Biogeography of gelatinous macroplankton in the upper 100-1000 m depth inferred from the Underwater Video Profiler.

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http://www.obs-vlfr.fr/LOV/ZooPart/UVP/

INTRODUCTION

Most of the last decades observation on zooplankton has been done in the upper 100 m.

We barely know the composition and the abundance of organisms living below that layer.

However, they may play a important role in the biological pump by modifying the vertical flux of elements.

Few global models include mesopelagic processes but they are not compared to *in situ* data.

Here I will deal with the relationships between POM and macrozooplankton in the first kilometer of the ocean.

QUESTIONS

- Is the spatial distribution of mesopelagic communities structured in space ?

- If yes, can we link the spatial distribution of mesopelagic macrozooplankton to the epipelagic biogeography of the ocean ?

- Can we establish a link between the surface production and the abundance of zooplankton in the mesopelagic layer ?

- Can we establish a link between mesopelagic organisms and particles size ?
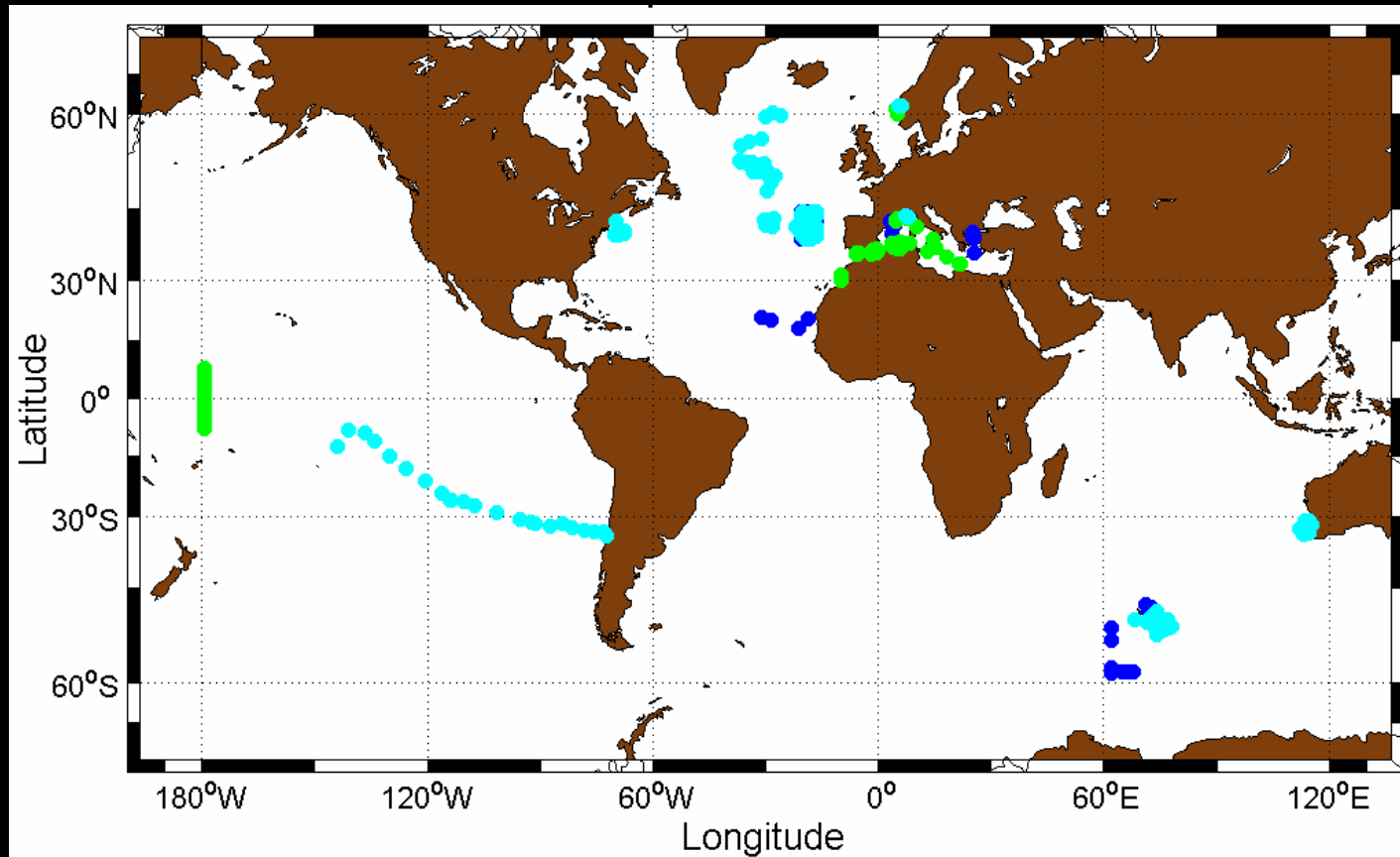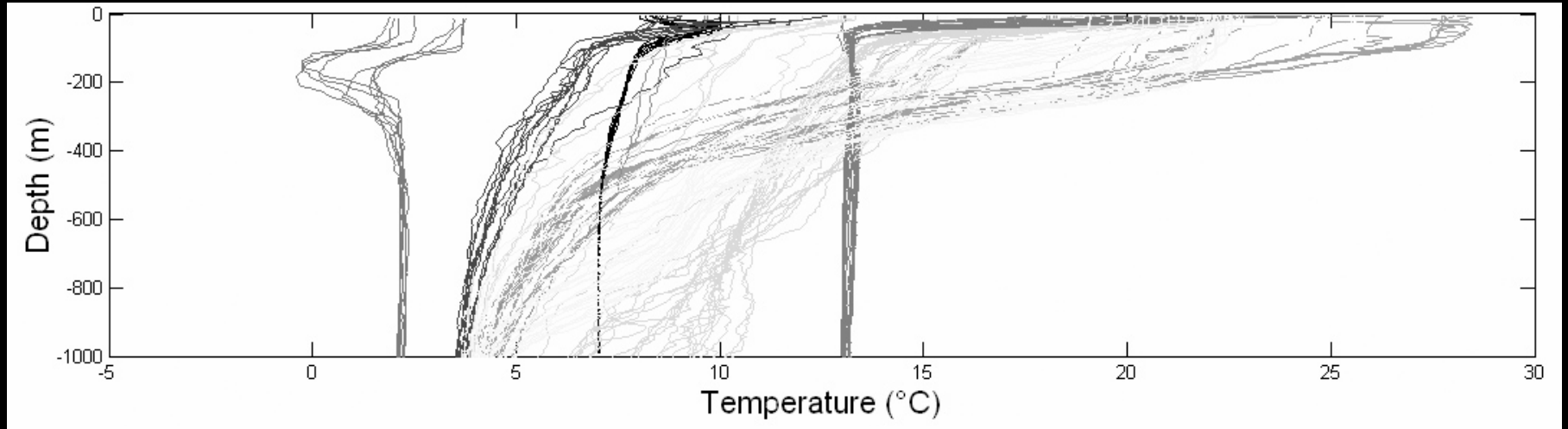
Methodology

Underwater Video Profiler 4 (UVP4)

The UVP4 is a vertically deployed instrumental platforme. Macrozooplankton (>1cm) and particles (>60μm) are counted in a volume of 125 m^3 for each 0-1000 m profiles (10L every 8cm).

