

5.6 Macrobenthic studies along a transect from the estuaries of Ob and Yenisei into the central Kara Sea

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Introduction

Biological studies of SIRRO 2001 are an important component to understand the full dimension of the cycle of organic matter in the open Kara Sea. The enormous fresh water inflow from the siberian rivers Ob and Yenisei is important for the distribution of macrobenthic organisms and hence determinant for the entire Kara Sea ecosystem. In this respect, sea floor living organisms are an important link between the water column and the sea bottom. Studies on the long-lived macrofauna are necessary to understand energy turnover and benthic-pelagic coupling in the area of the Kara Sea and the adjacent Arctic Ocean.

Within the scope of the Russian-German project SIRRO, the macrofauna of the estuarine areas of Ob and Yenisei as well as the adjacent southern Kara Sea has been studied extensively. However, for logistic reasons offshore parts of the Kara Sea, which are more difficult to reach, have been investigated insufficiently. In comparison with previous expeditions substantial changes of macrobenthic species composition with increasing latitude are indicated. During this expedition evenly distributed samples for incubation experiments were also collected in the Kara Sea (Tab. 5.5, see chapter 8.2).

Sampling

The large-scale distribution of the Kara Sea macrobenthic organisms was studied handling two approaches. First, the benthic fauna was collected using a Large Box Corer (0.25m²). The macrofauna from 60 LBC were separated from the sediment by sieving on 500µm-screens and preserved by 7% with Natriumtetraborat buffered formaldehyde. In combination with the LBC samples and to capture larger quantities of macrobenthic animals a dredge with a frame size of 150 x 50cm was used. Subsamples of the dredge material were pre-sorted and deep-frozen (-80°C) for biochemical investigations. The retained dredge sample was also formalin fixated for subsequent examination.

For benthic respiration studies, the sampling program includes evenly distributed multi-corer samples, four replications on each station. The incubated sediment cores were closed with lids, kept in the dark and cooled in a water basin for 24h. In addition, water from the similar multi-corer was bottled (four replications á 100ml) and kept dark and cooled together with the sediment cores. Aboard oxygen was determined using standard methods (Winkler titration). Respiration rates were calculated from the differences in oxygen concentration between the incubated sediment cores and the bottled seawater.

Preliminary results

Only preliminary results are available since most of the material will be sorted at the Alfred Wegener Institute in Bremerhaven. Molluscs, especially bivalvia, represented the most important macrobenthic group, followed by polychaeta, crustacea and echinodermata. *Portlandia* (cf.) *arctica* and *Tridonta borealis* dominated the bivalvia fauna. Gastropoda were very rare in the samples. Amphipods and isopods were the most abundant crustacea. Of some importance were the amphipoda *Pontoporeia affinis* and different species of the isopode *Saduria*. However, larger specimens of *Saduria entomon*, which had been abundant in previous expeditions, were found this year only sporadic. Comparable with other arctic shelf areas, echinodermata are an important macrobenthic element of the central Kara Sea. Very remarkable are *Ophiocten sericeum* and *Ophiopleura borealis*. These arctic species occurred only in the northern part of the investigation area, where the Kara Sea is more influenced by Atlantic waters. The sea star *Ctenodiscus crispatus* appeared in the dredge samples in relatively large numbers. In the northwestern Kara Sea the suspension feeding *Heliometra glacialis* and *Gorgonocephalus arcticus* inhabited the high arctic deeper areas.

At 8 evenly distributed stations a total of 32 respiration measurements were conducted. As expected, absolute oxygen consumption decreased within 24h. Sediment cores, which contained larger macrobenthic animals, had considerably higher oxygen demands compared to incubated cores without visible organisms.

