The gelatinous component of the mesozooplankton community in the northern Benguela Upwelling System

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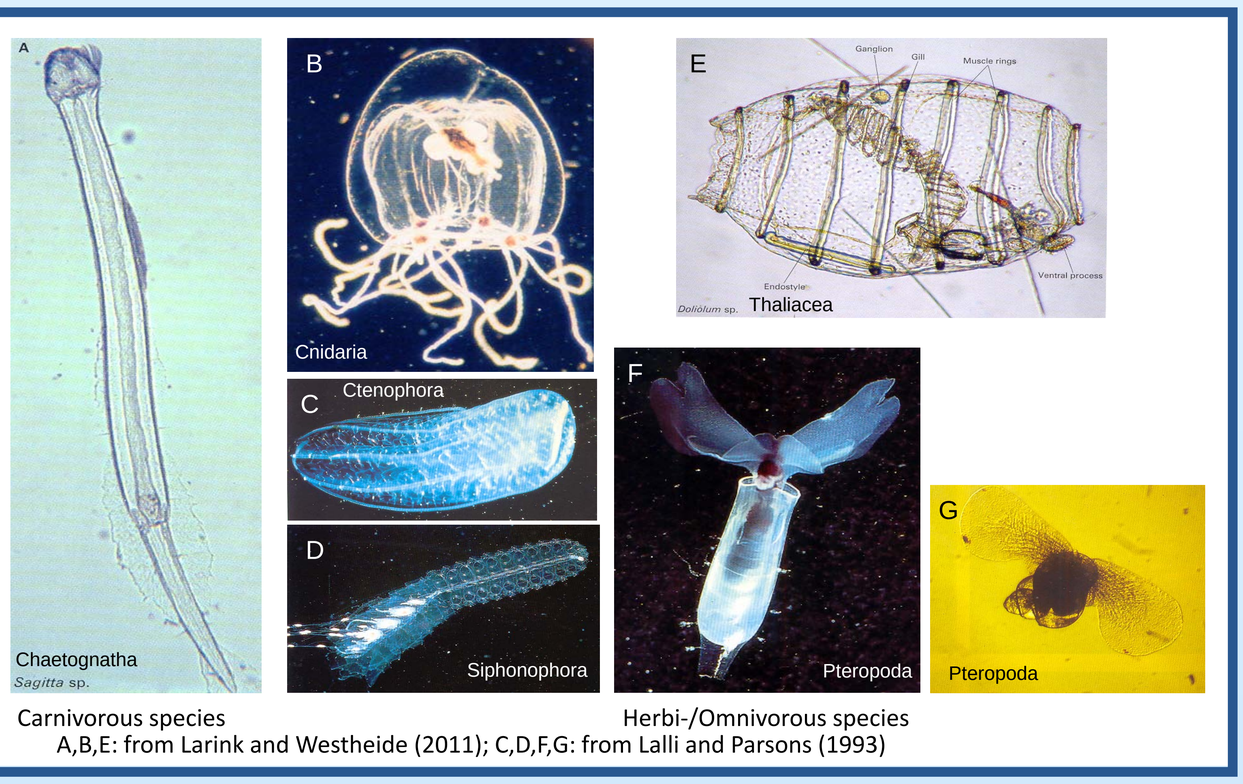
Gelatinous and semi-gelatinous organisms

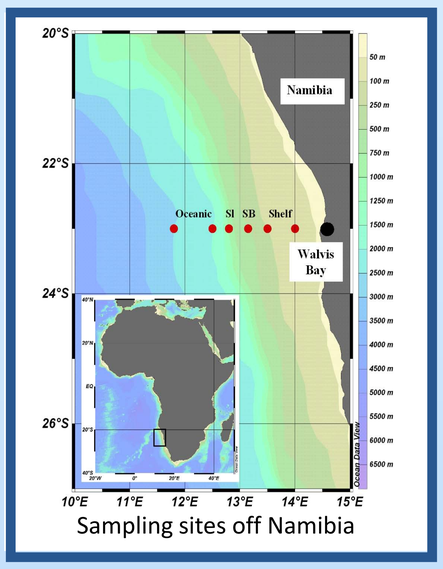
Semi-gelatinous zooplankton organisms consisting of Thecosomata (Pteropoda), Chaetognatha and Thaliacea and gelatinous organisms consisting of Cnidaria and Ctenophora are important members of the zooplankton community of the northern Benguela Upwelling System (BUS). The trophic positions of these animals range from herbivore and omnivore (Pteropoda and Thaliacea) to strictly carnivore (Cnidaria, Ctenophora and Chaetognatha).

