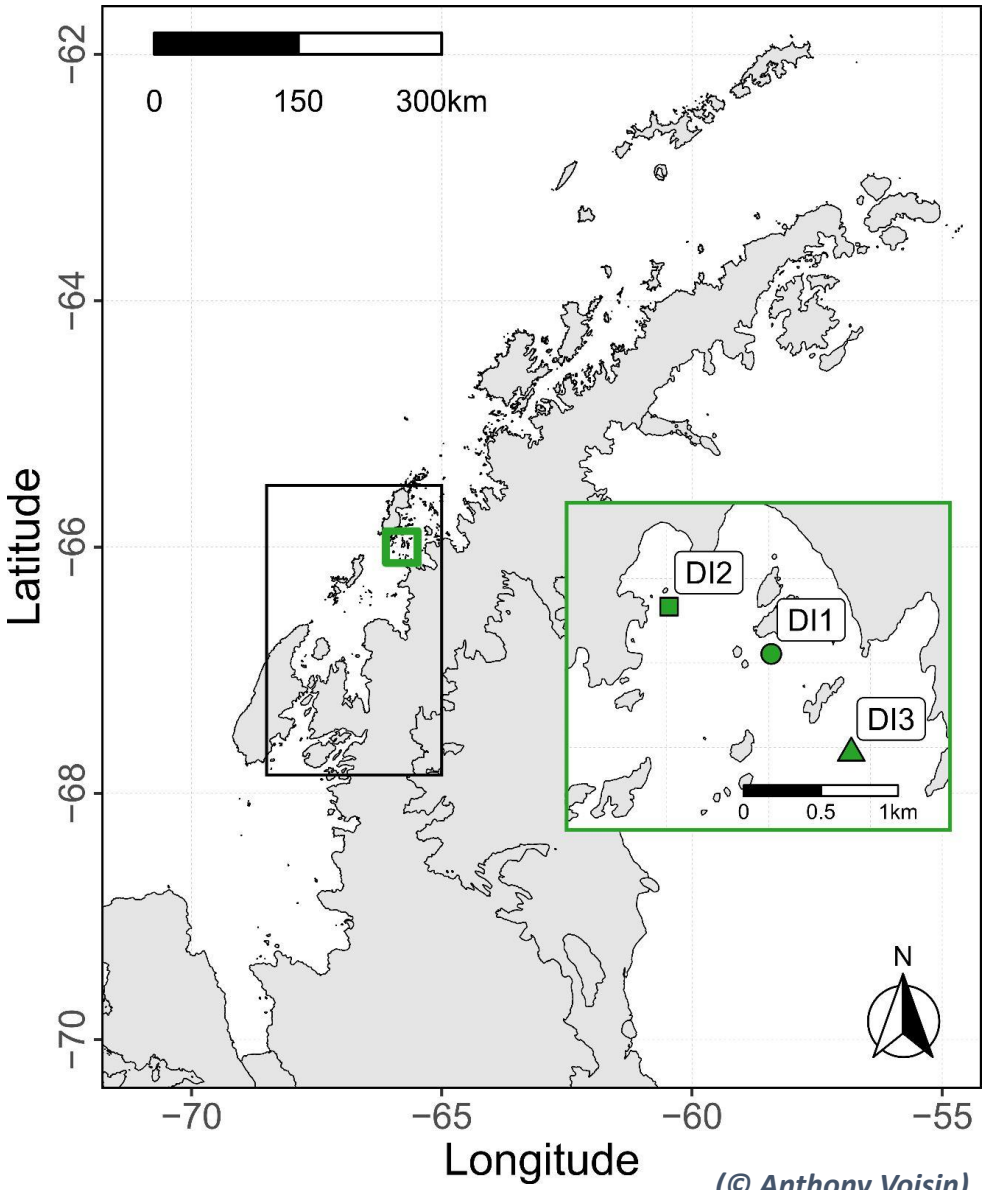
4) Sampling design

Dodman Island:

- Two macroalgae forests on rocky bottom
  - ● DI1 & ▲ DI3
- One soft-bottom community
  - ■ DI2

