

CRUISE REPORT

R.V. HEINCKE

Cruise No.: HE 168

General subject of research: Physical, chemical, biological and fishery oceanography

Port calls: None

IFM-Department/CAU Institute: Marine Ecology (Fishery Biology) / Institute of Marine Sciences

Chief Scientists: Rudolf Lüthje (leg 1), Justus van Beusekom (leg 2), Christian Möllmann (leg 3)

Number of Scientist: 23

Project: BMBF GLOBEC Germany

This cruise report consists of 17 pages.

Research programme

The cruise was conducted within the framework of GLOBEC Germany “Trophic interactions between zooplankton and fish under the influence of physical processes”. Investigations were carried out in the Central Baltic areas of the Arkona Basin, Stolpe Trench, Gdansk Deep and Bornholm Basin, the latter being the main focus area (Figure 1). Research was performed on all trophic levels incl. phyto-, zoo- and ichthyoplankton as well as pelagic clupeid and gadoid fish.

Major goals were the description of abundance, biomass, production and nutritional condition of phyto-, zoo- and ichthyoplankton. Further emphasis was given on the meso- to small-scale horizontal and vertical distribution of phyto-, zoo- and ichthyoplankton (incl. for the latter two diurnal vertical migration) as well as their main predator fish species herring and sprat. Further, stock structure, gonadal maturation, egg production and survival of sprat and cod was investigated. Concurrently hydrographic measurements were performed and the amount of nutrients in the water column was recorded.

Gears used

<i>Phytoplankton:</i>	Watersampler, Multifluorescence-Probe
<i>Microzooplankton:</i>	Watersampler
<i>Zooplankton:</i>	Apstein-Net (50µm), Babybongo-Net (150µm), Multinet (50µm), WP-2 (200µm), Videoplanktonrecorder (VPR),
<i>Ichthyoplankton:</i>	Bongo-net (335/500mm), Biomoc (335µm)
<i>Fish:</i>	Kombitrawl (308 Meshes)
<i>Hydrography:</i>	CTD

Cruise Report (leg 1: 05.– 11. May 2002)

1) Scientific crew

- Rudolf Lüthje (Chief scientist)	IfM Kiel
- Mohammad-Mukhlis Kamal	IfM Kiel
- Annett Seehagen	IfM Kiel
- Janna Peters	University of Bremen
- Diane Seidel	IHF Hamburg
- Tanja Berg	IHF Hamburg
- Knut Rinas	IfM Hamburg
- Berit Rabe	IfM Hamburg
- Elena Karasiova	AtlantNIRO, Kaliningrad

2) Report of cruise leg 1 with technical details

<i>Sunday 05/05/02:</i>	0800-0930	Loading of equipment at IfM Kiel pier
	1000-1300	Loading of equipment at the Kiel Seafishmarket and installation of VPR winch
	1315	Leaving in direction of Arkona Basin
<i>Monday 06/05/02:</i>	0215	Start with station grid on hydrography/horizontal distribution of phyto-, zoo- and ichthyoplankton in the Arkona Basin (Figure 1)
	1410	End of station grid in the Arkona Basin (number, type and location of samples taken, see Table 1 and Figure 1)
<i>Thursday 09/05/02:</i>	2220	End of station grid on hydrography/horizontal distribution as well as vertical distribution of phyto-, zoo- and ichthyoplankton in the Bornholm Basin; including HELCOM Baltic Monitoring Station K2 (number, type and location of samples taken, see Table 2 and Figure 2)
<i>Friday 10/05/02:</i>	0600	Start with permanent station (grid-station 23) on hydrography/vertical distribution of phyto-, zoo- and ichthyoplankton in the Bornholm Basin
<i>Saturday 11/05/02:</i>	1130	End of permanent station (grid-station 23) on hydrography/vertical distribution of phyto-, zoo- and ichthyoplankton in the Bornholm Basin
	1400	Exchange of scientists in the vicinity of Nexø (Bornholm)

3) Summary of HE 168 cruise leg 1

Cruise leg 1 successfully covered a station grid on hydrography as well as phyto-, zoo- and ichthyoplankton (using a CTD- and Multifluorescence-Probe, Bongo/Babybongo and Apstein-Nets) in the Arkona Basin (Table 1 and Figure 1). In the Bornholm Basin the 45 station grid on hydrography as well as phyto-, zoo- and ichthyoplankton (using a CTD- and Multifluorescence-Probe, Watersampler, Bongo/Babybongo, Multi- and Apstein-Nets) was covered (Table 1 and Figure 2). Thereby various samples on nutrients, phytoplankton, microzooplankton, copepods and sprat larvae were taken for laboratory analyses on growth, condition and biochemical composition (Table 3). Additionally station K2 of the HELCOM Baltic Marine Monitoring Programme was covered with a WP-2 net for comparison with the HELCOM time-series.