326 UVP4 profiles (2001-2006)
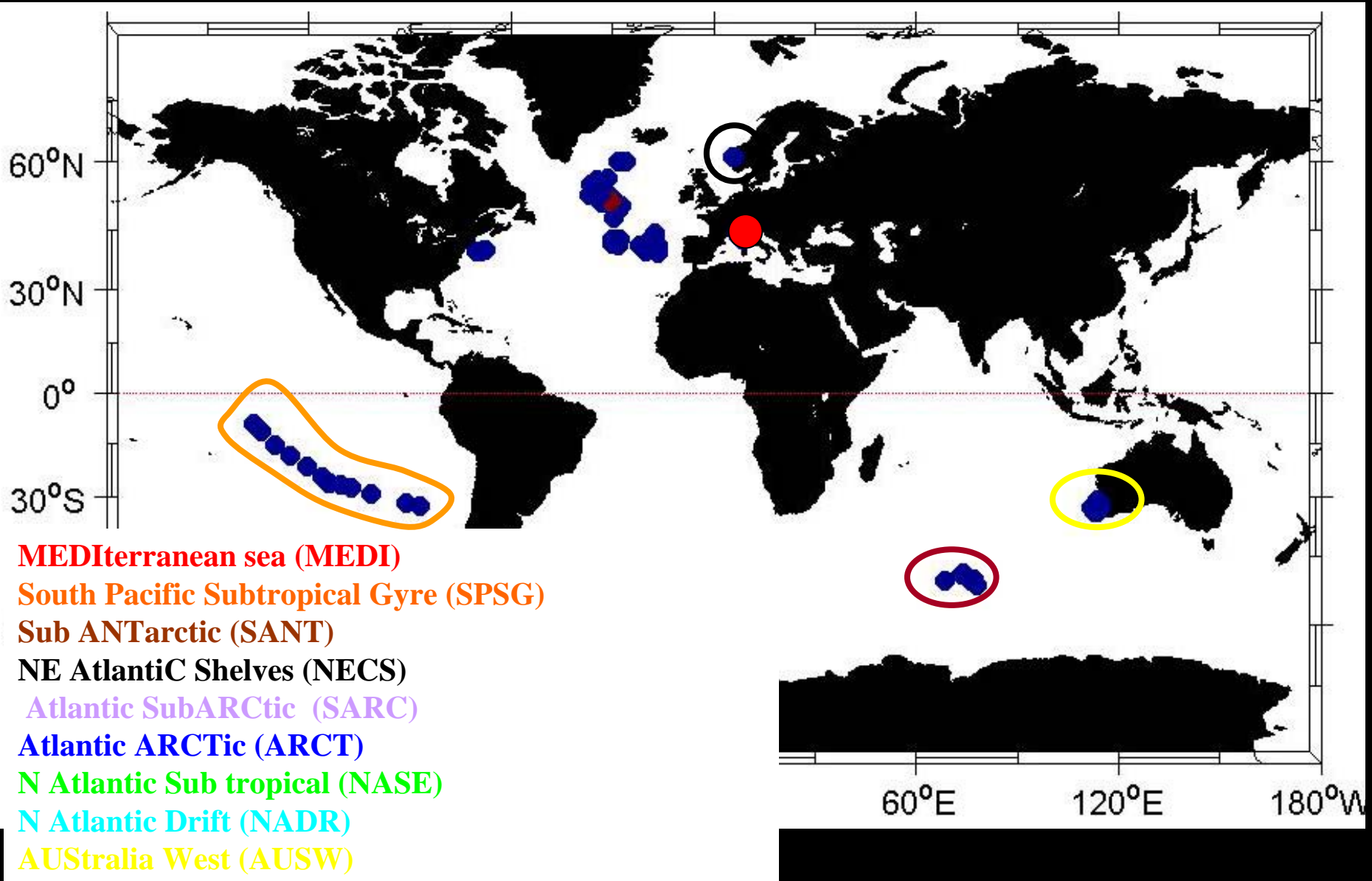
200 oceanic profiles are used in the present work

Hydrological pattern

Hydrological pattern

Nine regions

MEDIterranean sea (MEDI)
South Pacific Subtropical Gyre (SPSG)
Sub ANTarctic (SANT)
NE AtlantiC Shelves (NECS)
Atlantic SubARCtic (SARC)
Atlantic ARCTic (ARCT)
N Atlantic Sub tropical (NASE)
**N Atlantic Drift (NADR)**
AUStralia West (AUSW)
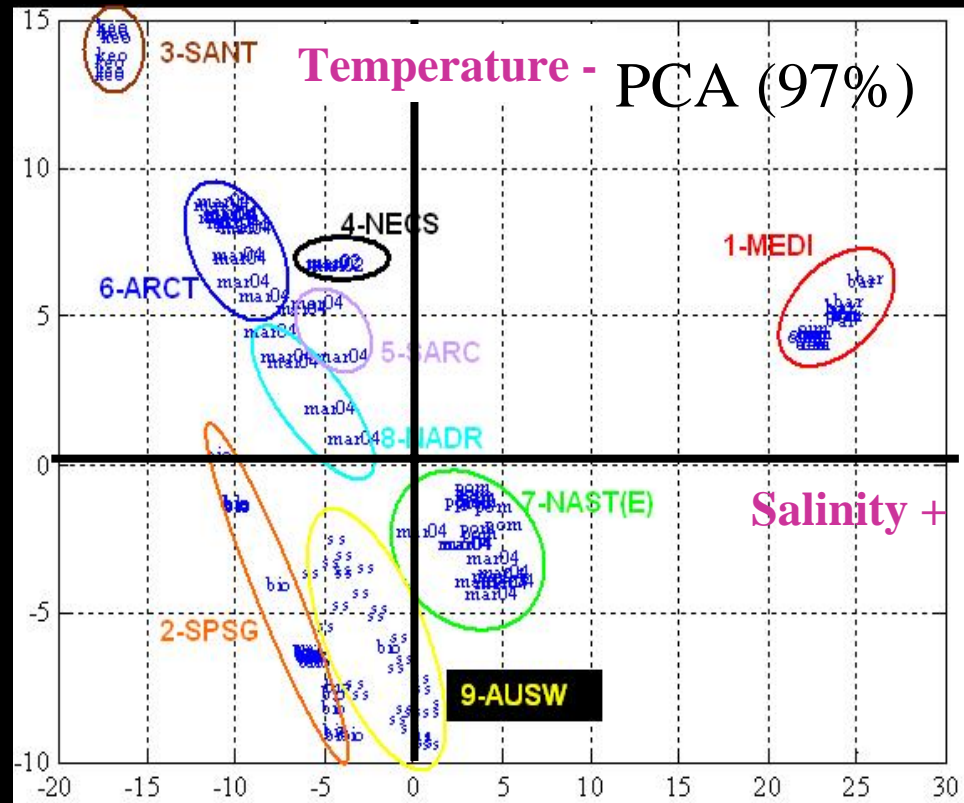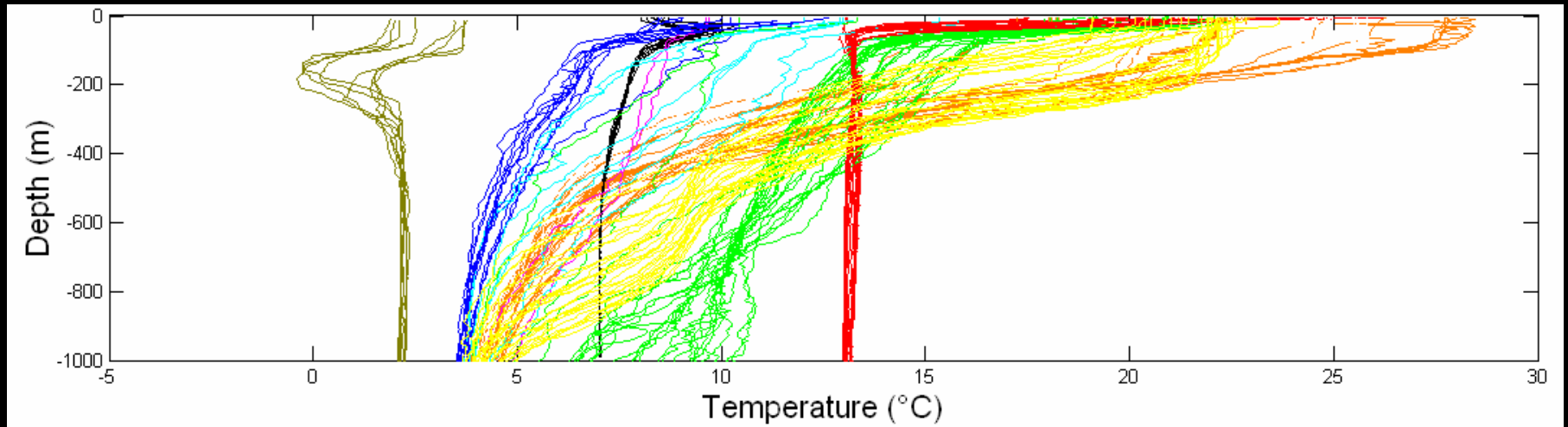
These correspond to the Longhurst's (1998) biogeographical provinces.

