

18. THE LINK BETWEEN STRUCTURAL AND FUNCTIONAL BIODIVERSITY OF THE MEIOBENTHOS IN THE ANTARCTIC DEEP SEA: FOCUS ON NEMATODES

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Objectives

Nematodes are the most abundant metazoan meiobenthic taxon in many areas of the world's ocean. Also in the deep sea they tend to be dominant and densities can be high, which makes them important players in the benthic food web. However, knowledge on the biodiversity and functioning of nematode communities is still scarce, especially in the deep realms of the oceans. In continuation of the SYSTCO I expedition we therefore aimed to further elucidate on the role of meiofauna, and especially nematodes, in the carbon flow through benthic deep-sea sediments of the Antarctic in relation to their biodiversity and surface water productivity. In order to unravel the link between nematode biodiversity and function, it is essential to reveal the interactions in the benthic food web and their trophic position at locations with contrasting food input. This contrasting food input was generated by sampling in three different oceanic regimes, with different chlorophyll a concentrations, as observed from satellite images. Through community analysis and biochemical profiles (fatty acids and/or stable isotopes) we hope to shed more light on the link between surface productivity and benthic nematode communities (i.e. benthic-pelagic coupling).

Work at sea

At all deep benthic stations, and for each MUC deployment, 2 cores were selected for meiofauna community analysis and fatty acid profiles (see Table 18.1. for an overview of the cores taken and their purpose). The core for community analysis was each time sliced down to 10 cm core depth in slices of 1 cm for the first 5 centimetres, and 1 slice of 5 cm from 5-10 cm. All separate sediment slices are stored on 4-7% buffered formalin until further analysis. The second core, to be analysed for fatty acids, was sliced down to 5 cm sediment depth in slices of 1 cm of thickness. Each slice is stored in petri dishes at -80°C. The same slices will be used afterwards to determine a set of sediment characteristics, including grain size, sediment-bound pigment concentrations and C/N ratios. To compare fatty acid and/or stable isotope signals in the nematodes with the water column, bottom and surface water (sampled with a CTD rosette mounted with Niskin bottles and with buckets) has been filtered over GF/F filters. The filters are stored in glass vials at -80°C.

At the shallow station at roughly 54°S52°W, samples were taken for a small-scale project where community structure is compared between regions, different

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deployments, different cores of each deployment and different parts of one core. For three deployments, 2 cores were taken and divided in slices of 0-3 cm and 3-5 cm. Subsequently, the slices were subdivided in 6 parts of which 3 are stored on 4-7% formalin and 3 at -80°C for sediment characteristics.

All organisms sampled quantitatively with the MUC6 will be sorted and counted on major taxon level at the lab of the Marine Biology Section of Ghent University. Nematodes will be identified down to genus level at the Marine Biology Section of Ghent University. Nematodes for fatty acid analyses will be picked out from each sediment layer stored at -80°C, after which the analyses (both extraction of fatty acids and identification of signals) will be performed in the lab. Fatty acid and/or stable isotope analysis on the GF/F filters stored at -80°C will also be carried out in the lab of Ghent University.

Tab. 18.1: MUC deployments and cores used for meiofauna community analysis and fatty acid profiles. (comm = community; FA = Fatty Acids; env = environmental characteristics)

