FS Alkor AL-465
(10.10. - 23.10.2015)

Cruise Report / Fahrtbericht

Vom Sediment zum Topp-Prädator – Einfluss von Eigenschaften des Meeresbodens auf Benthos und benthivore Vögel
Teilprojekt STopP-See

BMBF-funding, grant no: 03F0672B

Institut für Geowissenschaften
Sedimentologie, Küsten- und Schelfgeologie

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1. Objective of the cruise

The cruise was carried out in the frame of the BMBF-funded KÜNO-Project STopP (Vom Sediment zum Topp-Prädator – Einfluss von Eigenschaften des Meeresbodens auf Benthos und benthivore Vögel). The objective of this cruise was to collect high resolution data of the geological structure and physical properties of the seabottom sediments and the subsurface in the FONA-Sea area around Amrumbank (North Sea) (figure 1). These data will be used to improve the understanding of the interrelation between sea surface and subsurface properties associated with benthic organisms and their influence as source of food for sea birds.

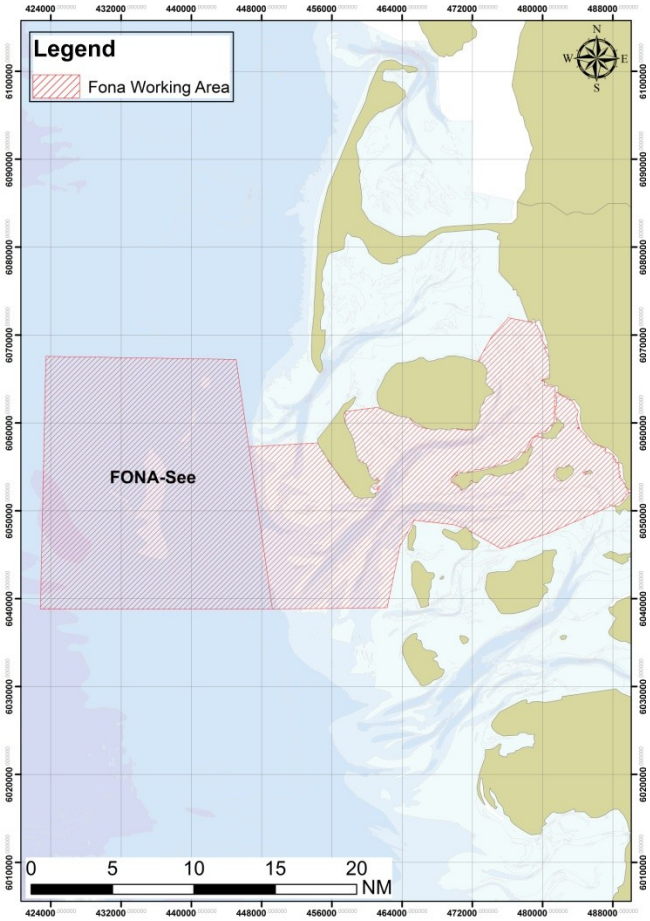

Figure 1: Working areas STopP-subtidal (FONA-See) and STopP-intertidal under investigation of IFG and FTZ Büsum.

2. Cruise-participants:

1. **Dr. Klaus Schwarzer** (chief scientist), Inst. of Geosciences, Kiel University
2. **Kerstin Wittbrodt** (scientist), Inst. of Geosciences, Kiel University
3. **Gitta Ann von Rönn** (scientist), Inst. of Geosciences, Kiel University
4. **Eric Steen** (technician), Inst. of Geosciences, Kiel University (coring)

5. **Andre Wagner** (technician), Inst. of Geosciences, Kiel University (hydroacoustics)

6. **Annelie Düring** (scientist), Inst. of Geosciences, Kiel University

7. **Svantje Gottschlich** (scientist), Inst. of Geosciences, Kiel University

8. **Jonas Drescher** (scientist), Inst. of Geosciences, Kiel University

9. **Sebastian Neumann** (scientist), Inst. of Geosciences, Kiel University

10. **Jil Kiefer** (scientist), Inst. of Geosciences, Kiel University

11. **Carola Wagner** (scientist), Inst. of Geosciences, Kiel University

Abbrevations used in this report:

1624 - Side-Scan Sonar (towed)	**SSS 1624**
Innomar Subbottom Profiler	**SES**
Grab Sampler	**GS**
Underwater Video (drop-camera)	**UWV**
CTD	**CTD**
Giant Grab Sampler	**GGS**

3. Cruise Narrative

Sa. 10.10.2015

Weather:	sunny, E 6
06:00	Departing Kiel (SH), transit through Kiel Canal
20:30	Arrival working area
20:35	Start SES profiling

Su. 11.10.2015

Weather	sunny, partly cloudy, E 5
06:03	End SES profiling
07:45	Deployment of devices (1624)

Mo. 12.10.2015

Weather:	sunny, partly cloudy, E 4
03:40	Devices out of water
04:43	start coring stations (2 stations)
05:10	end core stations
06:40	Deployment of devices (SES, 1624)

Tu. 13.10.2015

Weather:	cloudy, ESE 4
04:15	Devices out of water (1624)
05:08	start coring stations (2 stations)
05:29	end core stations
06:35	Deployment of devices (SES, 1624)

We. 14.10.2015
Weather: cloudy, rainy, E 6
00:00-00:00 continuing hydroacoustic profiling (SES, 1624)

Th. 15.10.2015
Weather: cloudy, NE 6
06:45 Devices out of water (1624)
07:31 Start of giant grab sampler sampling
11:11 End of giant grab sampler sampling
12:50 Deployment of devices (SES, 1624)

Fr. 16.10.2015
Weather: NE 6
06:40 Devices out of water (1624)
07:47 Start of grab sampling
15:40 End of grab sampling
17:01 Deployment of devices (1624)

Sa. 17.10.2015
Weather: ENE 4
06:15 Devices out of water (1624)
07:45 Start coring stations (2 stations)
08:00 End coring stations
08:59 Deployment of devices (SES, 1624)
13:01 Devices out of water (1624)
13:32 Start coring stations (2 stations)
13:52 End coring stations
14:20 Deployment of devices (SES, 1624)

Su. 18.10.2015
Weather cloudy E 5
07:45 Devices out of water (1624)
08:05 Start coring stations (2 stations)
08:29 End coring stations
09:08 Deployment of devices (SES, 1624)
13:03 Devices out of water (1624)
14:07 Start coring stations (2 stations)
14:25 End core stations
15:22 Deployment of devices (SES, 1624)

Mo. 19.10.2015
Weather: sunny, NE 3
08:41 Devices out of water (1624)
09:04 Start coring stations (2 stations)
09:40 End coring stations
10:10 Deployment of devices (1624)
14:08 Devices out of water (1624)
14:57 Start coring stations (2 stations)
15:26 End coring stations
16:12 Start SES profiling

Tu. 20.10.2015
Weather: ENE 2
05:50 End SES profiling
05:59 Start of grab sampling
09:11 End of grab sampling
09:30 Start coring stations (2 stations)
09:51 End coring stations
10:12 Start of giant grab sampler sampling
13:28 End of giant grab sampler sampling
15:06 Start of grab sampling
15:33 End of grab sampling
16:18 Start of SES profiling

We. 21.10.2015
Weather: sunny, SW 6
05:25 End of SES profiling
06:00 CTD-station
06:12 Start of grab sampling
10:09 End of grab sampling
10:34 Start SES profiling
12:43 End SES profiling
12:45 Transit to Cuxhaven
17:00 Arrival Cuxhaven

Th. 22.10.2015
Weather: sunny, partly cloudy
07:00 Departing Cuxhaven, Transit back to Kiel via Kiel Kanal
17:00 Arrival at Kiel GEOMAR Pier

Fr. 23.10.2015
Weather: cloudy-partly sunny
06:00 Unloading of FS Alkor at GEOMAR Pier

4. Methods

The sidescan sonar system **Benthos 1624** was applied to aquire high resolution hydroacoustic data to preduce maps of the seafloor sediment backscatter characteristics and sediment distribution patterns in the survey area. The system was towed behind the vessel with a towing speed of 5 knots. The **Benthos 1624** is working with a frequency of 100 kHz as well as 400 kHz. The system was used with an own whinch, MacArtney, Cormac 4 with 500 m Rochester Cable.