TANGO 2023 sampling stations



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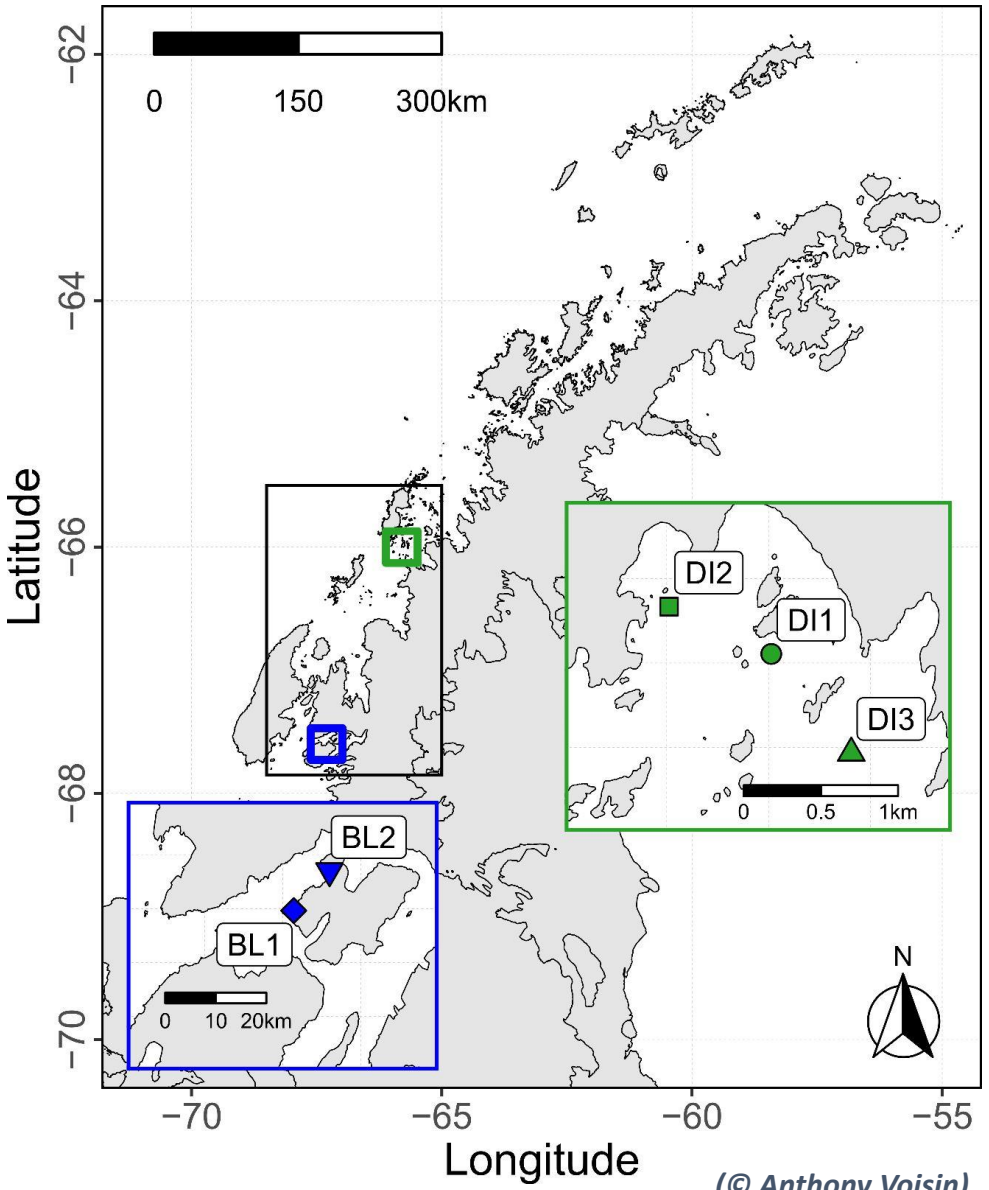
Blaiklock Island:

- One soft-bottom community
  - ◆ BL1
- One rocky slope sparsely covered with algae
  - ▼ BL2

