

DTU Aqua



16.9.2015, 15.11-20-12.2015, Jnr 15/12287"

Cruise Report

Sand eel Dredge Survey, Sand eel Area 1, 2 and 3, 2015

Vessel: Salling
 Cruise number: 2015

Cruise dates: 20.11.2015 – 15.12.2015
 Cruise name: Sand eel Dredge Survey, Sandeel Area 1, 2 and 3

Port of departure:	Esbjerg	Date:	20.11.2015
Port of return:	Esbjerg	Date:	15.12.2015
Other ports:		Date and justification:	

Participants

Leg #: 1		
Name	Institute	Function and main tasks
Dirk Tijssen	DTU Aqua	Cruise leader

Leg #:		
Name	Institute	Function and main tasks

Objectives

The purpose of the sand eel dredge survey was to collect sand eels buried in the seabed and compare catches (number and age composition) with the previous year's collections to assess the 2015 year class strength of sand eel in area 1, 2 and 3 of the different areas adopted by ICES in 2009 (figure 1). Data from the dredge survey is the basis for calculating an index, which is used in the stock assessment for sandeel in the North Sea.

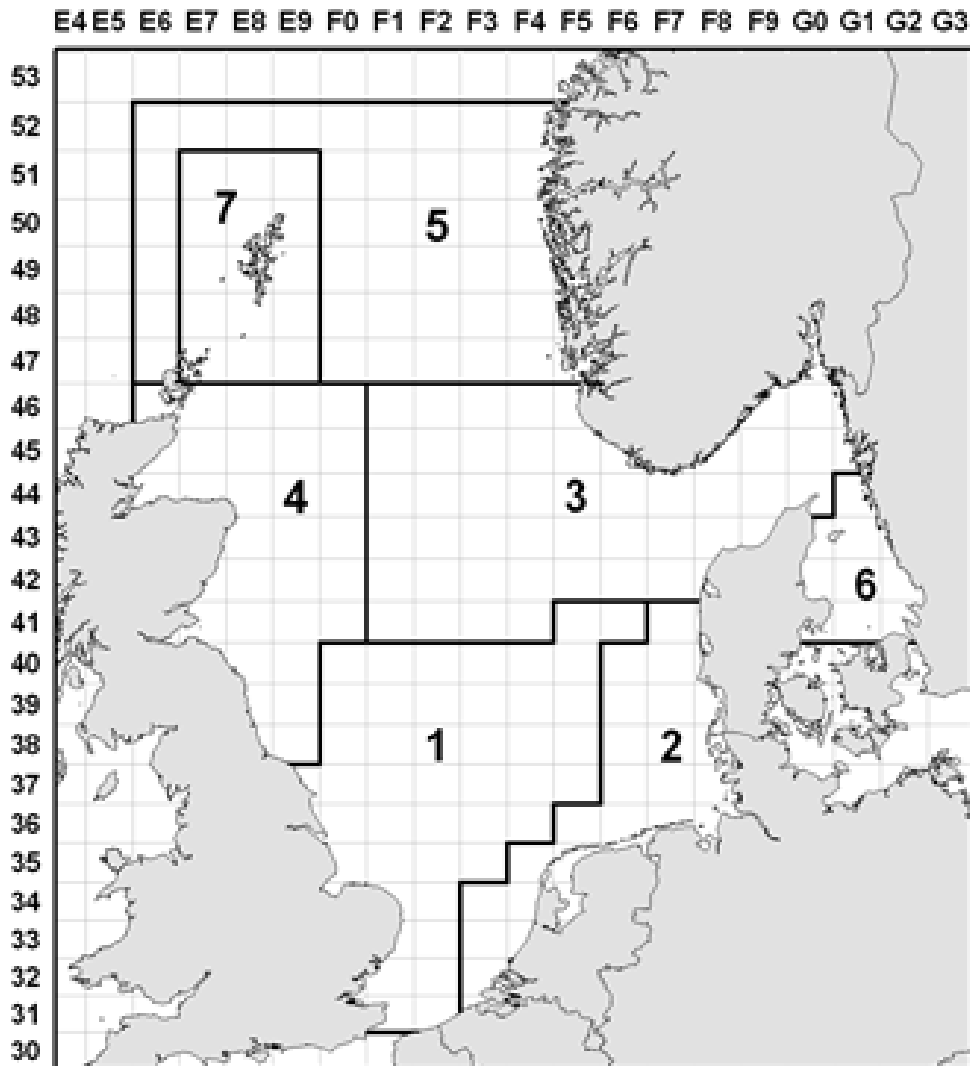


Figure 1. Sandeel management areas (ICES, 2009)

Itinerary

The vessel departed Esbjerg Harbor 20.11.2015 at 20.00 hrs. and returned to Esbjerg Harbor at 11.00 hrs 15.12.2015. Sampling with the modified dredge typically started just after sunset (UTC 17.00 hrs) and the last station of the night was completed before sunrise (UTC 04.00 – 06.00 hrs) i.e. fishing was only conducted during darkness.

Achievements

Types of data collected

- GPS Positions
- Depth
- Dredge (sand eels; species, weight, length)
- Van Veen grab (sediment samples; grain size composition)

Achievements in 2015:

- 25 days at sea (planned: 24)
- 304 stations; 34 sediment grab samples and 270 dredge hauls distributed over 89 sample positions (planned 68 with high priority and 38 with low priority).

Methods

On each sampling location three hauls were carried out with the modified mussel dredge according to descriptions for fishing with modified mussel dredge used since 2004. The DK II dredge was used as the primary gear and the DK IV dredge served as 'back-up'. On new sample locations sediment samples were taken with the Van Veen grab (0.2m²), for the grain size composition analysis i.e. whether the bottom could be classified as a suitable habitat for sand eel (a very fine-grained sediment with a high content of silt is generally found to be unfit as an overwintering habitat for the sandeel).