A range of 100 m on each side was applied. Additionally the hull mounted high resolution sub bottom profiler system (**Innomar-SES**) was used to get further information of the geological/sedimentological built up of the subsurface (see figure 8).

Ground truthing was done by **grab sampling** and **under water video** (drop-camera) observations. For the video surveys the underwater video system Mariscope was used.

To gain in situ samples with an undisturbed sediment surface a **giant grab sampler** was used (figure 2). Within the sediment the shovel of the giant grab sampler is closed by a mechanical release and the bottom of the steel box closes while capturing the sediment inside. Each giant grab sampler was described, photographed and sampled. Altogether 12 stations were successfully sampled.

Additionally 18 sediment cores were taken with an **3m-vibrocorer** (see figure 2). Stations were selected based on the SES-data from this cruise and from AL-440.

Tracklines of all hydroacoustic profiles and the positions of sampling/core stations are shown in figure 3 - 6. In table 1-6 (see appendix) all stations and profiles of this cruise are listed. The obtained data were used to get an overview of sediment distribution patterns and sediment properties in the working area, which are decisive for the occurrences and distribution of different benthic species.

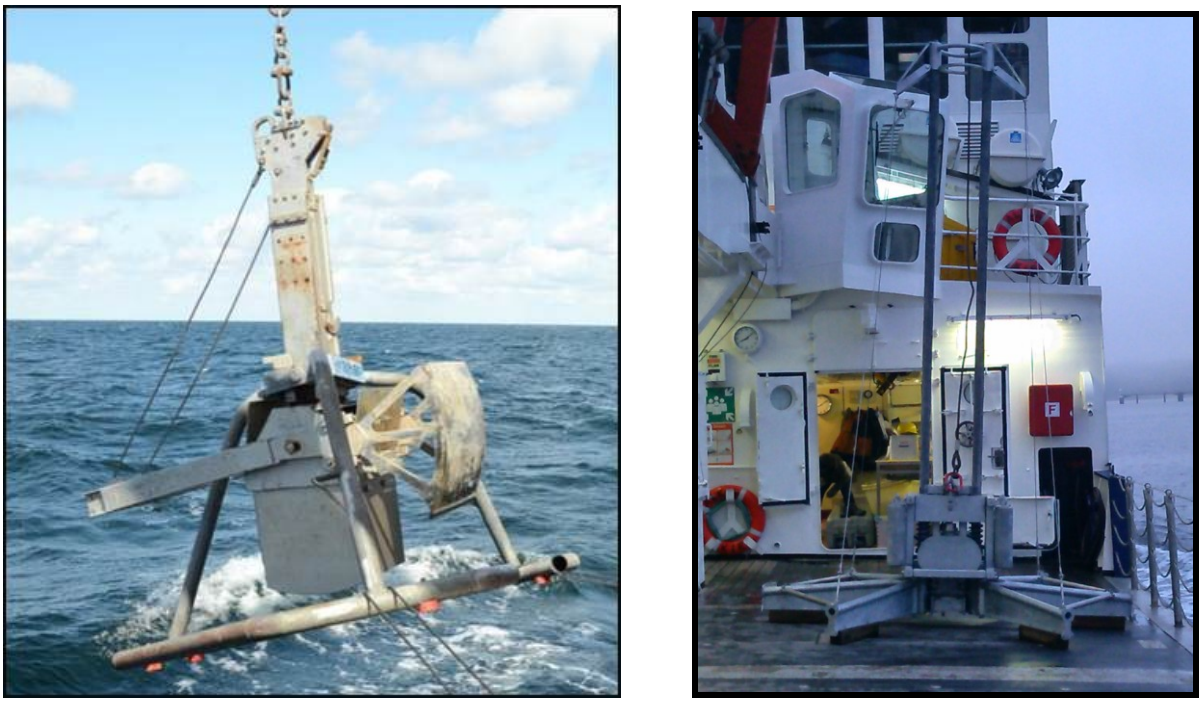

Figure 2: Giant grab sampler (GGS) (left) and vibrocorer 3m (right) used during AL465.

5. Preliminary scientific results

The sidescan sonar mosaic resulting from 79 profiles is shown in figure 4. An area of about 250 km^2 is covered. The surveyed area is characterized by areas of eye-catching high backscatter values (dark colors) which appear along the entire tracklines. The edges of these high backscatter areas were embossed by sharp transitions to low backscatter values (light colors). In the central-, northern-, and eastern parts of Amrum Bank, areas of striking sediment structures were found which were characterized by small scale alteration of light and

dark areas of backscatter values. These structures could be identified as so called “sorted bedforms” (Cacchione et al. 1984, Diesing et al. 2006), which are highly elongated patches of rippled coarse sand, which tend to be tens to hundreds of meters wide and hundreds to thousands of meters long (Cacchione et al. 1984; Goff et al. 2005). These sediment structures, which are approximately shore perpendicular, are slightly depressed by up to 1 m with respect to the surrounding seafloor. They can be clearly identified in sidescan sonar images (Goff et al. 2005). Typically they can be found on shelf areas where sediment supply is low (Cacchione et al.1984, Murray & Thieler 2004). Additionally large-scaled sediment structures located on the Amrum Bank morphological ridges were found which are built of coarse sand and medium to coarse sand. Within the sidescan sonar mosaic they are characterized as areas with higher backscatter intensities compared to the surrounding seafloor (see figure 4).

Based on the sidescan sonar mosaic sediment sampling was carried out at 72 grab sample stations and 12 giant grab sample stations (see fig. 4 and 5). All sample stations were used to take a closer look to the benthos content, especially at *Ensis* occurrence. Therefore the entire grab content was sieved through a sieve with 2 mm mesh width and the remained sieve content photographed afterwards. In figure 7 some pictures of the giant grab samples and related sieve content are shown. Their locations in the survey area can be found in figure 5. In figure 7 A and 7 D the benthic organism *Lanice conchilega* is present which seems to be the cause for the eye-catching high backscatter values (Degraer et al. 2008, Heinrich et al., submitted) in sidescan sonar images. Populations of *Lanice conchilega were* also observed in the underwater video profiles. In these video profiles, sediment structures which were recognized in the sidescan sonar waterfall window, like ripple structures, were also present.

Besides sidescan sonar mapping, grab sampling and giant grab sampling, sub bottom profiler data were collected to get information about the sedimentological built-up and the geological architecture of the subsurface in the working area. Within these profiles several channel structures were identified (for example see figure 8). Based on these sub bottom profiler data 18 vibrocores have been taken (locations see figure 6). In figure 8 selected coring stations are presented with their related sub bottom profiler screenshots.

6. References

Cacchione, D.A., Drake, D.E., Grant, W.D. & Tate, W.B., 1984. Rippled scour depressions on the inner continental shelf off central California. Journal of Sedimentary Petrology 54, 1280–1291.

Degraer, S., Moerkerke, G., Rabaut, M., Van Hoey, G., Du Four, I., Vincx, M., Henriet, J.P. & Van Lancker, V., 2008. Very-high resolution side-scan sonar mapping of biogenic reefs of the tube-worm *Lanice conchilega.* Remote Sensing of Environment 112, 3323-3328.

Diesing, M., Kubicki, A., Winter, C., Schwarzer, K., 2006. Decadel stability of sorted bedforms, German Bight, southeastern North Sea. – Continental Shelf Research, 26, 902 – 916.

Goff, J.A., Mayer, L.A., Traykovski, P., Buynevich, I., Wilkens, R., Raymond, R., Glang, G., Evans, R.L., Olson, H. & Jenkins, C., 2005. Detailed investigation of sorted bedforms, or ‘‘rippled scour depressions’’, within the Martha’s Vineyard Coastal Observatory, Massachusetts. Continental Shelf Research 25 (4), 461–484.

Heinrich, C., Feldens, P., Schwarzer, K., Identification of a biologically altered seabed in the German Bight (offshore Sylt Island) and its impact on image texture, the *L. conchilega* case (submitted).