TANGO 2023 sampling stations



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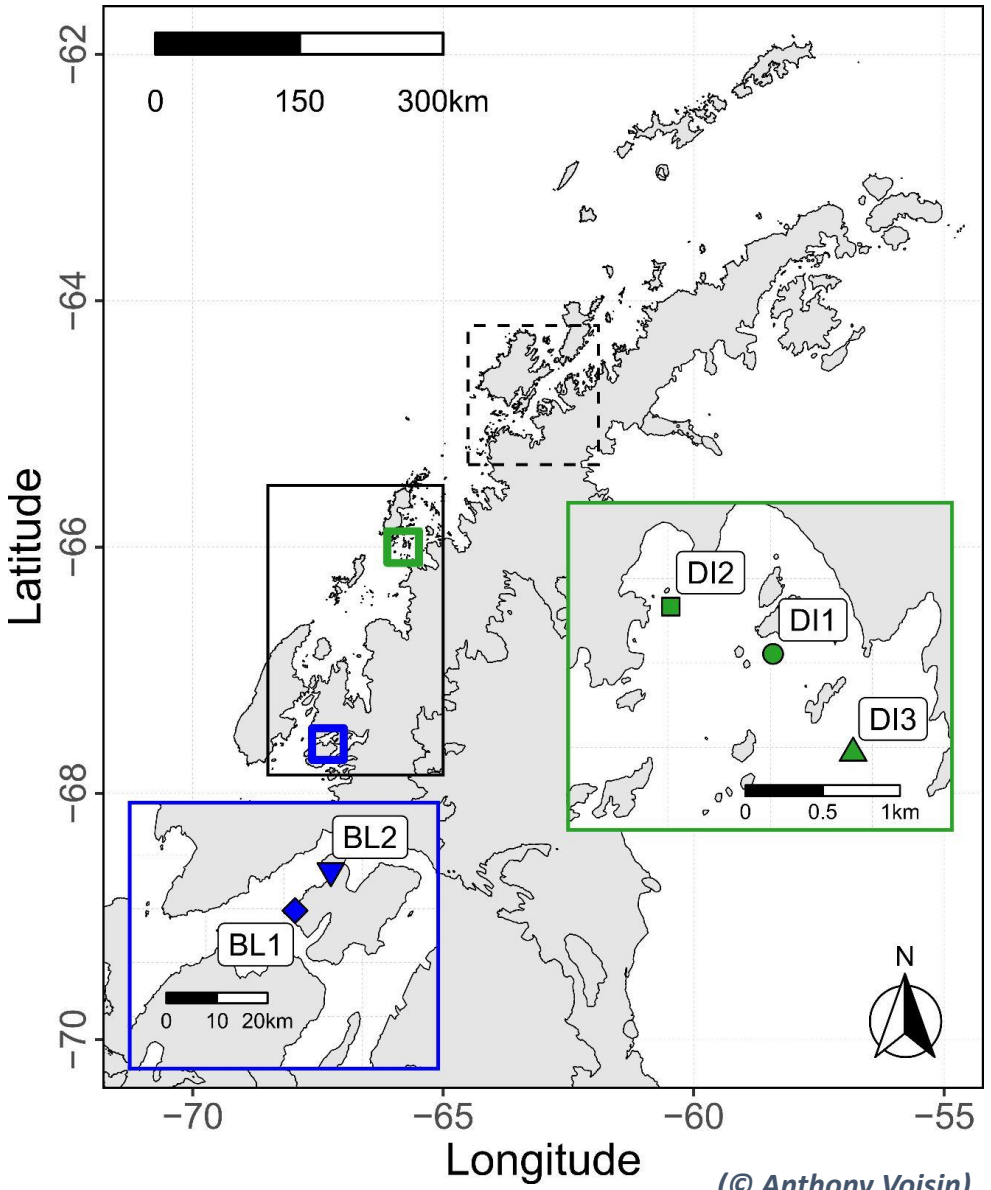
Potential sampling area for the 2024 expedition:

Lemaire Channel & Gerlache Strait

TANGO 2023 sampling stations



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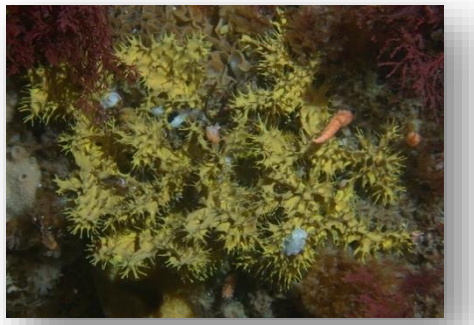
5) Communities sampled

A. Large-scale variability

Dodman Island:

- Biomass dominated by filter feeders and scavengers / predators
- Presence of dense and diverse macroalgae forests

