Distribution and composition of mesopelagic macroplankton and micronekton in the North-east Atlantic

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1. INTRODUCTION

Mesopelagic organisms play an important role in the vertical carbon flux, because most of them feed in surface layers at night and staying between 200-1000 m depth during daylight [1]. To estimate mesopelagic abundance net sampling has been used [2]. However, sampling with nets leads to high bias in the assessment of marine communities [3], but it has the advantage of permitting a precise taxonomic identification as well as length measurements of catch [4]. Acoustic techniques have the advantage of lack of avoidance and large volume sampled [3].

2. OBJECTIVES

→ To investigate the **distribution** and **composition** of the mesopelagic macroplankton and micronekton.

→ To **compare** the **trawls** and **acoustic methods** to estimate biomass.

3. METHODS

The cruise was conducted from 6-24 June 2018 on *R.V.* "G.O. Sars".

Equipment:

- A **CTD**, measuring: temperature, salinity, fluorescence and dissolved O_2 .
- Two **trawls** lined with fine meshes:

	Theoretical mouth opening (m^2)	Measured mouth opening (m^2)	Mesh size (mm)
Small	36	30-34	8
Large	800	400-500	20

- A time- and depth-referenced **camera** system mounted inside the trawl.
- A **hull mounted echo sounder**.
- A **towed echo sounder**, operating between 10 and 1000m.
- A **drifting echo sounder**, operating between 67 and 460 m.

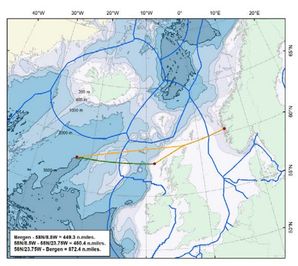
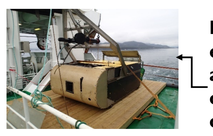
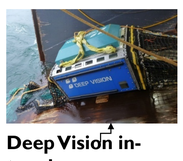


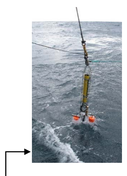
Fig 1: Study area.



Messor equipped with acoustic, optical and oceanographic sensor packages.



Deep Vision in-trawl camera system



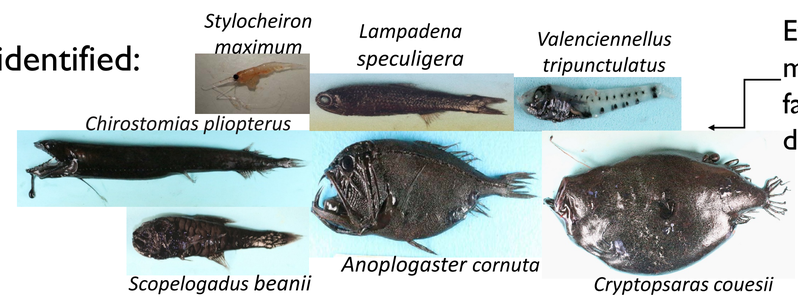
Drifting SIMRAD WBAT

4. RESULTS AND DISCUSSION

Species composition

In the trawls, a total of 120 taxa were identified:

- 13 **crustaceans**
- 87 **fishes**
- 10 **molluscs**
- 4 **gelatinous organisms**



Examples of mesopelagic fauna collected during the cruise.

Vertical distribution and relationship with environmental factors

Acoustic observations showed 2 Deep Scattering Layers (DSL):

- **Upper layer** (between ~200-500 m depth), which moved to the surface at night, probably to feed. This layer generally was associated with water masses around 8°C and 5.6-6.1 ml/l O_2.
- **Lower layer** (between ~500-800 m depth) generally associated to water masses between 6-8°C and O_2 concentration from 4.6-6.0 ml/l.

There is another **scattering layer** (between 50-250m) that showed higher intensity levels of acoustic backscatter when chlorophyll of surface waters was >1 µg/L. This chlorophyll concentrations are also associated with high and wide acoustic backscattering in the surface waters.

