

Macrofauna in soft sediments on the Faroe shelf

Background

The Faroe Shelf is highly influenced by water currents from the Atlantic Ocean and the distance to industrialized and densely populated areas is long. It may therefore be anticipated that influence of pollution is relatively small compared to, for instance, parts of the North Sea and the Scandinavian Seas, Skagerrak, Kattegat and the Baltic Sea. Since benthic macrofauna in soft sediments often is used as an indicator of environmental quality, sampling of this faunal category on the Faroe shelf would constitute a reference to more polluted areas. This was the background for sampling sediment macrofauna on the Faroe shelf in the period 1987 - 1990 within the BIOFAR program. The area is relatively exposed (high energy environment) and the inputs of organic matter as well as fine grained inorganic matter from land is small which has the consequence that fine grained deposits are scarce on the shelf. The pilot survey in 1987 revealed two areas on the shelf with fine grained deposits suitable for quantitative macrofaunal sampling, one on the west side (Skeivibanka) and one on the east side (East Suðuroy) of the shelf, both at 300-350 m water depth (Figure 1, Table 1). The areas were sampled once a year in the period 1987 - 1990, and sampling was made in May except for 1987 when samples were taken in July.

Methods

Methods used were quantitative sampling with a modified Smith-McIntyre grab which covers a surface area of 0.1 m² and has a maximum penetration depth of 20 cm. Sampling was performed while the ship was drifting. At each time and station a number of replicate samples (3 - 6) were taken and in 1988 a large spatial grid of stations were sampled in each of the two areas, with one grab sample per station. Subsamples, one per grab sample, was taken of the surface (0-2 cm) sediment for analysis of grain size and content of organic matter. Sediment samples were deep-frozen (at minimum -20°C) for later analysis. Grab samples were sieved through a 1 mm square metal mesh and the retained

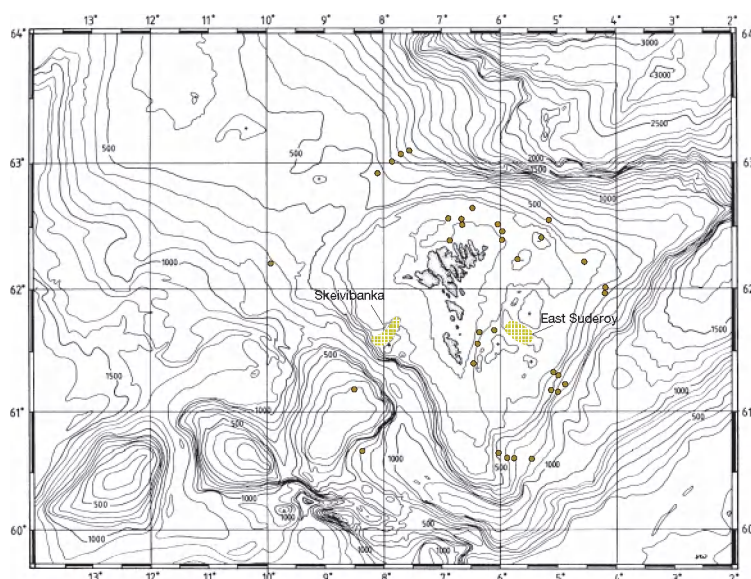


Figure 1.

Map of the Faroes with soft bottom areas indicated. Dots show Smith-McIntyre grab samples from the BIOFAR program.

material preserved in 5% buffered formalin. In the laboratory the individuals of each species were enumerated, and the formalin wet weight of all individuals for each species (or rather taxon) were determined. After determination and weighing all material was stored in 80% ethanol.

Investigated localities

A description of surface sediment composition is shown in Table 1. The ignition loss, a measure of the organic content, is low at both localities and varies between 2.5 and 4.5. Water content and the percentage silt-clay (percent fines) are similar in the two areas and typical for sandy silt bottoms. In the eastern area (East Suðuroy) the bottoms may contain great amounts of sponge spicules.

Fauna

The total abundance, which was relatively low at both sites with 1000 - 2000 ind./m², was dominated by polychaetes (40-50%) followed by molluscs and the category 'remaining'. Dominating species among polychaetes were *Paramphipnomme jeffreysi* at both sites and *Paradiopatra quadricusps* at the eastern site. Molluscs were dominated by bivalves of the genus *Thyasira* at both sites, and 'remaining' was dominated

Table 1.

Approximate positions, depths and sediment characteristics at the two areas on the Faroe shelf sampled for sediment macrofauna. Locality W: Skeivibanka, Locality E: east Suðuroy. For detailed positions see Nørrevang *et al.* 1994.

Locality and year	Latit. N	Longit. W	Depth (m)	Number samples	Ignition loss (%)	Water content (%)	Percent fines (< 50 micr)
W 87	61° 40'	07° 50'	329-350	3	2.8-3.3	37-39	34-46
W 88	61° 41'	07° 47'	317-367	15	2.7-3.9	35-40	-
E 87	61° 42'	05° 50'	350	1	4.3	47	47
E 88	61° 43'	05° 50'	349-351	2	3.3-4.1	42-48	-

by sipunculids notably *Onchnesoma steenstrupi*.