Nine regions
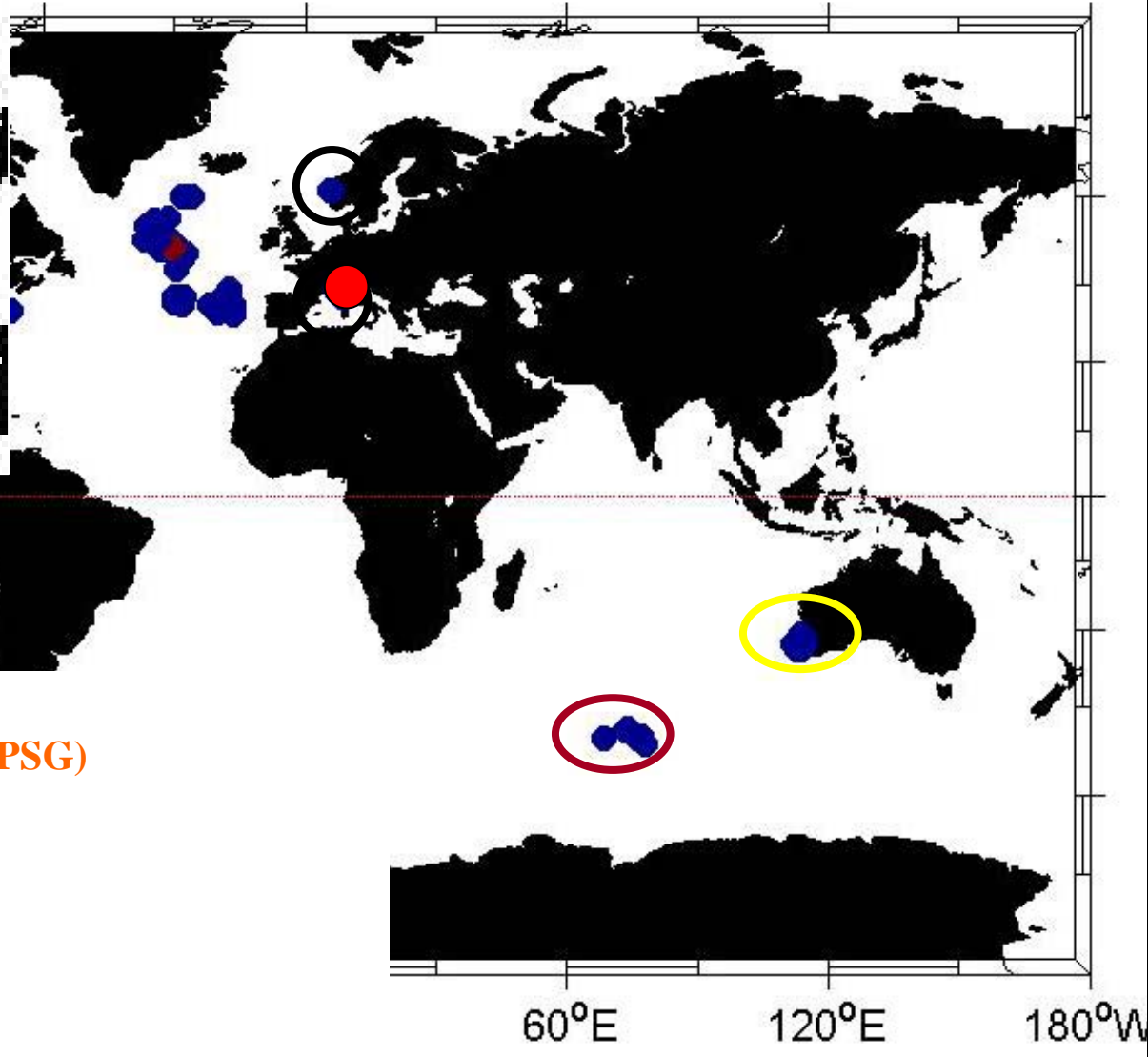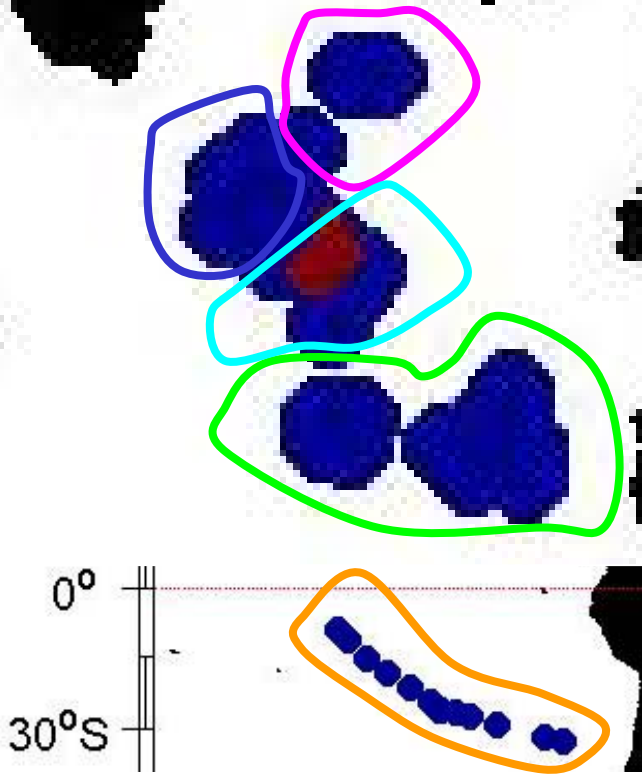
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21 groups of zooplankton
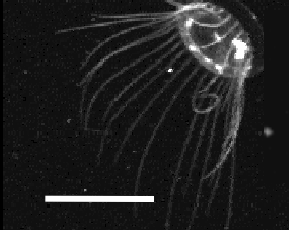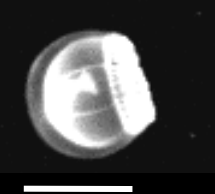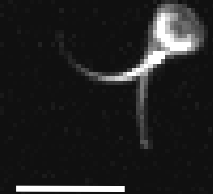
Med. (1) **Med. (2)** **Solm.** **Agl.** **Aeg.** **Halisc.**
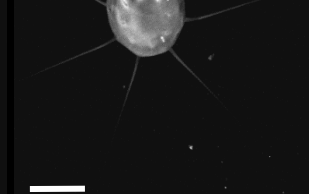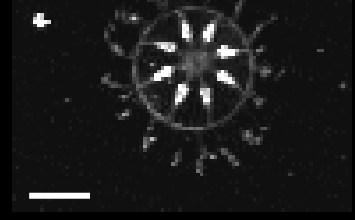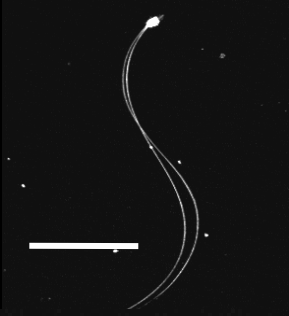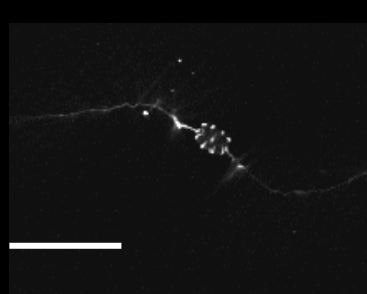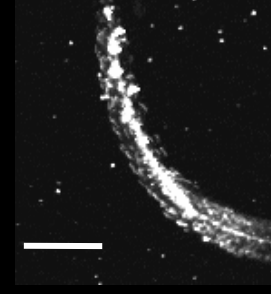
Cyd. (1) **Cyd. (2)** **Lob.** **Siph.** **Radio. Col1.** **Radio. Col2.**