Time of sampling

Sand eels survive the winter by burying in the seabed, but can under some circumstances be forced to seek food in the water column. In these cases, the food search is almost exclusively carried out in darkness. In order to ensure that as large and constantly a fraction of sand eels as possible is available for the fishing gear the fishing was therefore exclusively done during darkness (i.e. optimizing the constancy of the catch ability). Sailing between sampling locations were hence, if possible, done during the light hours of the day.

Prioritization of the sampling

It was sought after, that samples should be collected from all of the planned positions. In the event of problems causing exclusion of locations, e.g. by bad weather, the highest priority was given to the locations where samples had been collected during previous sand eel surveys or where the samples were considered to provide important information for a specific area. Lowest priority was given to the positions where only a few previous sand eel cruises had taken samples or where the samples were not considered to have important information for a specific area. The organization of the sampling (sail route) was done, so time spent sailing between locations was minimized.

Processing of samples at sea

- Greater sand eel (*Hyperoplus lanceolatus*) and Smooth sand eel (*Gymnammodytessemisquamatus*) were identified at sea and discarded to separate samplebags. Small sand eel (*Ammodytes tobianus*) were not separated, and thus measured together with the lesser sand eel and first identified on land.
- Numbers of sand eels (total or sample) was recorded in a station scheme for each haul.
- At least one of the 3 hauls for each sample location was processed at sea
- All sand eels (or a sample) was length measured to the nearest half cm (scm) and the results were introduced in a graduated scheme.
- The fish were gathered in bags for each scm group, for each haul, which again were gathered for each location.

Bottom contact

In order to be able to carry out an assessment of the individual hauls validity (in addition to the skipper's assessment of the haul quality) mechanical bottom contacts were fitted on the dredges. These were logging contact/no contact with the seabottom for the dredge each second while fishing as a measure for the performance of the dredge. This enabled the calculation of the part of the haul where the dredge had bottom contact. This was used to exclude hauls with a low bottom contact frequency from the later data analysis.

Results

The sand eel dredge survey in sand eel areas 1, 2 and 3 was carried out in accordance with the survey protocol in the period from November 20 - December 15. 89 positions were sampled with a total of 304 stations; 120 in area 1, 56 in area 2 and 128 in area 3. Mean catch (number of sand eel /position) was highest in area 3 due to very high catch rates on some of the positions in Norwegian EEZ.

Table 1. Station list. GRB refers to Van Veen grab (sediment samples) and DK2 and DK4 are dredges (hauls).

Date_start	Position	Station	Area	Gear	Timestart	Timeend	LatPos StartDec	LonPos StartDec	LatPos EndDec	LonPos EndDec	DepthAvg (m)
21-11-2015	4165.16	1	1	GRB	16:06	16:08	56.2968	5.5877	56.2963	5.5871	35
