

Using stable isotopes ratios to decipher changes in benthic food webs characteristics along the rapidly warming West Antarctic Peninsula



DOGNIEZ Martin^{1,2*}, Camille MOREAU³, Léa KATZ³, Bruno DANIS³, Axelle BRUSSELMAN⁴, Bruno DELILLE⁴, Loïc MICHEL⁵, Isa SCHÖN² & Gilles LEPOINT¹

1. Trophic & Isotopic Ecology Laboratory, R.U. FOCUS, University of Liège | 2. Freshwater Biology Unit, OD Nature, Royal Belgian Institute of Natural Sciences | 3. Marine Biology Laboratory, Free University of Brussels | 4. Chemical Oceanography Unit, R.U. FOCUS, University of Liège | 5. Animal Systematics & Diversity Laboratory, R.U. FOCUS, University of Liège.

* Corresponding author. E-mail: martin.dogniez@uliege.be

Background

February 2023, 1st TANGO expedition:

Sampling of shallow-water benthic organisms across the Antarctic food web.

Environment of interest:

Rarely explored areas along the **Western Antarctic Peninsula (WAP)** subject to rapid warming

Project goal:

To better understand the **trophic response** of these communities to **changes in their biotic and abiotic environment**.

Sampling design & processing

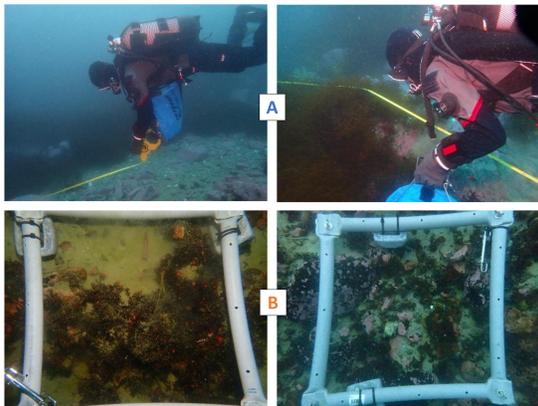


Fig.3 : Illustrations of underwater (A) transects & (B) quadrates to collect benthic invertebrates and primary producers along the West Antarctic Peninsula (© C. Moreau)

Quantitative sampling of whole communities:

- Handpicking & substrate scraping

Dual-scale approach:

- **Underwater transects** & **quadrates** (see Fig. 3 & 4)

Onboard processing:

- **Wet weight biomass** measurement
- Dissection and storage (dried / frozen at -20°C)

Laboratory processing:

- Grinding & encapsulation of samples (total-n = 435, n-morphospecies = 64, max n-replicates = 6)
- Vapor phase acidification for carbonated samples
- **IRMS** analysis of **C, N & S ratios**

Communities' characteristics

- Low number of morphospecies (4/64) **common** to all stations
- Highest organisms' biomass in **DI1** algae forest (1348 g/m² ww) dominated by *D. antarctica* (Demospongiae)
- Highest species diversity in **DI3** macroalgae forest

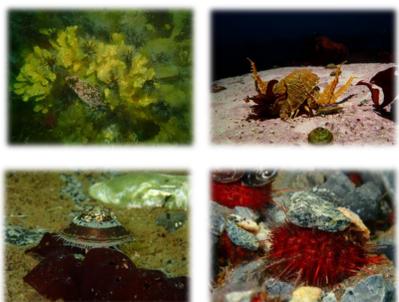


Fig.5: Organisms sampled (left to right/top to bottom): *Dendrilla antarctica*, *Glyptonotus antarcticus*, *Nacella concinna*, *Sterechninus neumayeri* (© C. Moreau)

Study area

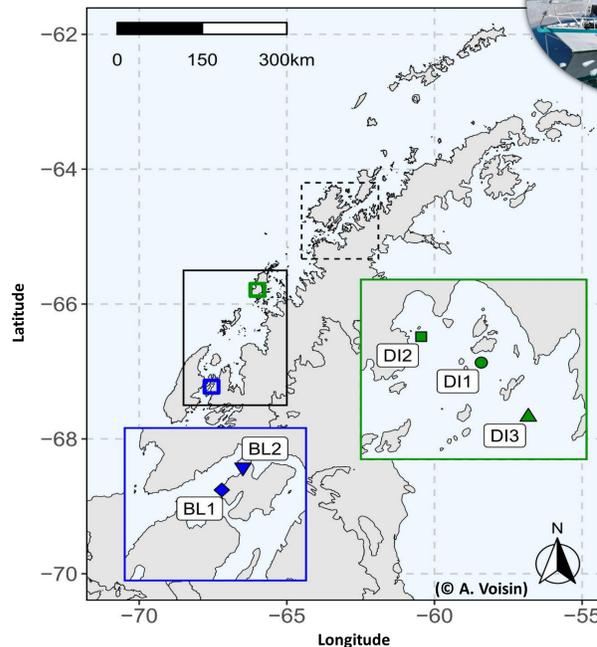


Fig.1 : Picture of the **RV Australis**, a highly mobile research vessel with a low environmental impact.