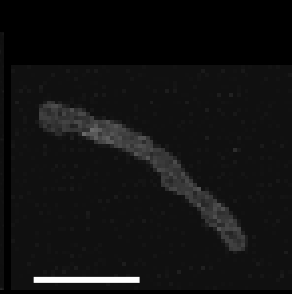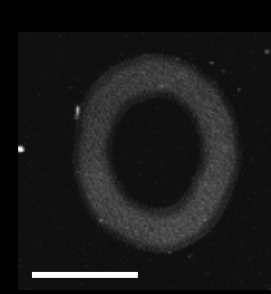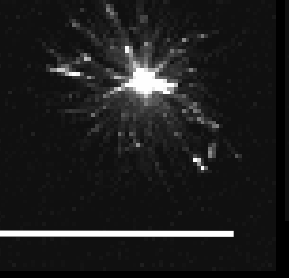
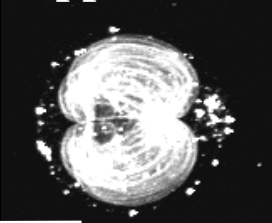**Sarco.** **RadioX.** **Sar. spine** **Crust. (1)** **Crust. (2)**
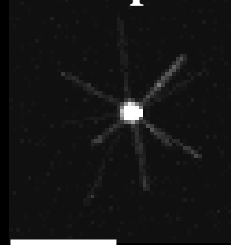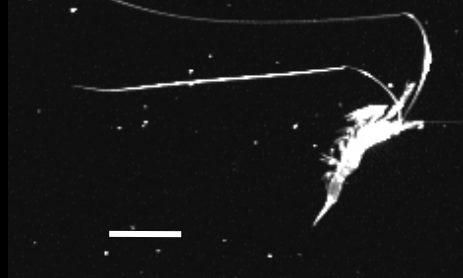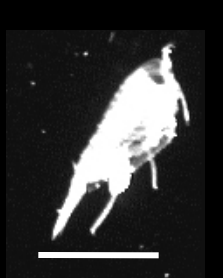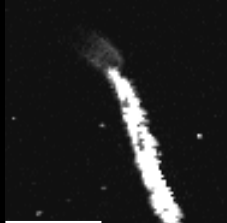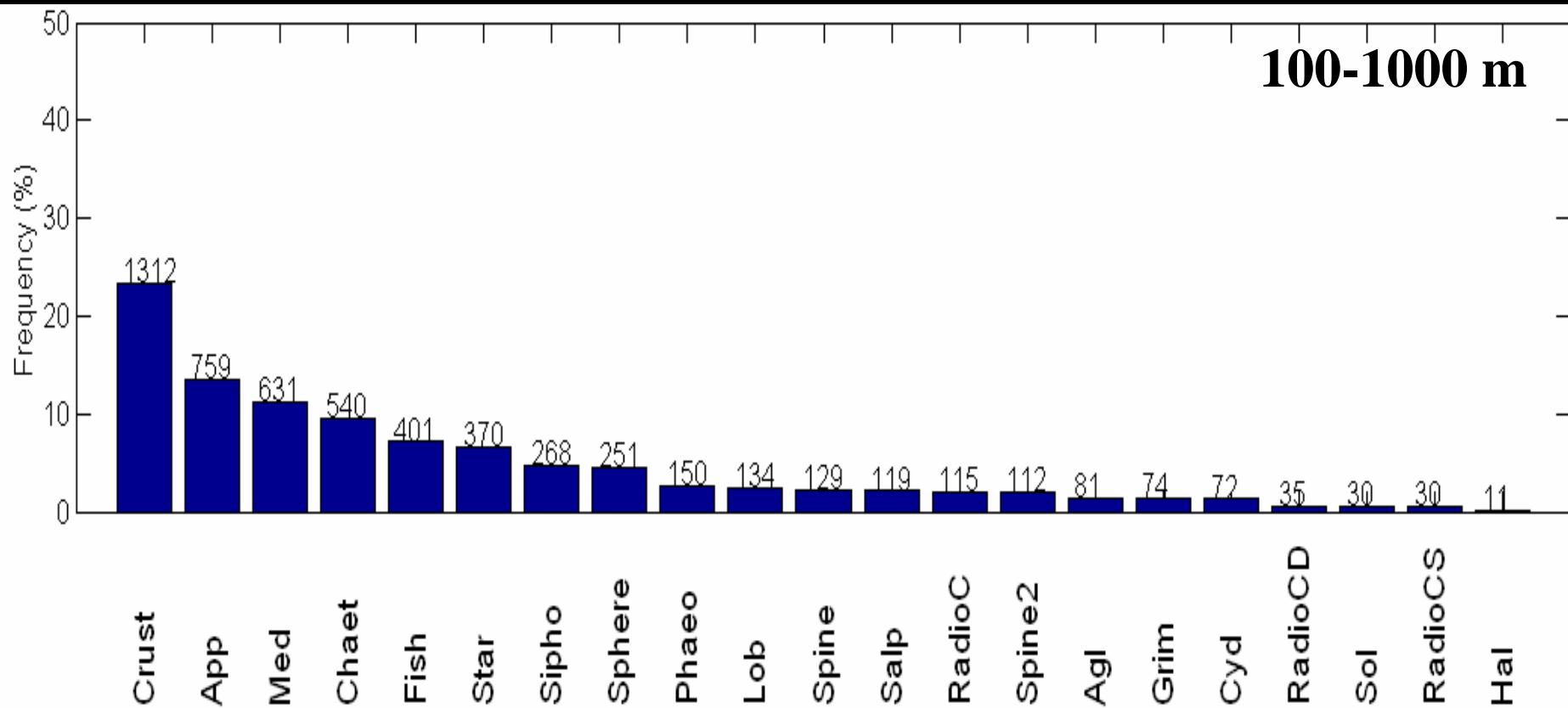
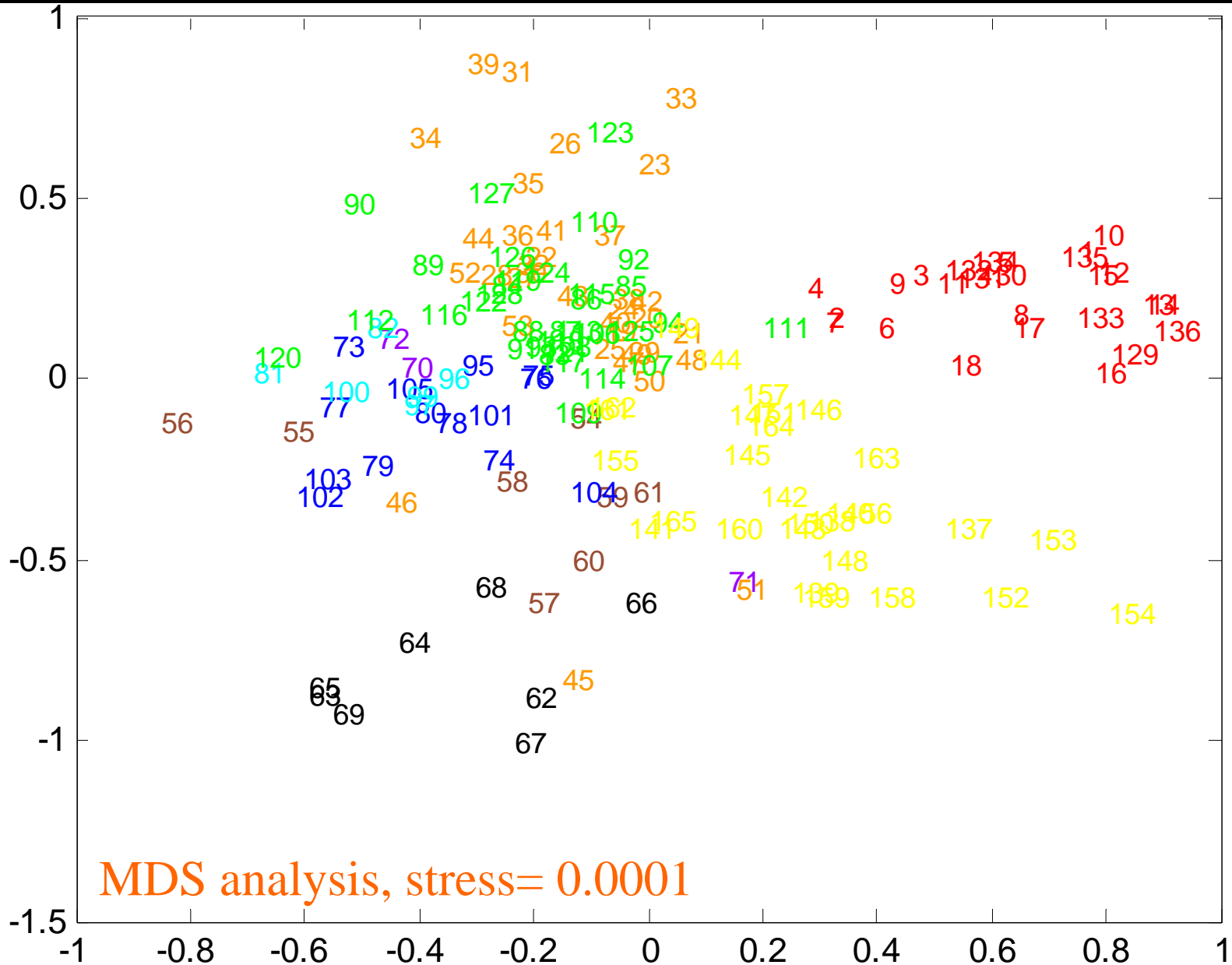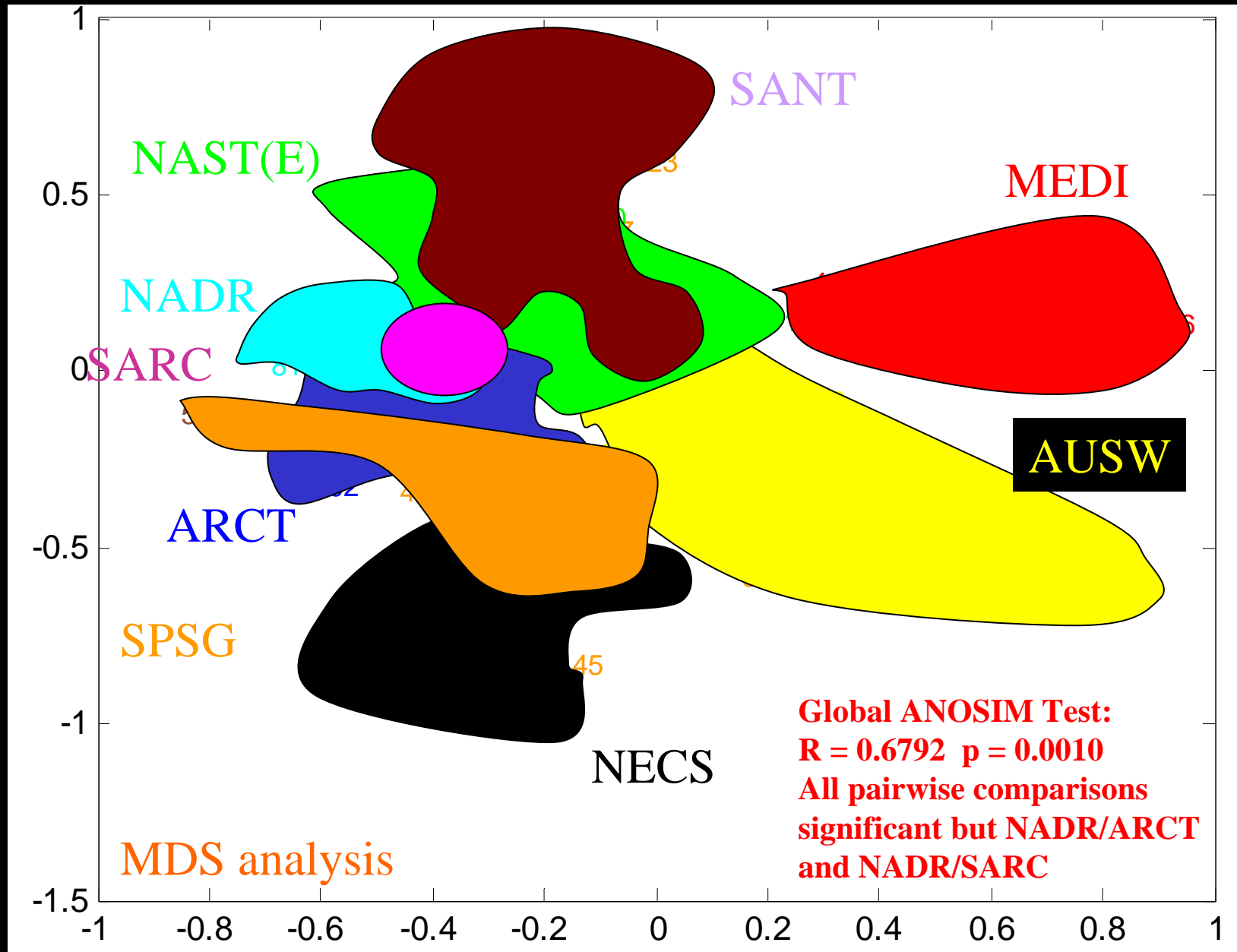**Chaet.** **Tha. (1)** **Tha. (2)** **App. (1)** **App. (2)**
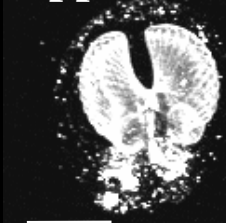
Frequency distribution of the zooplankton groups (>7000 organisms were identified)