The biomass was dominated by echinoderms, in particular the sea urchin *Brisaster fragilis* at the western site, and molluscs where the bivalve *Tridonta elliptica* was the dominant at both sites. *Brisaster fragilis* was not included in Table 2 as only few specimen occurred in the samples. Total biomass in wet weight including shells was somewhat less than 50 g/m², which using published conversion factors corresponds to ca 2.5 g AFDW/m². This is a low figure relative to many coastal shallow areas, and probably reflects a small input of degradable organic matter to the benthic environment in these areas.

The species composition in terms of abundance is characterized by a high evenness and the number of taxa per areal unit is similar to the northern part of the North Sea and parts of the Skagerrak (Eleftheriou & Basford 1989). For instance, the number of taxa of the 4 major groups (Polychaeta, Mollusca, Echinodermata and Crustacea) on a 1/2 m² ranges from 60-90. The total number of taxa found at the two sites in the 4 years was above 200. The most frequently occurring taxa in the total samples on each of the two sites, 31 grabs from Skeivibanka and 15 grabs from Eastern Suðuroy, are listed in Tables 2 and 3 respectively.

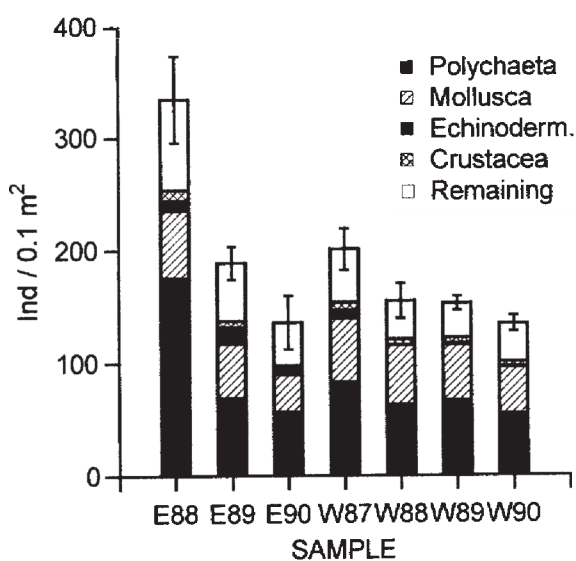


Figure 2. Distribution of abundance on major taxonomic groups at the two sites (E and W) from the period 1987-1990. Error bars denote 2 x SE (Standard Error) of the total. Each sample based on 3-5 replicate grabs.

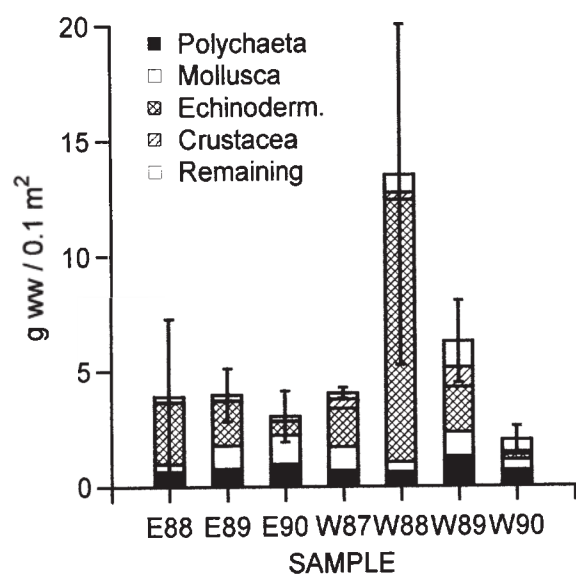


Figure 3. Distribution of biomass on major taxonomic groups at the two sites (E and W) from the period 1987-1990. Error bars denote 2 x SE (Standard Error) of the total. Each sample based on 3-5 replicate grabs.

Table 2.

List of taxa at the western site of the Faroe Islands, Skeivibanka, occurring in more than 50 % of the total 31 grab samples (1987-1990) ranked by frequency.