5 stations sampled:

- 2 Macroalgae forests on hard bottom (DI1 & DI3)**
- 3 Soft sedimentary bottom (DI2, BL1 & BL2)**

Fig.2 : Map of TANGO 2023 sampling stations in **Dodman Island** & **Blaiklock Island**, WAP, along with TANGO 2024 sampling region (dashed square).

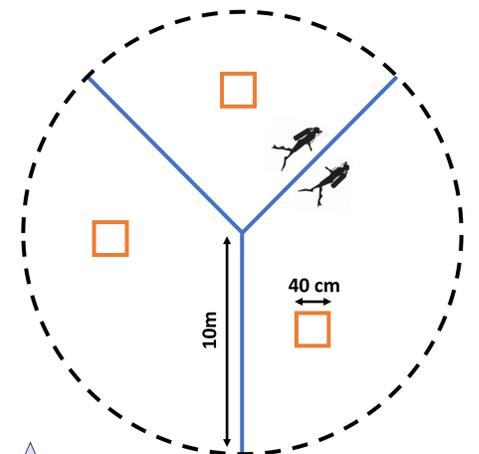
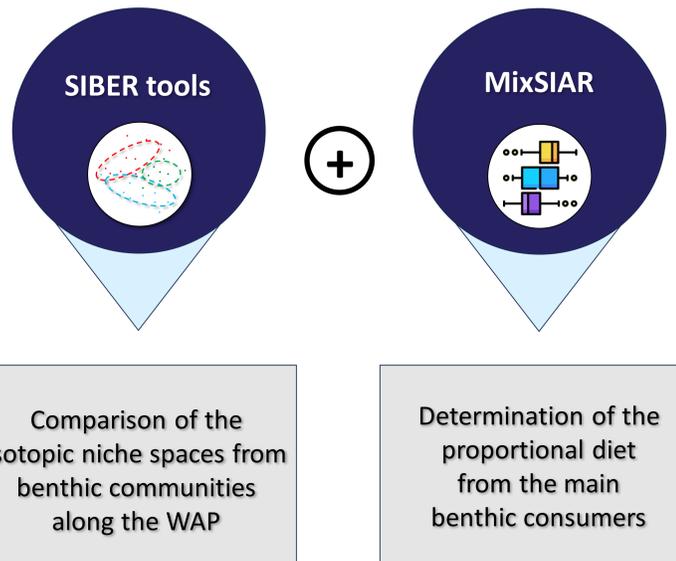


Fig.4 : Schematic representation (not to scale) of the trophic sampling design used during TANGO 2023, relying on a combination of underwater transects (blue lines) and quadrates (orange squares)

What's next ?



Comparison of the isotopic niche spaces from benthic communities along the WAP

Determination of the proportional diet from the main benthic consumers

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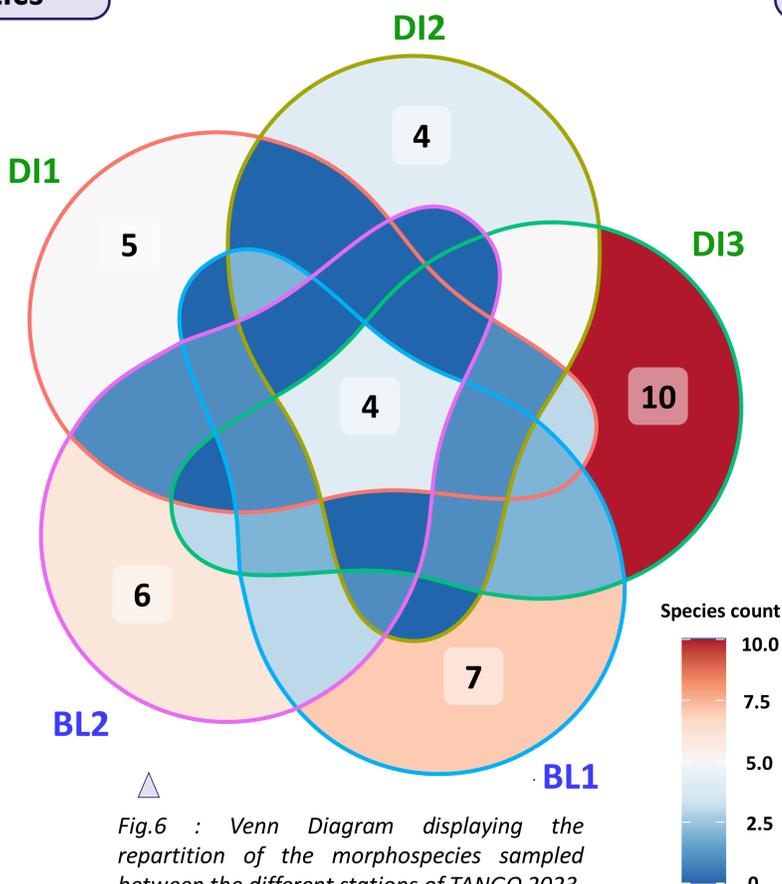


Fig.6 : Venn Diagram displaying the repartition of the morphospecies sampled between the different stations of TANGO 2023