Analysis of patterns in the composition of the macrozooplankton communities

MDS analysis, stress= 0.0001

Analysis of patterns in the composition of the macrozooplankton communities

SANT

NAST(E)

MEDI

NADR

SARC

AUSW

ARCT

SPSG

NECS

MDS analysis

Global ANOSIM Test:
R = 0.6792 p = 0.0010
All pairwise comparisons
significant but NADR/ARCT
and NADR/SARC

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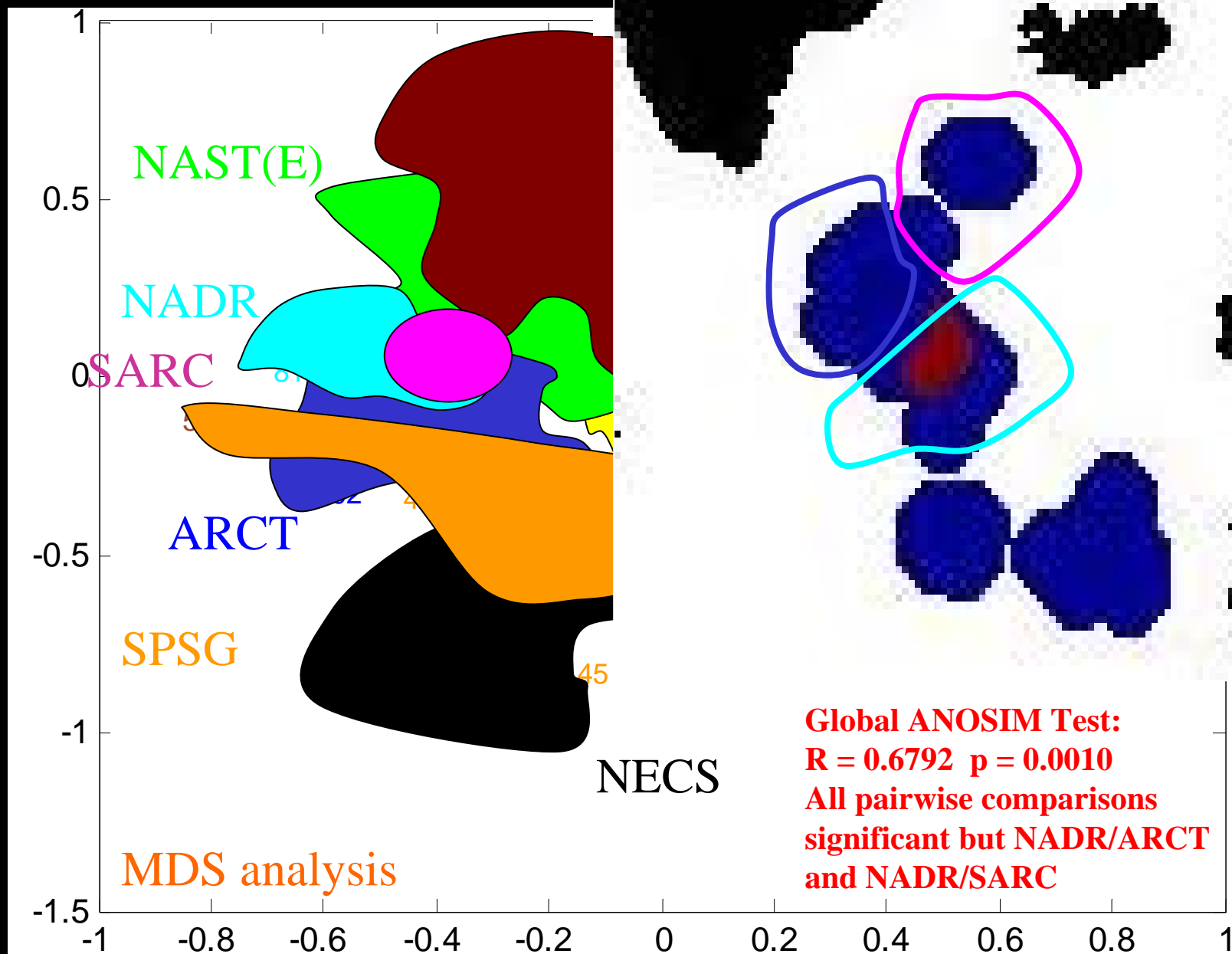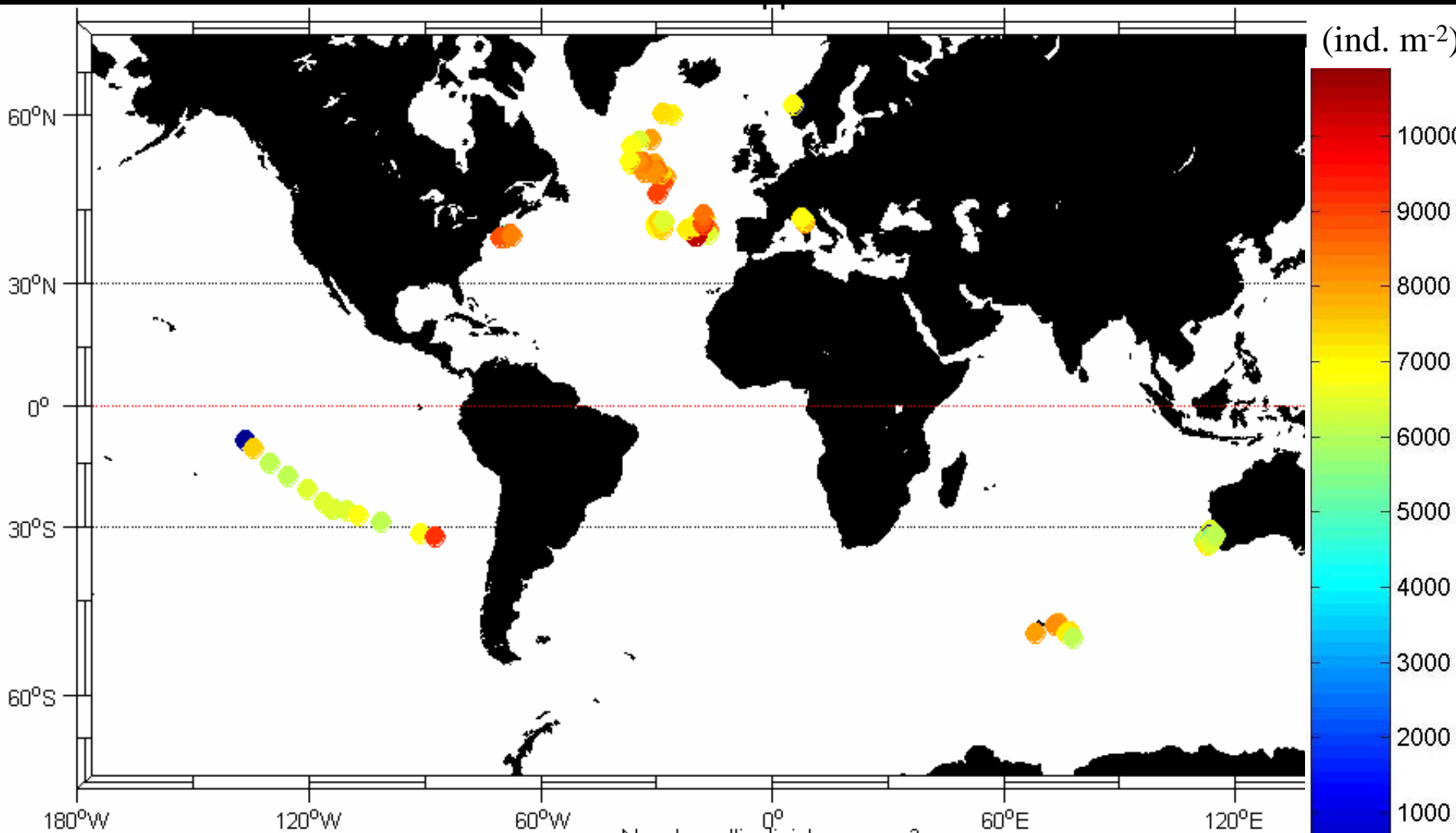
Appendicularia

Appendicularia
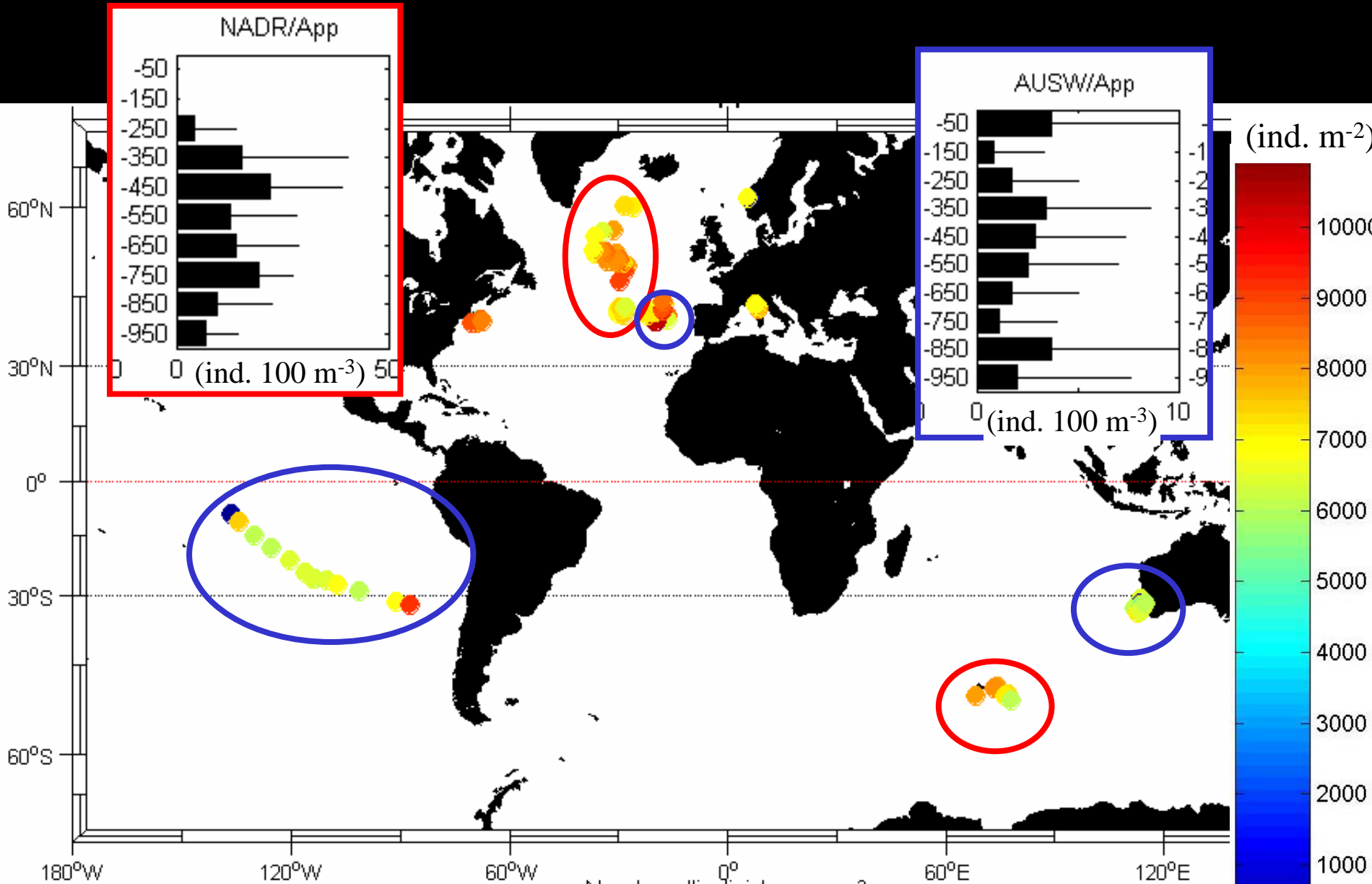
Concluding remarks I

1) Mesopelagic layers of macrozooplankton exist in most of the provinces. Crustacean, Appendicularians and medusae are the three dominant groups.

2) The mesopelagic macro zooplankton communities are structured horizontally and vertically.

