

Cruise Report RV ALKOR Cruise 453

29.03.2015 – 10.04.2015

BONUS-INSPIRE

Background of cruise:

This research cruise was part of the BONUS funded project „INSPIRE“. Focus of the cruise was to resolve the impact of the current major inflow of high saline and oxygen rich North Sea water on the hydrography and biology of the Baltic Sea with a special emphasis on the deep basins (i.e. Bornholm Basin).

Another important aspect of this cruise was to obtain information of the planktonic prey fields of larval and adult life stages of cod and sprat in the different basins of the Baltic Sea. The different scales of plankton and fish distribution patterns will be resolved by using traditional sampling methods (e.g. nets) as well as modern techniques like the Video Plankton Recorder (VPR), an underwater imaging system, and a high speed tow body (TRIAXUS) equipped with different sensors. VPR images will be used to parametrize small scale prey fields in consumption models. In the second leg of the cruise a process oriented study was conducted over a period of 48h to obtain behavioral and trophodynamic predator prey interactions with a focus on the vertical plane in the Bornholm Basin.

Furthermore, this cruise will have an educational background and will give students of the University Hamburg / IHF the opportunity to learn standardized fishery and oceanographic sampling techniques on board of a research vessel.

Preliminary remark:

All scientific work and sampling were restricted to the area of the Bornholm Basin due to bad weather conditions (strong wind)

Cruise participants 1. Leg 29.03. - 06.04.2015:

- | | | |
|----|-----------------|-----------------------------|
| 1. | Klas Ove Möller | IHF Hamburg (Cruise leader) |
| 2. | André Eckhardt | IHF Hamburg |
| 3. | Tim Dudeck | IHF Hamburg |
| 4. | Dominik Gloe | IHF Hamburg |

5.	Silke Janßen	IHF Hamburg
6.	Jan Niemax	IHF Hamburg
7.	Kristin Hänselmann	IHF Hamburg
8.	Heike Schwermer	IHF Hamburg
9.	Nicole Smialek	IHF Hamburg
10.	Saskia Otto	IHF Hamburg

Cruise participants 2. Leg 06.04. - 10.04.2015:

1.	Klas Ove Möller	IHF Hamburg (Cruise leader)
2.	André Eckhardt	IHF Hamburg
3.	Tim Dudeck	IHF Hamburg
4.	Dominik Gloe	IHF Hamburg
5.	Silke Janßen	IHF Hamburg
6.	Jan Niemax	IHF Hamburg
7.	Kristin Hänselmann	IHF Hamburg
8.	Heike Schwermer	IHF Hamburg
9.	Nicole Smialek	IHF Hamburg
10.	Christian Möllmann	IHF Hamburg
11.	Stefan Neuenfeldt	DTU-Aqua Dänemark

Cruise narrative:

29.03.2015 Leaving port of Saßnitz and sailing towards Bornholm Basin. A first test station was performed on the way south-west of the Basin. Deployment of CTD, Bongo and Multi-opening-closing net (MSN). Afterwards continue track towards Bornholm Basin.

30.03.2015 No scientific work or sampling gear deployments possible due to strong wind. Weathering the storm in the shelter of the island of Bornholm.

31.03.2015 Begin of scientific work with a net station (CTD and Bongo) in the shelter of the island of Bornholm (easterly). Afterwards, begin of hydroacoustic transect steaming towards east into the deep parts of the Bornholm Basin and deployment of the young fish trawl (JFT). No sampling net deployments were possible outside the shelter of the island due to increasing wind speeds and swell. The west-east transect was continued with a CTD sampling chain along the Globec Germany station grid (see Annex) until the afternoon to obtain information on the hydrographic conditions in the Bornholm basin. In the late afternoon, even deployments of the CTD were not possible due to increasing wind.

01.04.2015 Due to improved weather conditions the CTD sampling chain along the west-east transect could be finalized. This continuously CTD sampling along the transect allowed resolving the hydrographic situation of the inflow in the deep basin with improved oxygen conditions and an increase in salinity (see figure). Further improved weather conditions in the afternoon allowed a hydroacoustic transect from east to west through the Bornholm Basin and two deployments of the fish net (JFT) as well as CTD and Bongo.

02.04.2015 Continued hydroacoustic transect to resolve the spatial distribution of fish throughout the Bornholm Basin under stable weather conditions with three more JFT hauls as well as Bongo and CTD.