Problem

There is some evidence that the number of large cnidarians like *Chyrsaora* spp. and *Aequorea* spp. has increased in the northern BUS since the 70th after the collapse of small-pelagic fish stocks (Clupeidae). In recent literature such increases in gelatinous organisms is referred to as jellyfication. However, little is known so far about the development of smaller Cnidaria and other gelatinous and semi-gelatinous organisms in the northern BUS. In the framework of GENUS (Geochemistry and Ecology of the Namibian Upwelling System), we investigated the zooplankton community off the Namibian coast and focussed on this faunal component.



A,B,E: from Larink and Westheide (2011); C,D,F,G: from Lalli and Parsons (1993)

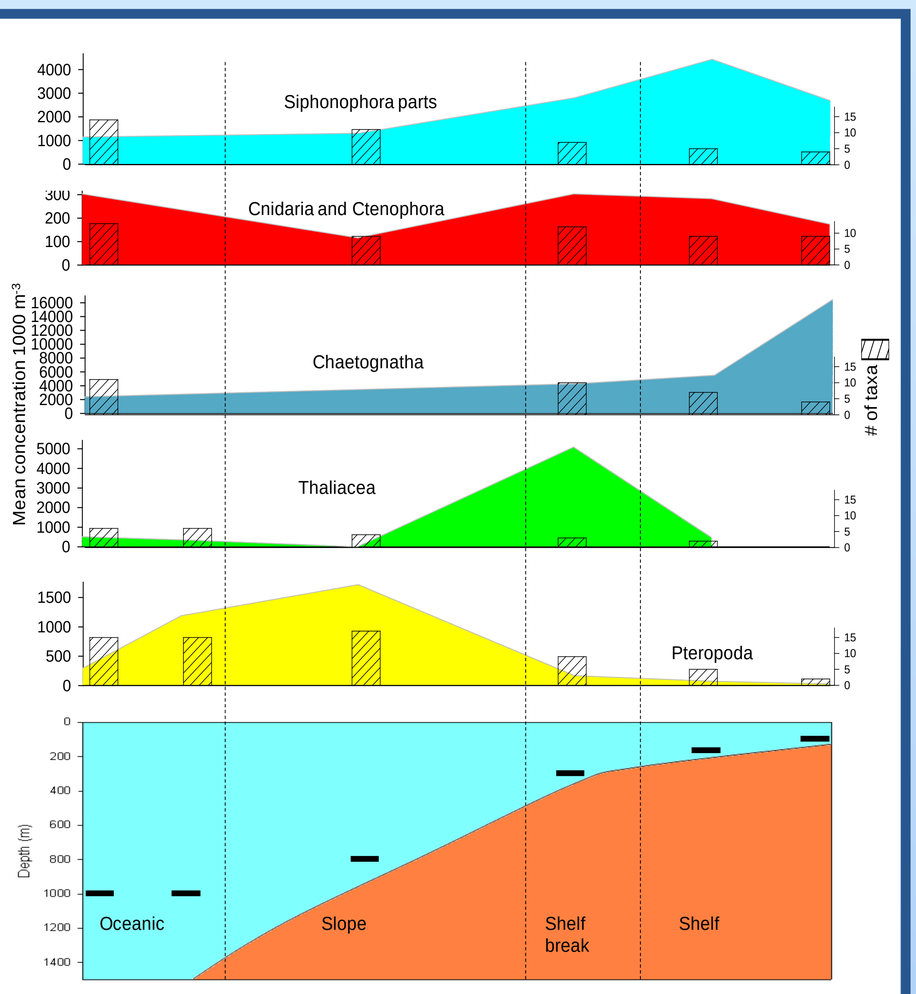


Sampling sites off Namibia

Material and Methods

Several stations were sampled off Walvis Bay, Namibia, between 2008 and 2011 using a multiple closing net (MOCNESS) with 330 µm mesh aperture. The distribution and taxonomic composition of gelatinous and semi-gelatinous organisms was analyzed for different depths from onshore to offshore.

Stable carbon and nitrogen isotope values of the groups were determined. Since trophic level calculations over different years are baseline-sensitive, values of the omni-/herbivorous group Thaliacea were used as a baseline and set to zero.



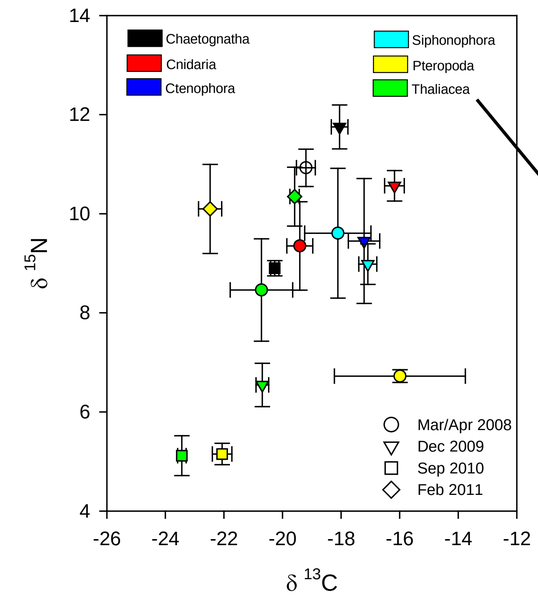
Abundance and number of taxa of gelatinous and semigelatinous zooplankton

