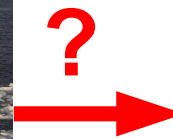


Feeding ecology of sea stars of the Southern Ocean

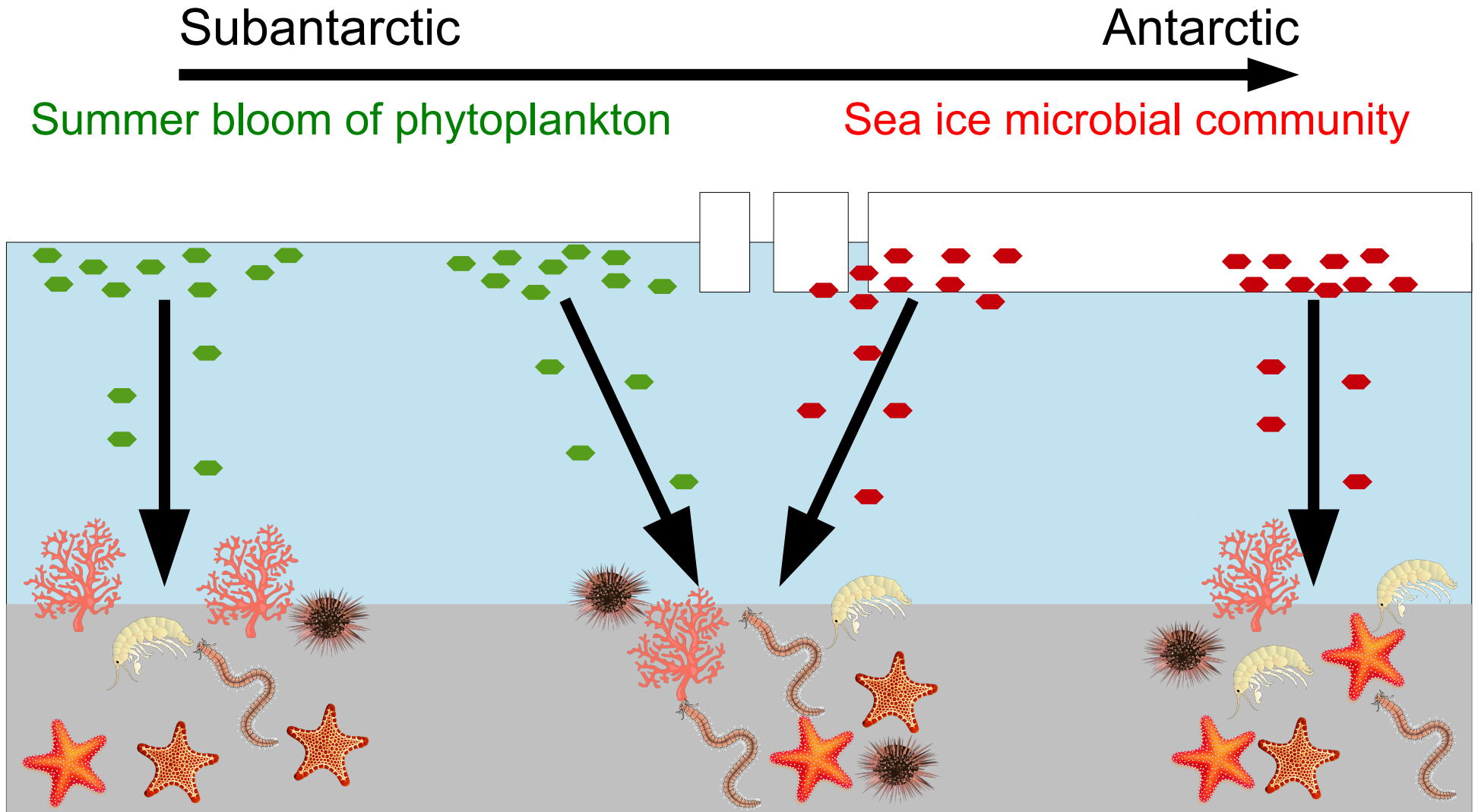
possible influence of sea ice on trophic niche partitioning

Baptiste Le Bourg, Alice Blanchard, Bruno Danis, Quentin Jossart,
Gilles Lepoint, Camille Moreau, Loïc N. Michel



Trophic status of Antarctic benthos

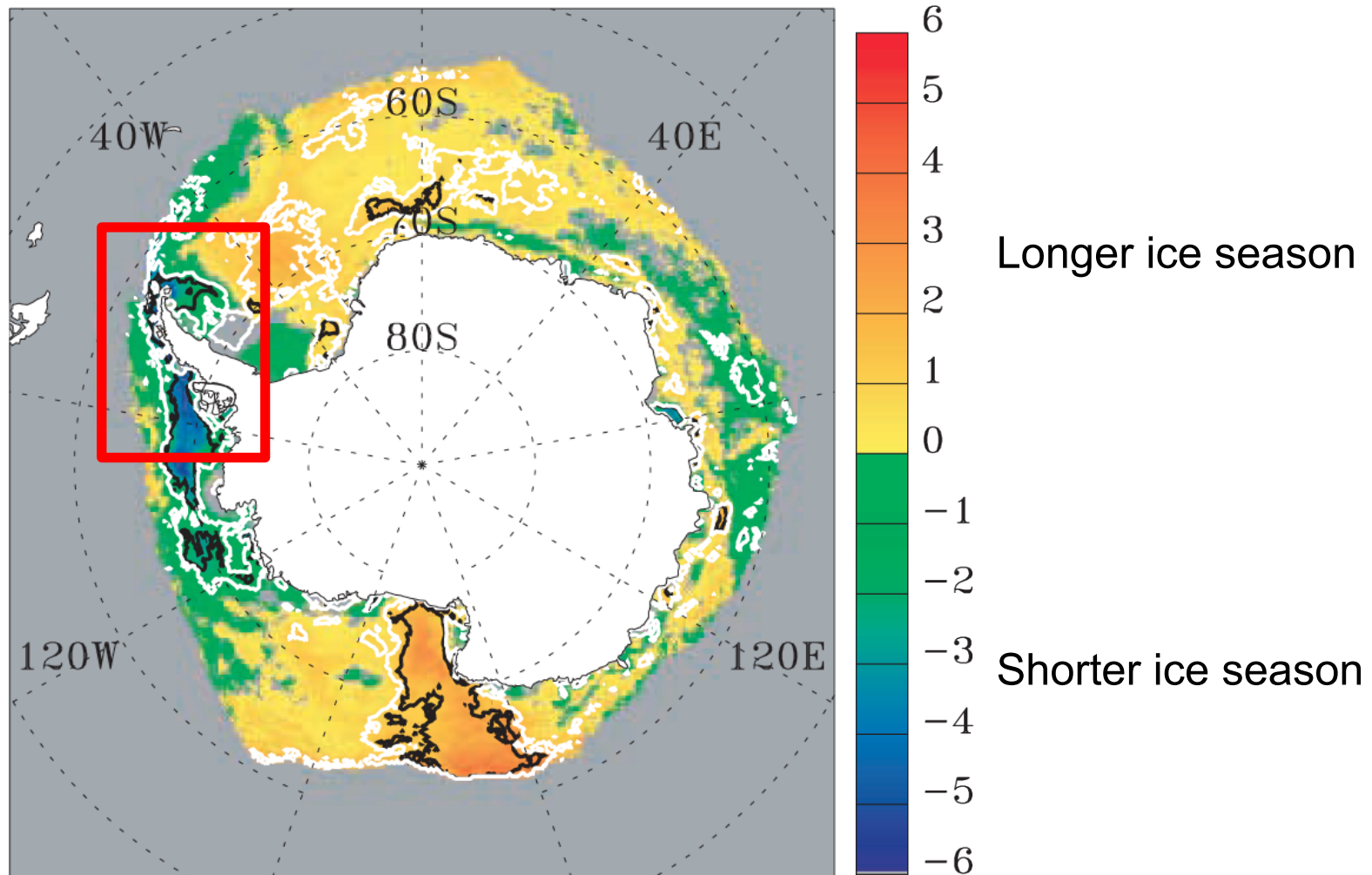
- Bentho-pelagic coupling in Antarctic : contribution of pelagic and sea ice microbial communities to Antarctic benthic food webs



Sea ice changes in Antarctic

- Decrease of sea ice extent in **Western Antarctic Peninsula**

1979-2004 Ice season duration changes (days/year)



Stammerjohn et al., 2008

- Sea stars of Antarctic → trophic diversity



Detritus feeders
(*Glabraster antarctica*)



Omnivores
(*Diplasterias brucei*)



Predators on active prey
(*Labidiaster annulatus*)