5 (2 night, 3 daytime) vertically resolving Biomoc-hauls were conducted on a 24h-permanent station on grid station 23 (using a CTD- and Multifluorescence-Probe, Multinet, Biomoc and Watersampler) (Table 2). 41 samples of about 5 sprat larvae were derived for laboratory analyses on growth and condition.

Cruise Report (leg 2: 11.– 18. May 2002)

1) Scientific crew

- Justus van Beusekom (Chief scientist)	AWI, WMS Sylt
- Annett Seehagen	IfM Kiel
- Janna Peters	University of Bremen
- Frank Hartmann	IHF Hamburg
- Matthias Bernreuther	IHF Hamburg
- Gernot Kurtz	IHF Hamburg
- Elena Karasiova	AtlantNIRO Kaliningrad

2) Report of cruise leg 2 with technical details

Saturday 11/05/02: 2020 Start with station grid on hydrography/horizontal distribution of phyto-, zoo- and ichthyoplankton in the Stolpe Trench and Gdansk Deep (Figure 4)

Sunday 12/05/02: 0845 Interruption of grid sampling
1045 Start with permanent station (grid-station 63) on hydrography/vertical distribution of phyto-, zoo- and ichthyoplankton in the Gdansk Deep
2000 End of permanent station (grid-station 63) on hydrography/vertical distribution of phyto-, zoo- and ichthyoplankton in the Gdansk Deep
2100 Continuation of station grid on hydrography/horizontal distribution of phyto-, zoo- and ichthyoplankton in the Stolpe Trench and Gdansk Deep (Figure 4)

Monday 13/05/02: 1810 End of station grid on hydrography/horizontal distribution as well as vertical distribution of phyto-, zoo- and ichthyoplankton in the Stolpe Trench and Gdansk Deep
1930 Start of second station grid on hydrography/horizontal distribution as well as vertical distribution of phyto-, zoo- and ichthyoplankton in the Bornholm Basin (Figure 3)

Thursday 16/05/02: 0130 Interruption of grid sampling
0600 Parallel working with RV Walther Herwig III to investigate the small-scale distribution of zoo-/ and ichthyoplankton as well as adult fish in relation to hydrographic features on a transect from 55°45 N / 16° 15 E to 55°22,5 N / 16°00 E.

2140 End of parallel working with RV Walther Herwig III
2300 Continuation of second station grid on hydrography/horizontal distribution as well as vertical distribution of phyto-, zoo- and ichthyoplankton in the Bornholm Basin (Figure 3)

Friday 17/05/02: 1730 End of second station grid in the Bornholm Basin

Saturday 18/05/02: 0800 Exchange of scientist in the vicinity of Nexø (Bornholm)

3) Summary of HE 168 cruise leg 2

Cruise leg 2 successfully covered a station grid on hydrography as well as phyto-, zoo- and ichthyoplankton (using a CTD- and Multifluorescence-Probe, Bongo/Babybongo and Apstein-Nets) in the Stolpe Trench and the Gdansk Deep (Table 1 and Figure 1). In the Bornholm Basin the 45 station grid on hydrography as well as phyto-, zoo- and ichthyoplankton (using a CTD- and Multifluorescence-Probe, Watersampler, Bongo/Babybongo, Apstein-Nets) was covered (Table 1 and Figure 2). Thereby various samples on nutrients, phytoplankton, microzooplankton, copepods and sprat larvae were taken for laboratory analyses on growth, condition and biochemical composition (Table 3).

2 daytime vertically resolving Biomoc-hauls were conducted on a permanent station on grid station 63 with additional casts of the CTD- and Multifluorescence-Probe, Multinet and Watersampler) (Table 2).

41 samples of about 5 sprat larvae were derived for laboratory analyses on growth and condition.