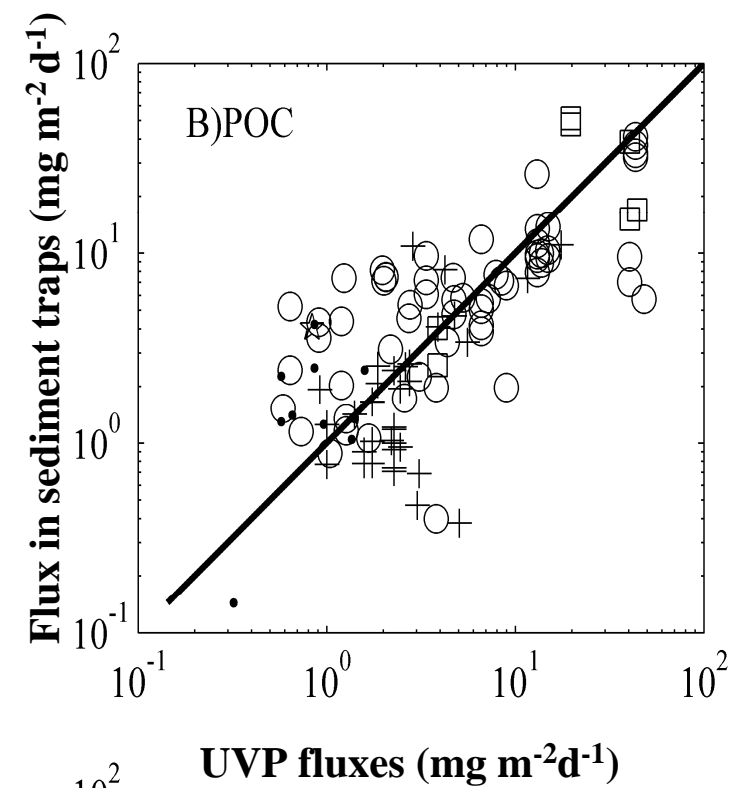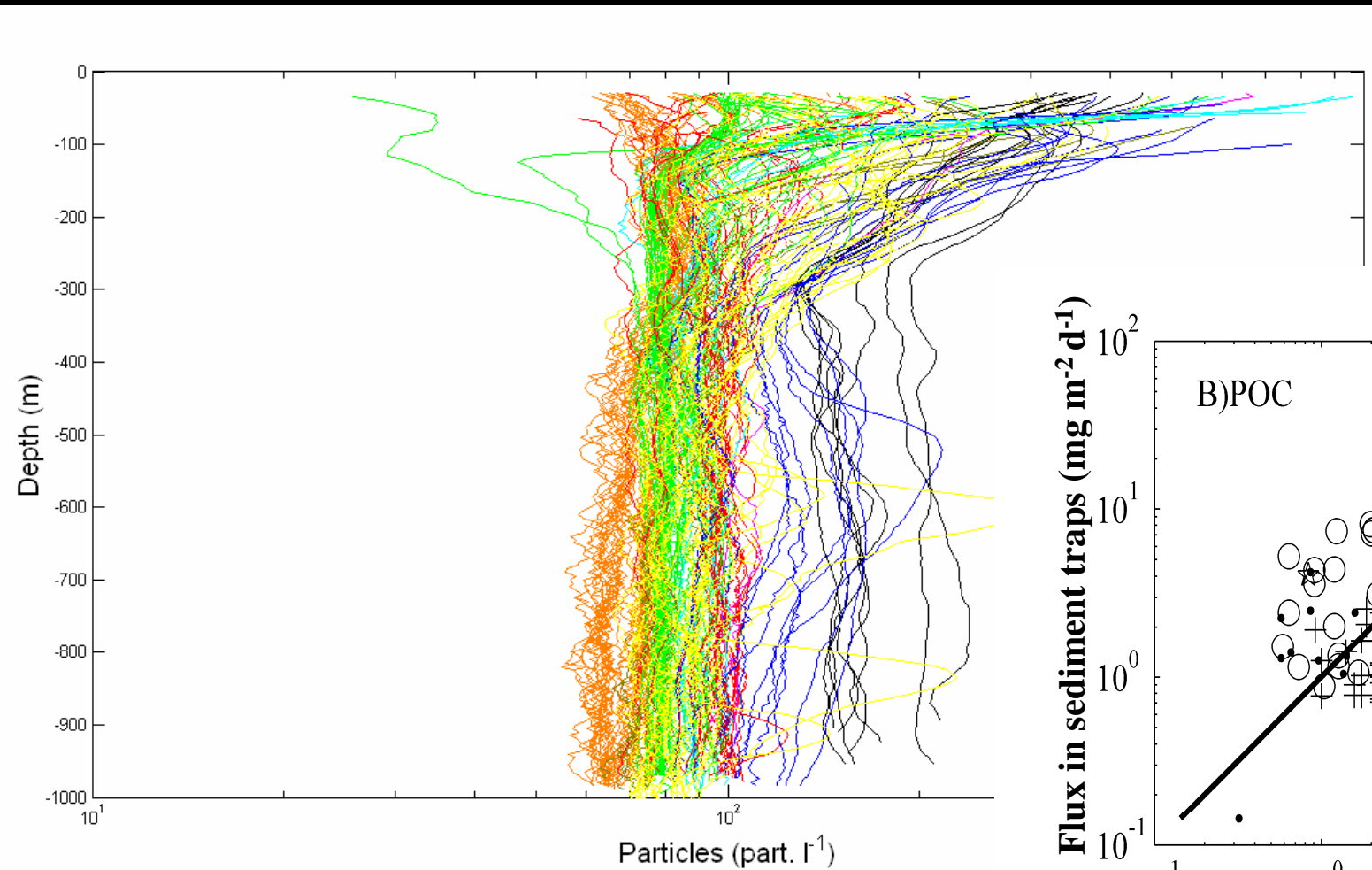3) The horizontal distribution follows the provinces as defined by Longhurst 1998.
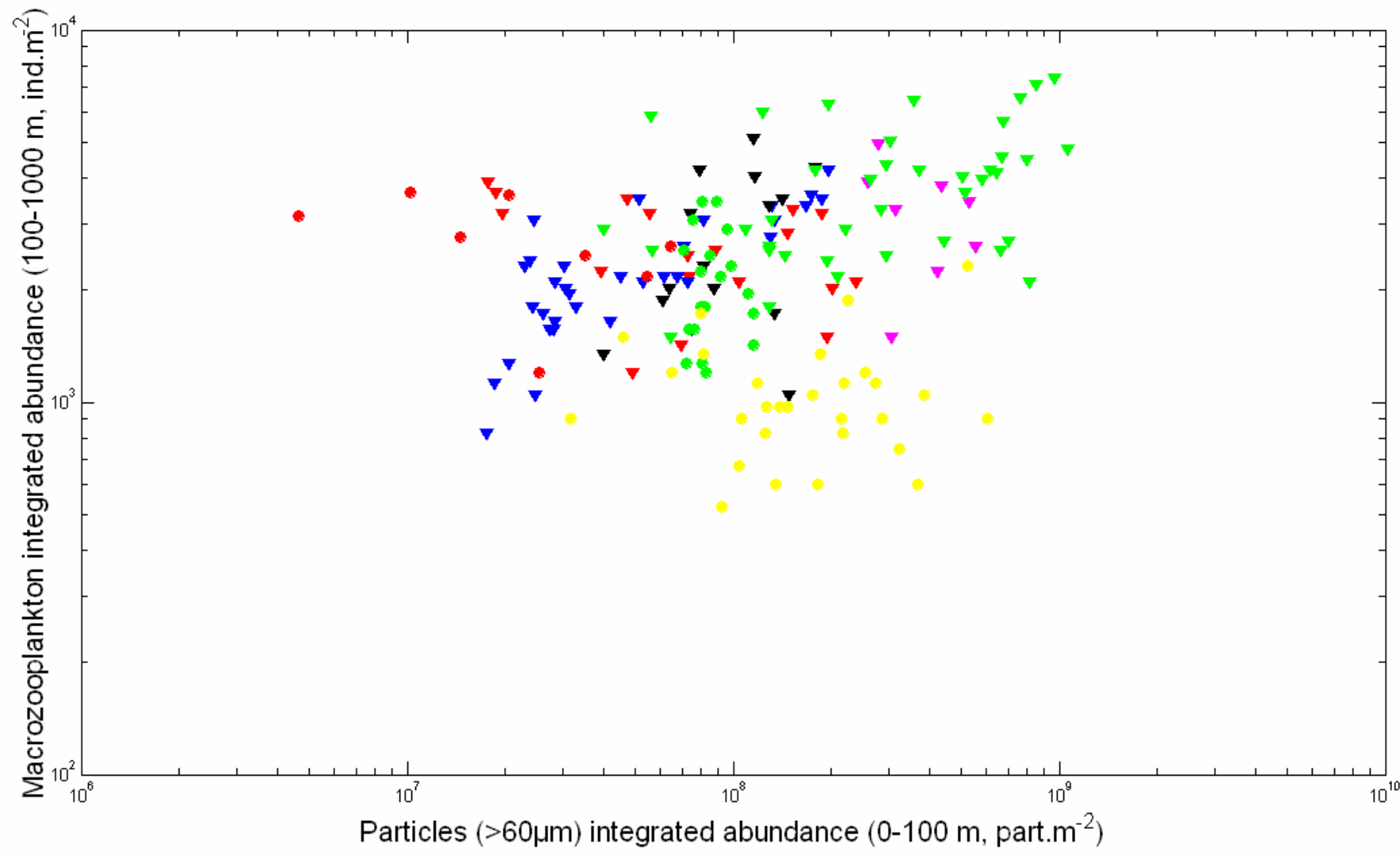