Station info	Station	Date	Latitude	Longitude	Depth (m)	Core Id.	Purpose	Fixation
FULL STATION	PS79/081-8	19/01/2012	51° 59.99' S	9° 59.99' E	3760.5	3	comm	4% formalin
						4	FA+env	-80°C
						6	FA+env	-80°C
	PS79/081-9	19/01/2012	52° 0.01' S	10° 0.05' E	3760.7	8	FA+env	-80°C
						10	comm	4% formalin
	PS79/081-12	19/01/2012	51° 59.93' S	10° 0.06' E	3757.5	6	comm	4% formalin
						8	FA+env	-80°C
	PS79/081-13	19/01/2012	52° 0.042' S	9° 59.90' E	3760.5	6	comm	4% formalin
7						FA+env	-80°C	
TRANSECT	PS79/084-24	23/01/2012	53° 0.67' S	10° 3.00' E	4320.2	4	comm	4% formalin
						5	FA+env	-80°C
						6	FA+env	-80°C
WEST	PS79/085-14	27/01/2012	51° 59.98' S	7° 59.99' W	2749.2	8	comm	4% formalin
						9	comm	4% formalin
						11	FA+env	-80°C
FULL STATION (before Eddy Pump)	PS79/086-26	1/02/2012	51° 58.87' S	12° 3.76' W	3966.2	4	FA+env	-80°C
						8	comm	4% formalin
	PS79/086-28	1/02/2012	51° 58.74' S	12° 2.11' W	3968	6	FA+env	-80°C
						8	comm	4% formalin
	PS79/086-29	1/02/2012	51° 58.78' S	12° 1.95' W	3970.8	3	comm	4% formalin
						5	FA+env	-80°C
						1	FA+env	-80°C
PS79/086-30	2/02/2012	51° 58.91' S	12° 2.16' W	3965.4	3	comm	4% formalin	
					1	FA+env	-80°C	
FULL STATION (after Eddy Pump)	PS79/141-5	18/02/2012	51° 16.04' S	12° 36.88' W	4115.5	1	FA+env	-80°C
	PS79/141-6	18/02/2012	51° 15.98' S	12° 37.04' W	4113	3	FA+env	-80°C
						4	comm	4% formalin
	PS79/141-9	18/02/2012	51° 16.03' S	12° 37.06' W	4114	6	FA+env	-80°C
						8	comm	4% formalin
	PS79/141-10	19/02/2012	51° 15.97' S	12° 36.94' W	4113	3	FA+env	-80°C
						6	comm	4% formalin
	PS79/141-11	19/02/2012	51° 16.02' S	12° 37.12' W	4113.2	3	FA+env	-80°C
5						comm	4% formalin	
DEEP	PS79/174-23	02/03/2012	49° 33.80' S	38° 24.27' W	4881	7	FA+env	-80°C
						8	comm	4% formalin

Station info	Station	Date	Latitude	Longitude	Depth (m)	Core Id.	Purpose	Fixation
FULL STATION (South Georgia)	PS79/175-5	04/03/2012	50° 46.69' S	39° 25.35' W	4154.2	7	comm	4% formalin
						8	FA+env	-80°C
	PS79/175-6	04/03/2012	50° 46.59' S	39° 25.33' W	4155.2	5	comm	4% formalin
						6	FA+env	-80°C
	PS79/175-7	04/03/2012	50° 46.60' S	39° 25.38' W	4154.2	2	comm	4% formalin
						3	FA+env	-80°C
	PS79/175-8	04/03/2012	50° 46.60' S	39° 25.39' W	4154	1	FA+env	-80°C
						10	comm	4% formalin
	PS79/175-9	04/03/2012	50° 46.57' S	39° 25.33' W	4152.1	3	comm	4% formalin
6						FA+env	-80°C	
SHALLOW	PS79/177-3	07/03/2012	53° 48.53' S	52° 21.31' W	338.7	2	Small-scale	Formalin & -80°C
						4		
	PS79/177-4	07/03/2012	53° 48.54' S	52° 21.30' W	340.2	4		
						5		
	PS79/177-6	07/03/2012	53° 48.56' S	52° 21.27' W	343	1		
						2		

Preliminary and expected results

Since extraction of animals and the analysis of environmental characteristics and fatty acids have to be done in a standardised way in the lab, no preliminary results are available for the meiobenthos.

Due to their small size, nematode identification at genus level has to be carried out on a light stereoscope microscope. Only a limited number of nematodes have been identified in this way onboard, on a stereoscopic microscope belonging to the Hamburg group (ZSM). It concerns nematodes retrieved from the epibenthic sledge (EBS) instead of the MUC, and therefore only qualitative samples of the larger fraction of the nematodes (>300 µm). Of these few identified nematode specimens, no surprises were found. All genera identified are regular inhabitants of deep-sea sediments. Most frequently found are the genera *Halalaimus*, *Actinonema* and *Viscosia*. Identification of the nematodes of the quantitative samples will be carried out in the lab of the Marine Biology Section, Ghent University.

Data management

Refer to page 75.