In concert with RV Walther Herwig III the small-scale distribution of zoo-/ and ichthyoplankton as well as adult fish in relation to hydrographic features was investigated on a transect from 55°45 N / 16° 15 E to 55°22,5 N / 16°00 E. Thereby 12 stations with CTD/ Multifluorescence-Probe, Multinet and Bongo/Babybongo-Nets were sampled.

Additional Apstein-Nets were conducted irregularly for estimation of copepod mortality (Table 4).

Cruise Report (leg 3: 18.– 25. May 2002)

1) Scientific crew

- Christian Möllmann (Chief scientist)	IfM Kiel
- Cordula Schmitz	IfM Kiel (18. – 21.05.)
- Anett Seehagen	IfM Kiel (18. – 21.05.)
- Jörn Schmidt	IfM Kiel
- Janna Peters	University of Bremen
- Matthias Bernreuther	IHF Hamburg (18. – 21.05.)
- Frank Hartmann	IHF Hamburg (18. – 21.05.)
- Anne Sell	IHF Hamburg (21. – 25.05.)
- Jens-Peter Herrmann	IHF Hamburg (21. – 25.05.)
- Axel Temming	IHF Hamburg (21. – 25.05.)
- Jens Flöter	IHF Hamburg (21. – 25.05.)
- Andrea Lübben	IfM Hamburg (18. – 21.05.)
- Elena Karasiova	AtlantNIRO, Kaliningrad
- Cabel Davis	Woods Hole Institution (21. – 25.05.)
- Scott Gallagher	Woods Hole Institution (21. – 25.05.)

2) Report of cruise leg 3 with technical details

<i>Saturday 18/05/02:</i>	0950	Start with benthopelagic fishery; 5 hauls (on grid stations 31, 30, 29, 35 and 39)
	1900	End of fishery part 1
	2400	Apstein-Net on grid station 23 for copepod mortality estimation
<i>Sunday 19/05/02:</i>	0600	Start with benthopelagic fishery; 5 hauls (on grid stations 23, 24, 25, 15 and 16)
	1900	End of fishery part 2
	2400	Apstein-Net on grid station 23 for copepod mortality estimation
<i>Monday 20/05/02:</i>	0600	Start with benthopelagic fishery; 5 hauls (on grid stations 22, 17, 18, 34 and 40)
	1900	End of fishery part 3
	2400	Apstein-Net on grid station 23 for copepod mortality estimation
<i>Tuesday 21/05/02:</i>	1030	Entering port of Rønne (Bornholm)

Exchange of scientists and installation of VPR

Wednesday 22/05/02: 1800 Leaving port of Rønne in direction of Bornholm Basin

Thursday 23/05/02: 0130 Start with monitoring small-scale distribution of zooplankton with the VPR
1200 CTD/Watersampler and WP-2 casts to catch *Pseudocalanus* females for egg production
1330 Continuation of monitoring small-scale distribution of zooplankton with the VPR

Friday 24/05/02: 0900 End of station work and leaving direction of Kiel

Saturday 25/05/02: XXXX Unload equipment at Kiel Seafishmarket
XXXX Entering IfM Kiel Pier

3) Summary of HE 168 cruise leg 3

15 benthopelagic fishery trawl hauls allowing for a horizontal coverage of the Basin (Figure 5). Length and weight distributions of herring and sprat were recorded as well as maturation stages on every fishery station. 837 herring and 1980 sprat stomach contents for feeding investigations were sampled. Additionally herring and sprat were frozen for bioenergetic analyses on every station. From 114 cod length and weight (full, cut, liver, gonads) measurements were performed, maturation stages recorded and otoliths collected. 5 cod were frozen for bioenergetic analyses and 31 female ovary samples for histological analyses were taken.

Apstein-Nets were conducted irregularly for estimation of copepod mortality (Table 4)

The VPR could be successfully installed and the small-scale spatial variability of zooplankton was recorded.

TABLES

Table 1. Number, type and location of samples taken on station grids.