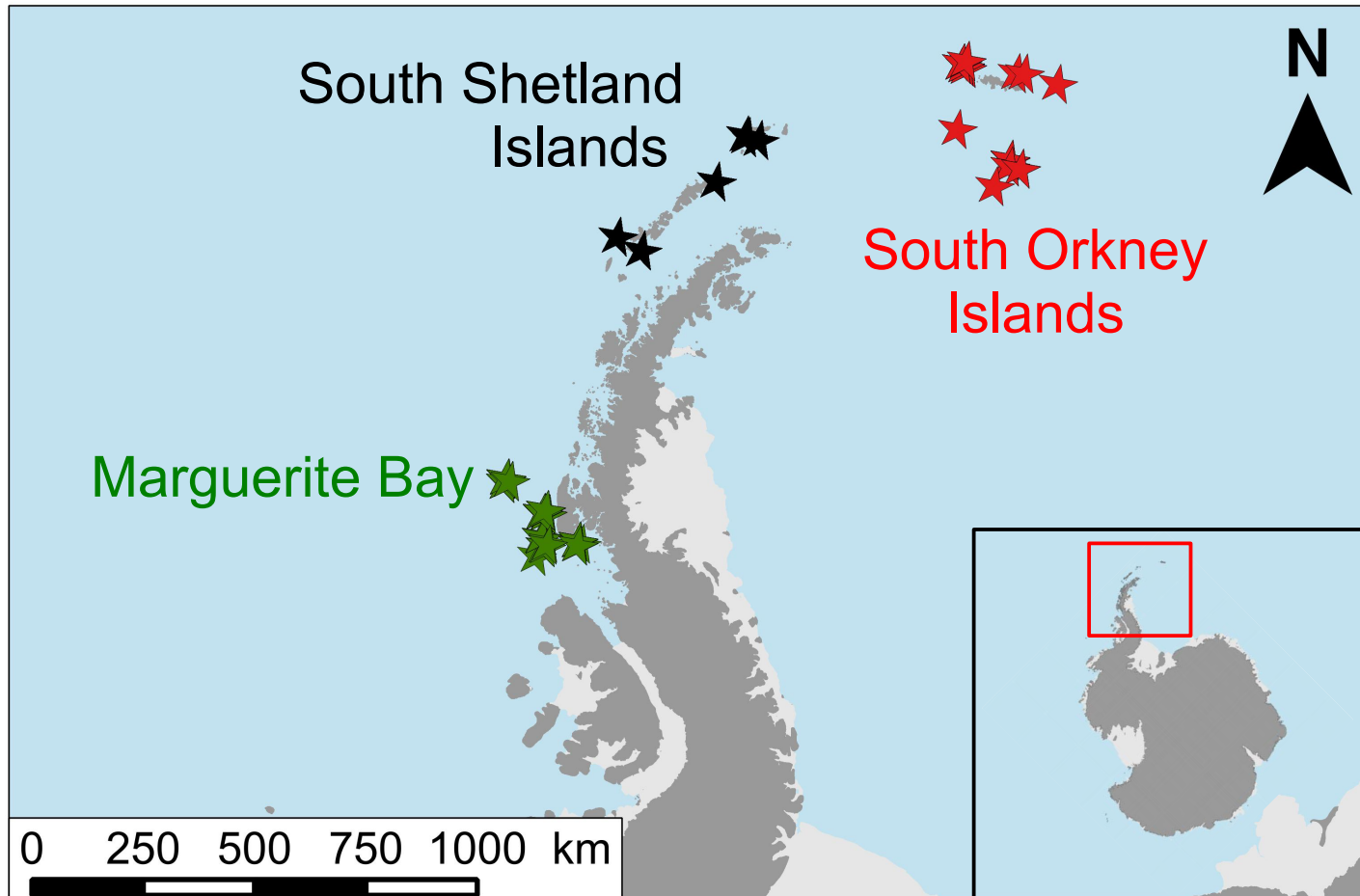
Predators on sessile prey
(*Notasterias armata*)



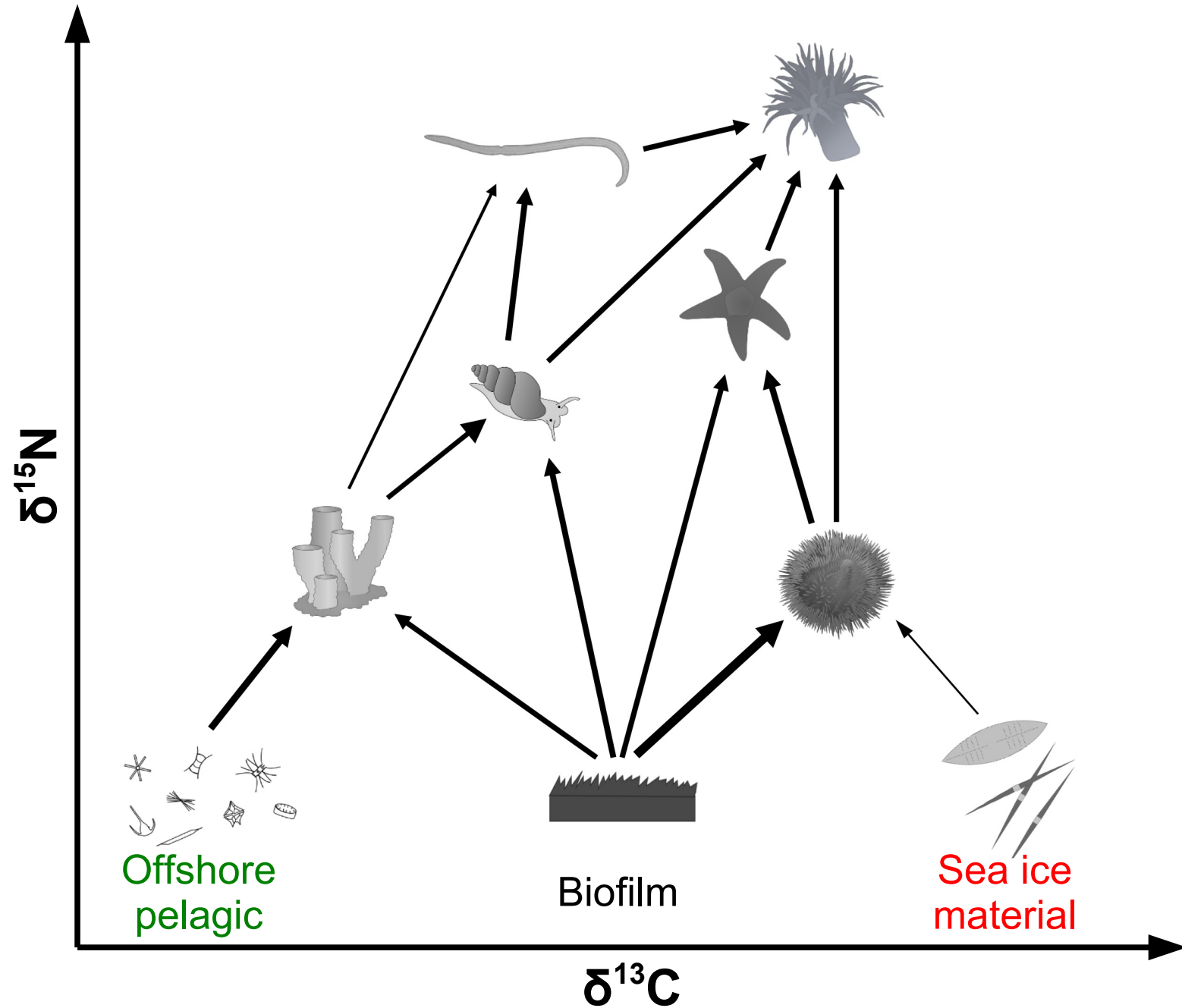
Unknown
(*Peribolaster folliculatus*)

Objectives

- To compare regional differences of trophic diversity between and within trophic groups along Western Antarctic Peninsula
→ Trophic niche partitioning and overlap