Murray, A.B. & Thieler, E.R. (2004): A new hypothesis for the formation of large-scale inner-shelf sediment sorting and ‘rippled scour depressions’. Continental Shelf Research 24, 295–315.

7. Appendix

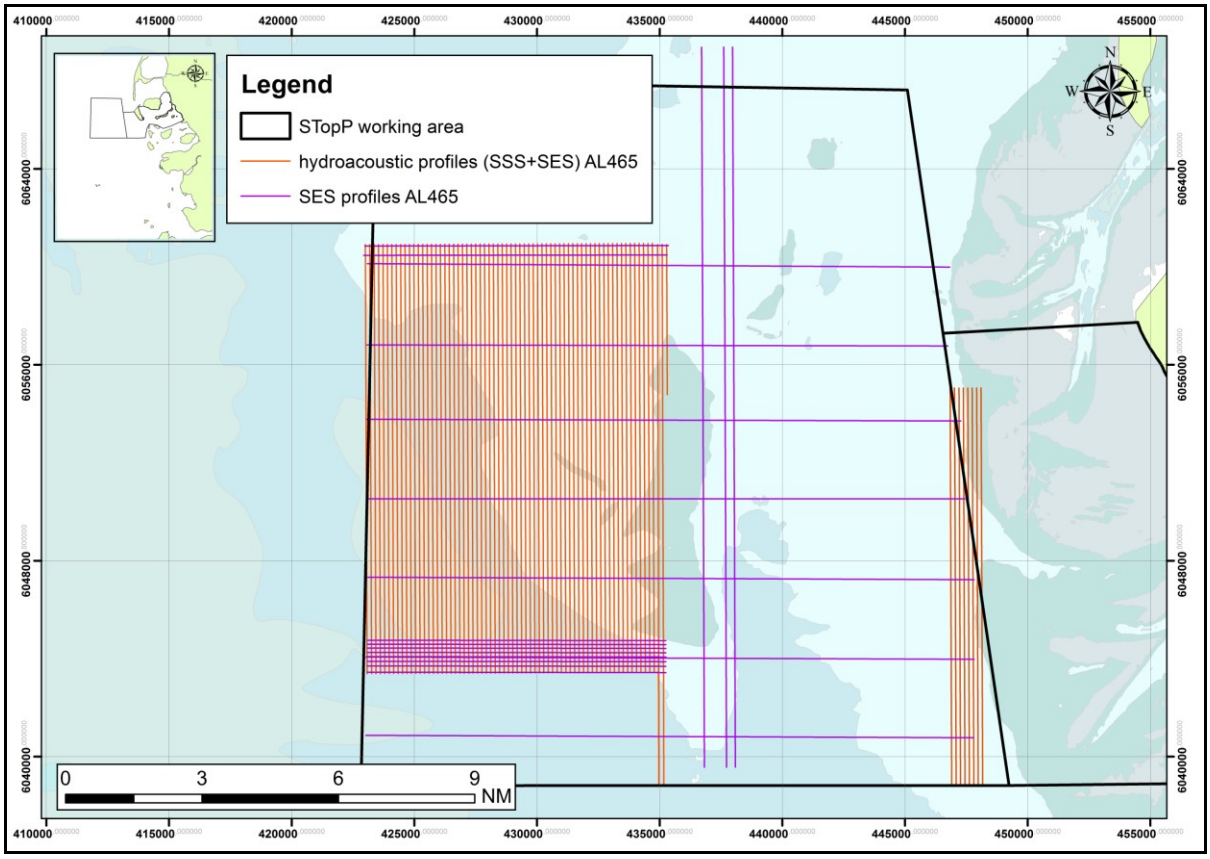

Figure 3: Hydroacoustic profiles of AL465. Red profiles: SES+SSS, purple profiles: SES.

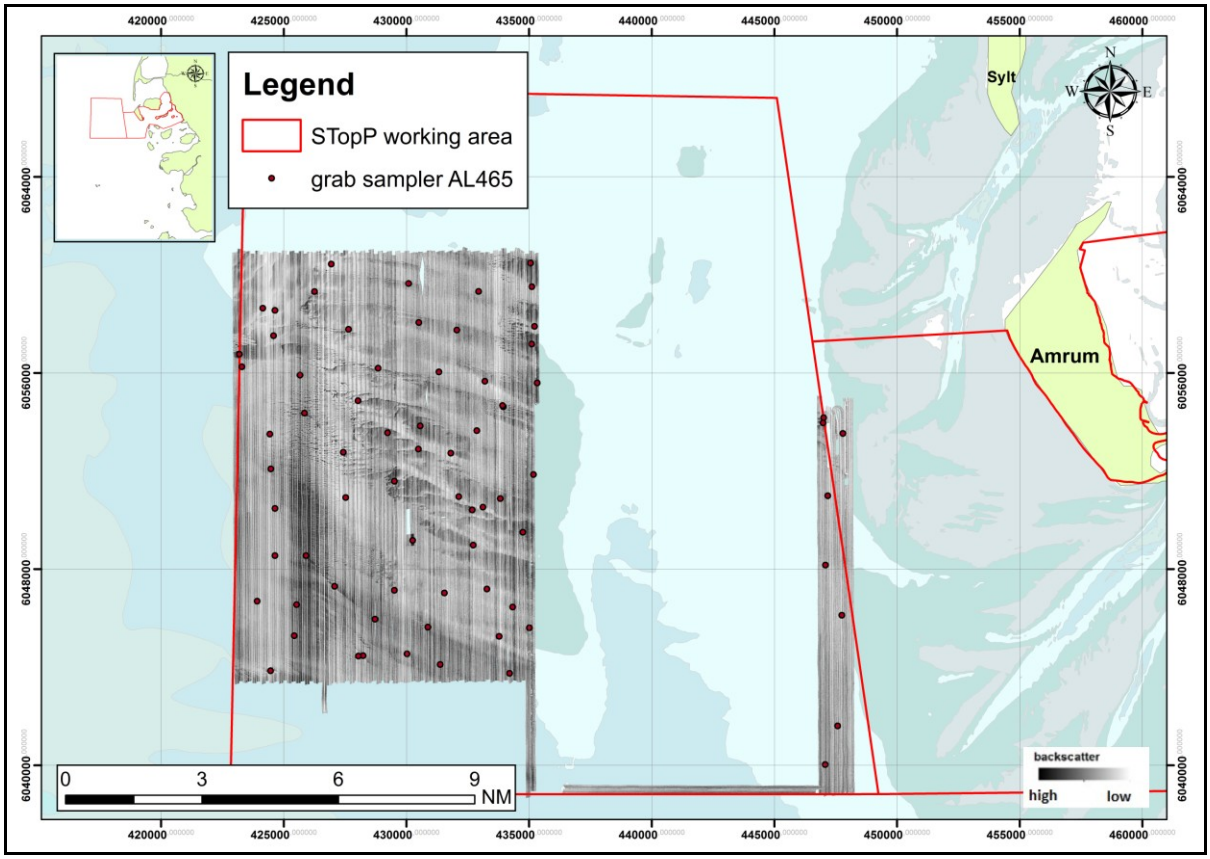

Figure 4: Sidescan mosaic of AL465 and location of grab sample stations AL465.