03.04.2015 Hydroacoustic transect from east to west into the basin followed by a fishery haul (JFT, Bongo, CTD). Afterwards a net station was performed on station 23 in the deep basin. Deployment of CTD/water sampler, Apstein net, WP-2 net as well as MSN to collect phyto- and zooplankton samples for project partners from the Institute for Baltic Sea research (IOW) in Warnemünde. This samples are used to support the yearly plankton abundance time series. Afterwards, the hydroacoustic transect was continued towards west and the starting point of the TRIAXUS / VPR transect planned for the following day.

04.04.2015 Begin of sampling the small scale hydrographic, plankton and fish distribution in the Bornholm Basin using the TRIAXUS / VPR, a high-speed towbody with a suite of different sensors and a camera system for imaging plankton. In total 6 deployments along the hydroacoustic transect which was sampled the previous day. In the evening sailing to the starting point of the next day.

05.04.2015 Continued sampling the hydrographic, plankton and fish distribution with the TRIAXUS along a North-South transect throughout the whole basin. Afterwards sailing towards the port of Rønne / Bornholm for an exchange of crew members.

06.04.2015 In the morning arriving in Rønne. Crew exchange and leaving port again in the evening. Sailing towards the central basin station BB23 of the Globec grid where the 48h station will be conducted.

07.04.2015 Begin of the 48h permanent station in the morning. Small-scale sampling around station BB23 in the deep basin. This permanent station was performed to sample the vertical distribution patterns of plankton and fish populations as well as obtain information on potential behavioral patterns (diurnal vertical migration and predator prey interactions) over the course of the day. Sprat was the dominant fish species during our sampling campaign and performs a pronounced diurnal vertical migration and hence our focus was to sample in the evening and morning (during

dusk and dawn). In total 4 CTD and Bongo hauls, 2 fish net deployments and 3 MSN hauls were performed. The TRIAXUS / VPR could not be deployed due to increasing wind and swell.

08.04.2015 Continued the 48h permanent station sampling with CTD (2 hauls), Bongo (2 hauls), MSN (3 hauls), JFT (2 hauls) and a long TRIAXUS deployment covering the whole dawn period.

09.04.2015 End of 48h permanent station with one haul of each instrument (CTD, Bongo, JFT). Sailing towards the port of Kiel after noon.

10.04.2015 Arriving in Kiel and unload equipment from RV Alkor.

Preliminary results:

All sampled data are integrated into the GLOBAN database which was developed during the Globec Germany project. The data integration was already performed on board RV Alkor during the cruise and consolidated shortly afterwards. A map with the Globec station grid and the transects sampled is attached to this report. Additionally, a copy of the stationbook containing all the instrument deployments can be found in the annex as well as a figure showing the oxygen and salinity conditions after the inflow event along a transect through the Bornholm Basin.

Due to the unfavourable weather conditions during our cruise campaign not all planned sampling stations could be conducted and the scientific program had to be shortened. The scientific program was restricted to the area of the Bornholm Basin to obtain complete information of the current inflow effects at least for one Baltic basin. Although some of the stations could not be sampled the cruise results were sufficient to target our goals successfully.

As in previous years, sprat was the dominant fish species in the Bornholm Basin during this time of the year. Additionally, young and small cod were abundant. The plankton distribution and abundance showed due to the inflow of high saline and oxygenated North Sea water pronounced changes in the vertical abundance, especially in the deep basin. The depth of the thermo-haline-cline has lowered approximately 20m, compared to stagnation periods. Diurnal behavioral patterns and predator-prey interactions as well as stomach content analysis of fish to obtain information on the diurnal consumption are currently analysed. The stomach content data will afterwards be integrated into consumption models. However, preliminary results point to the fact that sprat have surprisingly high stomach contents during the beginning of dusk when they migrate into the deeper layers of the basin. Potentially, sprat are feeding most effective in very high prey concentrations (patches), in the depth of the halocline. These high prey patches can not be resolved with traditional sampling methods. Furthermore, preliminary VPR results show very high abundances of marine snow particles, also not quantifiable by net sampling, which might contribute as a prey source for fish and plankton in the deep layers of the basin.