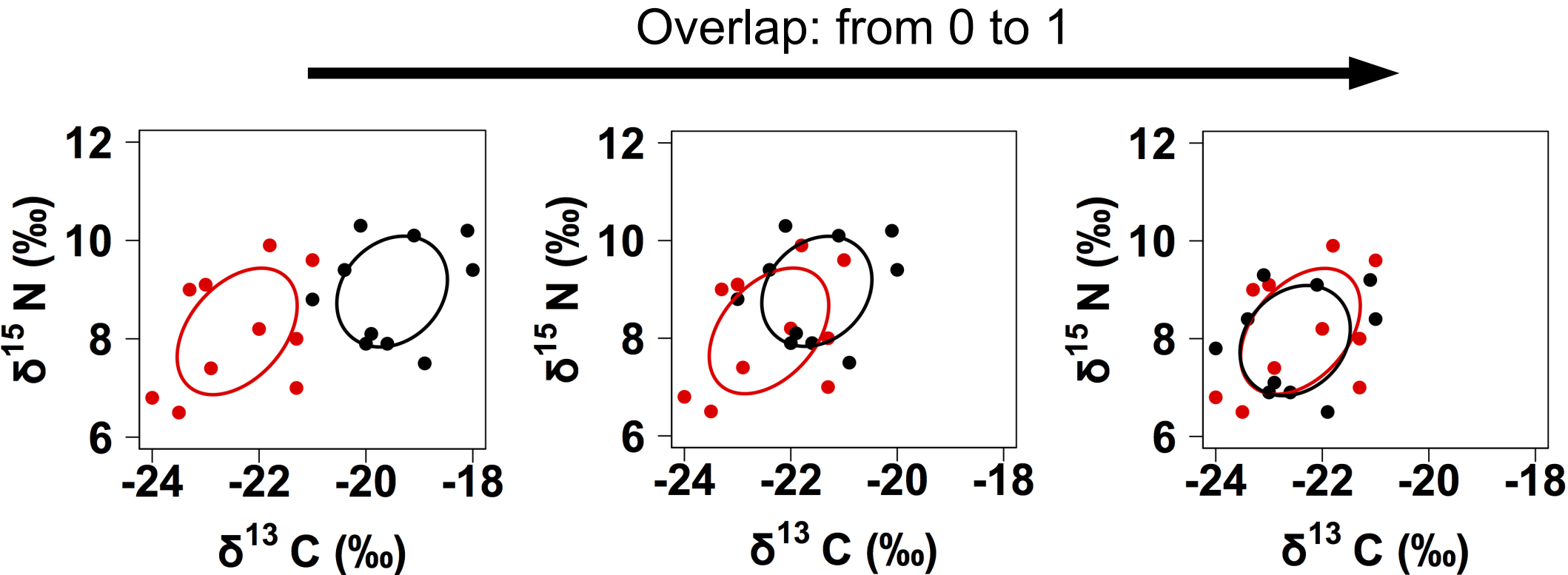


Stable isotopes in trophic ecology



Stable isotopes in trophic ecology

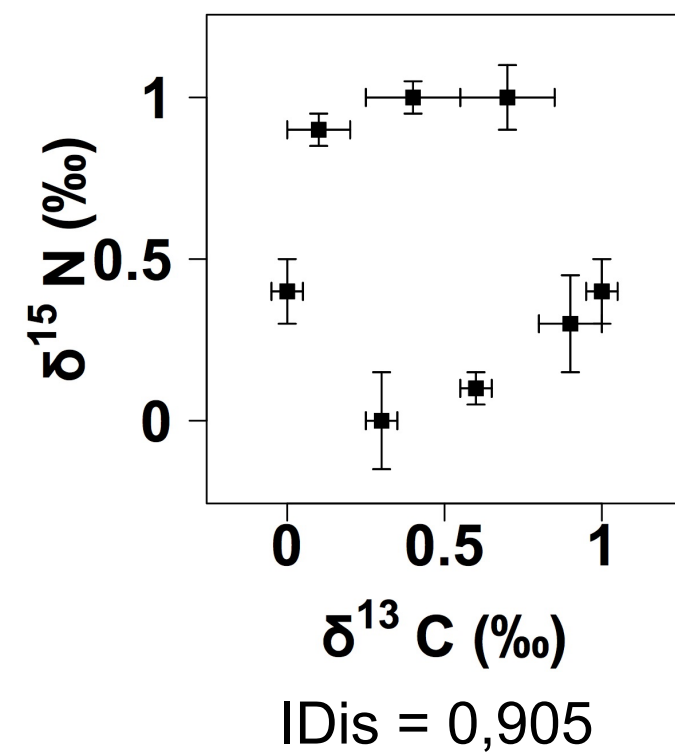
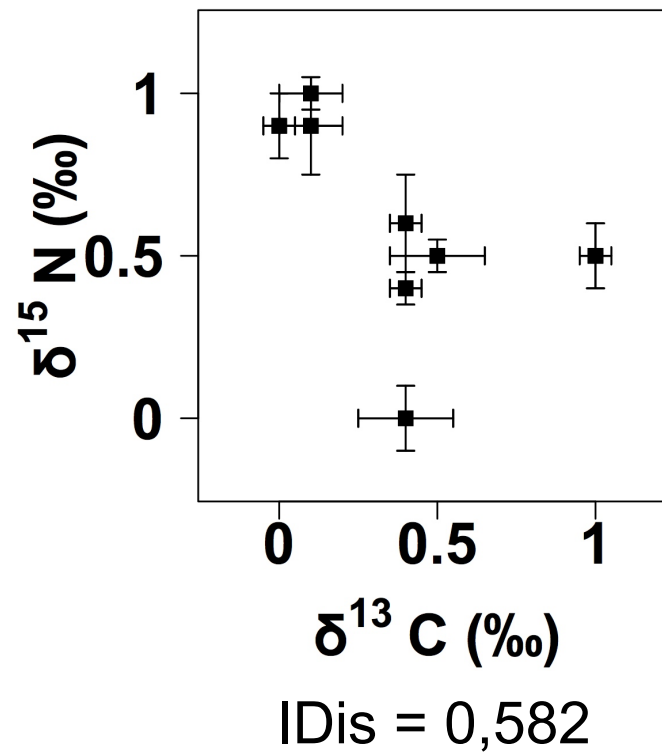
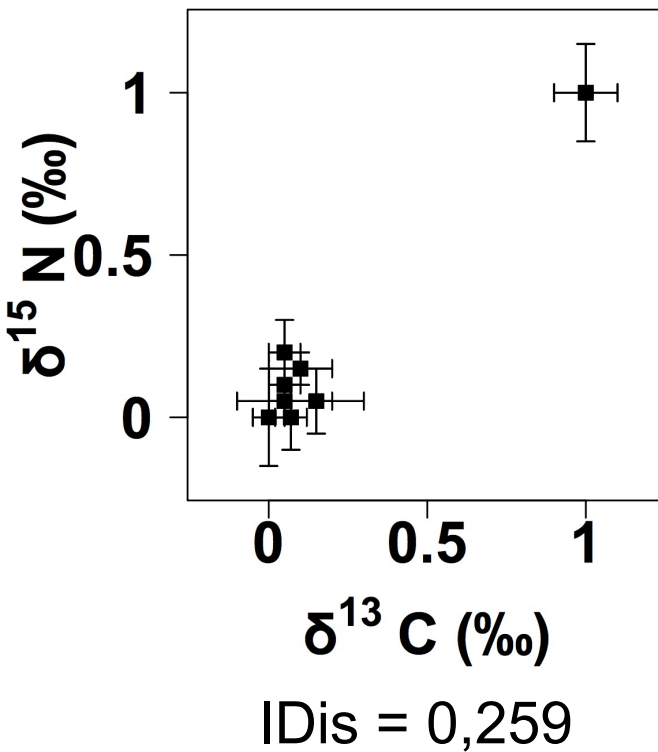
- Isotopic niches \Leftrightarrow trophic niches \rightarrow estimation of trophic diversity, trophic variability and diet overlap with ellipse areas



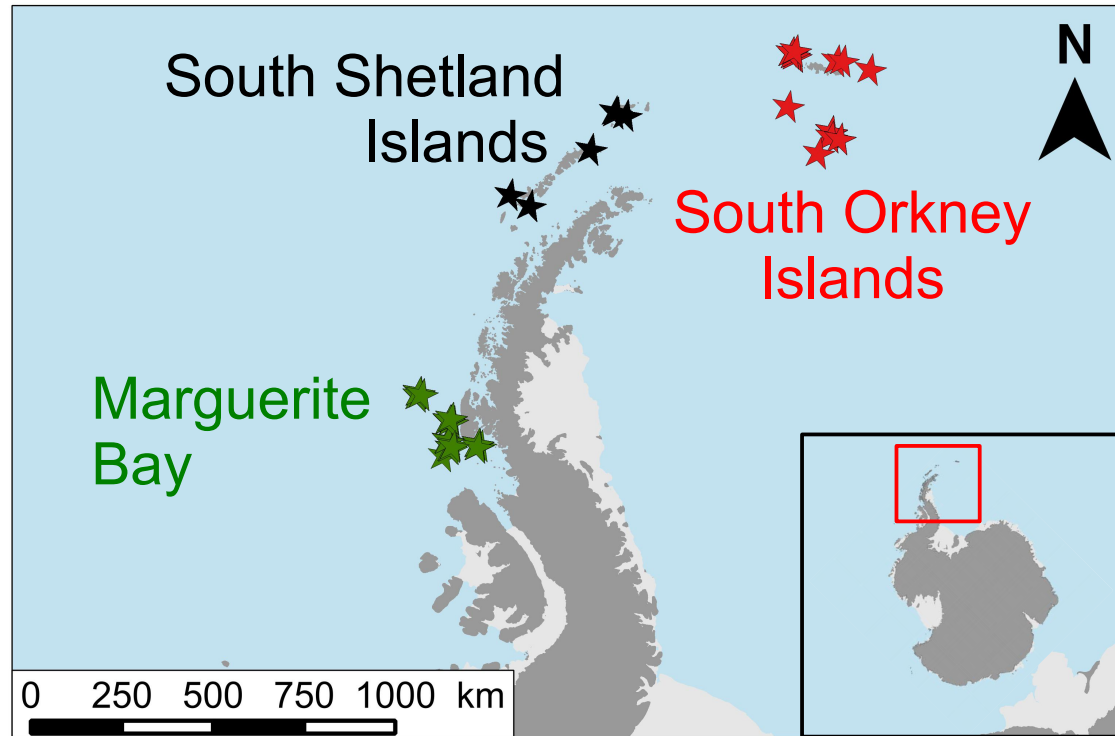
Stable isotopes in trophic ecology

- Isotopic dispersion (IDis) → estimation of trophic diversity at community scale

IDis: from 0 to 1



Sampling



33 species (318 specimens)
assigned to **trophic groups**:

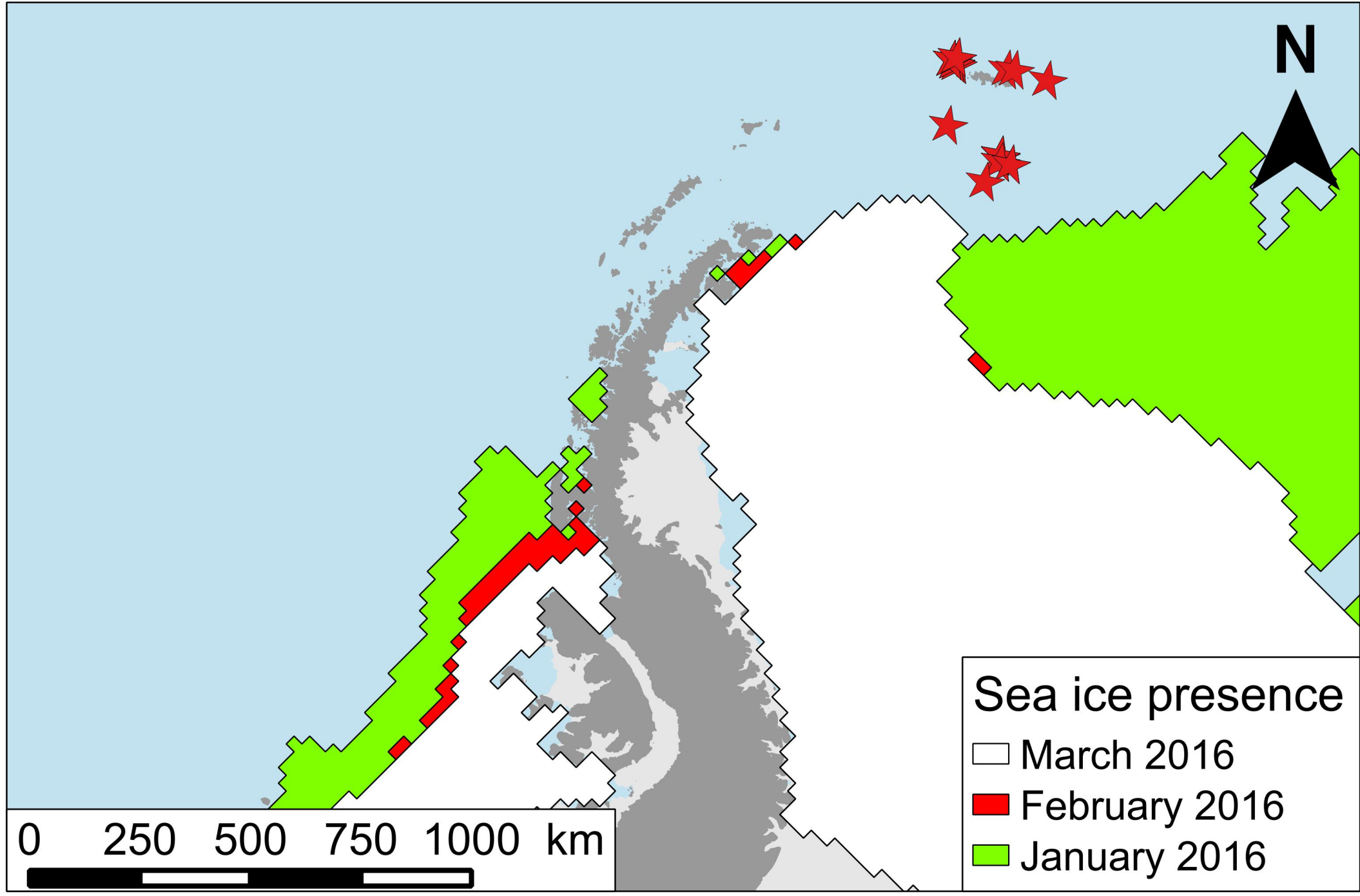
- Detritus feeders
- Predators on sessile prey
- Predators on active prey
- Omnivores
- Unknown

$\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ in tegument
measured by EA-IRMS

→ Isotopic niche if $n > 5$

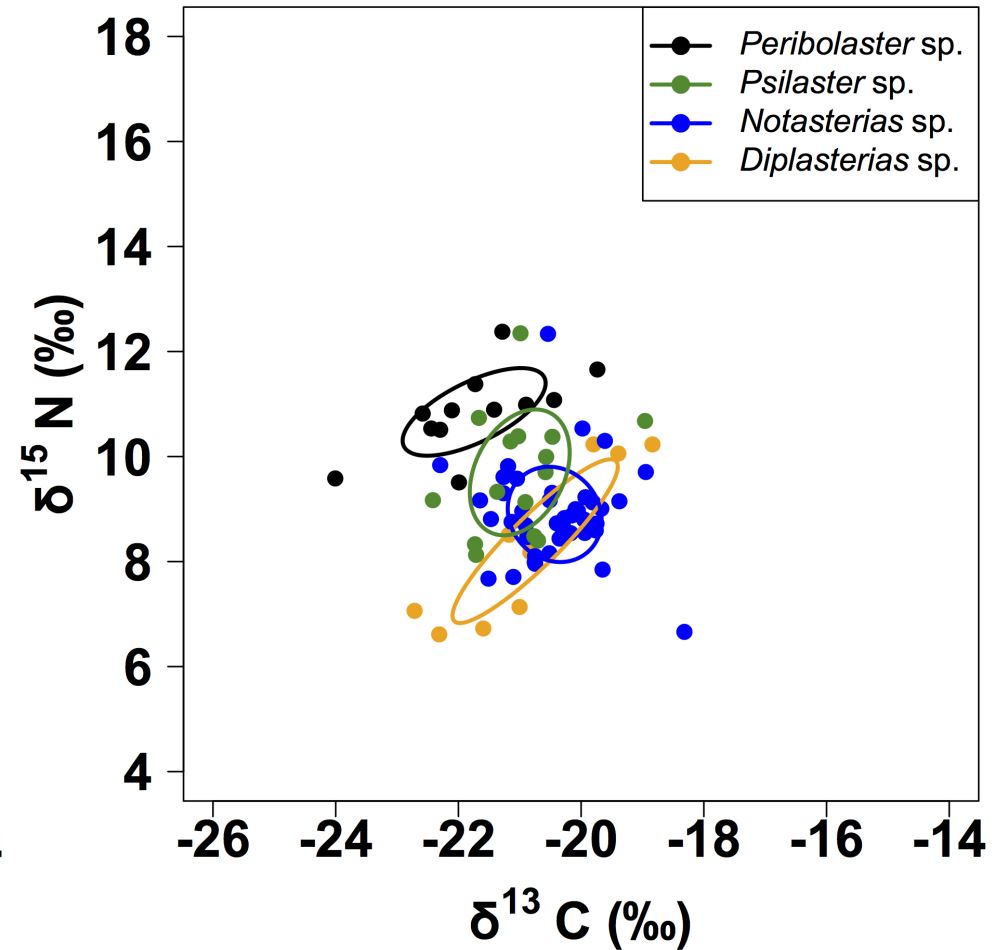
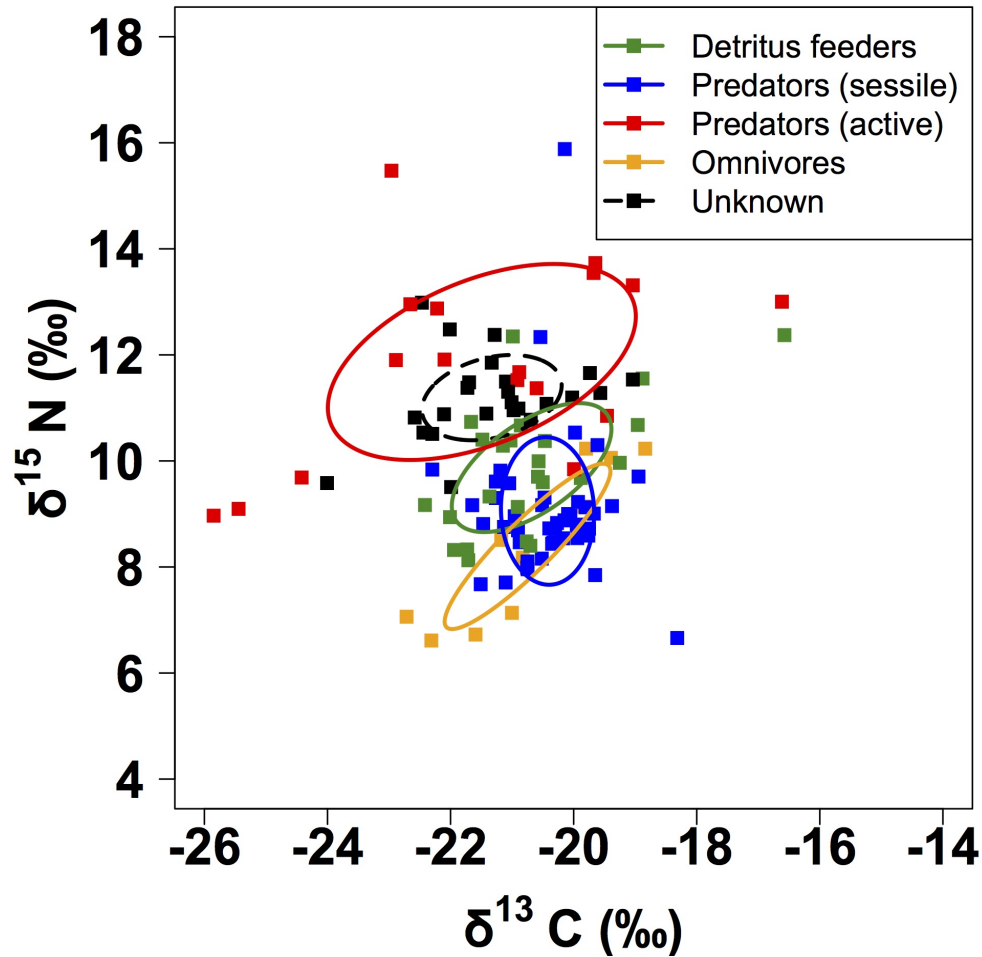
→ Isotopic dispersion (IDis)