Basin	Date	Type	Number
Arkona	06/05/02	CTD/Fluor.	7
		Bongo/Babybongo	4
		Apstein-Net	4
Bornholm	06/05/02 – 09/05/02	CTD/Fluor.	45
		Bongo/Babybongo	45
		Apstein-Net	27
		Multinet	9*
		Watersampler	9
		WP-2	1
Stolpe Trench	11/05/02 & 13/05/02	CTD/Fluor.	9
		Bongo/Babybongo	2
		Apstein-Net	2
		WP-2	1
Gdansk	12/05/02 – 13/05/02	CTD/Fluor.	10
		Bongo/Babybongo	7
		Apstein-Net	3
		WP-2	7
Bornholm	13/05/02 – 17/05/02	CTD/Fluor.	45
		Bongo/Babybongo	45
		Apstein-Net	28
		Watersampler	9

* Double hauls covering the water column in 10m-steps

Table 2. Number, type and location of samples taken on permanent stations for vertically resolving sampling.

Basin	Grid station	Date	Type	Number
Bornholm	23	10/05 – 11/05/02	CTD/Fluor.	3
			Biomoc	5**
			Multinet	3*
			Watersampler	2
Gdansk Deep	63	12/05	CTD/Fluor.	1
			Multinet	6*
			Watersampler	1
			Biomoc	2**

* Double hauls covering the water column in 10m-steps

** Double hauls covering the water column in 5m-steps

Table 3a. Number and type of samples for laboratory analysis derived on station grid 1 in the Bornholm Basin (06/05/02 – 09/05/02).

	RNA/DNA-Analysis	Biochemical-Analysis (Lipids, Proteins)	Others
Nutrients	-	-	90 (from 9 Watersamplings)
Phytoplankton	-	54 Filters (from 14 Watersamplings)	45 in Lugol (from 9 Watersamplings)
Microzooplankton	-	-	
Copepods	-	93** (from 5 Stations)	-
Spratlarvae	78* (from 26 Bongo hauls)	20*** (from 7 Bongo hauls)	-

* samples of about 5 larvae

** samples of about 20 copepods

***samples of about 10 larvae

Table 3b. Number and type of samples for laboratory analysis derived on station grid 2 in the Bornholm Basin (13/05/02 – 17/05/02).

	RNA/DNA-Analysis	Biochemical-Analysis (Lipids, Proteins)	Others
Nutrients	-	-	
Phytoplankton	-		
Microzooplankton	-	-	
Copepods	-	109** (from 7 Stations)	-
Spratlarvae		32*** (from 8 Bongo hauls)	-

* samples of about 5 larvae

** samples of about 20 copepods

***samples of about 10 larvae

Table 3c. Number and type of samples for laboratory analysis derived on station grid in the Stolpe Trench and Gdansk Deep (11/05/02 – 13/05/02).

	RNA/DNA-Analysis	Biochemical-Analysis (Lipids, Proteins)	Others
Nutrients	-	-	90 (from 9 Watersamplings)
Phytoplankton	-	54 Filters (from 14 Watersamplings)	45 in Lugol (from 9 Watersamplings)
Microzooplankton	-	-	
Copepods	-	78** (from 9 Stations)	-
Spratlarvae	78* (from 26 Bongo hauls)	51*** (from 13 Bongo hauls)	-

* samples of about 5 larvae

** samples of about 20 copepods

***samples of about 10 larvae

Table 3b. Number of sprat larvae for laboratory analysis from Biomoc-sampling in the Bornholm Basin (10/05/02)

Profile-No.	No. of larvae
D1	14
D2	37
D3	4
N1	13
N2	15

D - daytime hauls

N – night hauls

Table 4. Extra sampling with Apstein-Net for mortality estimations on grid station 23.

No.	Station	Date	Time
1	358/23	06/04/02	1847-1901
2	375/D23	08/04/02	0630-0649
3	387/23	09/04/02	1911-1932
4	410/23	11/04/02	0141-0205
5	413/23	11/04/02	1009-1030
6	421/23	12/04/02	0046-0105
7	429/23	13/04/02	0225-0245
8	429/23	13/04/02	0801-0821
9	429/23	13/04/02	1344-1404
10	439/23	14/04/02	0120-0141
11	455/23	15/04/02	0221-0241

