Micronecton analysis from the insular shelf of the Kerguelen Islands: the amphipod *Themisto gaudichaudii*'s case

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Introduction

The hyperiid amphipod ***Themisto gaudichaudii*** is a representative species of the subantarctic pelagic communities, having a circumpolar distribution limited at north by the Subtropical Convergence and at south by the Antarctic Polar Front. This study's objective was to describe the distribution of *T.gaudichaudii* in the **Kerguelen Islands** Waters (**Fig.1**), Southern Indian Ocean, based on the analysis of the species **abundance** and **size spectra** in the SKALP stations. Our results were compared with the data of the Birds Zooplankton Interactions Program (IOZ), representing the *T.gaudichaudii*'s population of the Morbihan Gulf (Kerguelen Islands) and the individuals from the stomachs of the island's birds for the same period of the year.

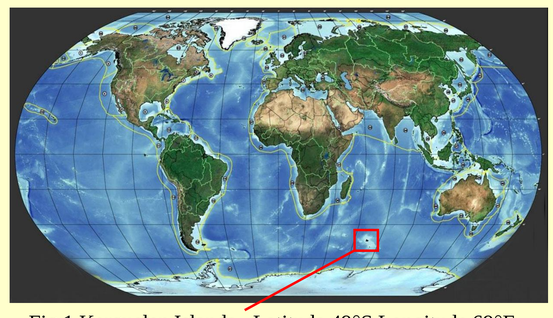

Fig.1 Kerguelen Islands - Latitude 49°S Longitude 69°E
Large Marine Ecosystems – source: NOAA

Materials and Methods

Sampling technique

(SKIF SKALP cruise, February 1987)

- Bongo net (ø 64 cm; 500 µm mesh) (**Fig.2**)
- 0 - 200m depth diagonal haul
- fixed with formaldehyde

Fig.2 Bongo net (source: kc-denmark.dk)

Sampling treatment (Fig.3)

- rinsed with freshwater
- divided with Motoda box
- sub samples ~200 individuals
- sort and identification
- counting
- morphometrics

(TL = total body length) (**Fig.4**)

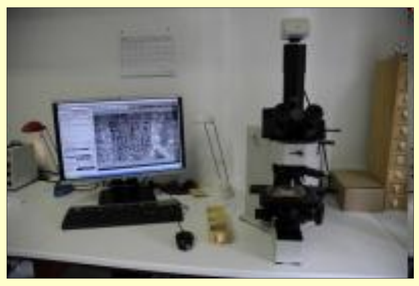

Fig.3 Image analysis platform

Data analysis

- Correspondence Analysis
- abundances of juveniles/adults (ind.m^{-3})*
- size spectra presented as 1 mm classes*

* georeferenced data as GIS maps (**Fig.5 & 6**)

Fig.4 *T. gaudichaudii* – body lengths measurements

Results

Spatial distribution

- density decreases from coastal to open waters stations
- maximal density of 10 ind.m^{-3} in the south-west coastal stations
- minimal density of 0,07 ind.m^{-3} at the southern stations (**Fig.5**)

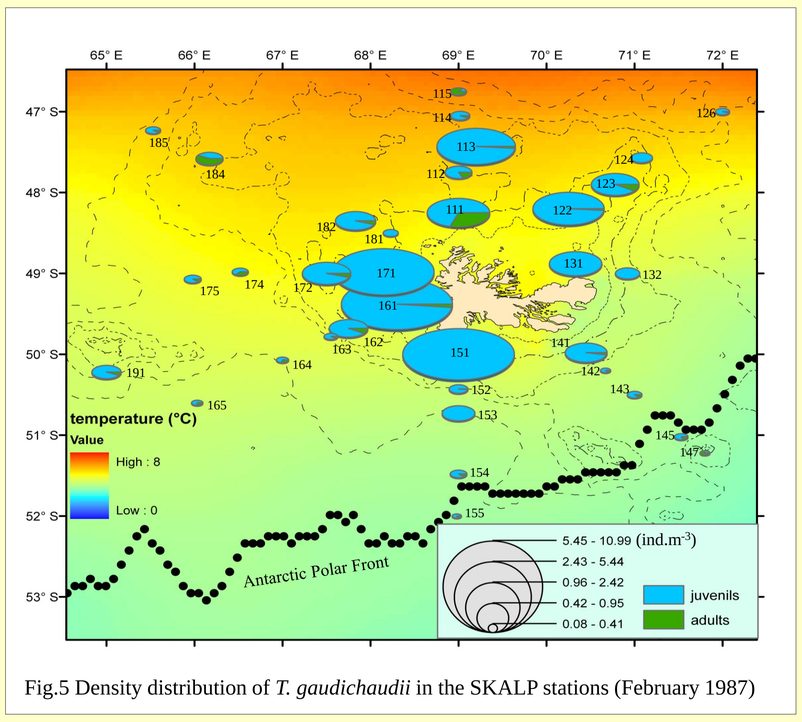

Fig.5 Density distribution of *T. gaudichaudii* in the SKALP stations (February 1987)