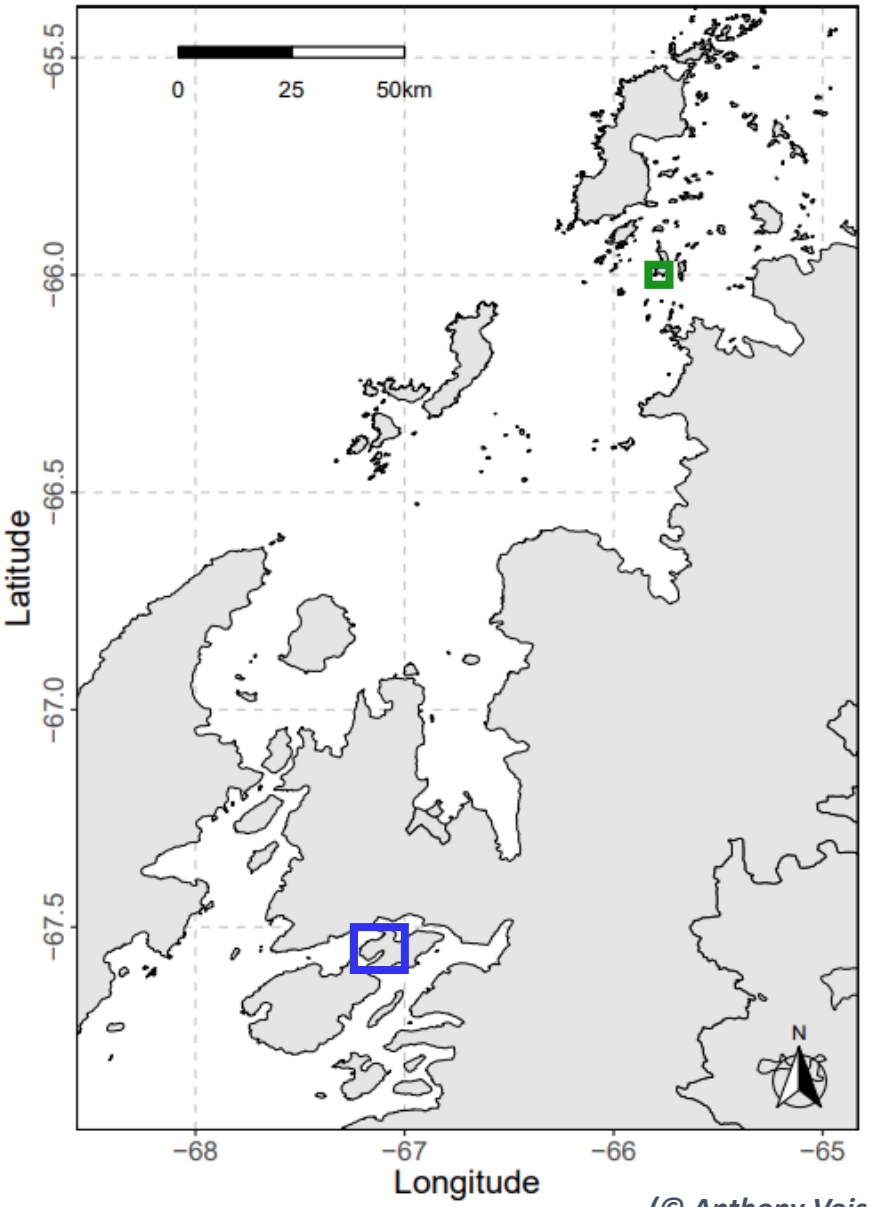


Dendrilla antarctica

Cnemidocarpa verrucosa

Parborlasia corrugatus

TANGO 2023 sampling locations



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5) Communities sampled

A. Large-scale variability

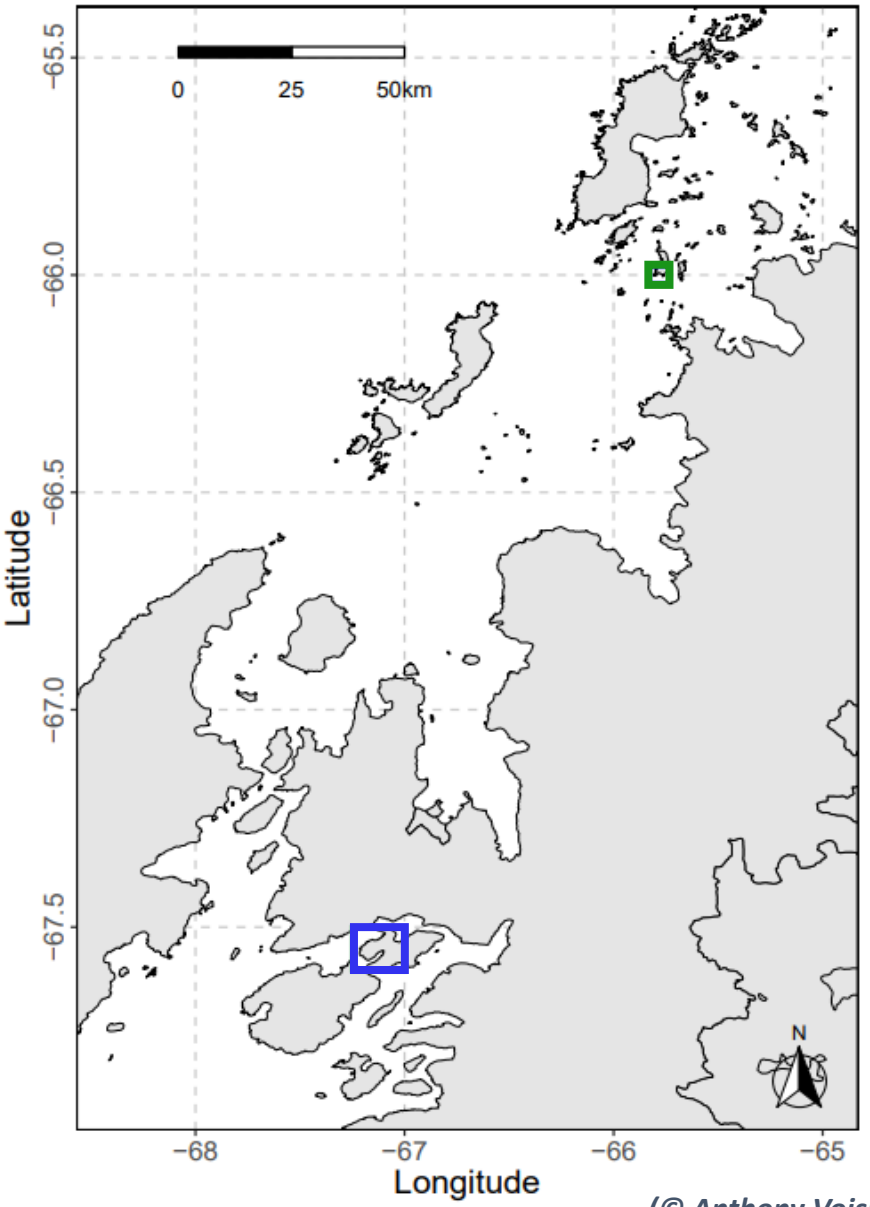
Blaiklock Island:

- Switch to a dominance of deposit and passive suspension feeders
- Near-disappearance of the macroalgae cover