FIGURES
Arkonabecken
HE 168

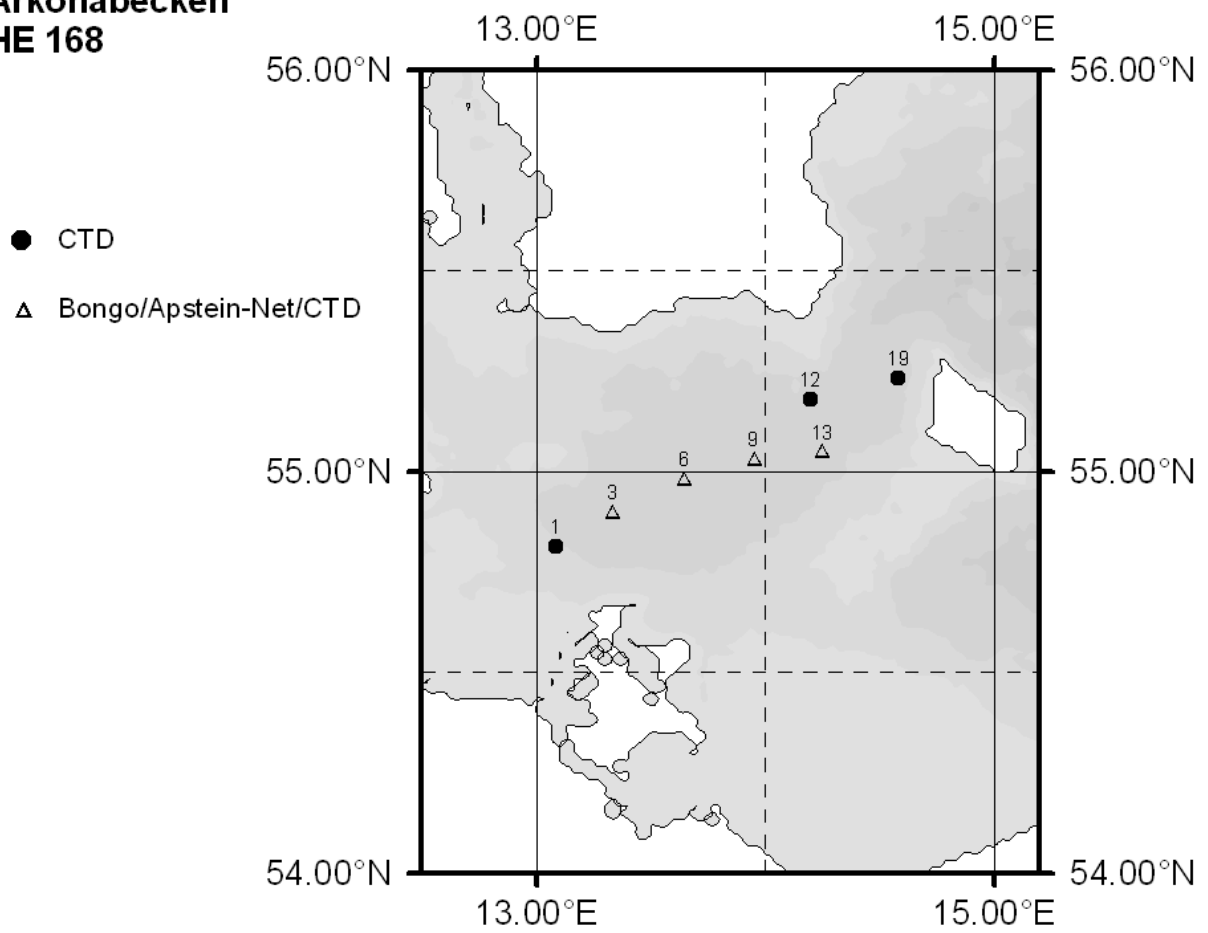


Figure 1. Sampling stations and types in the Arkona Basin 06/05/02.