Stationsbuch AL453 Geräteeinsatz

29.03.15	16:05	45,3	CTD	CTD	in water
29.03.15	16:10	45,0	CTD	CTD	on deck
29.03.15	16:16	45,4	Bongo net	BONGO	in water
29.03.15	16:23	44,8	Bongo net	BONGO	on deck
				GESCHL.	
29.03.15	16:37	44,8	Towed MSN	MSN	in water
				GESCHL.	
29.03.15	16:44	44,4	Towed MSN	MSN	on deck
31.03.15	05:58	45,9	Bongo net	BONGO	in water
31.03.15	06:03	45,1	Bongo net	BONGO	on deck
31.03.15	06:07	45,3	CTD	CTD	in water
31.03.15	06:12	45,2	CTD	CTD	on deck
31.03.15	07:02	72,9	CTD	CTD	in water
31.03.15	07:07	72,0	CTD	CTD	on deck
31.03.15	07:10	72,9	Bongo net	BONGO	in water
31.03.15	07:16	72,3	Bongo net	BONGO	on deck
31.03.15	07:28	72,2	Fish trawl	JFT	in water
31.03.15	07:42	72,5	Fish trawl	JFT	Fishing
31.03.15	08:13	74,8	Fish trawl	JFT	Hieven
31.03.15	08:24	75,0	Fish trawl	JFT	on deck
31.03.15	10:00	97,0	CTD	CTD	in water
31.03.15	10:07	97,5	CTD	CTD	on deck
31.03.15	11:08	96,3	CTD	CTD	in water
31.03.15	11:14	94,5	CTD	CTD	on deck
31.03.15	12:25	83,8	CTD	CTD	in water
31.03.15	12:30	82,8	CTD	CTD	on deck
31.03.15	13:46	74,1	CTD	CTD	in water
31.03.15	13:52	74,0	CTD	CTD	on deck
31.03.15	15:17	58,9	CTD	CTD	in water
31.03.15	15:21	57,9	CTD	CTD	on deck
01.04.15	08:14	76,6	CTD	CTD	in water
01.04.15	08:20	77,0	CTD	CTD	on deck
01.04.15	09:32	93,2	CTD	CTD	in water
01.04.15	09:38	93,2	CTD	CTD	on deck
01.04.15	10:42	97,8	CTD	CTD	in water
01.04.15	10:49	98,2	CTD	CTD	on deck
01.04.15	10:52	98,4	Bongo net	BONGO	in water
01.04.15	11:09	98,2	Bongo net	BONGO	on deck
01.04.15	11:13	97,8	Fish trawl	JFT	in water
01.04.15	11:24	97,3	Fish trawl	JFT	Fishing
01.04.15	11:54	96,4	Fish trawl	JFT	Hieven
01.04.15	12:02	95,9	Fish trawl	JFT	on deck
01.04.15	13:52	89,4	Bongo net	BONGO	in water
01.04.15	14:06	90,2	Bongo net	BONGO	on deck