Ophionotus victoriae

Staurocucumis turqueti & Heterocucumis steineni

TANGO 2023 sampling locations



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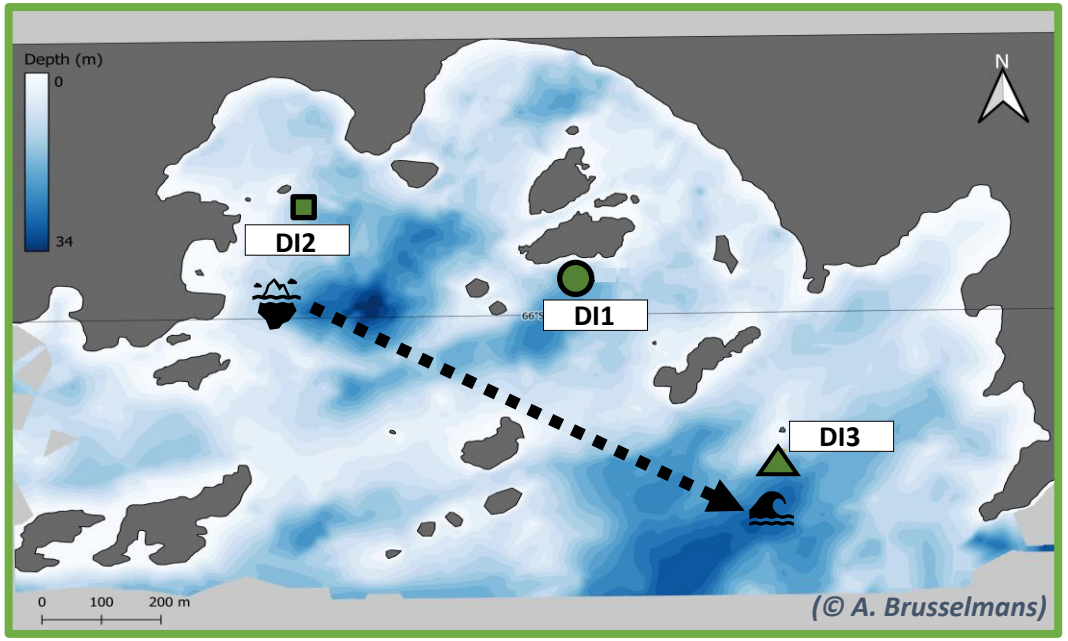
5) Communities sampled

B. Local variability – Dodman Island

- Change in the macroalgae cover
- Increased abundance & diversity of the invertebrates community