Table 5.5: List of total benthological activities during the Kara Sea expedition SIRRO 2001

LBC = Large Box Corer; MUC = Multicorer; EBS = Epibenthos sledge

Station	Date	Depth (m)	SIRRO 2001				ESTABLISH	
			LBC	Dredge	MUC	EBS	Okean - Grab	Meiofauna sample
BP-01-01	14.08.2001	39	2	0	0	1	2	1
BP-01-03	15.08.2001	15	0	0	0	0	2	1
BP-01-04	16.08.2001	21	0	0	0	0	2	1
BP-01-05	16.08.2001	13	0	0	0	0	2	1
BP-01-06	17.08.2001	16	0	0	0	0	2	1
BP-01-08	17.08.2001	29	0	0	0	0	2	1
BP-01-09	18.08.2001	9	0	0	0	0	2	1
BP-01-11	18.08.2001	10	0	0	0	0	3	1
BP-01-14	19.08.2001	21	0	0	0	0	2	1
BP-01-16	19.08.2001	27	0	0	0	0	2	0
BP-01-17	20.08.2001	17	0	0	0	0	2	0
BP-01-18	21.08.2001	11	0	0	0	0	2	0
BP-01-19	21.08.2001	26	0	0	0	0	2	1
BP-01-20	21.08.2001	14	0	0	0	0	2	0
BP-01-22	22.08.2001	14	0	0	0	0	3	0
BP-01-23	22.08.2001	21	0	0	0	0	2	1
BP-01-24	22.08.2001	41	0	0	0	0	2	0
BP-01-26	23.08.2001	33	0	0	0	1	0	0
BP-01-28	24.08.2001	51	2	1	0	0	2	0
BP-01-30	24.08.2001	47	2	0	0	0	0	0
BP-01-31	25.08.2001	88	2	0	0	0	2	0
BP-01-34	25.08.2001	92	2	1	0	0	0	0
BP-01-35	26.08.2001	142	2	0	0	0	1	0
BP-01-37	26.08.2001	144	2	0	0	0	0	0
BP-01-38	27.08.2001	111	2	1	X	0	0	0
BP-01-39	27.08.2001	102	0	0	0	0	2	0
BP-01-40	27.08.2001	53	2	0	0	0	0	0
BP-01-41	28.08.2001	42	2	1	X	0	0	0
BP-01-42	28.08.2001	45	0	0	0	0	2	0
BP-01-43	28.08.2001	43	2	0	0	0	0	0
BP-01-45	29.08.2001	87	2	1	X	1	0	0
BP-01-46	30.08.2001	295	2	1	X	0	2	0
BP-01-48	31.08.2001	202	2	1	X	0	0	0
BP-01-49	31.08.2001	198	0	0	0	0	2	0
BP-01-51	31.08.2001	158	2	0	0	0	0	0
BP-01-52	01.09.2001	75	2	0	0	0	0	0
BP-01-55	01.09.2001	76	2	0	0	1	2	0
BP-01-56	02.09.2001	176	2	1	0	0	0	0
BP-01-58	02.09.2001	79	2	0	0	0	1	0
BP-01-59	03.09.2001	160	2	0	0	0	0	0
BP-01-60	03.09.2001	80	0	0	0	0	2	0
BP-01-61	03.09.2001	112	2	0	X	1	0	0
BP-01-62	04.09.2001	135	2	1	0	0	0	0
BP-01-63	04.09.2001	88	0	0	0	0	2	0
BP-01-64	04.09.2001	99	2	0	0	0	0	0
BP-01-65	05.09.2001	58	2	1	X	0	0	0
BP-01-66	05.09.2001	49	2	1	0	1	0	0
BP-01-67	06.09.2001	49	2	1	0	0	2	0
BP-01-68	06.09.2001	31	2	0	0	1	0	0
BP-01-70	07.09.2001	22	2	1	X	0	2	0
BP-01-72	08.09.2001	24	0	0	0	0	2	0
BP-01-73	09.09.2001	13	0	0	0	0	2	0
BP-01-77	09.09.2001	13	0	0	0	0	2	0
BP-01-80	10.09.2001	15	2	0	0	0	3	1
BP-01-82	11.09.2001	29	2	1	0	0	1	1
total			60	14	8	7	70	13