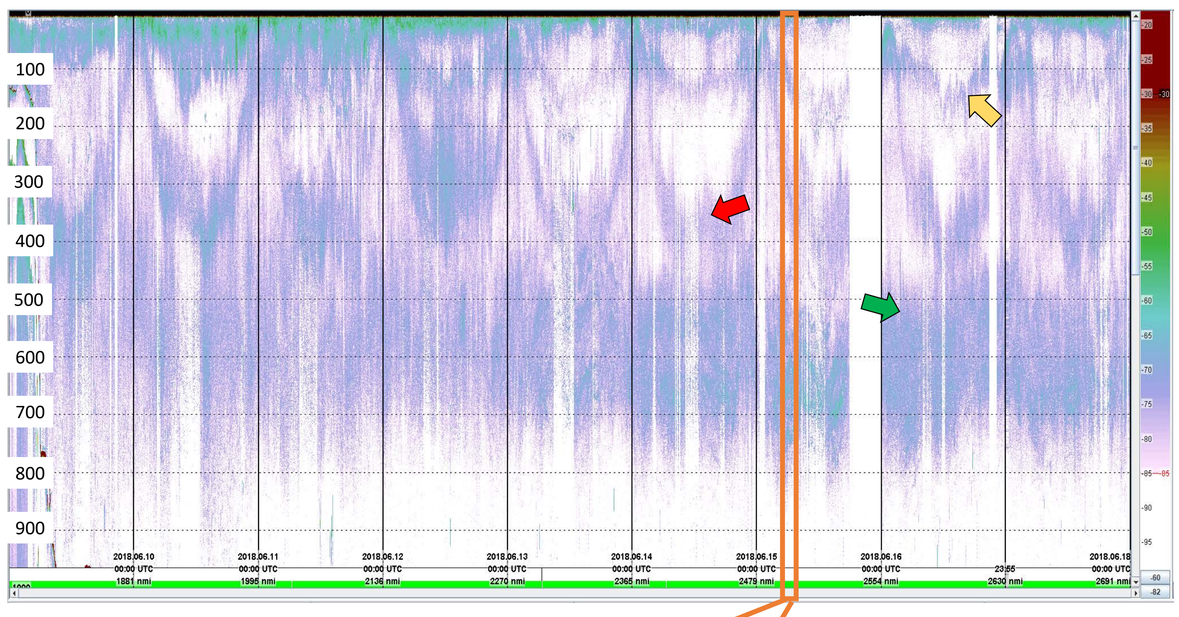
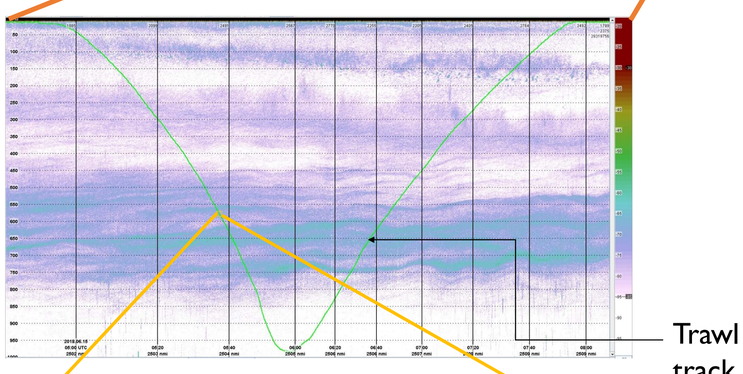
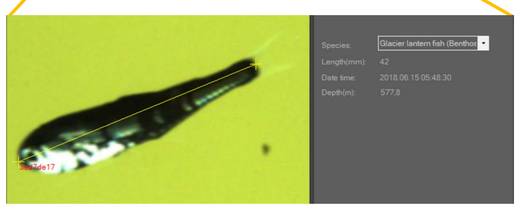


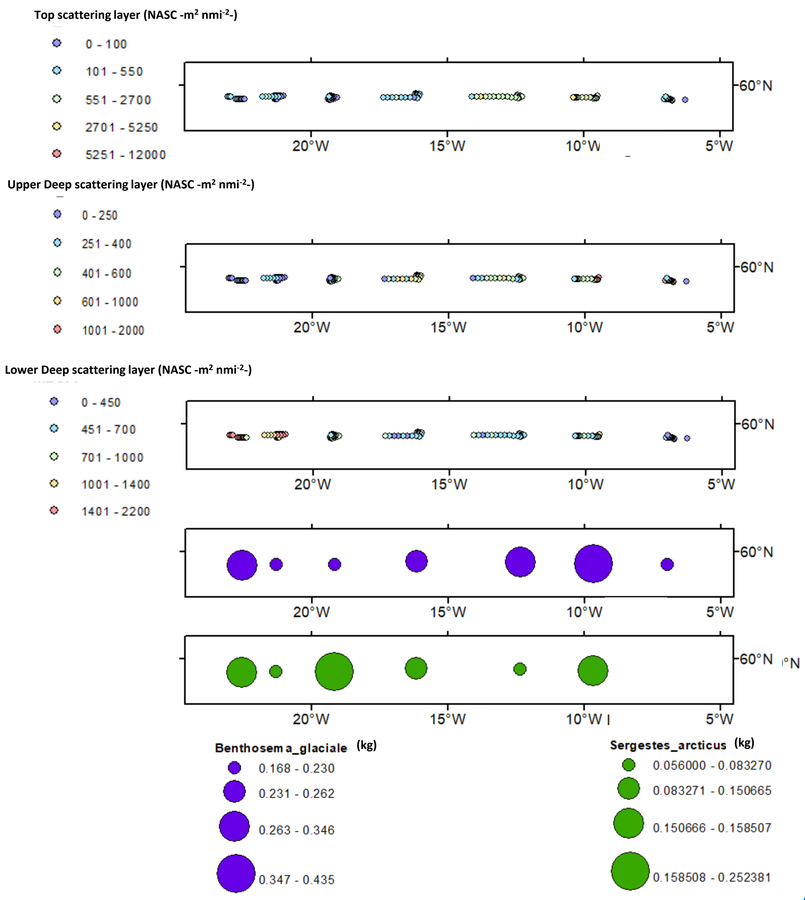
Fig 2: Echogram (after noise removal) at 38 kHz (from the LSSS software) from 9 June at 00:00 to 18 June at 00:00. The scale on the right indicates the volume backscattering strength (dB re $1m^{-1}$) in the echogram. The yellow arrow indicates the top scattering layer, and the red and green the upper and lower deep scattering layers, respectively.





Benthosema glaciale (42 mm standard length -SL-) imaged by the Deep Vision system at 578 m depth.

Comparison between acoustic backscatter and trawl biomass estimates.



5. FUTURE WORK

✓ **Stomach contents** of key predators will be analyzed to identify the main prey items.

✓ Vertical distribution of organisms from the **in-trawl camera system**.

References:

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