21-11-2015	4165.16	2	1	DK2	16:19	16:29	56.2945	5.5844	56.2996	5.5912	35
21-11-2015	4165.16	3	1	DK2	16:41	16:51	56.2960	5.5915	56.2979	5.5785	35
21-11-2015	4165.16	4	1	DK2	17:02	17:12	56.2987	5.5860	56.2924	5.5918	35
21-11-2015	4165.02	5	1	GRB	19:08	19:11	56.0624	5.2871	56.0615	5.2877	38
21-11-2015	4165.02	6	1	DK2	19:20	19:30	56.0589	5.2870	56.0656	5.2859	38
21-11-2015	4165.02	7	1	DK2	19:38	19:48	56.0632	5.2813	56.0601	5.2930	38
21-11-2015	4165.02	8	1	DK2	19:58	20:08	56.0632	5.2901	56.0590	5.2786	38
21-11-2015	4165.01	9	1	GRB	20:29	20:32	56.0288	5.2580	56.0275	5.2574	37
21-11-2015	4165.01	10	1	DK2	20:40	20:50	56.0233	5.2542	56.0297	5.2603	37
21-11-2015	4165.01	11	1	DK2	21:01	21:11	56.0271	5.2643	56.0266	5.2523	37
21-11-2015	4165.01	12	1	DK2	21:25	21:35	56.0315	5.2561	56.0249	5.2607	37
21-11-2015	4065.03	13	1	GRB	22:02	22:07	55.9651	5.2471	55.9639	5.2455	43
21-11-2015	4065.03	14	1	DK2	22:16	22:26	55.9628	5.2520	55.9670	5.2520	43
21-11-2015	4065.03	15	1	DK2	22:36	22:46	55.9632	5.2549	55.9659	5.2438	43
21-11-2015	4065.03	16	1	DK2	23:00	23:10	55.9684	5.2476	55.9610	5.2521	43
21-11-2015	4065.02	17	1	DK2	23:48	23:58	55.8929	5.1525	55.8872	5.1445	35
22-11-2015	4065.02	18	1	DK2	00:11	00:21	55.8863	5.1511	55.8926	5.1459	34
22-11-2015	4065.02	19	1	DK2	00:33	00:43	55.8901	5.1409	55.8889	5.1542	35
22-11-2015	4065.01	20	1	DK2	01:36	01:46	55.7857	5.0656	55.7782	5.0637	32
22-11-2015	4065.01	21	1	DK2	01:57	02:07	55.7780	5.0692	55.7830	5.0597	32
22-11-2015	4065.01	22	1	DK2	02:18	02:28	55.7786	5.0588	55.7827	5.0688	32
22-11-2015	3964.03	23	1	DK2	16:26	16:36	55.4878	4.4134	55.4820	4.4083	28
22-11-2015	3964.03	24	1	DK2	16:48	16:58	55.4796	4.4136	55.4852	4.4073	28
22-11-2015	3964.03	25	1	DK2	17:10	17:20	55.4834	4.4029	55.4827	4.4145	27
22-11-2015	3964.02	26	1	GRB	18:02	18:03	55.4160	4.3160	55.4156	4.3161	31
22-11-2015	3964.02	27	1	DK2	18:10	18:20	55.4159	4.3247	55.4157	4.3134	32
21-11-2015	3964.02	28	1	DK2	18:35	18:45	55.4127	4.3156	55.4195	4.3179	31
22-11-2015	3964.02	29	1	DK2	18:56	19:06	55.4185	4.3122	55.4137	4.3211	31
22-11-2015	3964.01	30	1	GRB	20:30	20:33	55.4184	4.0630	55.4186	4.0621	26
22-11-2015	3964.01	31	1	DK2	20:42	20:52	55.4186	4.0581	55.4179	4.0694	26
22-11-2015	3964.01	32	1	DK2	21:02	21:12	55.4148	4.0675	55.4209	4.0613	26
22-11-2015	3964.01	33	1	DK2	21:21	21:31	55.4223	4.0650	55.4156	4.0650	25
22-11-2015	3963.04	34	1	GRB	23:12	23:14	55.2639	3.7264	55.2637	3.7264	30
22-11-2015	3963.04	35	1	DK2	23:22	23:32	55.2637	3.7194	55.2638	3.7304	30
22-11-2015	3963.04	36	1	DK2	23:41	23:51	55.2609	3.7293	55.2666	3.7215	29
23-11-2015	3963.04	37	1	DK2	00:02	00:12	55.2663	3.7271	55.2599	3.7249	29
23-11-2015	3963.04	38	1	DK2	00:30	00:40	55.2607	3.7240	55.2670	3.7273	30
23-11-2015	3963.01	39	1	GRB	02:07	02:09	55.0865	3.4745	55.0865	3.4745	30
23-11-2015	3963.01	40	1	DK2	02:21	02:31	55.0874	3.4694	55.0860	3.4814	29
23-11-2015	3963.01	41	1	DK2	02:42	02:52	55.0842	3.4768	55.0911	3.4750	30
23-11-2015	3963.01	42	1	DK2	03:02	03:12	55.0887	3.4797	55.0887	3.4710	29
23-11-2015	3762.05	43	1	DK2	16:28	16:38	54.4883	2.3792	54.4956	2.3784	16
23-11-2015	3762.05	44	1	DK4	17:09	17:19	54.4946	2.3850	54.4899	2.3784	16
23-11-2015	3762.05	45	1	DK2	17:44	17:54	54.4909	2.3863	54.4929	2.3756	16
24-11-2015	3861.36	46	1	GRB	16:15	16:17	54.5781	1.8821	54.5778	1.8828	20