Bay of Dodman Island - Bathymetry



DI2

DI1

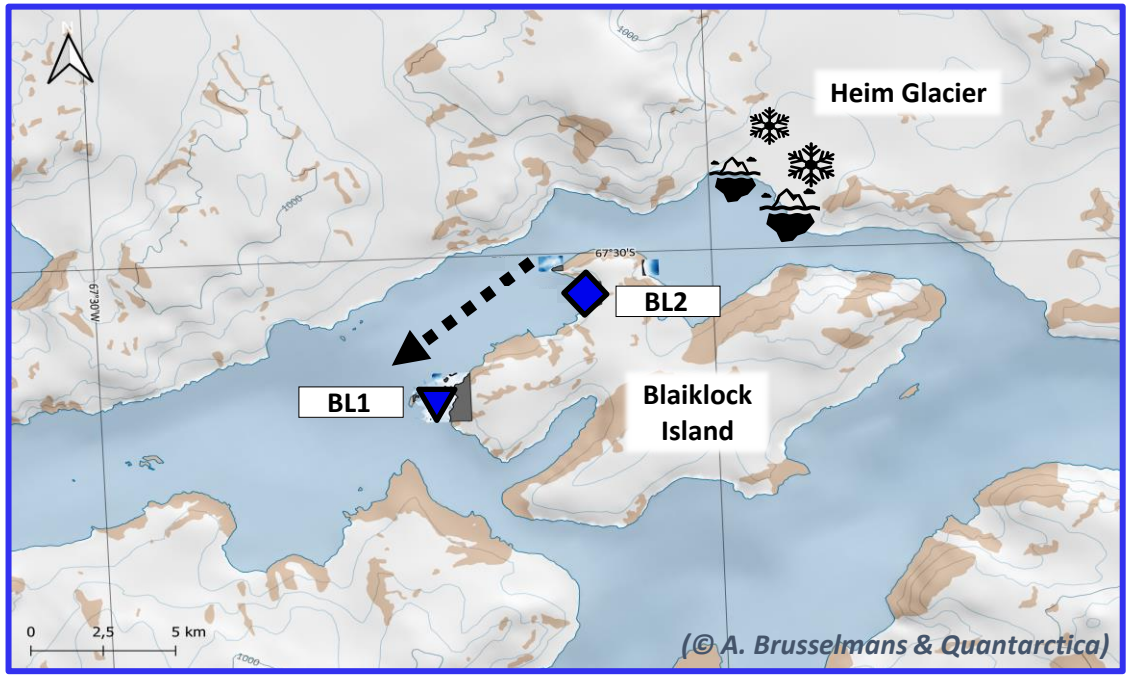
DI3

5) Communities sampled

B. Local gradients – Blaiklock Island

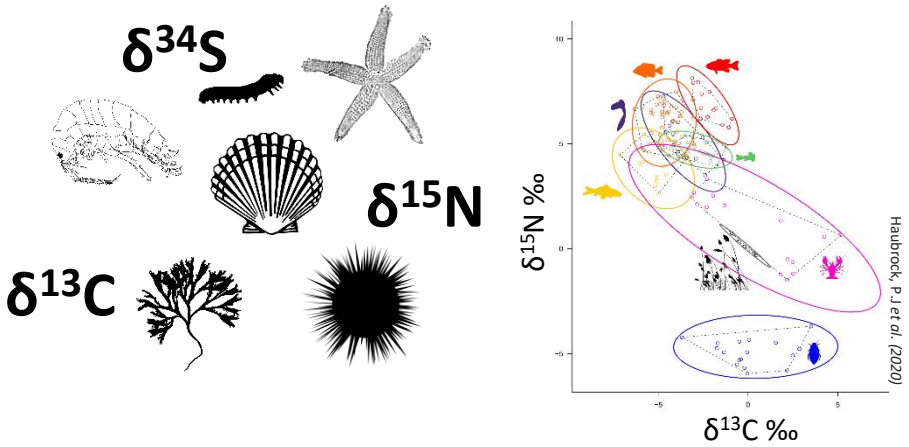
- Increase of the diversity & abundance of invertebrates
- More turbidity & finer sediments at the outlet of the fjord

Blaiklock Island – General map



BL2 ◆ ▼ BL1

6) Methods & Objectives



Stable Isotopes Analysis

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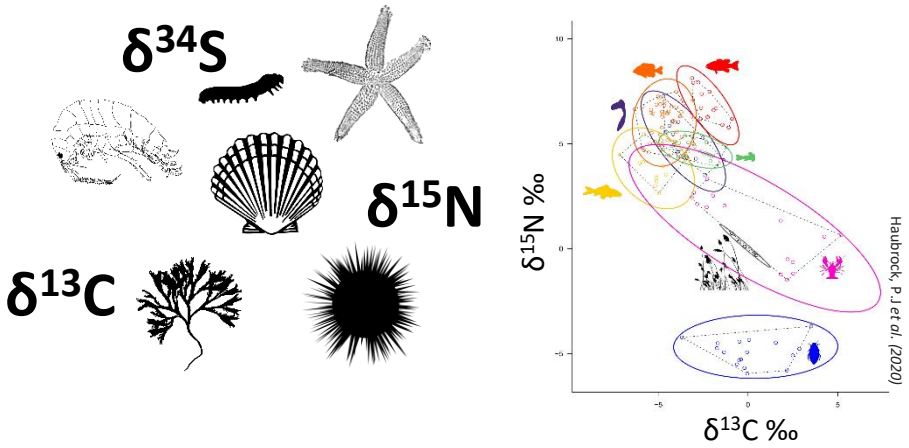

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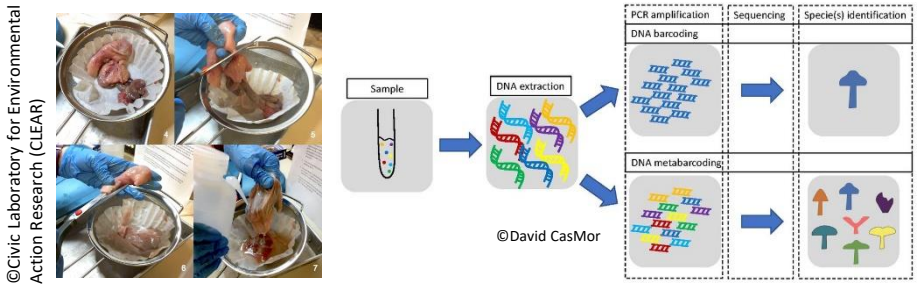

Gut Content Metabarcoding

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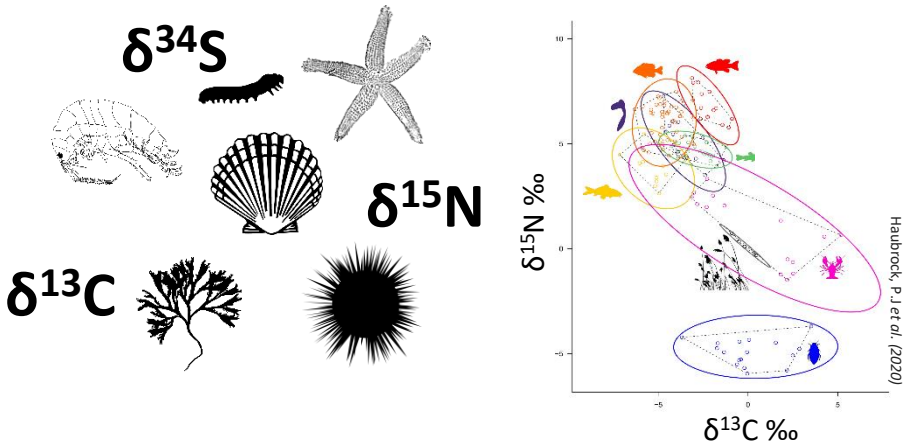