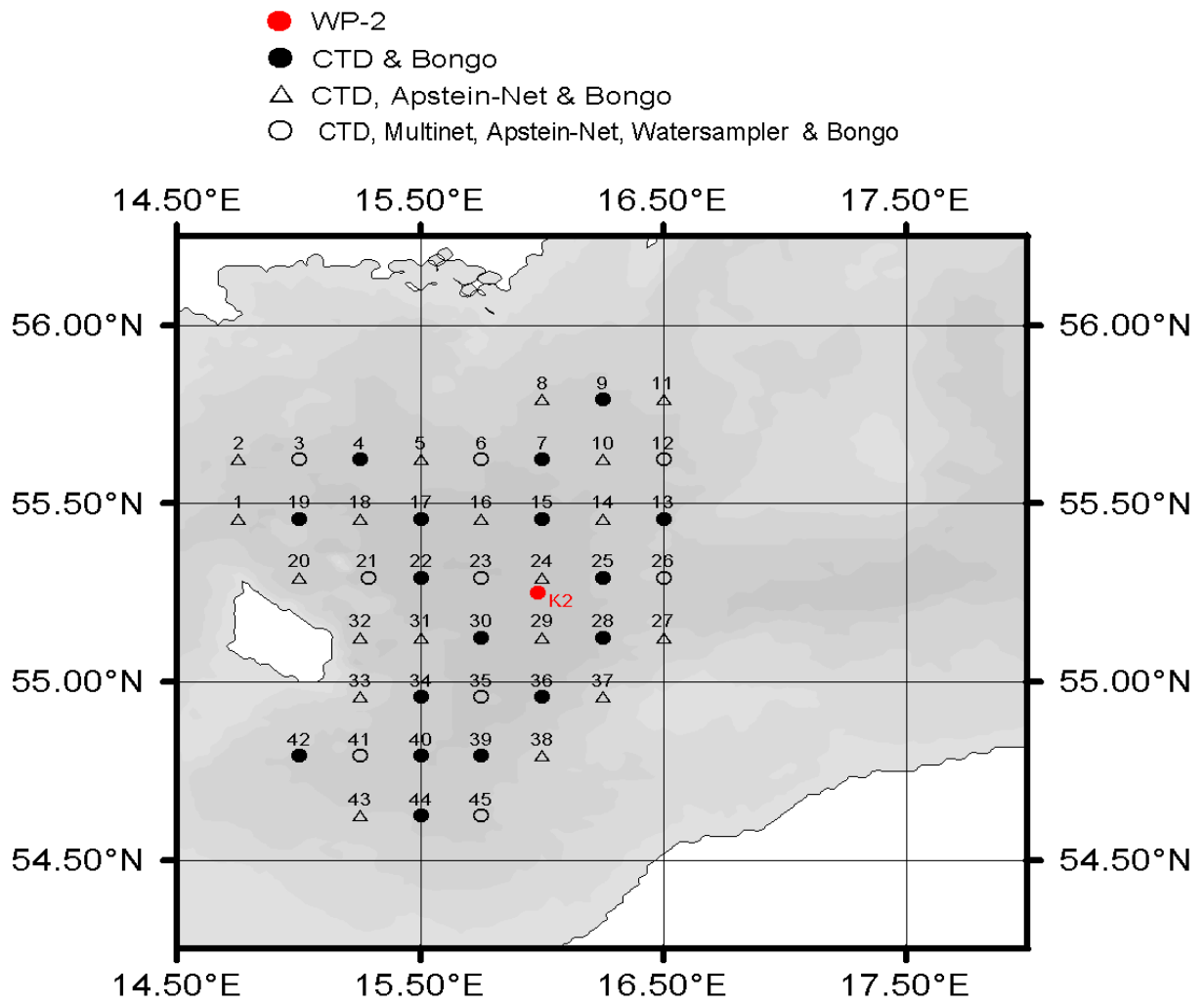


Figure 2. Sampling stations and types in the Bornholm Basin 06/05/02 – 09/05/02.

