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Pelagic Biodiversity and Ecophysiology of Mesozooplankton in the Atlantic Ocean: Latitudinal and Bathymetric Trends

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Zooplanktonic organisms are animals that live freely in the water column but are, by definition, not capable of swimming against currents. My study is mainly focused on copepods which are by far the most abundant components of mesozooplankton communities throughout the world's ocean. As dominant primary consumers, they play a key role in the marine ecosystem as a linkage between primary producers and higher trophic levels. Due to their enormously high secondary production and behavioural adaptations such as vertical migrations, copepods are important to the global carbon cycle as they enhance the vertical flux of organic matter from the euphotic zone to the deeper layers.

Knowledge about the distributional patterns, dietary preferences and metabolism of copepods are essential to understand their role in the complex marine food web and element cycles. The results of my studies will provide a high resolution picture of the physiological performance and biodiversity of copepods as well as trophic relations within mesozooplankton communities throughout the different geographic regions in the eastern Atlantic Ocean. Samples were collected on the research vessel Polarstern from Portugal ($\sim$40°N) to Namibia ($\sim$21°S). Carbon demands, trophic levels and dietary preferences of surface and deep-dwelling copepods will be estimated to help understanding carbon fluxes and disentangling food web structures in different subsystems across the Atlantic Ocean. Distributional patterns of copepods will be set in relation to environmental factors, such as temperature, salinity, oxygen and nutrients to determine primary factors influencing their distribution. Cryptic species diversity will be analyzed genetically by testing for differences in certain DNA sequences to explore speciation and distribution processes across the eastern Atlantic Ocean. In addition, a permanent transect in the highly productive Benguela Current upwelling system at 20° S was sampled regularly between 2005 and 2011 to identify temporal and seasonal trends in zooplankton abundance and species composition in relation to environmental factors.

The handling and communication of uncertainties in science have become increasingly crucial to avoid external misunderstandings and misinterpretations. Thus, scientists have the responsibility to make themselves clear when speaking of uncertainties within their results. Disentangling the complicate relationships within different marine ecosystems, uncertainties are omnipresent due to the input of countless parameters. The distribution of zooplankton and its dependence on environmental factors is a complex non-linear system and long-term predictions seem to be almost impossible. However, we try to narrow down influencing factors and possible responses of zooplankton communities to environmental changes to make shorter-term predictions. During this work we are constantly confronted with uncertainties, e.g. due to random effects or lack of knowledge of certain factors. Results are therefore handled with great care, while uncertainties are estimated, communicated and openly discussed to make them clear to the reader in the end. Uncertainty is and has always been an essential but also natural feature in science and is not the uncertain what drives us scientists? However, it may also be frustrating. It is important to be honest about uncertainties and discuss them openly to make science more comprehensible for the public and policy-makers.