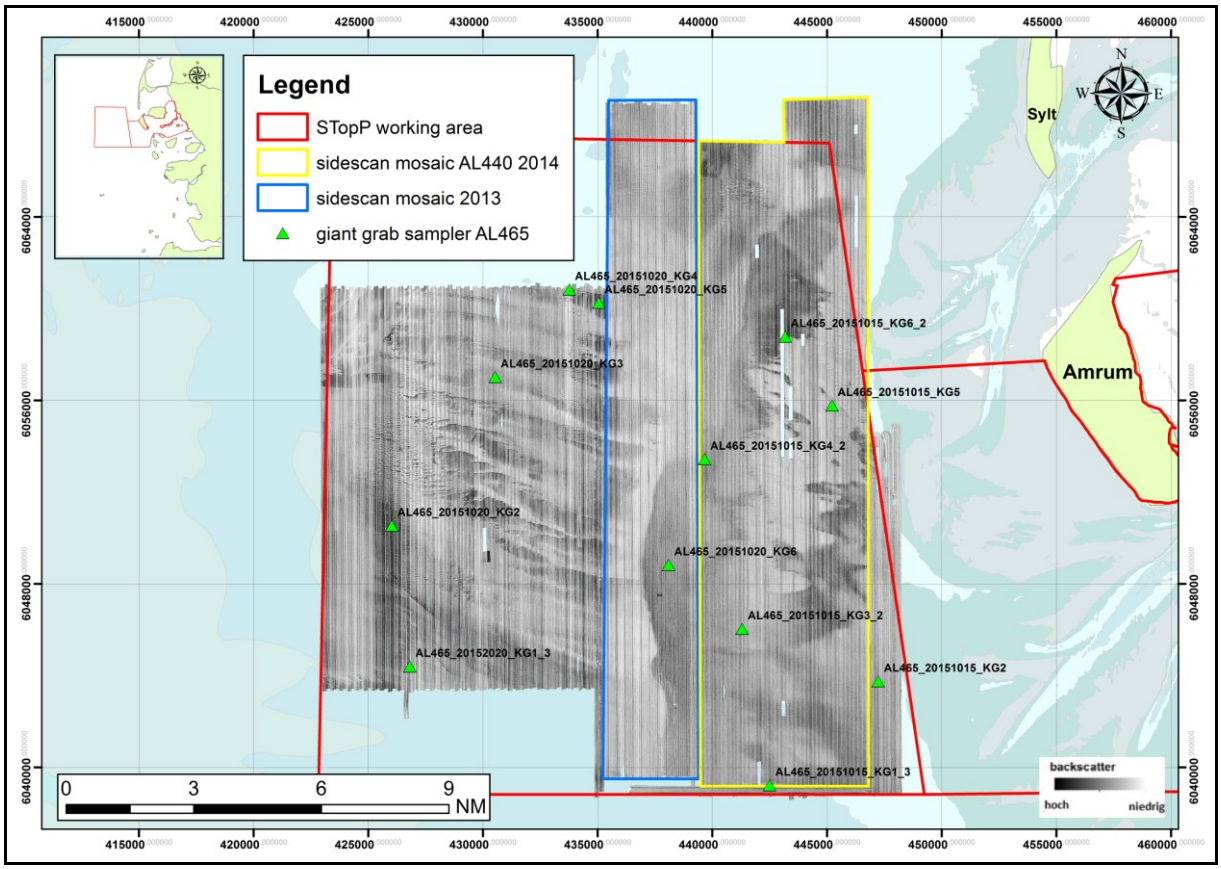

Figure 5: Location of giant grab sampler stations AL465. The map also contains the sidescan mosaic of AL440 in 2014 (see yellow box) and from Littorina 2013 (see blue box).

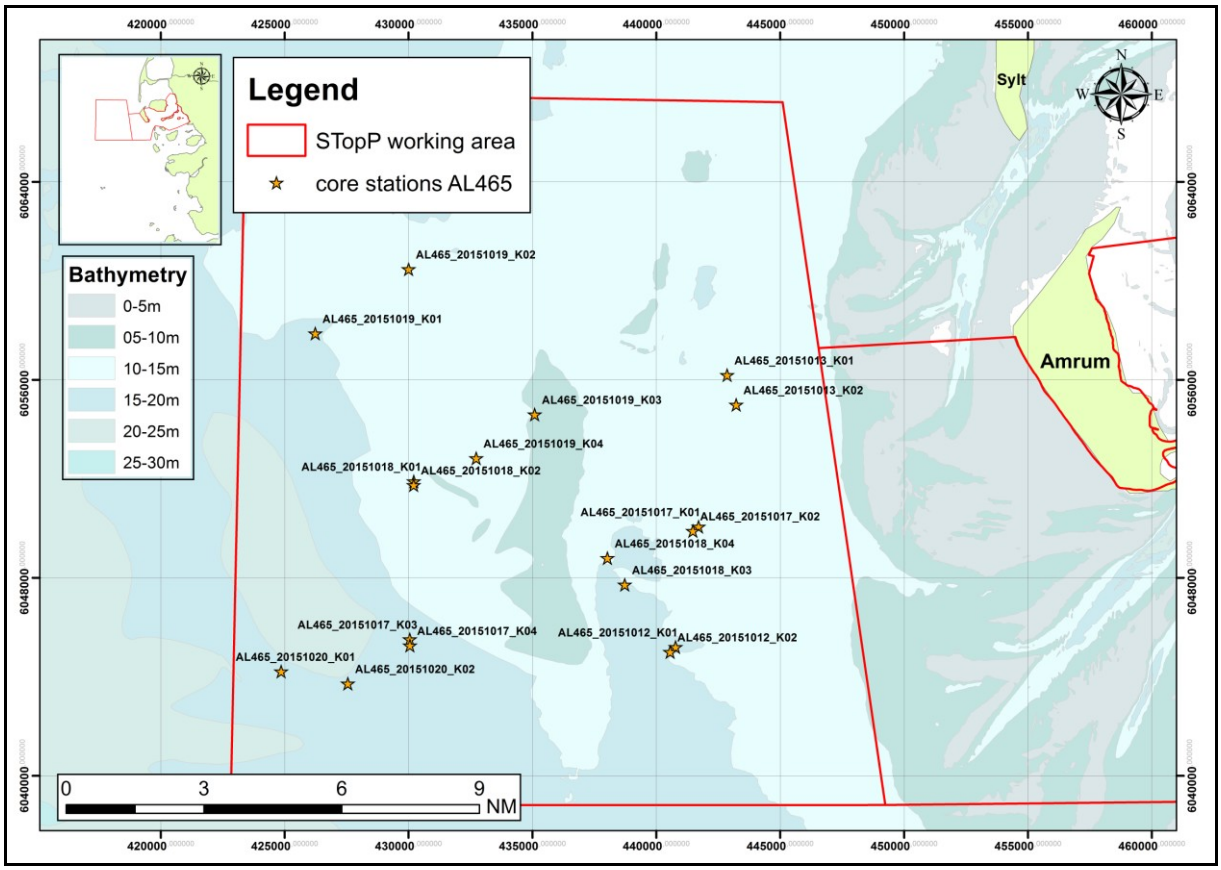

Figure 6: Location of vibrocorer stations AL465.

Figure 7: Pictures of giant grab sampler cross sections and sieve contents (**A**: AL465-20151015_KG2, **B**: AL465-20151015_KG3_2, **C**: AL465-20151020_KG1_3, **D**: AL465-20151020_KG3)