South Orkney Islands



South Orkney Islands

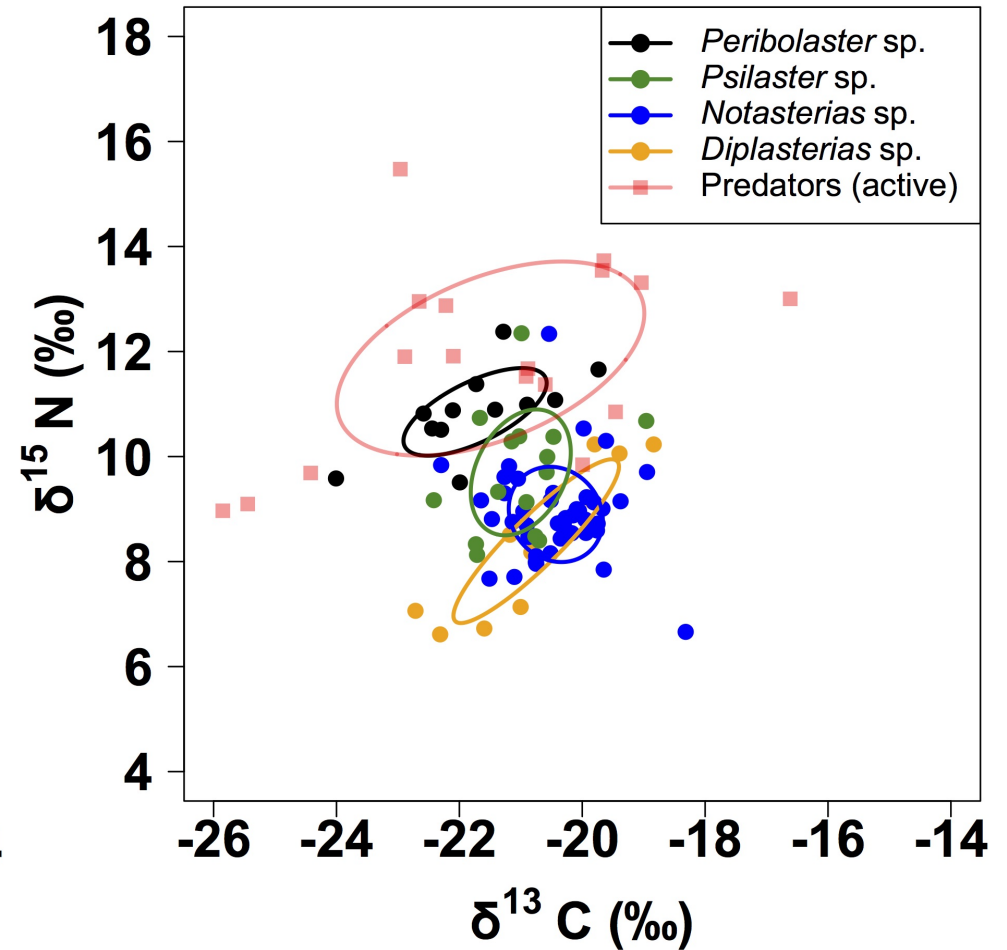
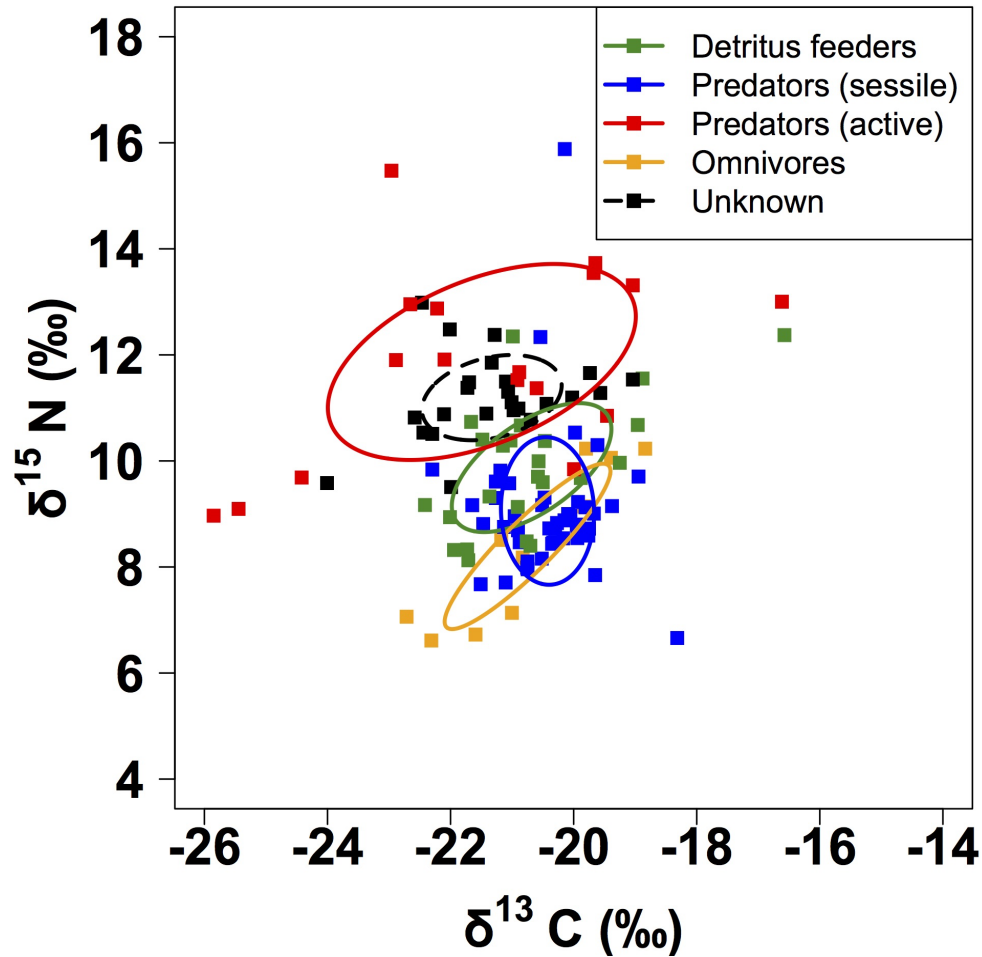
→ Isotopic niche if $n > 5$



- No differences of δ¹³C between trophic groups and species
→ Strong overlap between omnivores and predators of sessile prey