01.04.15	14:09	91,1	CTD	CTD	in water
01.04.15	14:15	90,8	CTD	CTD	on deck
01.04.15	14:19	92,4	Fish trawl	JFT	in water
01.04.15	14:29	91,1	Fish trawl	JFT	Fishing
01.04.15	14:59	91,8	Fish trawl	JFT	Hieven
01.04.15	15:10	94,4	Fish trawl	JFT	on deck
02.04.15	06:01	70,7	CTD	CTD	in water
02.04.15	06:07	70,6	CTD	CTD	on deck
02.04.15	06:12	70,4	Bongo net	BONGO	in water
02.04.15	06:18	68,5	Bongo net	BONGO	on deck
02.04.15	06:25	68,4	Fish trawl	JFT	in water
02.04.15	06:43	70,6	Fish trawl	JFT	Fishing
02.04.15	07:13	71,3	Fish trawl	JFT	Hieven
02.04.15	07:30	70,8	Fish trawl	JFT	on deck
02.04.15	09:58	99,1	Bongo net	BONGO	in water
02.04.15	10:13	95,8	Bongo net	BONGO	on deck
02.04.15	10:17	101,9	CTD	CTD	in water
02.04.15	10:24	94,7	CTD	CTD	on deck
02.04.15	10:26	98,6	Fish trawl	JFT	in water
02.04.15	10:41	95,0	Fish trawl	JFT	Fishing
02.04.15	11:13	95,4	Fish trawl	JFT	Hieven
02.04.15	11:24	95,5	Fish trawl	JFT	on deck
02.04.15	13:48	77,4	CTD	CTD	in water
02.04.15	13:54	75,9	CTD	CTD	on deck
02.04.15	13:58	74,8	Bongo net	BONGO	in water
02.04.15	14:09	77,7	Bongo net	BONGO	on deck
02.04.15	14:13	77,0	Fish trawl	JFT	in water
02.04.15	14:26	75,1	Fish trawl	JFT	Fishing
02.04.15	14:55	78,6	Fish trawl	JFT	Hieven
02.04.15	15:05	76,6	Fish trawl	JFT	on deck
03.04.15	05:57	72,9	Bongo net	BONGO	in water
03.04.15	06:07	73,2	Bongo net	BONGO	on deck
03.04.15	06:16	73,1	CTD	CTD	on deck
03.04.15	06:53	75,4	Fish trawl	JFT	in water
03.04.15	07:00	74,1	Fish trawl	JFT	Fishing
03.04.15	07:30	72,5	Fish trawl	JFT	Hieven
03.04.15	07:46	72,7	Fish trawl	JFT	on deck
03.04.15	11:05	101,9	CTD/rosette water sampler	CTD/RO	in water
03.04.15	11:18	102,0	CTD/rosette water sampler	CTD/RO	on deck
03.04.15	11:39	95,9	CTD/rosette water sampler	CTD/RO	in water
03.04.15	12:00	96,1	CTD/rosette water sampler	CTD/RO	on deck
03.04.15	12:05	99,0	Apstein net	APSN	in water
03.04.15	12:23	100,1	Apstein net	APSN	on deck
03.04.15	12:25	99,7	Apstein net	APSN	in water
03.04.15	12:44	96,0	Apstein net	APSN	on deck
03.04.15	12:50	96,0	Apstein net	APSN	in water
03.04.15	13:08	100,6	Apstein net	APSN	on deck

03.04.15	13:12	101,2	WP 2	WP 2	in water
03.04.15	13:28	96,0	WP 2	WP 2	on deck
03.04.15	13:32	99,9	WP 2	WP 2	in water
03.04.15	13:48	102,9	WP 2	WP 2	on deck
03.04.15	13:53	95,9	WP 2	WP 2	in water
03.04.15	14:09	101,7	WP 2	WP 2	on deck
03.04.15	14:13	99,5	WP 2	WP 2	in water
03.04.15	14:32	96,0	WP 2	WP 2	on deck
				GESCHL.	
03.04.15	14:40	101,9	Towed MSN	MSN	in water
				GESCHL.	
03.04.15	14:53	96,1	Towed MSN	MSN	on deck
04.04.15	07:12	71,3	Triaxus	TRI-X	in water
04.04.15	12:23	88,2	Triaxus	TRI-X	on deck
04.04.15	13:08	91,5	Triaxus	TRI-X	in water
04.04.15	13:29	92,0	Triaxus	TRI-X	on deck
04.04.15	15:33	92,2	Triaxus	TRI-X	in water
04.04.15	15:39	91,7	Triaxus	TRI-X	on deck
04.04.15	17:19	91,7	Triaxus	TRI-X	in water
04.04.15	17:28	91,5	Triaxus	TRI-X	on deck
04.04.15	18:16	92,2	Triaxus	TRI-X	in water
04.04.15	18:55	92,0	Triaxus	TRI-X	on deck
05.04.15	05:50	68,9	Triaxus	TRI-X	in water
05.04.15	20:07	93,6	Triaxus	TRI-X	on deck
07.04.15	06:57	90,2	CTD	CTD	in water
07.04.15	07:03	87,8	CTD	CTD	on deck
07.04.15	07:07	88,3	Bongo net	BONGO	in water
07.04.15	07:19	89,1	Bongo net	BONGO	on deck
07.04.15	07:25	89,2	Multischlieflnetz	MSN	in water
07.04.15	07:38	90,9	Multischlieflnetz	MSN	on deck
07.04.15	07:54	89,4	Fish trawl	JFT	in water
07.04.15	08:11	90,4	Fish trawl	JFT	Fishing
07.04.15	08:41	91,3	Fish trawl	JFT	Hieven
07.04.15	08:54	93,3	Fish trawl	JFT	on deck
07.04.15	12:13	89,5	Bongo net	BONGO	in water
07.04.15	12:28	91,7	Bongo net	BONGO	on deck
07.04.15	12:31	90,8	CTD	CTD	in water
07.04.15	12:38	91,7	CTD	CTD	on deck
07.04.15	14:47	89,2	CTD	CTD	in water
07.04.15	14:53	88,3	CTD	CTD	on deck
07.04.15	14:57	89,3	Bongo net	BONGO	in water
07.04.15	15:08	89,5	Bongo net	BONGO	on deck
				GESCHL.	
07.04.15	15:13	91,2	Towed MSN	MSN	in water
				GESCHL.	
07.04.15	15:16	89,0	Towed MSN	MSN	on deck
07.04.15	15:45	89,0	Fish trawl	JFT	in water