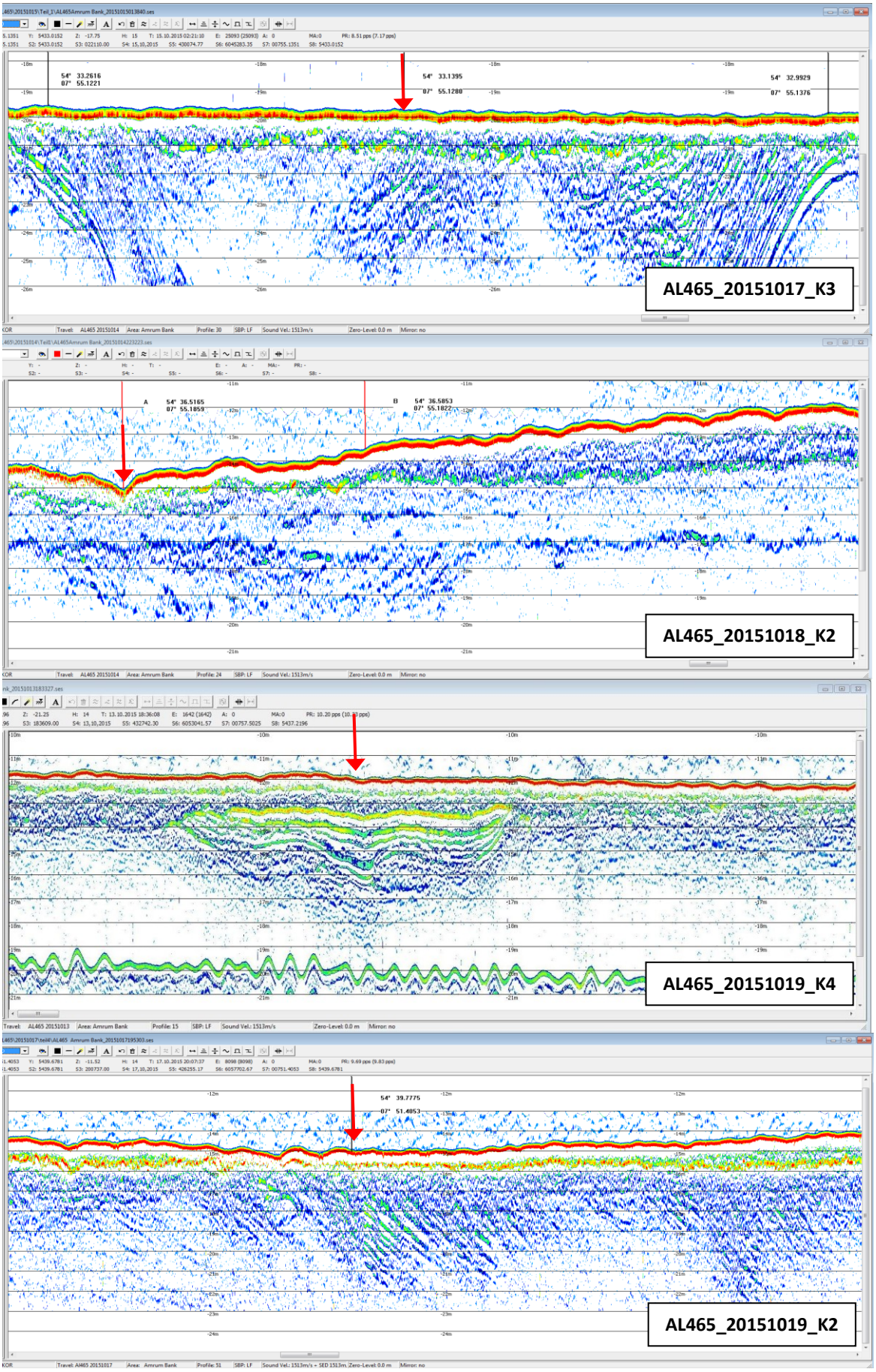

Figure 8: Screenshots of selected SES Profiles within the AB area. Several subsurface structures like channels can be identified. Red arrows indicate vibrocorer stations. For core locations at AB see figure 6.

Tab. 1.1: Hydroacoustic profiling (SSS+SES)

No	Date	Time (UTC)	Latitude	Longitude	Remarks
1	11.10.2015	07:54	54°29.634	08°11.986	start profile (SES;SSS)
1	11.10.2015	09:58	54°38.430	08°11.730	end profile (SES;SSS)
2	11.10.2015	10:02	54°38.323	08°11.582	start profile (SES;SSS)
2	11.10.2015	12:22	54°29.652	08°11.820	end profile (SES;SSS)
3	11.10.2015	12:27	54°29.671	08°11.605	start profile (SES;SSS)
3	11.10.2015	14:23	54°38.035	08°11.420	end profile (SES;SSS)
4	11.10.2015	14:33	54°37.670	08°11.249	start profile (SES;SSS)
4	11.10.2015	16:26	54°29.639	08°11.480	end profile (SES;SSS)
5	11.10.2015	16:34	54°29.637	08°11.310	start profile (SES;SSS)
5	11.10.2015	18:27	54°38.023	08°11.096	end profile (SES;SSS)
6	11.10.2015	18:32	54°38.169	08°10.928	start profile (SES;SSS)
6	11.10.2015	20:35	54°29.640	08°11.144	end profile (SES;SSS)
7	11.10.2015	20:44	54°29.636	08°10.981	start profile (SES;SSS)
7	11.10.2015	22:32	54°38.109	08°10.758	end profile (SES;SSS)
8	11.10.2015	22:45	54°38.383	08°10.578	start profile (SES;SSS)
8	12.10.2015	00:45	54°23.617	08°10.810	end profile (SES;SSS)
9	12.10.2015	00:49	54°29.788	08°10.769	start profile (SES;SSS)
9	12.10.2015	02:02	54°29.737	08°01.116	end profile (SES;SSS)
10	12.10.2015	02:14	54°29.635	08°01.072	start profile (SES;SSS)
10	12.10.2015	03:29	54°29.696	08°10.638	end profile (SES;SSS)
11	12.10.2015	06:51	54°38.179	07°59.876	start profile (SES;SSS)
11	12.10.2015	07:40	54°41.488	07°59.755	end profile (SES;SSS)
12	12.10.2015	07:49	54°41.489	07°59.590	start profile (SES;SSS)
12	12.10.2015	10:12	54°29.668	07°59.697	end profile (SES;SSS)
13	12.10.2015	10:21	54°29.439	07°59.732	start profile (SES;SSS)
13	12.10.2015	12:51	54°41.462	07°59.415	end profile (SES;SSS)
14	12.10.2015	13:33	54°41.488	07°59.211	start profile (SES;SSS)
14	12.10.2015	15:50	54°32.057	07°59.523	end profile (SES;SSS)
15	12.10.2015	15:59	54°32.048	07°59.357	start profile (SES;SSS)
15	12.10.2015	18:13	54°39.638	07°59.114	end profile (SES;SSS)
16	12.10.2015	18:23	54°41.514	07°58.872	start profile (SES;SSS)
16	12.10.2015	20:37	54°32.045	07°59.196	end profile (SES;SSS)
17	12.10.2015	21:15	54°32.032	07°59.039	start profile (SES;SSS)
17	12.10.2015	23:33	54°41.496	07°58.708	end profile (SES;SSS)
18	12.10.2015	23:47	54°34.227	07°58.535	start profile (SES;SSS)
18	13.10.2015	02:08	54°32.055	07°58.846	end profile (SES;SSS)
19	13.10.2015	02:18	54°32.041	07°58.666	start profile (SES;SSS)
19	13.10.2015	04:13	54°40.283	07°58.417	profile interrupted (SES;SSS)
19	13.10.2015	06:44	54°40.056	07°58.415	profile restart (SES;SSS)
19	13.10.2015	07:03	54°41.506	07°58.417	end profile (SES;SSS)
20	13.10.2015	07:14	54°41.514	07°58.228	start profile (SES;SSS)
20	13.10.2015	09:07	54°32.004	07°58.533	end profile (SES;SSS)