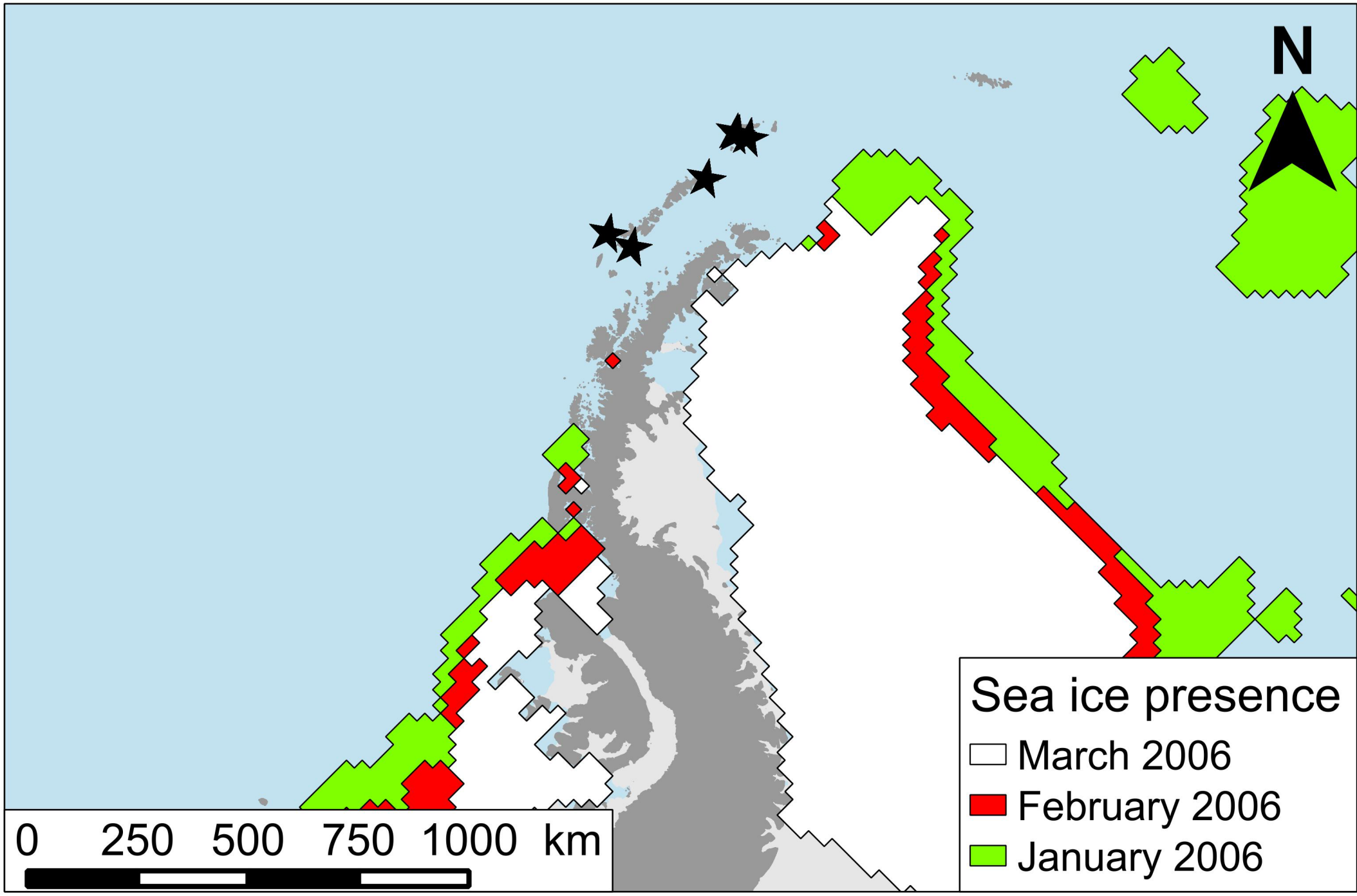
South Orkney Islands

→ Isotopic niche if $n > 5$



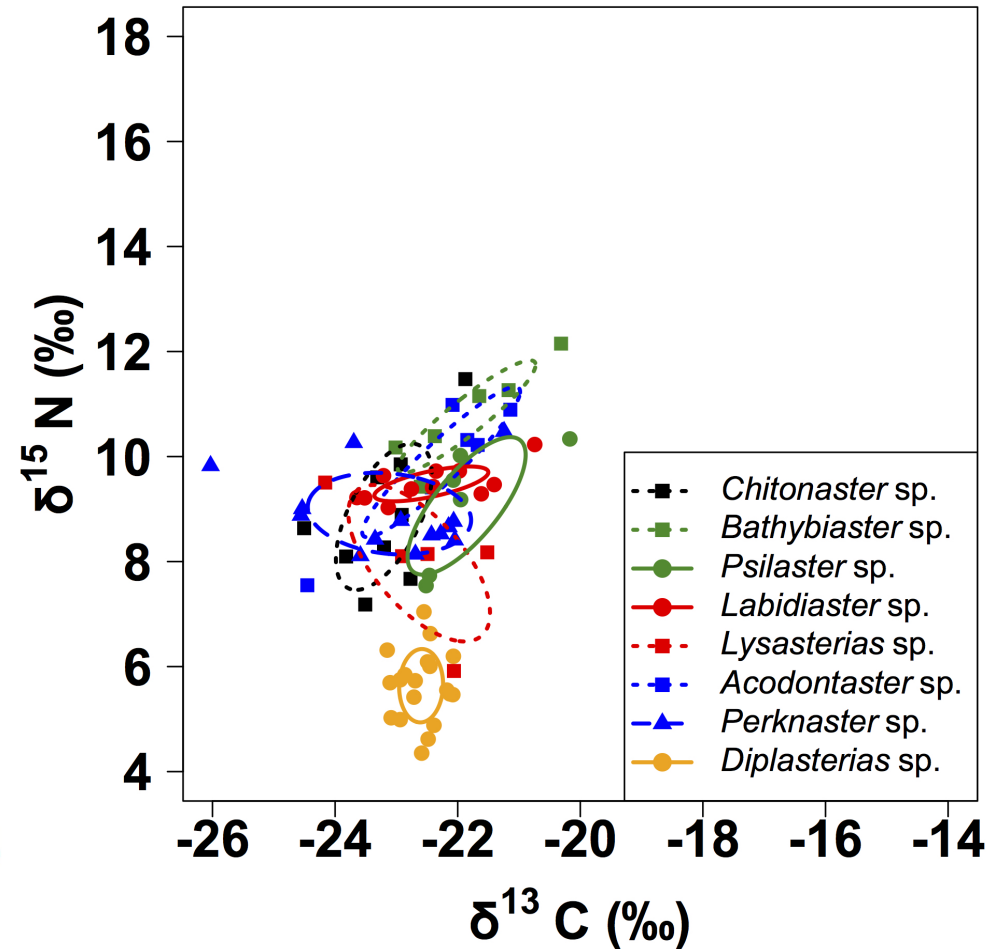
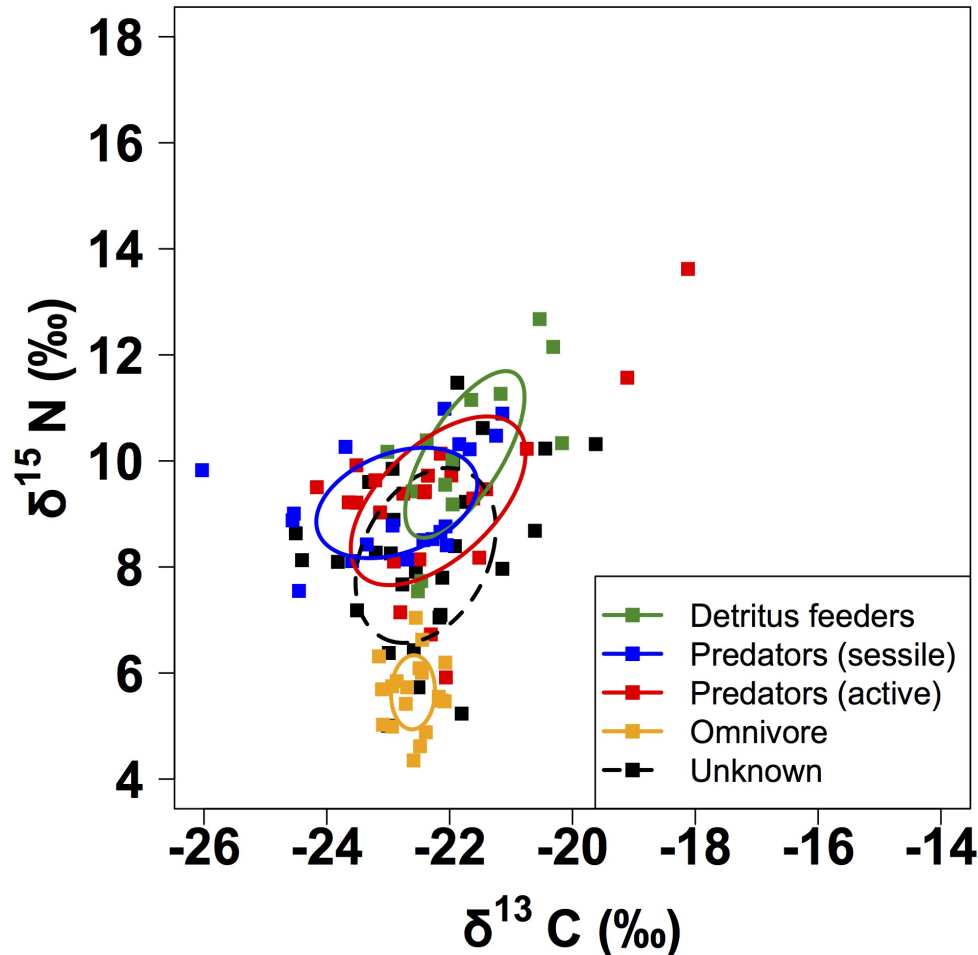
- *Peribolaster* sp. → Predator of active prey?