Is there a link between the surface export and the abundance of mesopelagic organisms ?
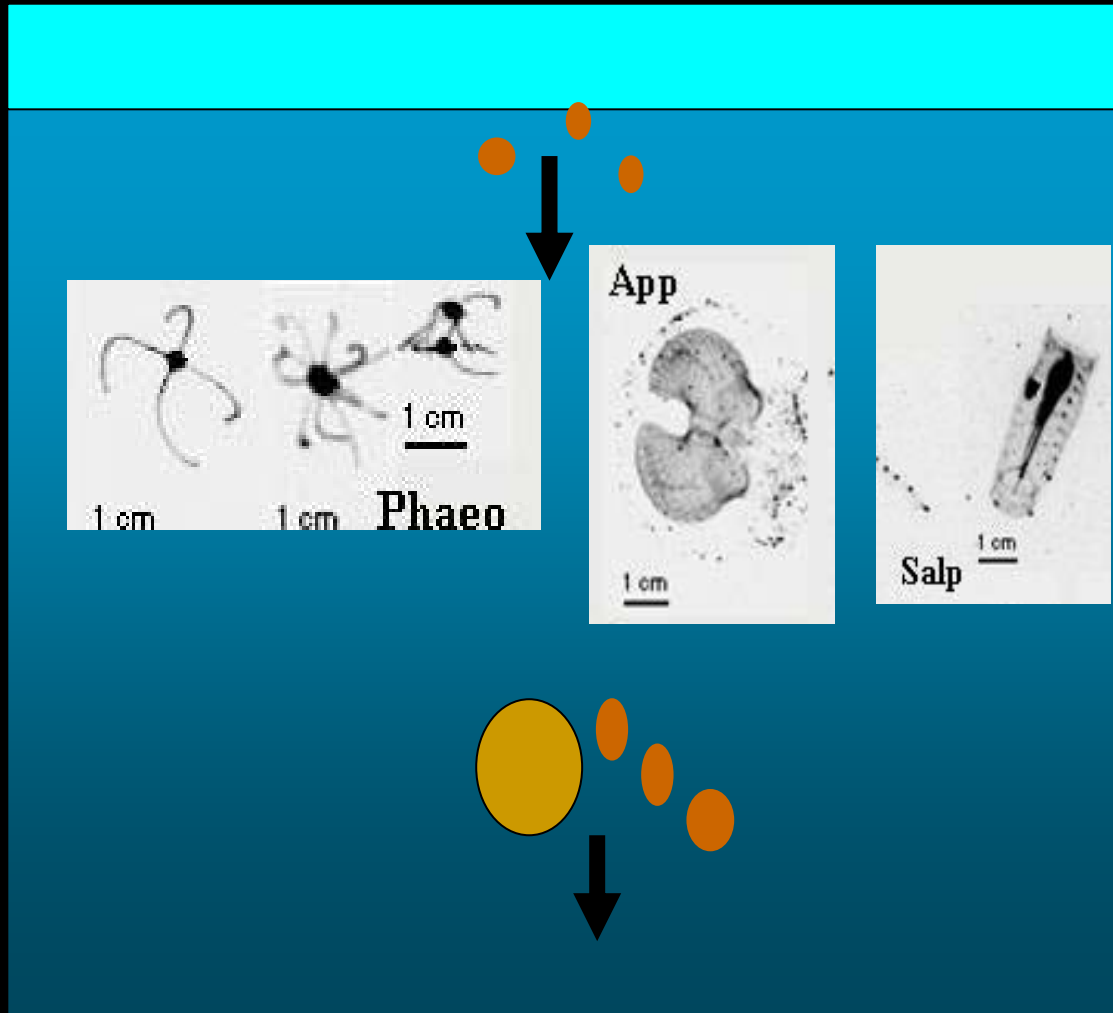
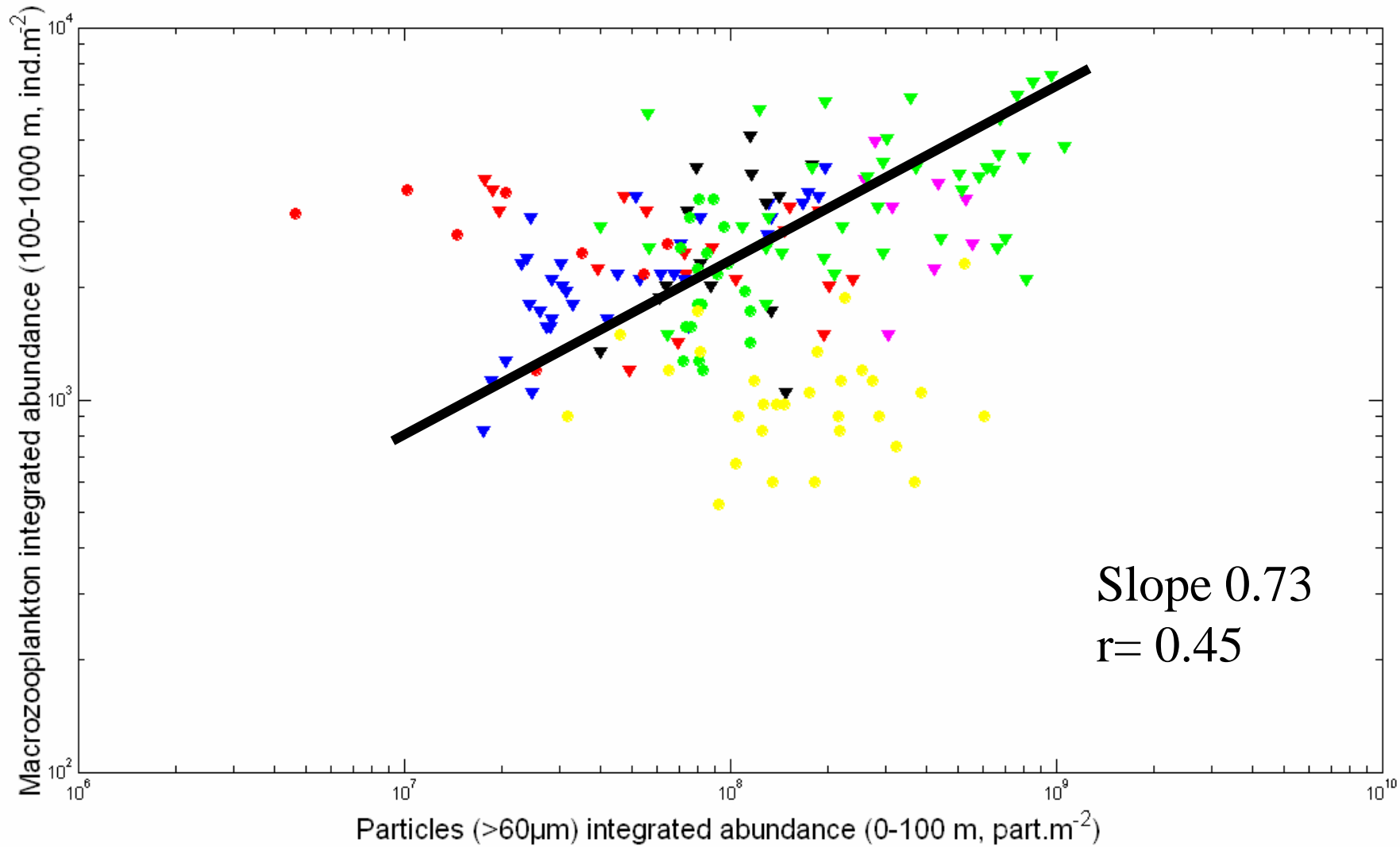# Is there a link between the surface export and the abundance of mesopelagic organisms ?