21	13.10.2015	09:19	54°32.053	07°58.349	start profile (SES;SSS)
21	13.10.2015	11:11	54°41.474	07°58.044	end profile (SES;SSS)
22	13.10.2015	11:21	54°41.486	07°57.917	start profile (SES;SSS)
22	13.10.2015	13:13	54°32.061	07°58.191	end profile (SES;SSS)
23	13.10.2015	13:22	54°32.024	07°58.002	start profile (SES;SSS)
23	13.10.2015	15:18	54°41.461	07°57.699	end profile (SES;SSS)
24	13.10.2015	15:26	54°41.493	07°57.540	start profile (SES;SSS)
24	13.10.2015	17:21	54°32.029	07°57.846	end profile (SES;SSS)
25	13.10.2015	17:31	54°32.016	07°57.676	start profile (SES;SSS)
25	13.10.2015	19:30	54°41.491	07°52.376	end profile (SES;SSS)
26	13.10.2015	19:41	54°41.488	07°57.182	start profile (SES;SSS)
26	13.10.2015	21:34	54°31.994	07°57.530	end profile (SES;SSS)
27	13.10.2015	21:44	54°32.049	07°57.359	start profile (SES;SSS)
27	13.10.2015	23:39	54°41.447	07°57.034	end profile (SES;SSS)
28	13.10.2015	23:50	54°41.479	07°56.862	start profile (SES;SSS)
28	14.10.2015	01:43	54°32.032	07°57.187	end profile (SES;SSS)
29	14.10.2015	01:54	54°32.056	07°56.991	start profile (SES;SSS)
29	14.10.2015	03:48	54° 41.452	07°56.697	end profile (SES;SSS)
30	14.10.2015	03:57	54° 41.485	07°56.526	start profile (SES;SSS)
30	14.10.2015	05:50	54° 32.016	07°56.852	end profile (SES;SSS)
31	14.10.2015	06:00	54°32.013	07°56.682	start profile (SES;SSS)
31	14.10.2015	07:55	54°41.493	07°56.368	end profile (SES;SSS)
32	14.10.2015	16:15	54°41.469	07°56.202	start profile (SES;SSS)
32	14.10.2015	18:05	54°31.989	07°56.512	end profile (SES;SSS)
33	14.10.2015	18:16	54°32.021	07°56.324	start profile (SES;SSS)
33	14.10.2015	20:18	54°41.513	07°56.060	end profile (SES;SSS)
34	14.10.2015	20:26	54°41.449	07°55.848	start profile (SES;SSS)
34	14.10.2015	22:22	54°32.007	07°56.179	end profile (SES;SSS)
35	14.10.2015	08:04	54° 41.463	07°55.705	start profile (SES;SSS)
35	14.10.2015	09:57	54° 32.007	07°56.021	end profile (SES;SSS)
36	14.10.2015	10:07	54°32.020	07°55.860	start profile (SES;SSS)
36	14.10.2015	12:00	54°41.455	07°55.540	end profile (SES;SSS)
37	14.10.2015	12:08	54°41.466	07°55.386	start profile (SES;SSS)
37	14.10.2015	14:01	54°32.018	07°55.675	end profile (SES;SSS)
38	14.10.2015	14:10	54°32.020	07°55.506	start profile (SES;SSS)
38	14.10.2015	16:03	54°41.464	07°55.182	end profile (SES;SSS)
39	14.10.2015	22:32	54°32.000	07°55.360	start profile (SES;SSS)
39	15.10.2015	00:24	54°41.452	07°55.020	end profile (SES;SSS)
40	15.10.2015	00:34	54°41.464	07°54.861	start profile (SES;SSS)
40	15.10.2015	02:30	54°31.979	07°55.171	end profile (SES;SSS)
41	15.10.2015	02:42	54°32.001	07°54.976	start profile (SES;SSS)
41	15.10.2015	04:33	54°41.400	07°54.682	end profile (SES;SSS)
42	15.10.2015	04:42	54°41.466	07°54.58	start profile (SES;SSS)
42	15.10.2015	06:34	54°32.006	07°54.848	end profile (SES;SSS)

43	15.10.2015	13:06	54°31.988	07°54.671	start profile (SES;SSS)
43	15.10.2015	15:11	54°41.402	07°54.350	end profile (SES;SSS)
44	15.10.2015	15:20	54°41.448	07°54.201	start profile (SES;SSS)
44	15.10.2015	17:22	54°32.005	07°54.510	end profile (SES;SSS)
45	15.10.2015	17:33	54°31.983	07°54.347	start profile (SES;SSS)
45	15.10.2015	19:41	54°41.443	07°54.037	end profile (SES;SSS)
46	15.10.2015	19:50	54°41.446	07°53.856	start profile (SES;SSS)
46	15.10.2015	21:56	54°31.997	07°54.177	end profile (SES;SSS)
47	15.10.2015	22:07	54°31.975	07°54.035	start profile (SES;SSS)
47	16.10.2015	00:12	54°41.428	07°53.687	end profile (SES;SSS)
48	16.10.2015	00:20	54°41.472	07°53.505	start profile (SES;SSS)
48	16.10.2015	02:28	54°32.013	07°53.842	end profile (SES;SSS)
49	16.10.2015	02:32	54°32.613	07°53.842	start profile (SES;SSS)
49	16.10.2015	04:36	54°41442	07°53.353	end profile (SES;SSS)
50	16.10.2015	04:44	54°41.449	07°53.191	start profile (SES;SSS)
50	16.10.2015	06:30	54°31.975	07°53.515	end profile (SES;SSS)
51	16.10.2015	17:41	54°31.982	07°53.334	start profile (SES;SSS)
51	16.10.2015	19:52	54°41.439	07°53.004	end profile (SES;SSS)
52	16.10.2015	20:01	54°41.433	07°52.832	start profile (SES;SSS)
52	16.10.2015	22:01	54°31.992	07°53.183	end profile (SES;SSS)
53	16.10.2015	22:11	54°31.967	07°53.032	start profile (SES;SSS)
53	17.10.2015	00:17	54°41.423	07°52.686	end profile (SES;SSS)
54	17.10.2015	00:25	54°41.442	07°52.541	start profile (SES;SSS)
54	17.10.2015	02:30	54°31.993	07°52.843	end profile (SES;SSS)
55	17.10.2015	02:40	54°31.971	07°52.675	start profile (SES;SSS)
55	17.10.2015	04:40	54°41.414	07°52.342	end profile (SES;SSS)
56	17.10.2015	04:49	54°41.428	07°52180	start profile (SES;SSS)
56	17.10.2015	06:41	54°31.957	07°52.525	end profile (SES;SSS)
57	17.10.2015	09:03	54°31.976	07°52.350	start profile (SES;SSS)
57	17.10.2015	10:56	54°41.409	07°52.016	end profile (SES;SSS)
58	17.10.2015	11:03	54°41.434	07°51.868	start profile (SES;SSS)
58	17.10.2015	12:58	54°31.975	07°52.188	end profile (SES;SSS)
59	17.10.2015	14:32	54°31.998	07°52.001	start profile (SES;SSS)
59	17.10.2015	16:25	54°41.411	07°51.684	end profile (SES;SSS)
60	17.10.2015	16:33	54°41.430	07°51.515	start profile (SES;SSS)
60	17.10.2015	18:27	54°31.952	07°51.837	end profile (SES;SSS)
61	17.10.2015	18:36	54°31.967	07°51.671	start profile (SES;SSS)
61	17.10.2015	20:29	54°41.482	07°51.368	end profile (SES;SSS)
62	17.10.2015	20:37	54°41.391	07°51.175	start profile (SES;SSS)
62	17.10.2015	22:29	54°31.965	07°51.507	end profile (SES;SSS)
63	17.10.2015	22:36	54°31.935	07°51.337	start profile (SES;SSS)
63	18.10.2015	00:27	54°41.404	07°51.007	end profile (SES;SSS)
64	18.10.2015	00:35	54°41.420	07°50.949	start profile (SES;SSS)
64	18.10.2015	02:28	54°31.970	07°51.178	end profile (SES;SSS)

65	18.10.2015	02:36	54°31.945	07°51.006	start profile (SES;SSS)
65	18.10.2015	04:28	54°41.375	07°50.671	end profile (SES;SSS)
66	18.10.2015	04:37	54°41.420	07°50.508	start profile (SES;SSS)
66	18.10.2015	06:28	54°31.993	07°50.899	end profile (SES;SSS)
67	18.10.2015	06:36	54°31.918	07°50.592	start profile (SES;SSS)
67	18.10.2015	10:06	54°41.386	07°50.333	end profile (SES;SSS)
68	18.10.2015	10:13	54°41.413	07°50.207	start profile (SES;SSS)
68	18.10.2015	12:05	54°31.958	07°50.511	end profile (SES;SSS)
69	18.10.2015	12:13	54°31.961	07°30.347	start profile (SES;SSS)
69	18.10.2015	16:32	54°41.384	07°49.962	end profile (SES;SSS)
70	18.10.2015	16:42	54°41.407	07°49.892	start profile (SES;SSS)
70	18.10.2015	18:35	54°31.938	07°50.173	end profile (SES;SSS)
71	18.10.2015	18:44	54°31.952	07°50.005	start profile (SES;SSS)
71	18.10.2015	20:37	54°41.390	07°49.629	end profile (SES;SSS)
72	18.10.2015	20:46	54°41.406	07°49.530	start profile (SES;SSS)
72	18.10.2015	22:37	54°31.951	07°49.840	end profile (SES;SSS)
73	18.10.2015	22:46	54°31.992	07°49.688	start profile (SES;SSS)
73	19.10.2015	00:37	54°41.370	07°49.340	end profile (SES;SSS)
74	19.10.2015	00:44	54°41.386	07°49.186	start profile (SES;SSS)
74	19.10.2015	02:36	54°31.406	07°49.530	end profile (SES;SSS)
75	19.10.2015	02:45	54°31.939	07°49.243	start profile (SES;SSS)
75	19.10.2015	04:38	54°41.376	07°48.993	end profile (SES;SSS)
76	19.10.2015	04:48	54°41.396	07°48.836	start profile (SES;SSS)
76	19.10.2015	06:39	54°31.970	07°49.232	end profile (SES;SSS)
77	19.10.2015	06:48	54°31.930	07°48.945	start profile (SES;SSS)
77	19.10.2015	08:38	54°41.352	07°48.610	end profile (SES;SSS)
78	19.10.2015	10:16	54°41.371	07°48.514	start profile (SES;SSS)
78	19.10.2015	12:08	54°31.928	07°48.847	end profile (SES;SSS)
79	19.10.2015	12:10	54°31.928	07°48.685	start profile (SES;SSS)
79	19.10.2015	14:04	54°41.363	07°48.324	end profile (SES;SSS)