24-11-2015	3861.36	47	1	DK2	16:25	16:35	54.5762	1.8891	54.5790	1.8787	20
24-11-2015	3861.36	48	1	DK2	16:45	16:55	54.5759	1.8792	54.5811	1.8874	19
24-11-2015	3861.36	49	1	DK2	17:02	17:12	54.5808	1.8822	54.5743	1.8866	20
24-11-2015	3761.04	50	1	GRB	18:18	18:20	54.4677	1.9842	54.4674	1.9850	15
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24-11-2015	3862.01	55	1	DK2	20:33	20:43	54.5846	2.1482	54.5779	2.1467	16
24-11-2015	3862.01	56	1	DK2	20:53	21:03	54.5793	2.1406	54.5820	2.1523	14
24-11-2015	3862.01	57	1	DK2	21:14	21:24	54.5785	2.1508	54.5834	2.1425	14
24-11-2015	3762.01	58	1	GRB	22:21	22:23	54.4573	2.1387	54.4571	2.1385	13
24-11-2015	3762.01	59	1	DK2	22:31	22:41	54.4576	2.1342	54.4577	2.1465	12
24-11-2015	3762.01	60	1	DK2	22:50	23:00	54.4605	2.1423	54.4545	2.1372	13
24-11-2015	3762.01	61	1	DK2	23:09	23:19	54.4543	2.1417	54.4604	2.1380	14
25-11-2015	3762.02	62	1	GRB	01:33	01:35	54.1479	2.0594	54.1478	2.0605	24
25-11-2015	3762.02	63	1	DK2	01:45	01:55	54.1522	2.0638	54.1464	2.0573	23
25-11-2015	3762.02	64	1	DK2	02:08	02:18	54.1470	2.0626	54.1527	2.0566	23
25-11-2015	3762.02	65	1	DK2	02:29	02:39	54.1490	2.0565	54.1489	2.0684	23
25-11-2015	3761.08	66	1	DK2	16:28	16:38	54.1888	1.5748	54.1920	1.5851	26
25-11-2015	3761.08	67	1	DK2	16:53	17:03	54.1878	1.5817	54.1921	1.5725	26
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25-11-2015	3760.03	69	1	DK2	20:52	21:02	54.2034	0.8426	54.2085	0.8343	35
25-11-2015	3760.03	70	1	DK2	21:12	21:22	54.2056	0.8337	54.2061	0.8459	35
25-11-2015	3760.03	71	1	DK2	21:31	21:41	54.2080	0.8419	54.2036	0.8345	36
25-11-2015	3760.03	72	1	DK2	21:54	22:04	54.2067	0.8339	54.2052	0.8449	37
25-11-2015	3760.04	73	1	DK2	22:53	23:03	54.2595	0.8011	54.2652	0.7943	44
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26-11-2015	3760.05	77	1	DK2	00:36	00:46	54.3171	0.9248	54.3130	0.9352	44
26-11-2015	3760.05	78	1	DK2	00:59	01:09	54.3117	0.9292	54.3184	0.9260	42
26-11-2015	3861.02	79	1	GRB	16:17	16:19	54.6659	1.1154	54.6655	1.1161	32
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26-11-2015	3861.19	84	1	DK2	18:46	18:56	54.5651	1.2688	54.5691	1.2596	23
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26-11-2015	3861.34	87	1	GRB	20:06	20:08	54.5296	1.3629	54.5296	1.3633	28
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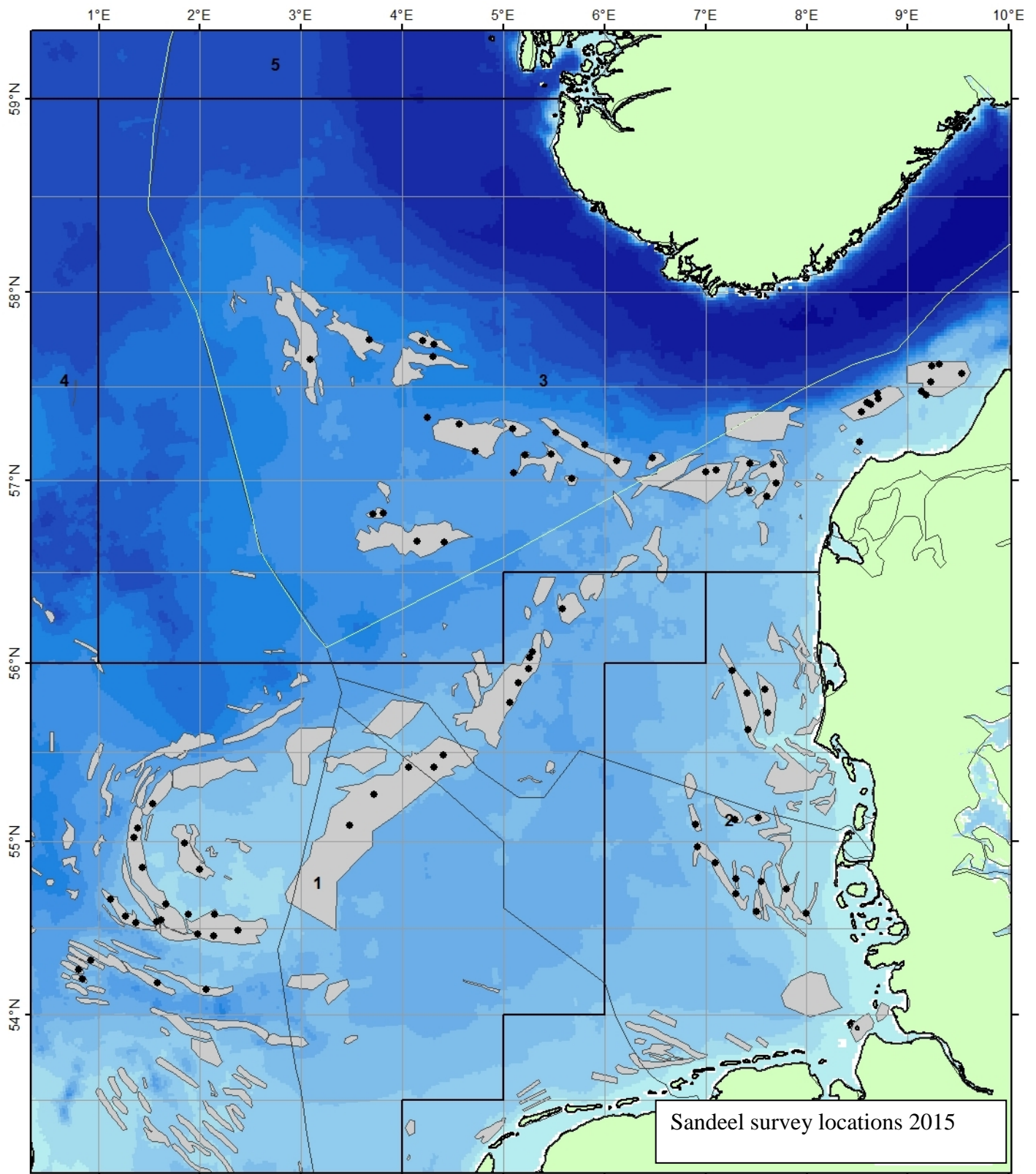
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27-11-2015	3861.14	100	1	DK2	16:26	16:36	54.8480	1.4286	54.8512	1.4399	26
27-11-2015	3861.14	101	1	DK2	16:47	16:57	54.8519	1.4347	54.8454	1.4304	23
27-11-2015	3861.14	102	1	DK2	17:07	17:17	54.8463	1.4376	54.8522	1.4314	22
27-11-2015	3861.17	103	1	DK2	19:22	19:32	54.8391	1.9912	54.8404	2.0034	21
27-11-2015	3861.17	104	1	DK2	19:40	19:50	54.8423	1.9988	54.8366	1.9931	20
27-11-2015	3861.17	105	1	DK2	20:00	20:10	54.8371	2.0006	54.8413	1.9912	20