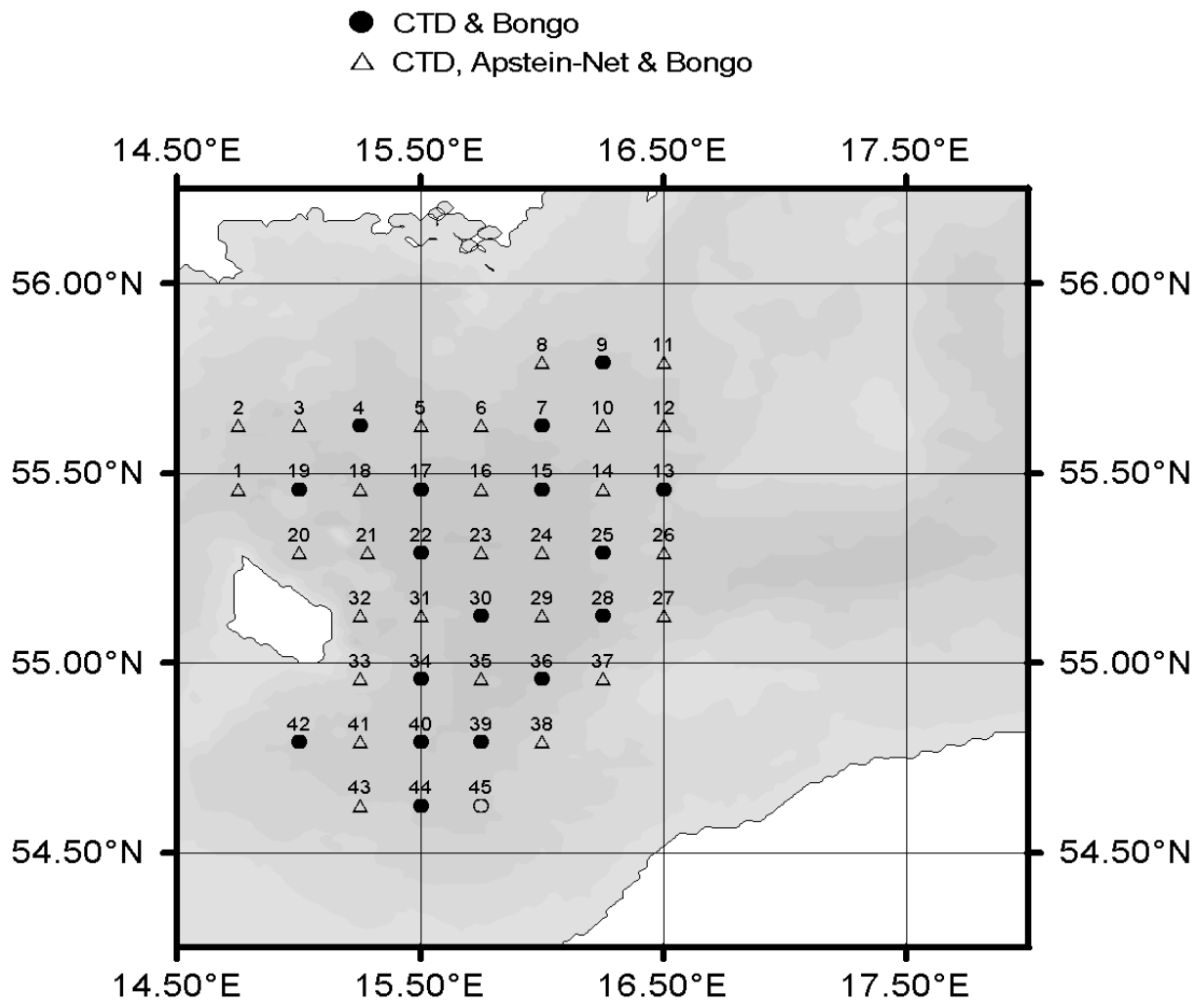


Figure 3. Sampling stations and types in the Bornholm Basin 13/05/02 – 17/05/02.

HE 168 Danziger Tief & Stolper Rinne (CTD, Bongo, Apstein)