07.04.15	15:56	89,1	Fish trawl	JFT	Fishing
07.04.15	16:26	90,2	Fish trawl	JFT	Hieven
07.04.15	16:41	91,0	Fish trawl	JFT	on deck
07.04.15	18:52	89,2	Bongo net	BONGO	in water
07.04.15	19:04	88,6	Bongo net	BONGO	on deck
07.04.15	19:07	89,2	Multischlieflnetz	MSN	in water
07.04.15	19:24	89,9	Multischlieflnetz	MSN	on deck
07.04.15	19:29	90,4	CTD	CTD	in water
07.04.15	19:38	90,2	CTD	CTD	on deck
				GESCHL.	
07.04.15	22:00	95,1	Towed MSN	MSN	in water
				GESCHL.	
07.04.15	22:14	94,2	Towed MSN	MSN	on deck
				GESCHL.	
08.04.15	03:32	94,5	Towed MSN	MSN	in water
				GESCHL.	
08.04.15	03:46	93,2	Towed MSN	MSN	on deck
08.04.15	06:06	88,5	Bongo net	BONGO	in water
08.04.15	06:19	89,1	Bongo net	BONGO	on deck
08.04.15	06:23	88,9	CTD	CTD	in water
08.04.15	06:30	91,1	CTD	CTD	on deck
08.04.15	06:35	89,2	Fish trawl	JFT	in water
08.04.15	06:49	89,9	Fish trawl	JFT	Fishing
08.04.15	07:19	91,4	Fish trawl	JFT	Hieven
08.04.15	07:33	91,6	Fish trawl	JFT	on deck
08.04.15	08:09	87,1	Triaxus	TRI-X	in water
08.04.15	14:15	89,2	Triaxus	TRI-X	on deck
08.04.15	14:40	90,6	CTD	CTD	in water
08.04.15	14:47	88,9	CTD	CTD	on deck
08.04.15	14:50	88,8	Bongo net	BONGO	in water
08.04.15	15:06	88,0	Bongo net	BONGO	on deck
				GESCHL.	
08.04.15	15:09	87,9	Towed MSN	MSN	in water
				GESCHL.	
08.04.15	15:25	87,0	Towed MSN	MSN	on deck
08.04.15	15:29	86,9	Fish trawl	JFT	in water
08.04.15	15:46	86,0	Fish trawl	JFT	Fishing
08.04.15	16:16	84,4	Fish trawl	JFT	Hieven
08.04.15	16:30	83,9	Fish trawl	JFT	on deck
08.04.15	17:13	86,0	Triaxus	TRI-X	in water
08.04.15	21:20	91,8	Triaxus	TRI-X	on deck
				GESCHL.	
08.04.15	21:58	90,7	Towed MSN	MSN	in water
				GESCHL.	
08.04.15	22:11	90,4	Towed MSN	MSN	on deck
				GESCHL.	
09.04.15	04:03	97,2	Towed MSN	MSN	in water
09.04.15	04:16	95,2	Towed MSN	GESCHL.	on deck

				MSN	
09.04.15	05:56	88,4	Bongo net	BONGO	in water
09.04.15	06:08	90,1	Bongo net	BONGO	on deck
09.04.15	06:11	88,8	CTD	CTD	in water
09.04.15	06:18	88,9	CTD	CTD	on deck
09.04.15	06:31	88,8	Fish trawl	JFT	in water
09.04.15	06:41	89,4	Fish trawl	JFT	Fishing
09.04.15	07:10	90,7	Fish trawl	JFT	Hieven
09.04.15	07:25	91,1	Fish trawl	JFT	on deck