Is there a link between the surface export and the abundance of mesopelagic organisms ?


Guidi et al., in prep
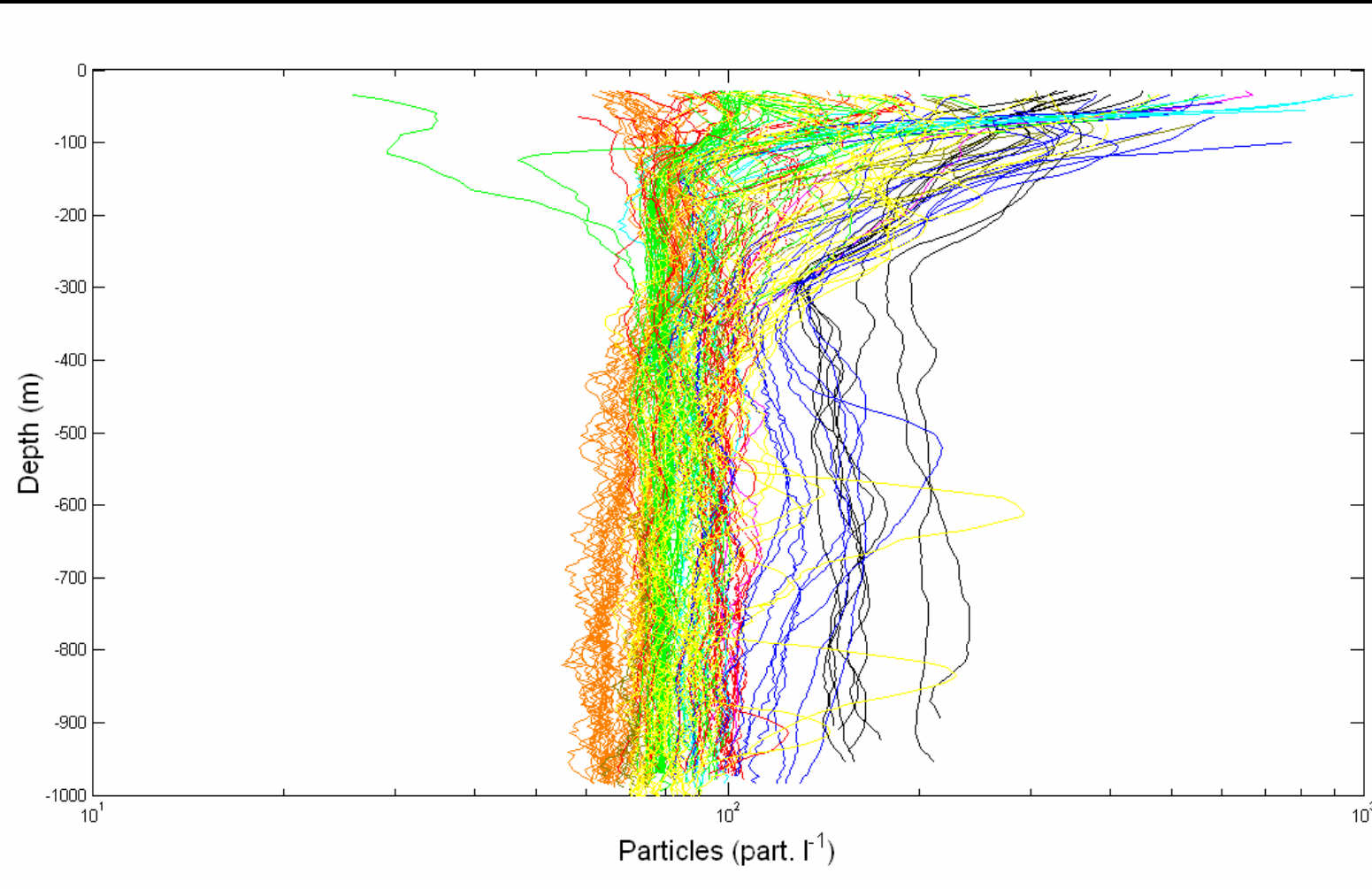
Relation between macrozooplankton (100-1000m) and particle abundance (0-100m)
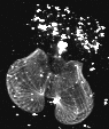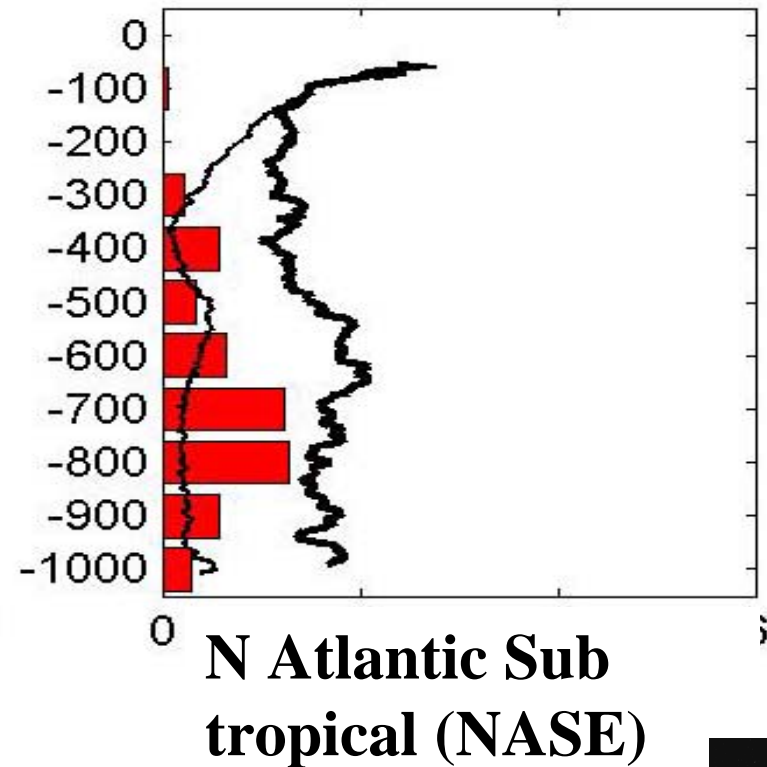
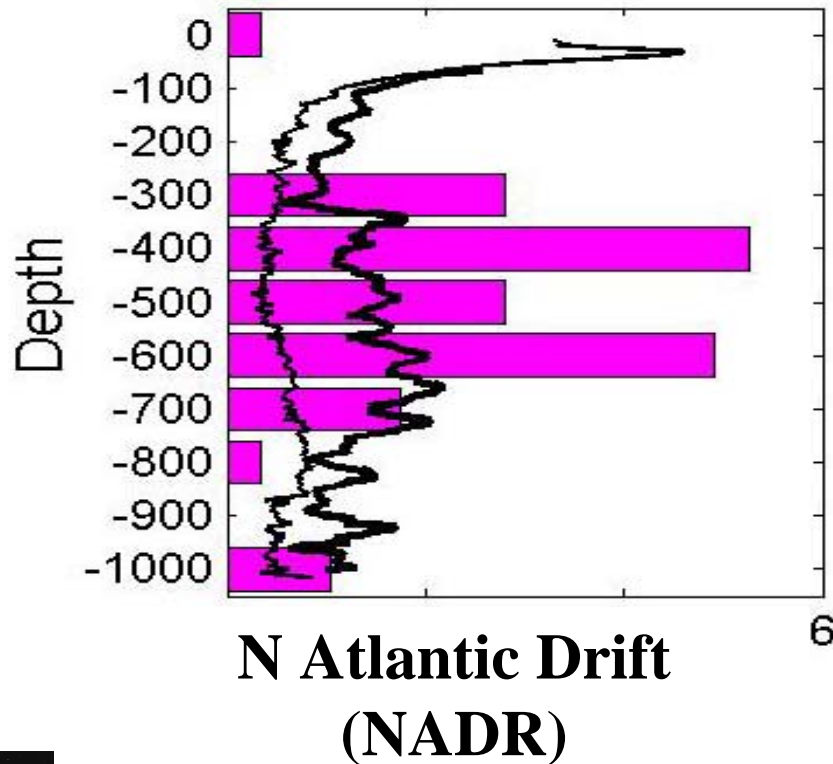# Relation between macrozooplankton (100-1000m) and particle abundance (0-100m)

Slope 0.73
r= 0.45

Relation between appendicularian and particle abundance profiles

MAR-ECO 2004 : Appendicularians (individus.10m-3) & particles (biovolume)

ESD : 0.09 - 1.06 mm
ESD : 1.06 - 26.79 mm

**N Atlantic Drift (NADR)**

N Atlantic Sub tropical (NASE)
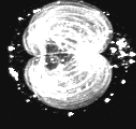
Concluding remarks II

1) The abundance of macrozooplankton in the mesopelagic layer is correlated to the flux of particles from the epipelagic layer.

2) The presence of appendicularians may increase the biomass of POM (>1mm).

Perspectives

1) The UVP results show that imaging technics can provide information on the mesopelagic biology. Imaging methods should certainly be improved.

2) These methods will provide better estimation of spatial distribution of macro-organisms and their interaction with the flux of particles.

3) This information is required to set constrains for the calibration of current and futur global models that include mesopelagic processes.
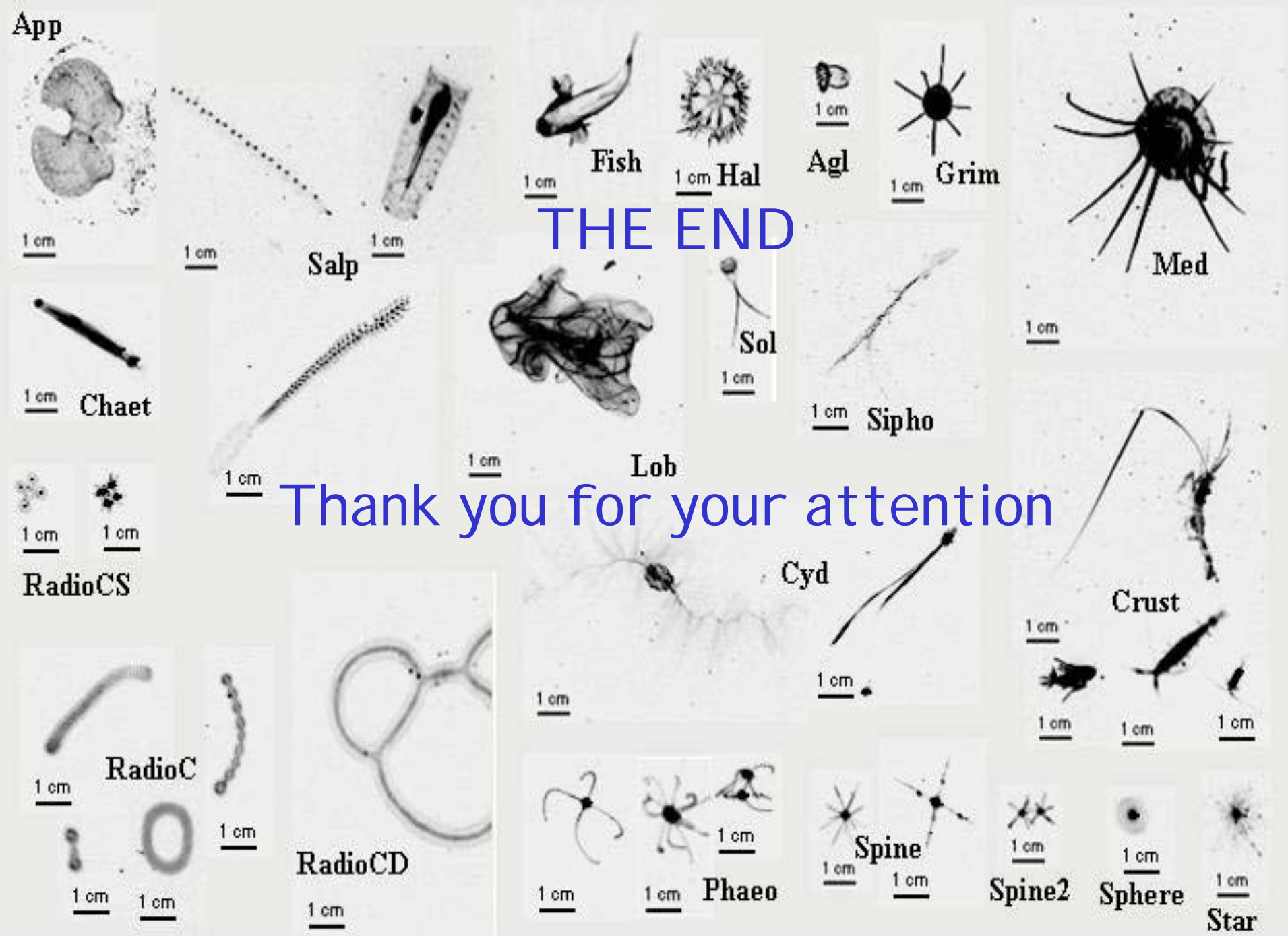
THE END

Thank you for your attention