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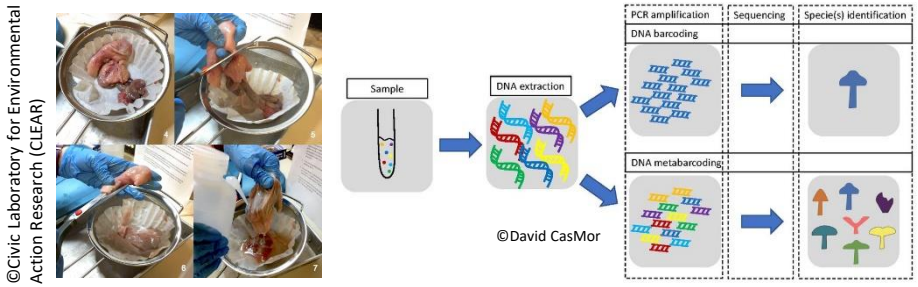

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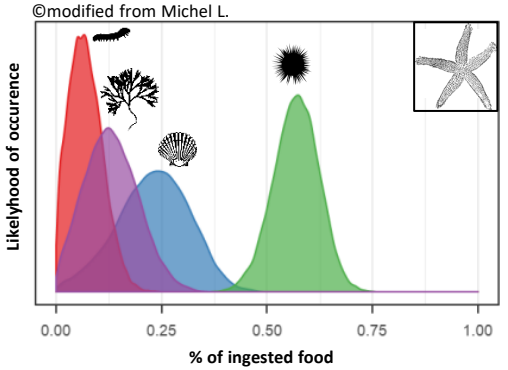

Bayesian mixing models

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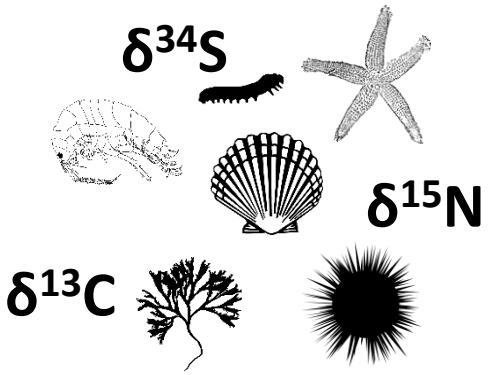

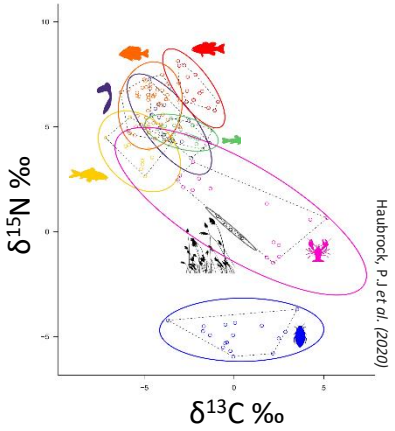

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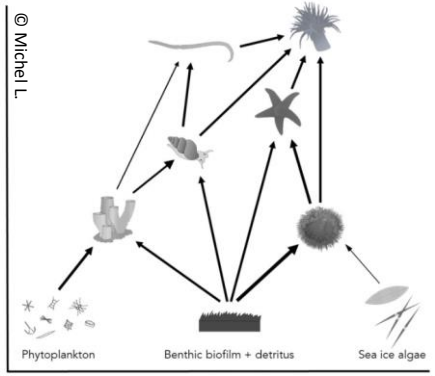
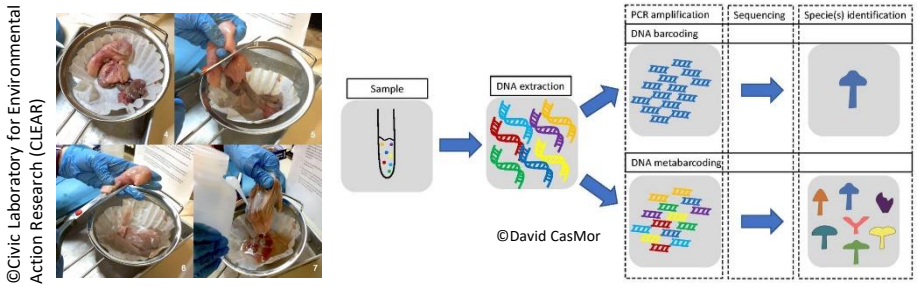


Topological food webs



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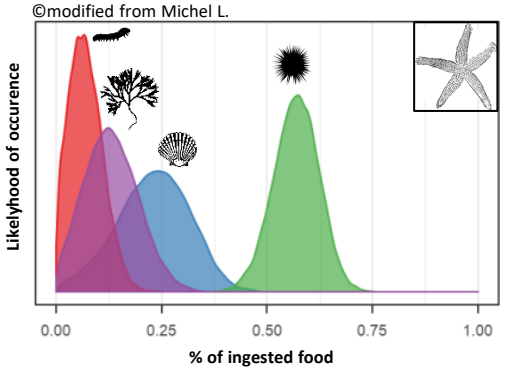

