Occurrence and distribution pattern of copepods in the vicinity of the Great Meteor Seamount, Northeast Atlantic

by

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Abstract
At all stations the zooplankton population was dominated by copepods representing 80 to 95% of the total numbers. Copepods occurred in highest abundance in the upper 300 m of the water column at the plateau as well as in the surrounding water. Within the copepods, calanoids contributed the largest fraction. Only one genus, *Clausocalanus*, dominated the calanoid assemblage at all stations and accounted for between 33 and 51%. Within the adults, six *Clausocalanus* species could be identified. *Clausocalanus furcatus* and *C. paululus* were the most abundant ones. Both dominant species differed in their distribution pattern:

- *C. furcatus* occurred in higher numbers at the plateau compared to the surrounding oceanic, *C. paululus* does not show a difference in occurrence.
- the maximum abundance of *C. furcatus* occurred in the upper 100m, whereas *C. paululus* is most abundant in deeper water layers.

However, cluster analysis of the copepod community reveals a great similarity between the stations and no separation into plateau and oceanic is evident.
**Introduction**

The influence of seamounts in conjunction with specific hydrographical structures and processes on the occurrence of plankton is controversially discussed in the literature (e.g. Voronina & Timonin 1986, Dower et al. 1992, Rogers 1994, Comeau et al. 1995, Dower & Mackas 1996). The aim of this study is to describe the spatial distribution of copepods in the vicinity of the Great Meteor Seamount and to elucidate the species composition.

**Material and methods**

Zooplankton samples were collected with a 100 µm mesh multiple opening-closing net during the cruise of RV "Meteor" in September 1998. Stratified sampling included the whole water column above the plateau and slope down to 2500m at oceanic stations. A total of 10 plateau, 4 slope and 4 oceanic stations were studied. Samples were preserved in 4% borax-buffered formaldehyde seawater solution. The filtered volume was calculated by multiplying the vertical distance of the tow by the mouth area of the multinet (0.25 m²) assuming 100% filtering efficiency. Calanoid copepods were identified as far as possible to genus/species level, and separated into adults and juveniles. Individuals of cyclopoids, poecilostomatoids, harpacticoids and mormonilloids were identified to genus level. Due to the relatively large mesh size (100 µm), copepod nauplii, especially the earliest stages of small species, were not sampled quantitatively and therefore were not further identified.

Statistical analyses were performed with the PRIMER programs (Plymouth Routines in Multivariate Ecological Research) developed at Plymouth Marine Laboratory. Hierarchical agglomerative clustering was applied to differentiate copepod communities using the Bray-Curtis Index which groups the samples according to both, presence and abundance.

**Results and discussion**

At all stations the mesozooplankton population was dominated by copepods representing 80 to 95% of the total numbers. Within the copepods, calanoids contributed the largest fraction followed by poecilostomatoids and cyclopoids. Harpacticoids and mormonilloids occurred at all stations but in very low numbers (Fig. 1). Independent of regions and time of day, copepods occurred in highest abundance in the upper 300 of the water column, showing a distinct day-night difference in vertical distribution (Fig. 2).
151 different calanoid species belonging to 64 genera and 24 families were identified. However, only one genus, *Clausocalanus*, dominated the assemblage at all stations and accounted for between 33 and 51% (Fig. 3). Within the adults, six *Clausocalanus* species could be identified. *Clausocalanus furcatus* and *C. paululus* were the most abundant ones. Above the plateau both species contributed to a similar fraction while *C. paululus* was more numerous at the slope and oceanic stations. *C. parapergens, C. mastigophorus, C. arcuicornis* and *C. jobei* occurred only in small numbers. All species except *C. paululus* occurred in higher numbers at the plateau compared to the surrounding oceanic waters. The maximum abundance of *C. furcatus* and *C. mastigophorus* occurred in the upper 100m, whereas maxima of the other *Clausocalanus* species were encountered in deeper water layers (Fig. 4).

Cluster analysis of the copepod community reveals a great similarity between the stations and only at the 84% similarity level two major grouping can be separated (Fig. 5). Two oceanic stations (#493, 539) and one slope station (#509) are isolated from all other stations.
Fig. 1. Abundance of the copepod groups at the plateau, slope and oceanic stations (mean and standard deviation).

Fig. 2. Vertical distribution of calanoid copepods as percentage of total numbers at the plateau and in oceanic waters during day and night.

Fig. 3. Relative composition of dominant genus of calanoid copepods in the different regions.
Fig. 5. Vertical distribution of four Clausocalanus species at the palteau station 467 at daytime.
Fig. 5. Cluster dendrogram of copepods in the upper 300 m.
Zooplankton in the vicinity of seamounts is only rarely studied (e.g. Weikert 1972, Fedosova 1974, Schirmer 1975, Voronina & Timonin 1986, Dower et al. 1992, Dower & Mackas 1996). The number of species found is this study is much higher compared to e.g. Voronina & Timonin (1986), who studied the zooplankton in the vicinity of the Equator and Fred seamounts in the Indian Ocean. One explanation probably is the smaller mesh size used in this study and the larger water column sampled. The dominant calanoid species and genus are different between the seamounts studied. Small species dominate the community around the Fred and the Great Meteor seamount (*Acartia, Clausocalanus, Calocalanus*). In contrast the large genus *Rhincalanus* and *Neocalanus* are prominent in the region of the Equator and the Cobb seamounts, respectively (Voronina & Timonin 1986, Dower et al. 1992).

References