South Shetland Islands



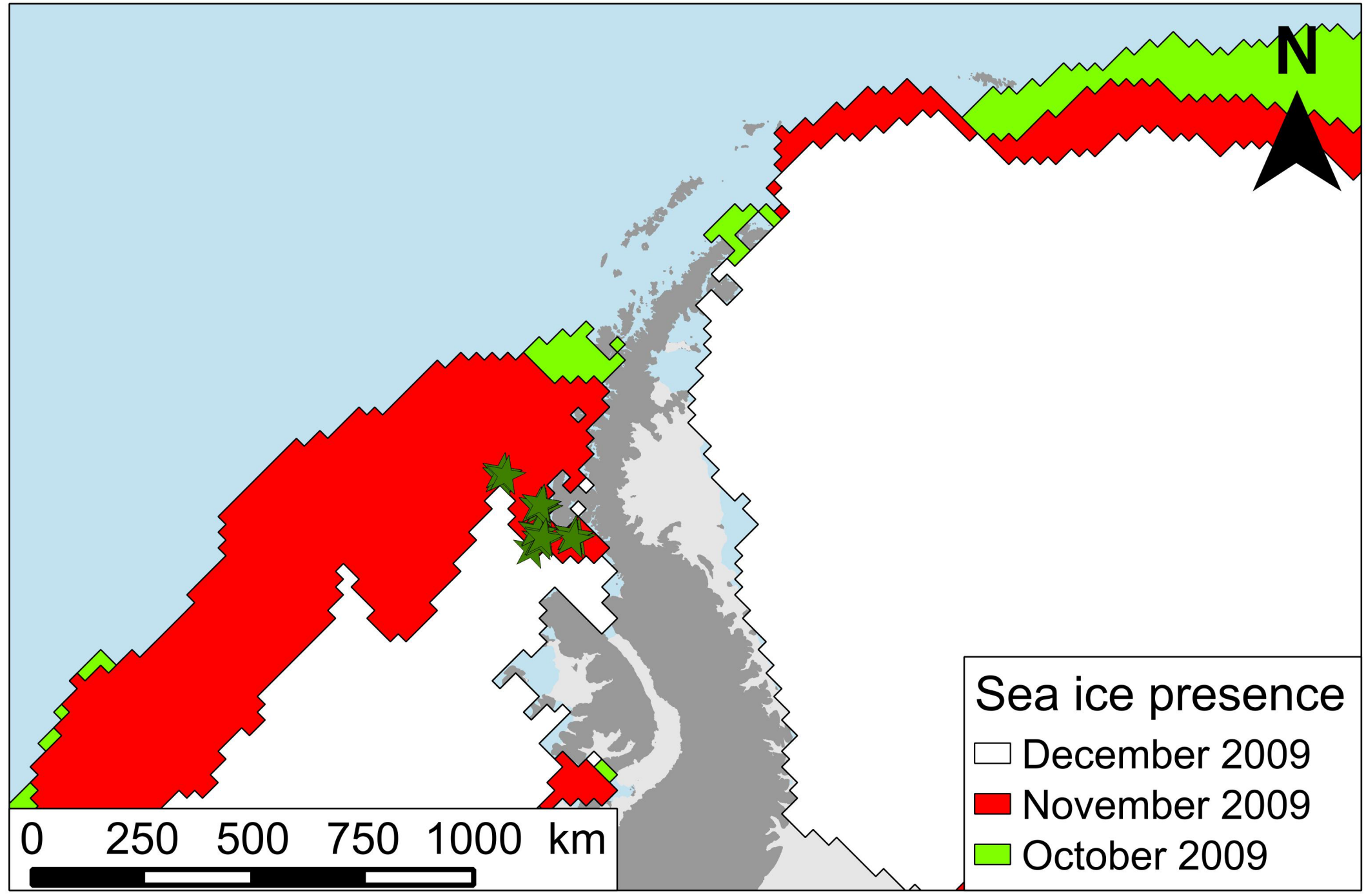
South Shetland Islands

→ Isotopic niche if $n > 5$



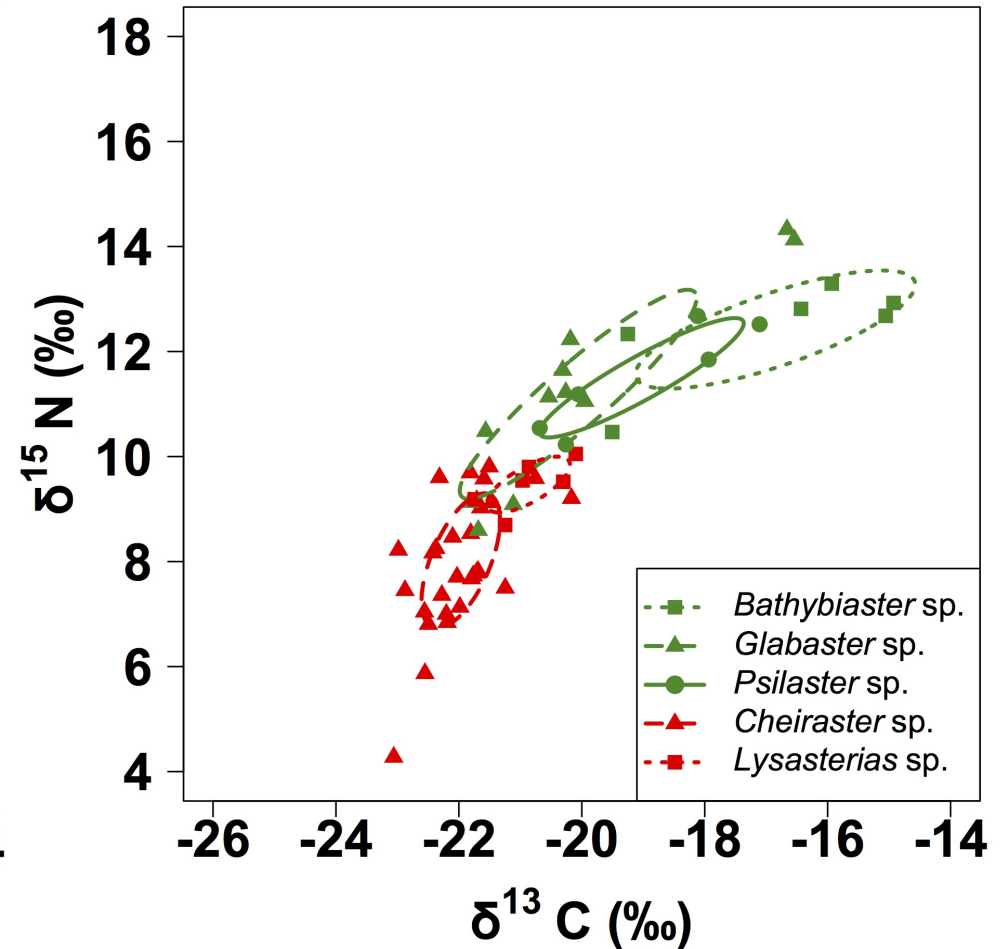
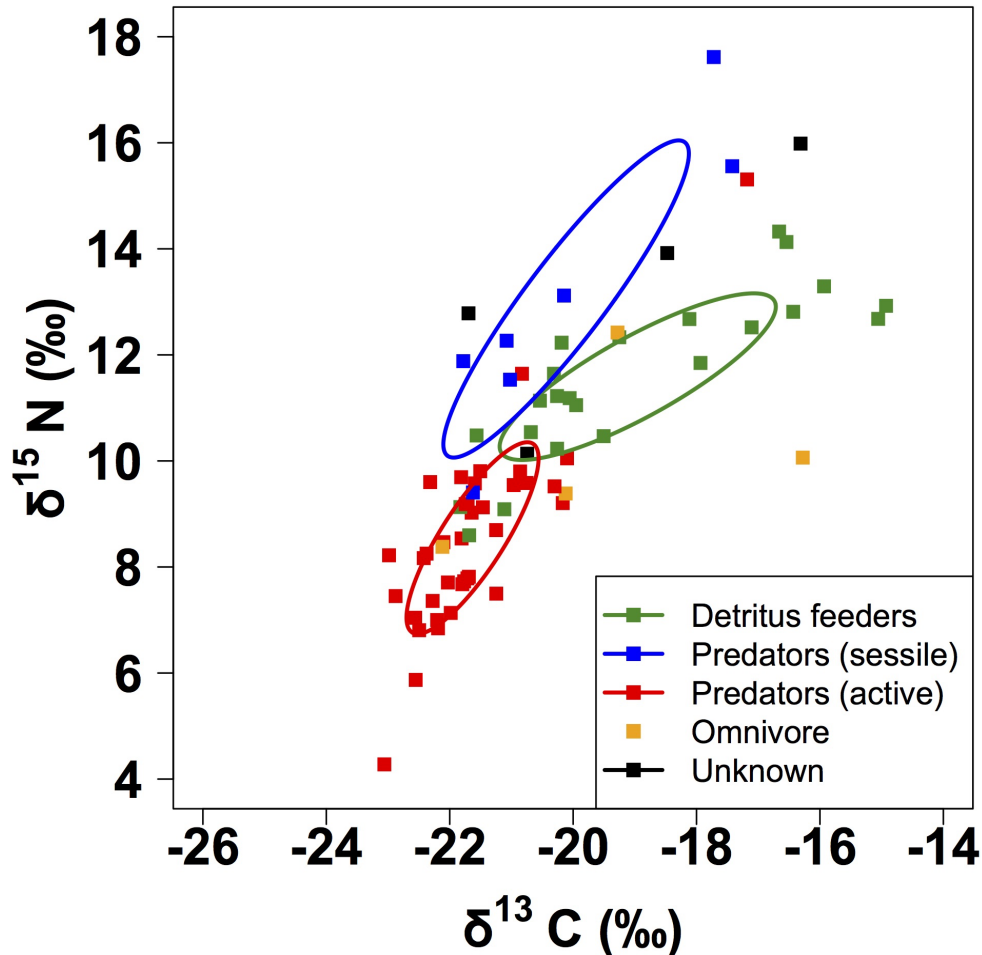
- No differences of $\delta^{13}\text{C}$ between trophic groups and species and low variability of $\delta^{13}\text{C}$ within trophic groups and species
→ important overlap of isotopic niches between trophic groups

Marguerite Bay



Marguerite Bay

→ Isotopic niche if $n > 5$



- Differences of $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ between trophic groups and species and important variability of $\delta^{13}\text{C}$ within trophic groups and species
→ Almost no overlap of isotopic niches between trophic groups

Isotopic dispersion (IDis)

- Isotopic dispersion (IDis) → estimation of trophic diversity
- Highest IDis recorded in Marguerite Bay, followed by South Orkney Island and South Shetland Islands

	IDis
South Orkney Islands	0.418
South Shetland Islands	0.362
Marguerite Bay	0.564