Taxon	Group	No of individuals	No of samples
<i>Onchnesoma steenstrupi</i> Koren & Danielssen, 1875	Sipuncula	698	30
Caudofoveata		254	30
<i>Thyasira ferruginea</i> (Forbes, 1851)	Bivalvia	303	30
<i>Thyasira obsoleta</i> (Verrill & Bush, 1898)	Bivalvia	246	30
<i>Paramphinome jeffreysi</i> (McIntosh, 1868)	Polychaeta	324	29
<i>Paraonis gracilis</i> (Tauber, 1879)	Polychaeta	136	29
<i>Yoldiella lucida</i> (Lovén, 1846)	Bivalvia	154	29
<i>Polydora</i> sp.	Polychaeta	74	28
<i>Prionospio</i> sp.	Polychaeta	83	28
<i>Amaeana trilobata</i> (M. Sars, 1863)	Polychaeta	92	27
<i>Diplocirrus glaucus</i> (Malmgren, 1867)	Polychaeta	95	27
Nemertea		74	26
<i>Notomastus latericeus</i> M. Sars, 1851	Polychaeta	84	26
<i>Chaetozone setosa</i> Malmgren, 1867	Polychaeta	72	24
<i>Yoldiella nana</i> (M. Sars, 1865)	Bivalvia	59	24
Amphipoda		74	23
<i>Tridonta elliptica</i> (Brown, 1827)	Bivalvia	58	23
<i>Thyasira croulinensis</i> (Jeffreys, 1847)	Bivalvia	136	22
<i>Lumbrineris gracilis</i> (Ehlers, 1868)	Polychaeta	60	21
Cirratulidae	Polychaeta	55	20
<i>Ophelina abranchiata</i> Støp-Bowitz, 1948	Polychaeta	36	20
<i>Spiophanes</i> sp.	Polychaeta	49	20
<i>Aricidea jeffreysi</i> (McIntosh, 1879)	Polychaeta	63	19
Euclymeninae	Polychaeta	36	19
<i>Lumbrineris impatiens</i> Claparède, 1868	Polychaeta	44	19
<i>Onchnesoma squamatum</i> (Koren & Danielssen, 1875)	Sipuncula	40	18
<i>Aglaophamus malmgreni</i> Théel, 1879	Polychaeta	39	17
<i>Thyasira</i> sp.	Bivalvia	43	17
<i>Pectinaria auricoma</i> (O.F. Müller, 1776)	Polychaeta	19	16

Table 3.

List of taxa at the eastern site, E. Suðuroy, occurring in more than 50 % of the total 15 grab samples (1987-1990) ranked by frequency.

Taxon	Group	No of individuals	No of samples
<i>Onchnesoma steenstrupi</i> Koren & Danielssen, 1875	Sipuncula	398	15
<i>Golfingia</i> sp.	Sipuncula	149	15
<i>Lumbrineris</i> sp.	Polychaeta	79	15
<i>Paradiopatra quadricuspis</i> (M. Sars in G.O. Sars, 1872)	Polychaeta	157	15
<i>Paramphinome jeffreysi</i> (McIntosh, 1868)	Polychaeta	177	15
Caudofoevata		132	15
<i>Yoldiella lucida</i> (Lovén, 1846)	Bivalvia	144	15
Nemertea		58	14
<i>Onchnesoma squamatum</i> (Koren & Danielssen, 1875)	Sipuncula	52	14
Amphipoda		62	14
<i>Yoldiella nana</i> (M. Sars, 1865)	Bivalvia	45	14
Maldanidae	Polychaeta	114	13
<i>Thyasira ferruginea</i> (Forbes, 1851)	Bivalvia	170	13
<i>Ophiura</i> sp.	Ophiuroidea	77	13
<i>Aglaophamus</i> sp.	Polychaeta	60	12
<i>Chaetozone setosa</i> Malmgren, 1867	Polychaeta	23	12
<i>Prionospio</i> sp.	Polychaeta	37	12
<i>Amaeana trilobata</i> (M. Sars, 1863)	Polychaeta	28	11
<i>Antalis</i> sp.	Scaphopoda	17	11
<i>Thyasira obsoleta</i> (Verrill & Bush, 1898)	Bivalvia	25	10
Cirratulidae	Polychaeta	40	9
<i>Thyasira croulinensis</i> (Jeffreys, 1847)	Bivalvia	22	9
Ampharetidae	Polychaeta	42	8
<i>Myriochele</i> sp.	Polychaeta	15	8
<i>Thyasira granulosa</i> (Monterosato, 1875)	Bivalvia	10	8
<i>Ophiura sarsii</i> Lütken, 1858	Ophiuroidea	12	8

In the comprehensive macrobenthic survey west of the Shetland Islands (CORDAH 1998) species composition and biomass was studied in relation to depth. In the present study samples were taken within the same depth range and water mass. The species frequently found here are all known from west of Shetland survey, however, whereas polychaetes and bivalves dominate the Faorese samples, polychaetes and crustaceans were the most dominant species in the area west of Shetland. The

species in the Faroe samples seem to fit best in the CORDAH Group 1. This group consists of samples from a water depth below 617 m. This is considerably deeper than the Faroe samples which were taken at 317-367 m. The sediment is probably more important as the percent fines are higher in the Faroe samples (34-47% < 50 micr.) than in the other 3 Groups described from west of Shetland, whereas Group 1 has 3.99-69.58% proportion of mud (< 63 micr.).

References

CORDAH 1998. West of Shetland macrobenthic survey: initial interpretative report. Report to Atlantic Frontier Environmental Network. CORDAH, Neyland, Pembrokeshire. Report no. OPRU/02/98. 29pp plus tables, figures and appendices.

Nørrevang, A., T. Brattegard, A.B. Josefson, J.-A. Snøli, O. Tendal, 1994. List of BIOFAR stations. – *Sarsia*, 79: 165-180.

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Figure 4.

Under-water photograph from a soft bottom area at 345 m depth at the western side of the Faroes showing *Virgularia* sp. and brisingid asteroid (BIOFAR Stn. 645: Nørrevang *et al.* 1994). (© photo J. Gutt).