28-11-2015	3861.32	106	1	DK2	00:07	00:17	54.9916	1.8432	54.9859	1.8505	24
28-11-2015	3861.32	107	1	DK2	00:27	00:37	54.9891	1.8504	54.9856	1.8404	24
28-11-2015	3861.32	108	1	DK2	00:48	00:58	54.9840	1.8465	54.9904	1.8471	23
30-11-2015	3961.29	109	1	GRB	16:13	16:15	55.0162	1.3520	55.0165	1.3521	29
30-11-2015	3961.29	110	1	DK2	16:25	16:35	55.0202	1.3545	55.0141	1.3484	28
30-11-2015	3961.29	111	1	DK2	16:44	16:54	55.0137	1.3544	55.0198	1.3501	28
30-11-2015	3961.29	112	1	DK2	17:04	17:14	55.0175	1.3470	55.0167	1.3500	28
30-11-2015	3961.28	113	1	GRB	17:42	17:44	55.0752	1.3814	55.0750	1.3817	33
30-11-2015	3961.28	114	1	DK2	17:54	18:04	55.0726	1.3765	55.0770	1.3854	32
30-11-2015	3961.28	115	1	DK2	18:14	18:24	55.0783	1.3816	55.0715	1.3818	33
30-11-2015	3961.28	116	1	DK2	18:36	18:46	55.0741	1.3855	55.0768	1.3798	33
30-11-2015	3961.42	117	1	GRB	20:14	20:16	55.2118	1.5317	55.2117	1.5328	34
30-11-2015	3961.42	118	1	DK2	20:26	20:36	55.2103	1.5368	55.2135	1.5268	33
30-11-2015	3961.42	119	1	DK2	20:46	20:56	55.2107	1.5265	55.2130	1.5384	35
30-11-2015	3961.42	120	1	DK2	21:08	21:18	55.2145	1.5328	55.2079	1.5303	34
01-12-2015	4264.05	121	3	GRB	15:49	15:53	56.6638	4.4165	56.6640	4.4157	48
01-12-2015	4264.05	122	3	DK2	16:04	16:14	56.6657	4.4129	56.6613	4.4218	49
01-12-2015	4264.05	123	3	DK2	16:26	16:36	56.6648	4.4209	56.6614	4.4100	48
01-12-2015	4264.05	124	3	DK2	16:47	16:57	56.6602	4.4155	56.6667	4.4184	49
01-12-2015	4264.03	125	3	GRB	18:00	18:03	56.6669	4.1511	56.6670	4.1503	47
01-12-2015	4264.03	126	3	DK2	18:12	18:22	56.6691	4.1441	56.6654	4.1548	46
01-12-2015	4264.03	127	3	DK2	18:34	18:44	56.6684	4.1527	56.6641	4.1432	46
01-12-2015	4264.03	128	3	DK2	18:55	19:05	56.6633	4.1494	56.6698	4.1484	46
01-12-2015	4263.03	129	3	GRB	20:43	20:53	56.8183	3.8165	56.8191	3.8162	54
01-12-2015	4263.03	130	3	DK2	20:57	21:07	56.8222	3.8151	56.8156	3.8184	53
01-12-2015	4263.03	131	3	DK4	22:28	22:33	56.8186	3.8200	56.8183	3.8135	53
01-12-2015	4263.03	132	3	DK4	22:46	22:51	56.8177	3.8160	56.8205	3.8203	53
01-12-2015	4263.02	133	3	GRB	23:39	23:42	56.8135	3.7118	56.8140	3.7124	55
01-12-2015	4263.02	134	3	DK4	23:54	23:59	56.8151	3.7108	56.8122	3.7138	55
02-12-2015	4263.02	135	3	DK4	00:46	00:51	56.8140	3.7132	56.8122	3.7084	55
02-12-2015	4263.02	136	3	DK4	01:18	01:23	56.8113	3.7122	56.8148	3.7120	52
02-12-2015	4463.05	137	3	DK4	16:21	16:31	57.6419	3.0868	57.6484	3.0906	60
02-12-2015	4463.05	138	3	DK4	16:44	16:54	57.6480	3.0868	57.6422	3.0914	60
02-12-2015	4463.05	139	3	DK4	17:06	17:16	57.6451	3.0934	57.6446	3.0809	60
02-12-2015	4463.03	140	3	DK4	19:40	19:50	57.7488	3.6672	57.7517	3.6790	63
02-12-2015	4463.03	141	3	DK4	20:03	20:13	57.7527	3.6733	57.7463	3.6694	65
02-12-2015	4463.03	142	3	DK4	20:25	20:35	57.7468	3.6763	57.7520	3.6676	64
02-12-2015	4464.06	143	3	DK4	22:45	22:55	57.7478	4.2016	57.7457	4.2133	68
02-12-2015	4464.06	144	3	DK4	23:09	23:19	57.7494	4.2109	57.7442	4.2029	68

