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Comparative zooplankton structure and functioning in epipelagic layers of different Mediterranean regions during the Hippocampe cruise

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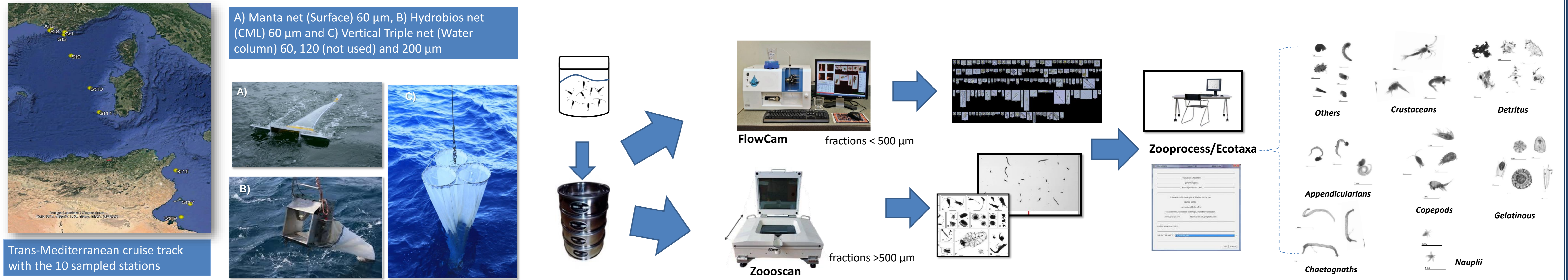
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Introduction

Zooplankton is known to play a fundamental ecological role in marine ecosystem as they are responsible for channeling carbon from primary producers to higher trophic levels, but it is suspected as well for channeling contaminants. The MERITE-HIPPOCAMPE oceanographic cruise carried out in spring 2019, along a North-South transect from French coast to the Tunisian coast to study the role of plankton as pump for Contaminants. In this paper we concentrate on the structure and distribution of the zooplankton community sampled at ten stations during the cruise.

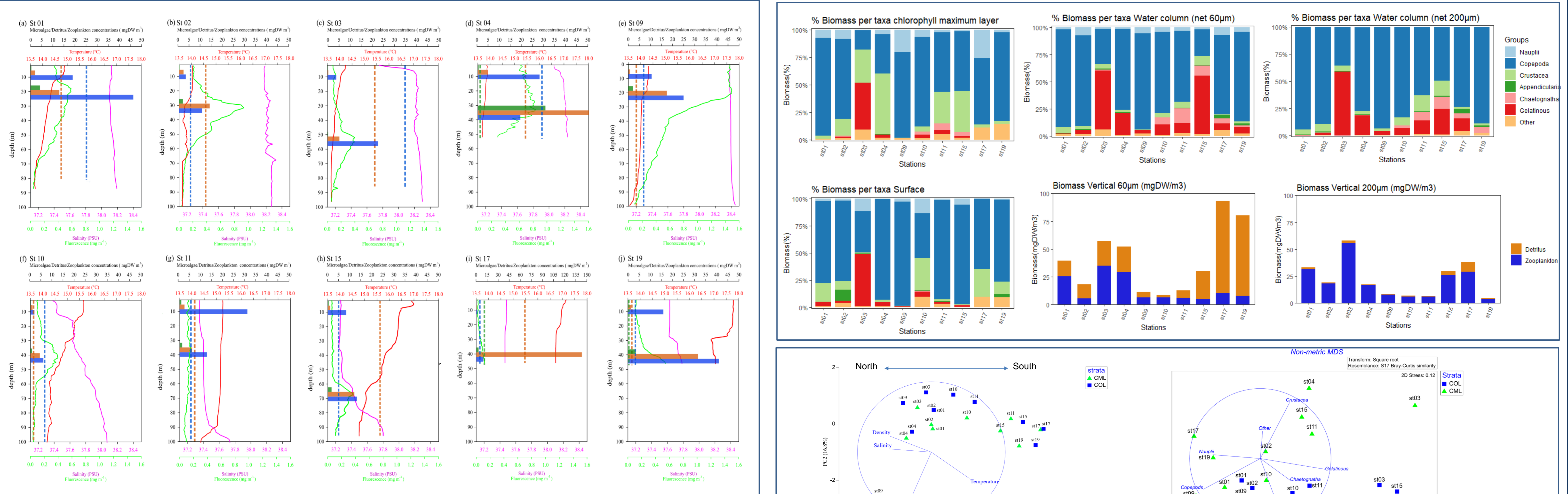
We present in this poster, in a comparative way, the zooplankton taxonomy and size fractions observed with the different net tows (/ layers) across regions by considering the characterization of each stations in terms of Temperature, Salinity, Oxygen and Chlorophyll profiles, as well as the content of detritus found in our samples.