Results and Conclusion

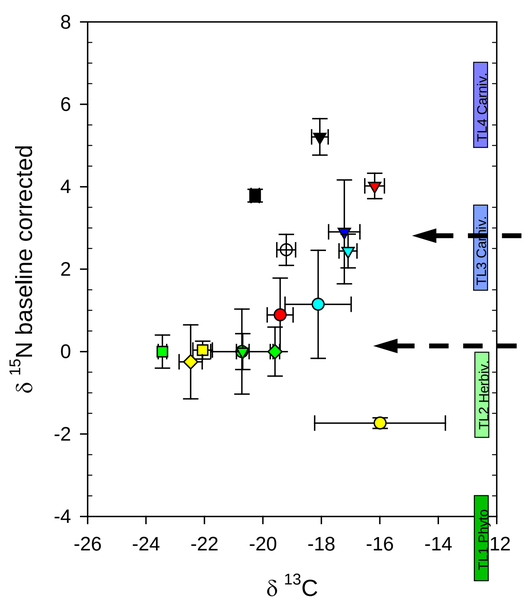
40 taxa of Cnidaria (22 Medusae and 18 Siphonophora), 1 taxon of Ctenophora, 20 taxa of Thecosomata (Pteropoda), 17 taxa of Chaetognatha and 7 taxa of Thaliacea (3 Doliolida and 4 Salpida) were sampled. Generally, the lowest diversity of all groups was detected on the shelf with an increasing trend towards the open ocean. The highest abundance of the carnivorous groups Coelenterata (Cnidaria and Ctenophora) and Chaetognatha was encountered on the shelf, but Cnidaria were also abundant offshore. Pteropoda were most common at the slope stations whereas high numbers of Thaliacea were sampled at the shelf break during a salp bloom in December 2009.

Stable isotope analysis confirmed the trophic level of the groups. Pteropods and Thaliacea compete with micro- and mesozooplankton for food, whereas Cnidaria and Chaetognatha are strong competitors of fish larvae.

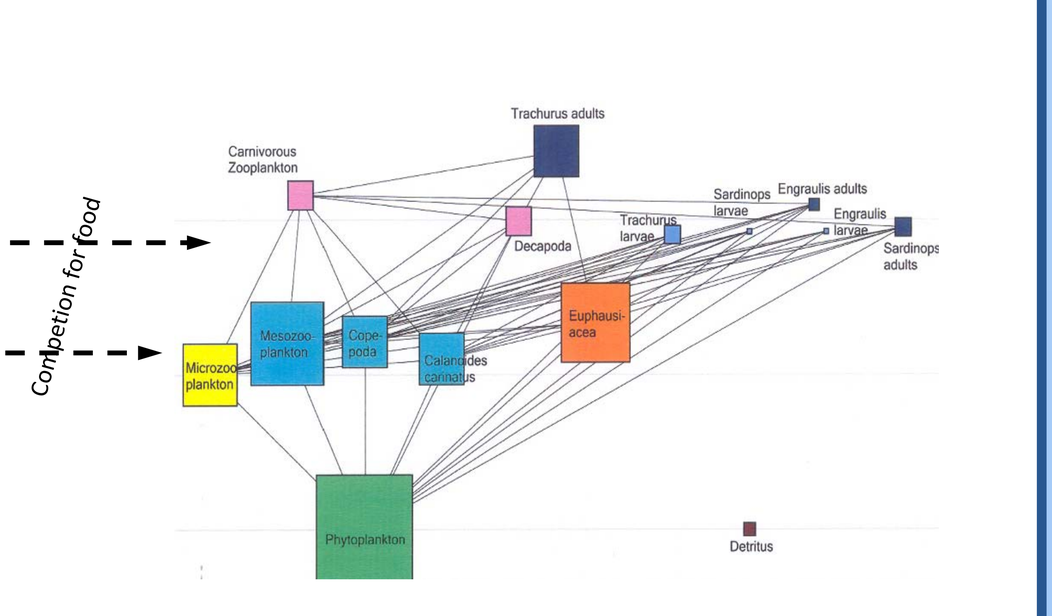
Future research will focus on the long-term temporal development of the gelatinous part of the zooplankton by retrospective analyses and future monitoring, as well as on the role of these faunal components in the trophic cascade and in elemental cycling.



Stable isotope data of different groups during different season



Baseline-adjusted stable isotope data, setting Thaliacea to zero



Pelagic food web based on an Ecopath with Ecosim-Model. The trophic level of the components is based on GENUS field data. The size of the squares represent the biomass. From Auel et al. (unpubl. results)