02-12-2015	4464.06	145	3	DK4	23:34	23:44	57.7443	4.2084	57.7505	4.2051	67
03-12-2015	4464.05	146	3	DK4	00:19	00:29	57.7272	4.3110	57.7242	4.3212	65
03-12-2015	4464.04	147	3	DK4	00:44	00:54	57.7275	4.3217	57.7233	4.3121	69
03-12-2015	4464.04	148	3	DK4	01:07	01:17	57.7222	4.3177	57.7289	4.3166	64
03-12-2015	4464.05	149	3	DK4	02:01	02:11	57.6486	4.3111	57.6420	4.3106	67
03-12-2015	4464.05	150	3	DK4	02:26	02:36	57.6436	4.3142	57.6468	4.3031	66
03-12-2015	4464.05	151	3	DK4	02:50	03:00	57.6438	4.3069	57.6476	4.3175	66
03-12-2015	4364.08	152	3	DK4	16:02	16:12	57.3374	4.2583	57.3331	4.2486	64
03-12-2015	4364.08	153	3	DK4	16:25	16:35	57.3322	4.2528	57.3390	4.2522	63
03-12-2015	4364.08	154	3	DK4	16:47	16:57	57.3368	4.2479	57.3335	4.2579	64
03-12-2015	4364.07	155	3	DK4	18:10	18:20	57.3016	4.5612	57.3015	4.5737	56
03-12-2015	4364.07	156	3	DK4	18:34	18:44	57.3036	4.5689	57.2985	4.5608	56
03-12-2015	4364.07	157	3	DK4	18:56	19:06	57.2977	4.5691	57.3043	4.5650	56
03-12-2015	4364.05	158	3	DK4	20:26	20:36	57.1605	4.7254	57.1544	4.7307	53
03-12-2015	4364.05	159	3	DK4	20:50	21:00	57.1579	4.7340	57.1559	4.7217	52
03-12-2015	4364.05	160	3	DK4	21:12	21:22	57.1532	4.7251	57.1599	4.7296	52
03-12-2015	4365.12	161	3	DK4	23:00	23:10	57.2738	5.0903	57.2766	5.1022	50
07-12-2015	4365.12	162	3	DK4	05:00	05:10	57.2725	5.0927	57.2763	5.1037	50
07-12-2015	4365.12	163	3	DK4	05:22	05:32	57.2784	5.1016	57.2720	5.0956	50
07-12-2015	4365.12	164	3	DK4	05:45	05:55	57.2720	5.1023	57.2774	5.0951	50
07-12-2015	4365.01	165	3	DK4	15:51	16:01	57.2579	5.5207	57.2530	5.5289	54
07-12-2015	4365.01	166	3	DK4	16:13	16:23	57.2553	5.5303	57.2541	5.5182	54
07-12-2015	4365.01	167	3	DK4	16:36	16:46	57.2530	5.5245	57.2597	5.5285	54
07-12-2015	4365.04	168	3	DK4	17:52	18:02	57.1455	5.4774	57.1390	5.4763	43
07-12-2015	4365.04	169	3	DK4	18:14	18:24	57.1402	5.4808	57.1438	5.4706	44
07-12-2015	4365.04	170	3	DK4	18:38	18:48	57.1398	5.4713	57.1438	5.4815	43
07-12-2015	4365.08	171	3	DK4	20:02	20:12	57.1317	5.2238	57.1321	5.2114	50
07-12-2015	4365.08	172	3	DK4	20:28	20:38	57.1297	5.2159	57.1361	5.2211	50
07-12-2015	4365.08	173	3	DK4	20:50	21:00	57.1350	5.2162	57.1289	5.2213	52
07-12-2015	4365.13	174	3	DK4	21:54	22:04	57.0407	5.1039	57.0353	5.0968	51
07-12-2015	4365.13	175	3	DK4	22:24	22:34	57.0327	5.1018	57.0400	5.0979	52
07-12-2015	4365.13	176	3	DK4	22:51	23:01	57.0389	5.0952	57.0347	5.1055	54
08-12-2015	4365.11	177	3	DK4	01:14	01:24	57.0065	5.6749	57.0082	5.6871	48
08-12-2015	4365.11	178	3	DK4	01:35	01:45	57.0105	5.6835	57.0038	5.6799	47
08-12-2015	4365.11	179	3	DK4	01:58	02:08	57.0043	5.6844	57.0109	5.6796	47
08-12-2015	4365.1	180	3	DK4	03:40	03:50	57.1888	5.8075	57.1953	5.8117	51
08-12-2015	4365.1	181	3	DK4	04:01	04:11	57.1963	5.8057	57.1912	5.8137	52
08-12-2015	4365.1	182	3	DK4	04:22	04:32	57.1937	5.8164	57.1930	5.8041	52
10-12-2015	4368.03	201	3	DK4	16:00	16:10	57.2045	8.5226	57.2109	8.5155	18
10-12-2015	4368.03	202	3	DK4	16:20	16:30	57.2069	8.5166	57.2069	8.5313	18
10-12-2015	4368.03	203	3	DK4	16:43	16:53	57.2103	8.5259	57.2049	8.5181	18
10-12-2015	4368.05	204	3	DK4	18:05	18:15	57.3641	8.5421	57.3722	8.5484	29
10-12-2015	4368.05	205	3	DK4	18:29	18:39	57.3711	8.5427	57.3641	8.5483	28
10-12-2015	4368.05	206	3	DK4	18:43	18:53	57.3680	8.5516	57.3685	8.5383	27
10-12-2015	4368.07	207	3	DK4	20:11	20:21	57.4142	8.5976	57.4168	8.6134	31
10-12-2015	4368.07	208	3	DK4	20:31	20:41	57.4188	8.6063	57.4125	8.6014	32
10-12-2015	4368.07	209	3	DK4	20:51	21:01	57.4142	8.6056	57.4208	8.6016	27
10-12-2015	4368.06	210	3	DK4	21:13	21:23	57.4091	8.6293	57.4043	8.6406	21
10-12-2015	4368.06	211	3	DK4	21:36	21:46	57.4074	8.6435	57.4045	8.6321	21
10-12-2015	4368.06	212	3	DK4	21:55	22:05	57.4017	8.6376	57.4088	8.6381	23