Methodology



The zooplankton data were collected with three different types of net tows at each station although all with 60 μm mesh size: horizontally at the chlorophyll maximum layer (CML) and at the surface, and vertically from the bottom or 200 m depth to the surface. In the latter case, an additional net with 200 μm mesh size was added. The samples were fractionated for two treatments: FlowCAM for fractions < 500 μm and ZOOSCAN for fractions > 500 μm. The integrated analysis allows to obtain a complete size structure of the zooplankton community from 60 μm to few mm. For the CML tows, the samples were fractionated on board with a column of sieves with the following mesh sizes: 60, 200, 500, 1000, 2000 μm. Zooplankton images were then analyzed with Zooproces/Ecotaxa to define the taxonomic composition considering large taxa groups. The contribution of these groups to the biomass was estimated using allometric relationships linking area of organisms and body weight (Lehette & Hernandez-Leon, 2009). The relative proportions of zooplankton and detritus within the weighted biomass was as well estimated for each layer.

Results



- Water column profiles of environmental parameters in biomass zooplankton, detritus and phytoplankton (panel left). In general, the highest concentrations of zooplankton and detritus were found at the CML and most often detritus biomass exceeded the zooplankton biomass.
- Taxonomic composition in the zooplankton biomass of different nets in biomass comparison between vertical nets (panel top right). The zooplankton community at the CML was characterized by high dominance of nauplii but lower dominance of adults and copepodites of copepods, and nearly absence of Appendicularians, whereas the neustonic layer (surface) presented lower nauplii concentrations and higher Appendicularians and other zooplanktonic organisms.

- PCA on environmental variables (panel bottom right), highlights north/south gradient (Temperature, Salinity) and discriminates between coastal and offshore stations by stronger differences (chlorophyll and oxygen) between CML and Water column.
- nMDS on zooplankton showed differences in taxonomic composition of all stations between the CML and the water column. For all stations Appendicularians (filter-feeders on small particles) show lower importance in the CML. Differences occur between stations in terms of small herbivores (Nauplii) and large carnivorous (Chaetognatha, Gelatinous and Crustacea).

Conclusions and perspectives

- These analyses highlight the accumulation of zooplankton in the CML with different taxonomic composition in comparison to the water column e.g. groups avoiding CML (Appendicularians) and others aggregating (Carnivorous). That can be link with the high proportion of detritus in the biomass at the CML. Complementary analysis of the different size-fraction composition sampled at the CML showed higher proportions of detritus and small herbivorous zooplankton in small fractions (<500μm) and progressive increase of larger carnivorous forms in largest fractions (>500 μm). These results, together with isotopic approach, might be important for the analysis of the contaminant transfer between size-fractions.
- In on-going investigations, we estimate the functioning role of the zooplankton community in the different ecoregions by deriving rates (grazing, respiration and excretion) from established allometric equations. This information is key for the interpretation of contaminant contents in the size fractions and to assess the role of plankton in channeling the contaminants in the food web