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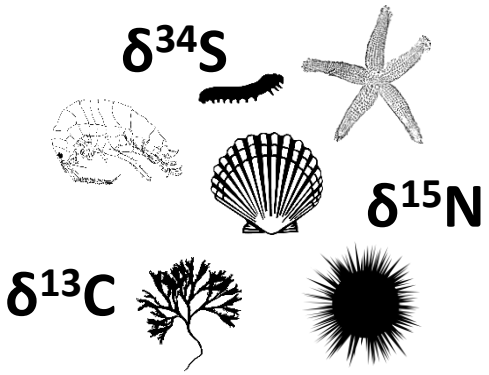

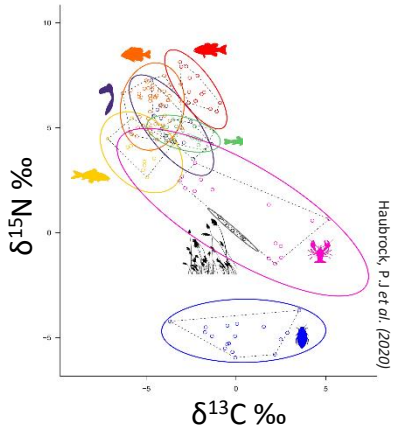

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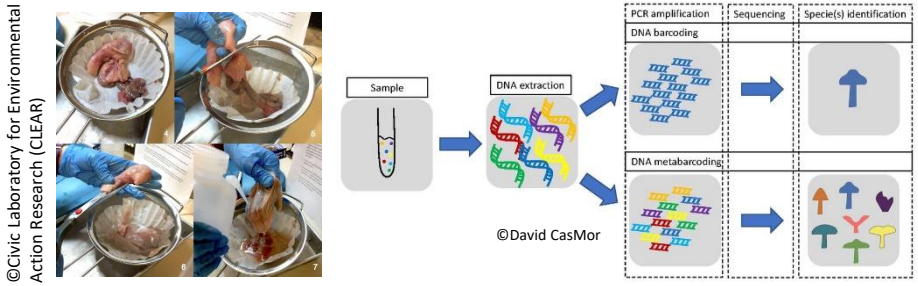

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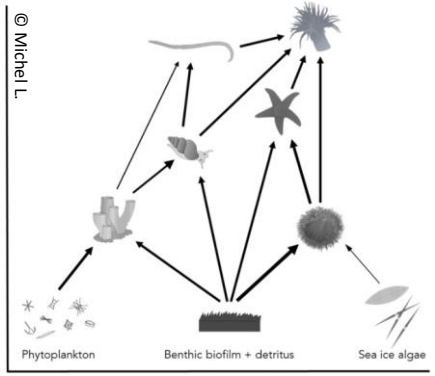

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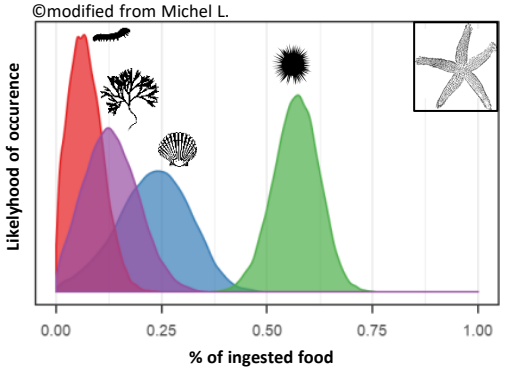
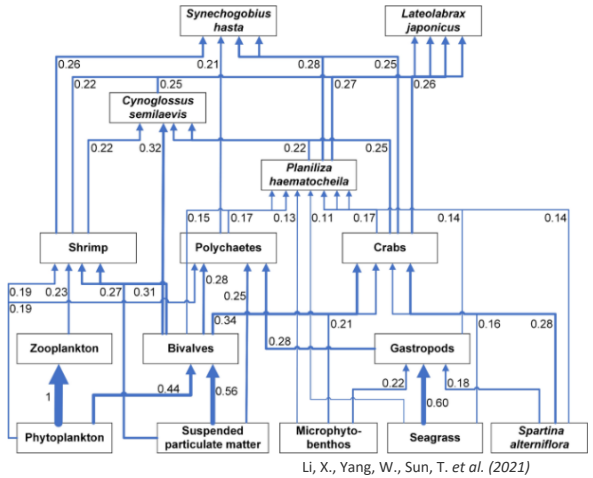


Bayesian mixing models

Quantitative food webs models



7) Acknowledgements

- **Funding**
  - *BELSPO*
  - *F.R.S - FNRS*

- **Expedition team**
  - *UGent*
  - *ULB*
  - *ULiège*
  - *RBINS*
  - *Ocean Expeditions*

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