10-12-2015	4368.09	213	3	DK4	22:27	22:37	57.4318	8.7067	57.4351	8.7217	22
10-12-2015	4368.09	214	3	DK4	22:51	23:01	57.4367	8.7160	57.4303	8.7122	25
10-12-2015	4368.09	215	3	DK4	23:09	23:19	57.4307	8.7172	57.4368	8.7087	23
11-12-2015	4368.08	216	3	DK4	00:30	00:40	57.4664	8.6919	57.4632	8.7064	38
11-12-2015	4368.08	217	3	DK4	00:51	01:01	57.4685	8.7065	57.4629	8.6973	35
11-12-2015	4368.08	218	3	DK4	01:09	01:19	57.4623	8.7009	57.4701	8.7008	36
08-12-2015	4366.06	183	3	DK4	15:50	16:00	57.1054	6.1245	57.0988	6.1257	48
08-12-2015	4366.06	184	3	DK4	16:11	16:21	57.1011	6.1298	57.1035	6.1184	46
08-12-2015	4366.06	185	3	DK4	16:32	16:42	57.1004	6.1195	57.1031	6.1305	45
08-12-2015	4366.13	186	3	DK4	18:01	18:11	57.1196	6.4640	57.1201	6.4766	52
08-12-2015	4366.13	187	3	DK4	18:23	18:33	57.1229	6.4738	57.1168	6.4681	52
08-12-2015	4366.13	188	3	DK4	18:43	18:53	57.1164	6.4736	57.1230	6.4695	53
08-12-2015	4367.02	189	3	DK4	21:00	21:10	57.0437	6.9976	57.0413	7.0100	36
08-12-2015	4367.02	190	3	DK4	21:20	21:30	57.0448	7.0031	57.0401	6.9990	38
08-12-2015	4367.02	191	3	DK4	21:39	21:49	57.0392	7.0031	57.0461	7.0048	37
08-12-2015	4367.06	192	3	DK4	22:17	22:27	57.0518	7.0982	57.0517	7.1107	23
08-12-2015	4367.06	193	3	DK4	22:38	22:48	57.0550	7.1077	57.0489	7.1020	24
08-12-2015	4367.06	194	3	DK4	22:56	23:06	57.0483	7.1073	57.0545	7.1022	23
09-12-2015	4367.16	195	3	DK4	00:25	00:35	57.0908	7.4300	57.0921	7.4433	23
09-12-2015	4367.16	196	3	DK4	00:46	00:56	57.0941	7.4390	57.0881	7.4339	27
09-12-2015	4367.16	197	3	DK4	01:06	01:16	57.0896	7.4398	57.0950	7.4332	23
09-12-2015	4367.23	198	3	DK4	02:13	02:23	57.0825	7.6670	57.0808	7.6800	5
09-12-2015	4367.23	199	3	DK4	02:33	02:43	57.0842	7.6764	57.0799	7.6672	23
09-12-2015	4367.23	200	3	DK4	02:52	03:02	57.0771	7.6731	57.0842	7.6735	23
11-12-2015	4469.02	219	3	DK4	15:35	15:45	57.5713	9.5418	57.5728	9.5295	16
11-12-2015	4469.02	220	3	DK4	15:53	16:03	57.5692	9.5318	57.5760	9.5386	16
11-12-2015	4469.02	221	3	DK4	16:10	16:20	57.5767	9.5324	57.5696	9.5350	15
11-12-2015	4469.03	222	3	DK4	17:24	17:34	57.6157	9.3161	57.6193	9.3047	19
11-12-2015	4469.03	223	3	DK4	17:42	17:52	57.6162	9.3054	57.6200	9.3187	18
11-12-2015	4469.03	224	3	DK4	18:01	18:11	57.6206	9.3121	57.6140	9.3121	22
11-12-2015	4469.04	225	3	DK4	18:35	18:45	57.6119	9.2418	57.6119	9.2287	18
11-12-2015	4469.04	226	3	DK4	18:53	19:03	57.6086	9.2291	57.6149	9.2364	18
11-12-2015	4469.04	227	3	DK4	19:13	19:23	57.6145	9.2303	57.6077	9.2341	20
11-12-2015	4469.01	228	3	DK4	20:42	20:52	57.5281	9.2244	57.5230	9.2339	16
11-12-2015	4469.01	229	3	DK4	21:00	21:10	57.5266	9.2371	57.5241	9.2254	15
11-12-2015	4469.01	230	3	DK4	21:17	21:27	57.5214	9.2282	57.5280	9.2326	16
11-12-2015	4369.01	231	3	DK4	22:05	22:15	57.4779	9.1448	57.4734	9.1346	16
11-12-2015	4369.01	232	3	DK4	22:23	22:33	57.4714	9.1406	57.4785	9.1384	16
11-12-2015	4369.01	233	3	DK4	22:39	22:49	57.4773	9.1342	57.4730	9.1454	16
11-12-2015	4369.02	234	3	DK4	23:14	23:24	57.4595	9.1813	57.4536	9.1885	16
11-12-2015	4369.02	235	3	DK4	23:31	23:41	57.4565	9.1924	57.4551	9.1792	14
11-12-2015	4369.02	236	3	DK4	23:50	00:00	57.4519	9.1836	57.4590	9.1870	15
12-12-2015	4267.25	237	3	GRB	15:32	15:34	56.9829	7.6969	56.9830	7.6977	18
12-12-2015	4267.25	238	3	DK4	15:41	15:51	56.9846	7.6901	56.9814	7.7024	18
12-12-2015	4267.25	239	3	DK4	16:00	16:10	56.9848	7.7012	56.9808	7.6907	18
12-12-2015	4267.25	240	3	DK4	16:18	16:28	56.9799	7.6966	56.9875	7.6958	18
12-12-2015	4267.27	241	3	GRB	17:10	17:20	56.9125	7.5956	56.9123	7.6045	20
12-12-2015	4267.27	242	3	DK4	17:20	17:30	56.9138	7.5967	56.9121	7.6097	20
12-12-2015	4267.27	243	3	DK4	17:37	17:47	56.9151	7.6087	56.9105	7.5997	20
12-12-2015	4267.27	244	3	DK4	17:56	18:06	56.9100	7.6058	56.9000	7.6012	20