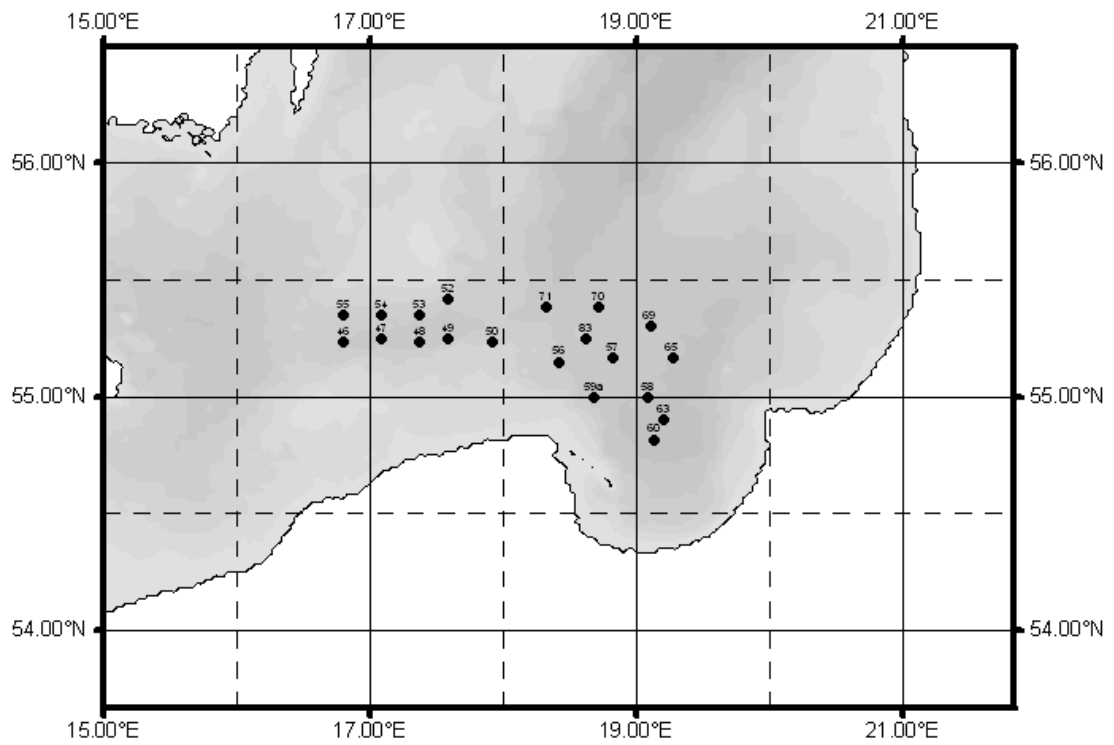


Figure 4. Sampling stations and types in the Gdansk Deep and Gotland Basin 11/05/02 – 13/05/02.

Fishery stations HE 168

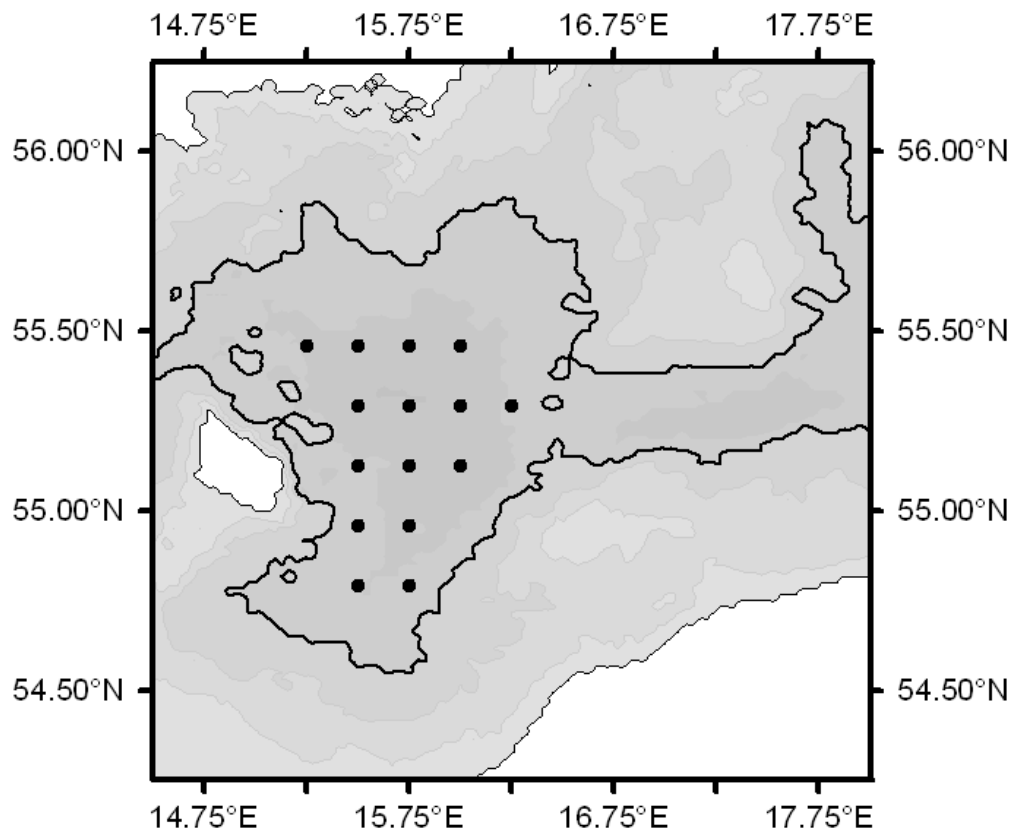


Figure 5. Fishing stations in the Bornholm Basin.