Summary and hypotheses

Sea ice cover during summer

South Shetland Islands
South Orkney Islands

Marguerite Bay



Phytoplankton



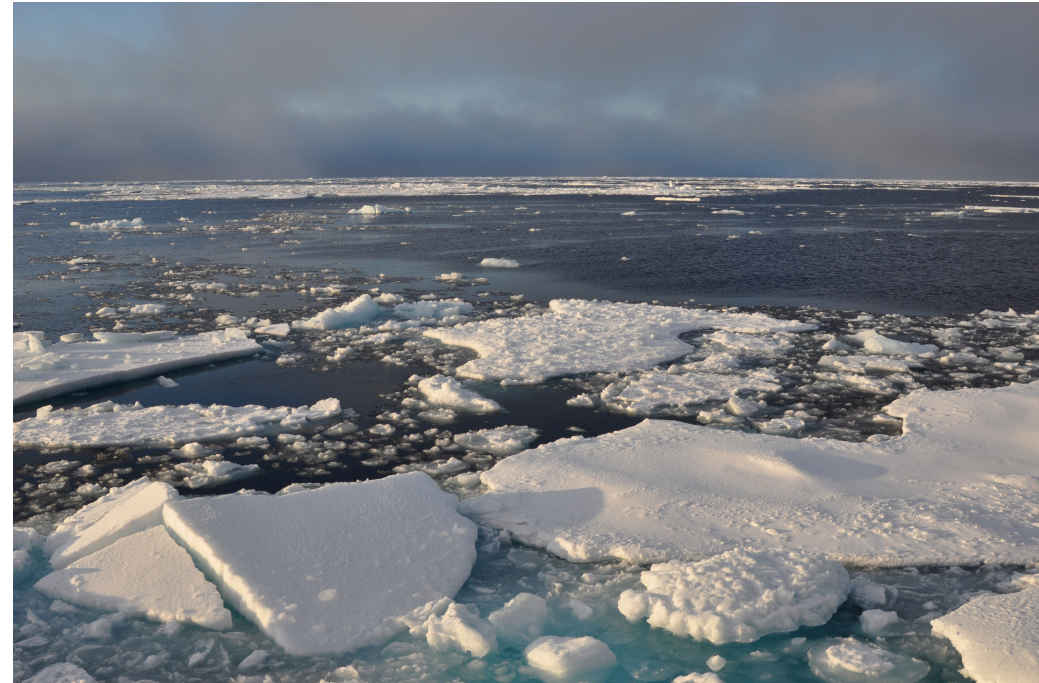
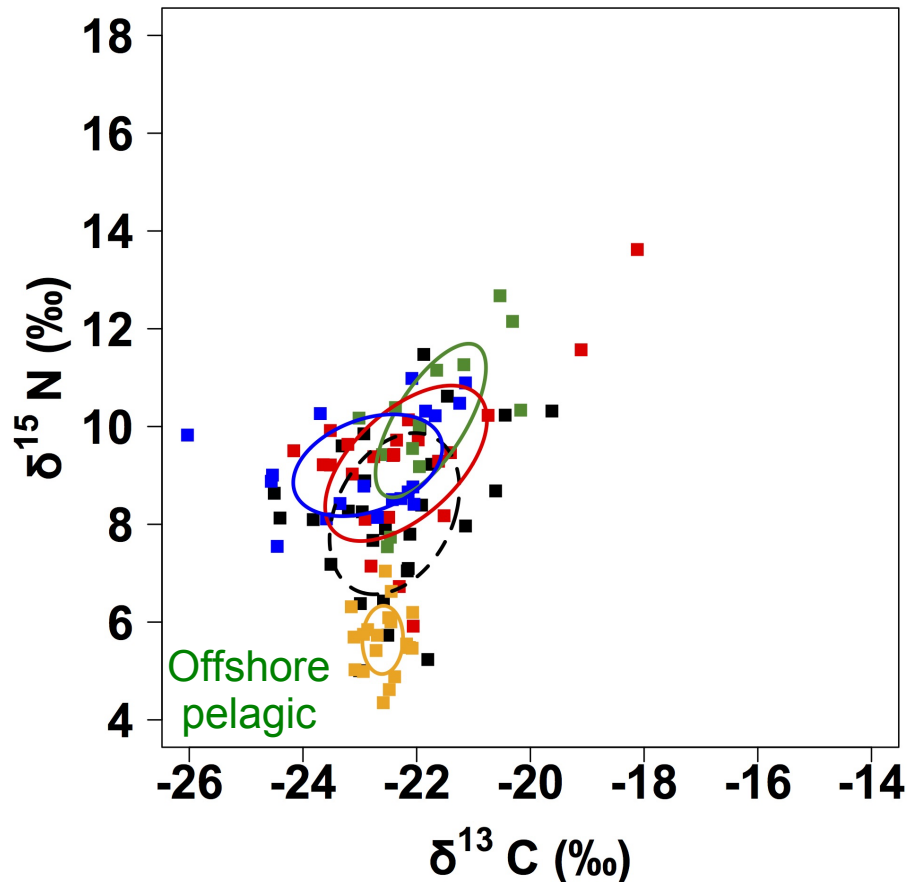
**Phytoplankton
Ice materials**

Summary and hypotheses

Sea ice cover during summer

South Shetland Islands
South Orkney Islands

Marguerite Bay



Phytoplankton
Ice materials

No differences of $\delta^{13}\text{C}$ between trophic groups → Overlap

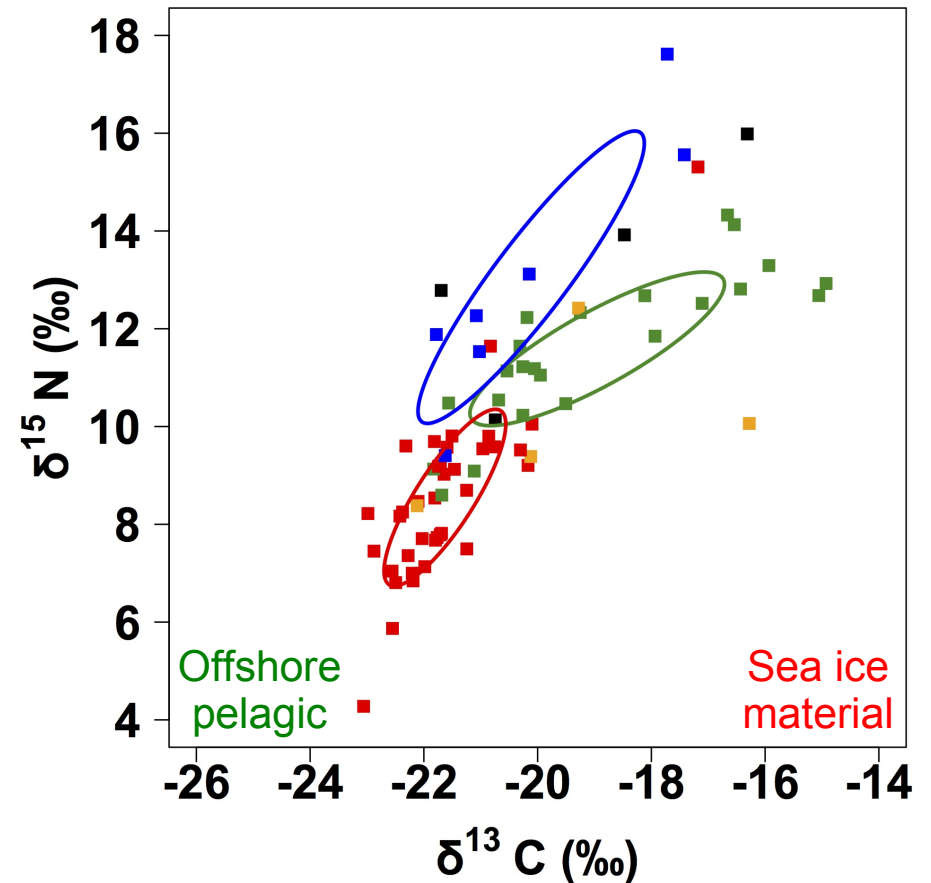
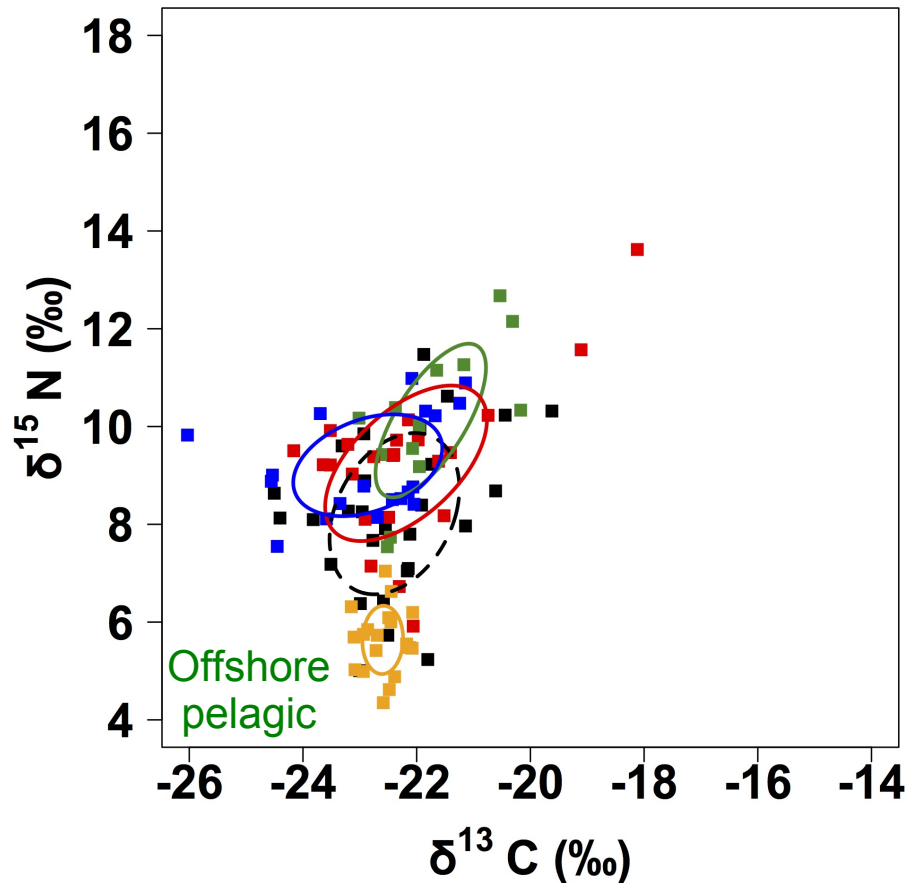
Low dispersion

Summary and hypotheses

Sea ice cover during summer

South Shetland Islands
South Orkney Islands

Marguerite Bay



No differences of $\delta^{13}\text{C}$ between trophic groups → Overlap

Differences of $\delta^{13}\text{C}$ between trophic groups → No overlap

Low dispersion

High dispersion

Acknowledgements



**British
Antarctic Survey**

NATURAL ENVIRONMENT RESEARCH COUNCIL

This work is part of vERSO (Ecosystem Response to global change: a multiscale approach in Southern Ocean, BR/132/A1/vERSO) and RECTO (Refugia and Ecosystem Tolerance in the Southern Ocean, BR/154/A1/RECTO) projects funded by BELSPO

Thank you for your attention