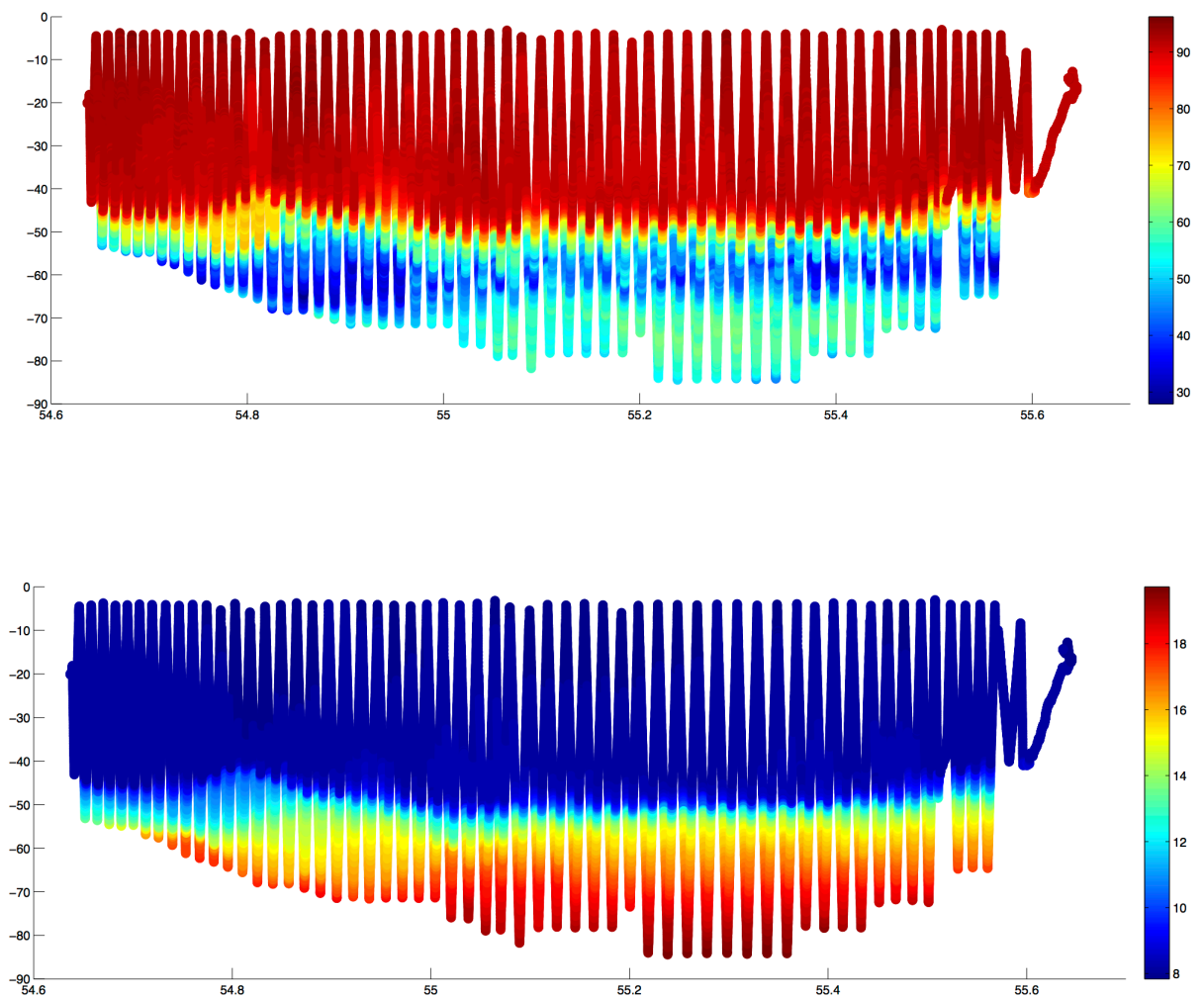


Fig.1: Vertical profile (color coded) of oxygen saturation (%) (upper panel) and salinity (lower panel) along a north-south transect through the Bornholm Basin with the TRIAXUS/VPR.

Annex 1: Alkor 453 29.03. - 10.04.2015

Stations, Transects and Area of small-scale study in the Bornholm Basin