Tab. 1.2: Hydroacoustic profiling (additional SES profiles)

No	Date	Time (UTC)	Latitude	Longitude	Remarks
1	10.10.2015	20:31	54°29.9824	08°01.4767	start profile (SES)
1	10.10.2015	23:35	54°45.9735	08°01.0152	end profile (SES)
2	10.10.2015	23:44	54°45.8000	08°01.797	start profile (SES)
2	11.10.2015	02:50	54°29.9588	08°02.2927	end profile (SES)
3	11.10.2015	02:56	54°30.0333	08°02.6124	start profile (SES)
3	11.10.2015	06:03	54°45.8785	08°02.1565	end profile (SES)
4	19.10.2015	16:12	54°40.9793	07°48.3172	start profile (SES)
4	19.10.2015	18:17	54°41.0573	08°09.9296	end profile (SES)
5	19.10.2015	18:35	54°39.3302	08°10.0371	start profile (SES)
5	19.10.2015	20:40	54°39.1648	07°48.3795	end profile (SES)
6	19.10.2015	20:59	54°37.5327	07°48.5757	start profile (SES)
6	19.10.2015	23:09	54°34.1892	08°11.4372	end profile (SES)
7	19.10.2015	23:27	54°35.9760	08°11.1970	start profile (SES)

7	20.10.2015	01:36	54°35.7922	07°48.5995	end profile (SES)
8	20.10.2015	01:51	54°34.0815	07°48.6489	start profile (SES)
8	20.10.2015	04:04	54°34.183	08°11.5676	end profile (SES)
9	20.10.2015	04:24	54°32.4424	08°11.6171	start profile (SES)
9	20.10.2015	/	/	/	profile interrupted (SES)
9	20.10.2015	16:19	54°32.3521	07°56.7133	profile restart (SES)
9	20.10.2015	17:06	54°32.2984	07°48.6066	end profile (SES)
10	20.10.2015	17:26	54°30.888	07°48.6709	start profile (SES)
10	20.10.2015	19:42	54°30.7554	08°11.8147	end profile (SES)
11	20.10.2015	20:55	54°32.0588	07°59.8447	start profile (SES)
11	20.10.2015	22:01	54°31.971	07°48.662	end profile (SES)
12	20.10.2015	22:05	54°32.099	07°48.667	start profile (SES)
12	20.10.2015	23:09	54°32.194	07°59.970	end profile (SES)
13	20.10.2015	23:12	54°32.285	07°59.939	start profile (SES)
13	21.10.2015	00:16	54°32.196	07°48.6855	end profile (SES)
14	21.10.2015	00:19	54°32.312	07°48.697	start profile (SES)
14	21.10.2015	01:18	54°32.414	07°59.926	end profile (SES)
15	21.10.2015	01:21	54°32.502	07°59.979	start profile (SES)
15	21.10.2015	02:42	54°32.4045	07°48.6419	end profile (SES)
16	21.10.2015	02:27	54°32.4894	07°48.6767	start profile (SES)
16	21.10.2015	03:33	54°32.5967	07°59.9995	end profile (SES)
17	21.10.2015	03:37	54°32.6799	07°59.9366	start profile (SES)
17	21.10.2015	04:34	54°32.5785	07°48.5949	end profile (SES)
18	21.10.2015	04:46	54°32.6689	07°48.6604	start profile (SES)
18	21.10.2015	05:25	54°32.7290	07°55.3035	profile interrupted(SES)
19	21.10.2015	10:35	54°41.293	07°48.457	start profile (SES)
19	21.10.2015	11:36	54°41.4464	07°59.7341	end profile (SES)
20	21.10.2015	11:40	54°41.2811	07°59.7520	start profile (SES)
20	21.10.2015	12:43	54°41.1274	07°48.3340	end profile (SES)

Tab. 2: Stations Grab Sampling

Station	Date	Time [UTC]	Latitude	Longitude	Waterdepth [m]	Remarks
1	16.10.2015	07:57	54°37.931	08°10.745	15.30	grab_sieved_2mm
2	16.10.2015	08:06	54°37.820	08°10.721	16.20	grab_sieved_2mm
3	16.10.2015	08:17	54°37.590	08°11.476	12.30	grab_sieved_2mm
4	16.10.2015	08:32	54°36.218	08°10.929	15.50	grab_sieved_2mm
5	16.10.2015	08:51	54°34.691	08°10.877	14.20	grab_sieved_2mm
6	16.10.2015	09:05	54°33.592	08°11.517	14.00	grab_sieved_2mm
7	16.10.2015	09:30	54°31.158	08°11.406	16.40	grab_sieved_2mm
8	16.10.2015	09:44	54°30.306	08°10.954	18.20	grab_sieved_2mm
9	16.10.2015	10:42	54°32.220	07°58.583	17.00	grab_sieved_2mm
10	16.10.2015	10:55	54°33.031	07°58.569	11.50	grab_sieved_2mm
11	16.10.2015	11:07	54°33.230	07°59.712	11.50	grab_sieved_2mm
12	16.10.2015	11:18	54°33.678	07°59.062	11.80	grab_sieved_2mm
13	16.10.2015	11:30	54°34.067	07°58.081	12.20	grab_sieved_2mm
14	16.10.2015	11:42	54°35.025	07°57.537	13.10	grab_sieved_2mm
15	16.10.2015	11:57	54°35.325	07°59.410	11.80	grab_sieved_2mm

