Trophic interactions of calanoid copepods in the northern Benguela upwelling system - a GENUS project -

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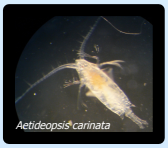
Introduction

In one of the major eastern boundary currents, the Benguela upwelling system, copepods play a crucial role in the energy flux and various species represent important components of the zooplankton community off the coast of northern Namibia (17°to 23°S).

Little is known about their dietary preferences. Therefore, copepods have been analysed by means of fatty acid biomarkers and stable isotopes ($\delta^{15}N$) to elucidate principal feeding relationships and trophic positions.

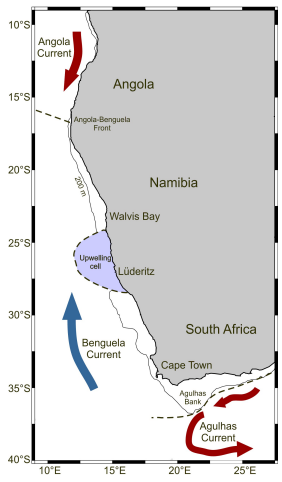


Conclusions

Most calanoid copepod species of the northern Namibian upwelling system exhibit trophic roles that are far more complex than just inter-linking primary producers with pelagic fish.

Fatty acid biomarkers and stable isotope ratios proved to be useful tools for trophic analyses integrating dietary signals over longer time periods (several weeks).

Investigation area (17°- 23°S)



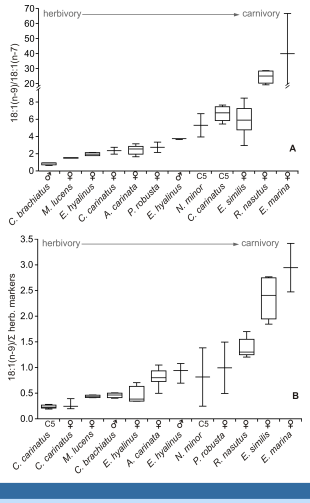
Results

Lipid levels and compositions: Total lipid (TL) levels range from 7% to 50% of dry mass in the relevant copepod species of the Benguela upwelling system. Lipid-rich species are characterized by massive wax ester (WE) accumulation (>80% TL), whereas other copepods exhibit higher amounts of triacylglycerol (TAG) or phospholipid (PL), suggesting different life strategies (right panel below).

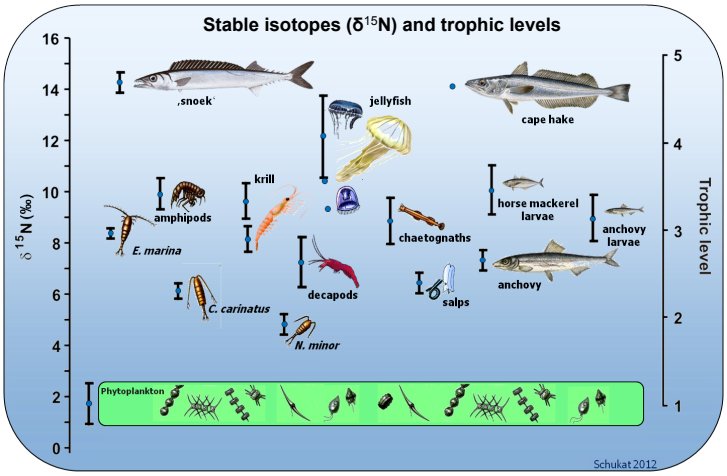
Fatty acid trophic markers: Two fatty acid (FA) biomarker ratios (18:1(n-9)/18:1(n-7) as well as 18:1(n-9)/sum of various FA indicating herbivory, e.g. 16:1(n-7), 18:3(n-4)) were applied to show the dietary preferences of the relevant Benguela copepod species. The figure (right panel, B) clearly displays their wide trophic spectrum from pronounced herbivory (*Calanoides carinatus*) to strict carnivory (*Euchaeta marina*).

Stable isotopes: The figure (below left) shows the relevant copepod species together with other important components of the northern Benguela food web (from phytoplankton to fish), sorted according to the $\delta^{15}N$ ratio and the corresponding trophic level.

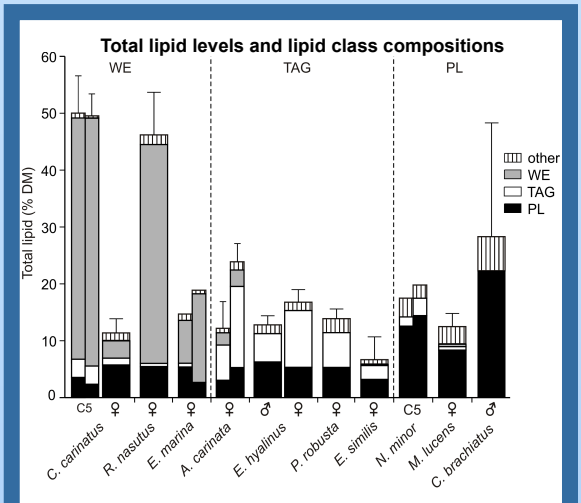
Fatty acid trophic marker ratios



Stable isotopes ($\delta^{15}N$) and trophic levels



Total lipid levels and lipid class compositions



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