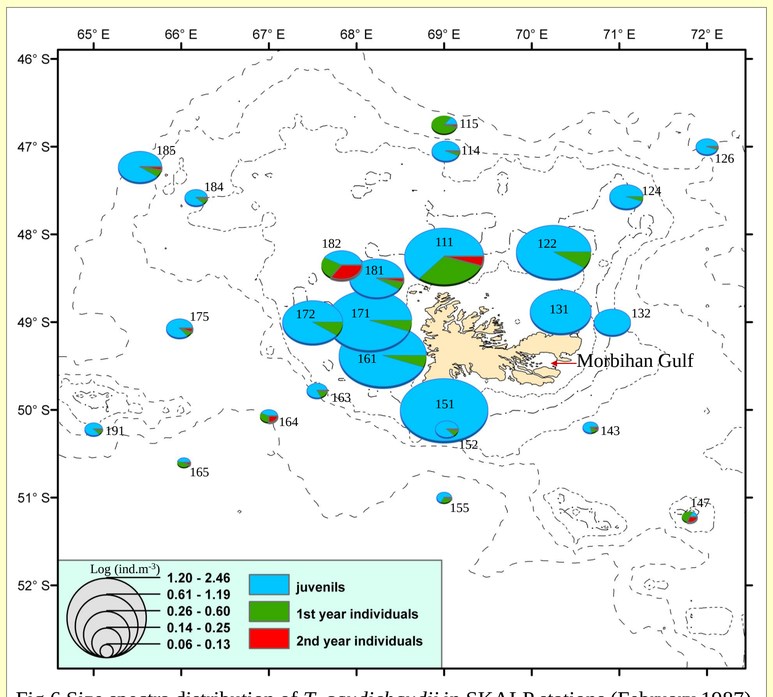

Fig.6 Size spectra distribution of *T. gaudichaudii* in SKALP stations (February 1987)

Size spectra analysis evidences three cohorts (**Fig.6 & 7**) :

▲Juveniles (TL<10 mm) dominate the SKALP stations

▲First year individuals (TL 10-20 mm) associated with the Gulf of Morbihan stations (IOZ)

▲Second year individuals (TL>20 mm) associated with few open waters SKALP stations

Correspondence Analysis

- Juveniles and medium size individuals well explained
- Adults larger than 20 mm poorly represented (**Fig.7**)

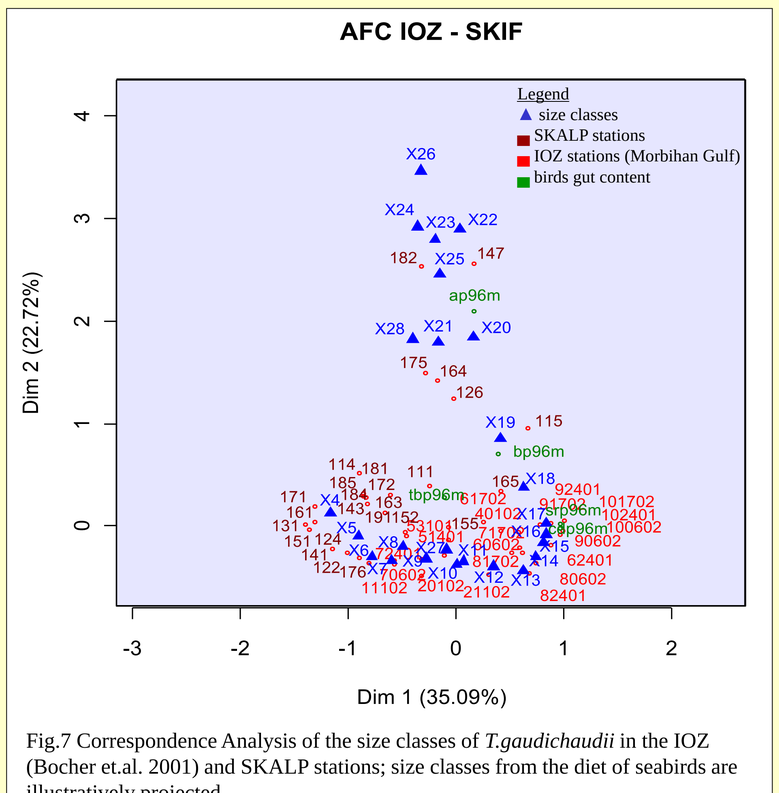

Fig.7 Correspondence Analysis of the size classes of *T.gaudichaudii* in the IOZ (Bocher et.al. 2001) and SKALP stations; size classes from the diet of seabirds are illustratively projected

Discussion

- The pattern of spatial distribution is a steep gradient coast – open waters, the values corresponding to other zones at the same latitude.
- A **dominance of juveniles** in the SKALP stations at the end of southern summer is in contrast with the IOZ population dynamics studied in the area.
- The use of different **sampling technique**: sampling at the SKALP stations used a Bongo net (500 µm) which is adapted to smaller size individuals; the sampling in the Morbihan Gulf (IOZ) used a bigger mesh size net, the Omori net (1 mm), therefore the results showed the dominance of the medium size individuals.
- The absence of larger individuals from the costal stations suggests a **migration** of the adults to the open ocean waters after their first year of life.
- The above assumptions are supported by the gut contents of the seabirds living on the islands which feed mainly on *T.gaudichaudii*.

Main bibliographic sources:
• Bocher, P., Cherel, Y., Labat, J.-Ph., Mayzaud, P., Razouls, S., Jouventin, P., (2001). Amphipod-based food web: *Themisto gaudichaudii* caught in nets and by seabirds in Kerguelen waters, Southern Indian Ocean. Mar. Ecol. Progr. Ser. 223: 261-276.
• Labat, J.-Ph., Mayzaud, P., Sabini, S., 2005. Population dynamics of *Themisto gaudichaudii* in Kerguelen Islands waters, Southern Indian Ocean. Polar Biol. 28 (10), 776-783
• Watts, J., Tarling, A., 2011. Population dynamics and production of *Themisto gaudichaudii* (Amphipoda, Hyperiidae) at South Georgia, Antarctica. *Deep–Sea Research II*, doi:10.1016/j.dsr2.2011.05.001.