16	16.10.2015	12:13	54°36.597	07°59.781	11.48	grab_sieved_2mm
17	16.10.2015	12:26	54°36.057	07°58.540	11.85	grab_sieved_2mm
18	16.10.2015	12:37	54°35.865	07°57.885	11.43	grab_sieved_2mm
19	16.10.2015	12:45	54°35.804	07°57.482	13.27	grab_sieved_2mm
20	16.10.2015	12:56	54°36.089	07°56.965	10.59	grab_sieved_2mm
21	16.10.2015	13:13	54°37.041	07°56.637	12.55	grab_sieved_2mm
22	16.10.2015	13:25	54°37.550	07°57.612	14.71	grab_sieved_2mm
23	16.10.2015	13:39	54°38.081	07°58.604	14.01	grab_sieved_2mm
24	16.10.2015	13:45	54°38.108	07°58.573	13.65	grab_sieved_2mm
25	16.10.2015	13:36	54°38.632	07°57.889	17.20	grab_sieved_2mm
26	16.10.2015	14:17	54°38.616	07°59.873	14.30	grab_sieved_2mm
27	16.10.2015	14:30	54°39.470	07°59.645	15.10	grab_sieved_2mm
28	16.10.2015	14:41	54°39.858	07°59.743	15.80	grab_sieved_2mm
29	16.10.2015	15:03	54°39.752	07°56.797	19.00	grab_sieved_2mm
30	16.10.2015	15:16	54°40.605	07°57.599	18.70	grab_sieved_2mm
31	16.10.2015	15:23	54°40.730	07°59.617	16.10	grab_sieved_2mm
32	16.10.2015	15:40	54°41.248	07°59.557	13.63	grab_sieved_2mm
33	20.10.2015	05:59	54°32.391	07°56.360	22.00	grab_sieved_2mm
34	20.10.2015	06:10	54°32.616	07°55.097	22.80	grab_sieved_2mm
35	20.10.2015	06:22	54°33.211	07°55.211	20.20	grab_sieved_2mm
36	20.10.2015	06:33	54°33.965	07°56.475	16.60	grab_sieved_2mm
37	20.10.2015	06:46	54°35.113	07°55.249	17.40	grab_sieved_2mm
38	20.10.2015	07:00	54°34.009	07°54.584	19.00	grab_sieved_2mm
39	20.10.2015	07:15	54°33.368	07°53.870	23.50	grab_sieved_2mm
40	20.10.2015	07:29	54°32.363	07°53.442	23.60	grab_sieved_2mm
41	20.10.2015	07:37	54°32.547	07°53.263	23.50	grab_sieved_2mm
42	20.10.2015	07:54	54°34.075	07°52.320	24.70	grab_sieved_2mm
43	20.10.2015	08:08	54°34.738	07°51.223	25.00	grab_sieved_2mm
44	20.10.2015	08:20	54°34.727	07°50.048	25.00	grab_sieved_2mm
45	20.10.2015	08:32	54°33.722	07°49.400	23.60	grab_sieved_2mm
46	20.10.2015	08:45	54°33.659	07°50.889	25.00	grab_sieved_2mm
47	20.10.2015	08:57	54°32.975	07°50.826	24.60	grab_sieved_2mm
48	20.10.2015	09:11	54°32.194	07°49.950	22.70	grab_sieved_2mm
49	20.10.2015	15:06	54°35.768	07°50.014	22.60	grab_sieved_2mm
50	20.10.2015	14:51	54°36.027	07°52.685	16.50	grab_sieved_2mm
51	20.10.2015	14:35	54°36.410	07°54.518	15.70	grab_sieved_2mm
52	20.10.2015	14:25	54°37.122	07°55.412	13.71	grab_sieved_2mm
53	20.10.2015	14:14	54°37.631	07°55.464	14.29	grab_sieved_2mm
54	20.10.2015	06:12	54°37.470	07°54.232	18.00	grab_sieved_2mm
55	20.10.2015	06:25	54°37.023	07°52.568	20.00	grab_sieved_2mm
56	20.10.2015	15:20	54°36.634	07°49.837	21.68	grab_sieved_2mm
57	20.10.2015	15:33	54°37.395	07°49.773	20.40	grab_sieved_2mm
58	20.10.2015	06:39	54°37.869	07°51.069	22.00	grab_sieved_2mm
59	20.10.2015	06:56	54°38.167	07°53.095	20.00	grab_sieved_2mm
60	20.10.2015	07:08	54°38.884	07°53.836	19.00	grab_sieved_2mm

61	20.10.2015	07:26	54°38.827	07°56.139	18.00	grab_sieved_2mm
62	20.10.2015	07:41	54°39.908	07°55.350	17.00	grab_sieved_2mm
63	20.10.2015	07:54	54°40.760	07°54.842	18.00	grab_sieved_2mm
64	20.10.2015	08:15	54°39.731	07°52.691	18.00	grab_sieved_2mm
65	20.10.2015	08:31	54°38.703	07°50.880	21.00	grab_sieved_2mm
66	20.10.2015	08:47	54°38.867	07°48.674	21.00	grab_sieved_2mm
67	20.10.2015	08:58	54°39.143	07°48.570	19.00	grab_sieved_2mm
68	20.10.2015	09:12	54°39.561	07°49.855	19.00	grab_sieved_2mm
69	20.10.2015	09:25	54°40.166	07°49.426	18.00	grab_sieved_2mm
70	20.10.2015	09:35	54°40.121	07°49.891	18.00	grab_sieved_2mm
71	20.10.2015	09:56	54°40.550	07°51.376	14.30	grab_sieved_2mm
72	20.10.2015	10:09	54°41.162	07°51.994	13.90	grab_sieved_2mm

Tab.3: Stations Giant Grab Sampling

Station	Date	Time [UTC]	Latitude	Longitude	Waterdepth [m]	Remarks
1	15.10.2015	07:31	54°29.838	08°06.731	15.80	empty, second trial
	15.10.2015	07:38	54°29.833	08°06.728	15.80	empty, third trial
	15.10.2015	07:42	54°29.841	08°06.728	15.80	
2	15.10.2015	08:22	54°32.318	08°11.068	11.40	
3	15.10.2015	09:03	54°33.505	08°05.546	14.50	empty, second trial
	15.10.2015	09:07	54°33.510	08°05.537	14.50	
4	15.10.2015	10:00	54°37.483	08°03.931	13.40	empty, second trial
	15.10.2015	10:05	54°37.487	08°03.927	13.40	
5	15.10.2015	10:42	54°38.786	08°09.064	14.20	
6	15.10.2015	11:11	54°40.392	08°07.124	15.10	
	15.10.2015	11:21	54°40.390	08°07.131	15.10	
7	20.10.2015	10:12	54°32.520	07°52.110	19.90	empty, second trial
	20.10.2015	10:18	54°32.520	07°52.110	19.90	empty, third trial
	20.10.2015	10:27	54°32.512	07°52.120	19.90	
8	20.10.2015	11:02	54°35.815	07°51.302	19.00	
9	20.10.2015	11:47	54°39.346	07°55.392	13.80	
10	20.10.2015	12:18	54°41.428	07°58.349	14.30	
11	20.10.2015	12:39	54°41.127	07°59.550	13.40	
12	20.10.2015	13:18	54°34.990	08°02.530	16.00	

Tab. 4: CTD stations

No	Date	Time (UTC)	Latitude	Longitude	Waterdepth
1	21.10.2015	06:00	54°37.470	07°54.248	14.00

Tab. 5: Video profiles

No	Date	Time	Latitude	Longitude	Waterdepth	Action
1	20.10.2015	10:30	54°32.513	07°52.110	20.20	start profile
	20.10.2015	10:13	54°32.516	07°52.109		end profile

2	20.10.2015	11:09	54°35.821	07°51.309	19.50	start profile
	20.10.2015	11:14	54°35.814	07°51.313		end profile
3	20.10.2015	11:50	54°39.343	07°55.405	14.10	start profile
	20.10.2015	11:55	54°39.352	07°55.403		end profile
4	20.10.2015	12:22	54°41.429	07°50.335	14.50	start profile
	20.10.2015	12:26	54°471.434	07°50.337		end profile
5	20.10.2015	12:43	54°41.119	07°59.543	13.50	start profile
	20.10.2015	12:47	54°41.123	07°59.549		end profile
6	20.10.2015	13:24	54°34.984	08°02.516	16.30	start profile
	20.10.2015	13:28	54°34.984	08°02.517		end profile

Tab. 6: vibrocore stations

Station	Date	Time	Latitude	Longitude	Waterdepth	Core length [cm]
1	12.10.2015	04:49	54°33.059	08°05.068	14.71	277
2	12.10.2015	05:05	54°32.950	08°04.866	14.63	206
3	13.10.2015	05:08	54°38.995	08°06.871	14.96	280
4	13.10.2015	05:29	54°38.352	08°07.223	13.77	256
5	17.10.2015	07:45	54°35.686	08°05.873	12.60	286
6	17.10.2015	08:00	54°35.592	08°05.658	13.30	226
7	17.10.2015	13:32	54°33.144	07°55.116	19.95	233
8	17.10.2015	13:50	54°33.008	07°55.120	19.95	260
9	18.10.2015	08:13	54°36.586	07°55.173	12.00	300
10	18.10.2015	08:29	54°36.505	07°55.171	13.00	282
11	18.10.2015	14:07	54°34.401	07°63.136	16.37	255
12	18.10.2015	14:25	54°34.976	07°62.471	16.25	294
13	19.10.2015	09:04	54°39.774	07°51.391	15.30	273
14	19.10.2015	09:33	54°41.206	07°54.857	14.54	282
15	19.10.2015	14:58	54°38.082	07°59.666	10.68	251
16	19.10.2015	15:22	54°37.109	07°57.502	13.74	292
17	20.10.2015	09:30	54°32.400	07°50.320	19.50	295
18	20.10.2015	09:51	54°32.157	07°52.821	19.48	288