12-12-2015	4267.12	245	3	GRB	19:27	19:30	56.9422	7.4305	56.9420	7.4308	25
12-12-2015	4267.12	246	3	DK4	19:39	19:49	56.9459	7.4289	56.9389	7.4303	26
12-12-2015	4267.12	247	3	DK4	19:58	20:08	56.9407	7.4351	56.9435	7.4229	22
12-12-2015	4267.12	248	3	DK4	20:17	20:27	56.9404	7.4256	56.9445	7.4361	26
13-12-2015	4067.05	249	2	GRB	15:44	15:46	55.9553	7.2593	55.9552	7.2593	22
13-12-2015	4067.05	250	2	DK4	15:51	16:01	55.9518	7.2595	55.9588	7.2583	22
13-12-2015	4067.05	251	2	DK4	16:09	16:19	55.9574	7.2639	55.9531	7.2639	22
13-12-2015	4067.05	252	2	DK4	16:27	16:37	55.9563	7.2650	55.9547	7.2526	22
13-12-2015	4067.04	253	2	DK4	17:42	17:52	55.8316	7.4067	55.8272	7.4164	21
13-12-2015	4067.04	254	2	DK4	18:00	18:10	55.8305	7.4188	55.8280	7.4070	21
13-12-2015	4067.04	255	2	DK4	18:18	18:28	55.8253	7.4098	55.8319	7.4139	21
13-12-2015	4067.01	256	2	DK4	19:31	19:41	55.8511	7.5847	55.8540	7.5962	16
13-12-2015	4067.01	257	2	DK4	19:50	20:00	55.8557	7.5921	55.8487	7.5917	15
13-12-2015	4067.01	258	2	DK4	20:07	20:17	55.8507	7.5968	55.8547	7.5873	15
13-12-2015	4067.02	259	2	GRB	21:17	21:18	55.7204	7.6216	55.7199	7.6200	11
13-12-2015	4067.02	260	2	DK4	21:25	21:35	55.7209	7.6130	55.7193	7.6249	10
13-12-2015	4067.02	261	2	DK4	21:43	21:53	55.7227	7.6244	55.7180	7.6151	12
13-12-2015	4067.02	262	2	DK4	22:00	22:10	55.7165	7.6191	55.7235	7.6181	11
13-12-2015	4067.07	263	2	GRB	23:09	23:11	55.6264	7.4248	55.6263	7.4246	12
13-12-2015	4067.07	264	2	DK4	23:18	23:28	55.6285	7.4191	55.6234	7.4311	12
13-12-2015	4067.07	265	2	DK4	23:41	23:51	55.6277	7.4300	55.6255	7.4181	12
14-12-2015	4067.07	266	2	DK4	00:02	00:12	55.6223	7.4219	55.6293	7.4249	12
14-12-2015	3867.11	267	2	DK4	15:39	15:49	54.5895	7.9920	54.5829	7.9975	7
14-12-2015	3867.11	268	2	DK4	15:55	16:05	54.5861	7.9996	54.5858	7.9875	7
14-12-2015	3867.11	269	2	DK4	16:12	16:22	54.5826	7.9900	54.5882	7.9975	7
14-12-2015	3867.1	270	2	DK4	17:27	17:37	54.7226	7.8105	54.7264	7.8007	14
14-12-2015	3867.1	271	2	DK4	17:44	17:54	54.7231	7.8001	54.7277	7.8101	14
14-12-2015	3867.1	272	2	DK4	18:01	18:11	54.7285	7.8053	54.7219	7.8024	14
14-12-2015	3867.07	273	2	DK4	19:13	19:23	54.7699	7.5556	54.7728	7.5435	17
14-12-2015	3867.07	274	2	DK4	19:31	19:41	54.7694	7.5453	54.7739	7.5550	18
14-12-2015	3867.07	275	2	DK4	19:50	20:00	54.7742	7.5489	54.7673	7.5512	18
14-12-2015	3867.06	276	2	GRB	21:10	21:12	54.5964	7.5063	54.5960	7.5065	19
14-12-2015	3867.06	277	2	DK4	21:19	21:29	54.5943	7.5038	54.6005	7.5099	20
14-12-2015	3867.06	278	2	DK4	21:38	21:48	54.5985	7.5053	54.5916	7.5074	20
14-12-2015	3867.06	279	2	DK4	21:56	22:06	54.5961	7.5106	54.5976	7.4988	20
14-12-2015	3867.02	280	2	GRB	23:13	23:15	54.6970	7.2993	54.6971	7.2994	21
14-12-2015	3867.02	281	2	DK4	23:22	23:32	54.6977	7.2938	54.6955	7.3057	21
14-12-2015	3867.02	282	2	DK4	23:41	23:51	54.6989	7.3022	54.6941	7.2930	21
14-12-2015	3867.02	283	2	DK4	23:58	00:08	54.6939	7.2995	54.7007	7.2955	21
15-12-2015	3867.05	284	2	GRB	00:42	00:44	54.7870	7.3008	54.7870	7.3010	22
15-12-2015	3867.05	285	2	DK4	00:51	01:01	54.7897	7.2989	54.7829	7.3024	22
15-12-2015	3867.05	286	2	DK4	01:08	01:18	54.7862	7.3065	54.7882	7.2948	22
15-12-2015	3867.05	287	2	DK4	01:27	01:37	54.7861	7.2972	54.7904	7.3078	22
14-12-2015	3867.01	288	2	DK4	15:34	15:44	54.8786	7.1013	54.8750	7.0917	23
15-12-2015	3867.01	289	2	DK4	15:52	16:02	54.8734	7.0953	54.8803	7.0962	23
11-12-2015	3867.01	290	2	DK4	16:10	16:20	54.8794	7.0915	54.8747	7.0995	23
15-12-2015	3866.01	291	2	GRB	17:13	17:15	54.9658	6.9245	54.9662	6.9235	26
15-12-2015	3866.01	292	2	DK4	17:19	17:29	54.9649	6.9268	54.9631	6.9310	26
15-12-2015	3866.01	293	2	DK4	17:41	17:51	54.9669	6.9188	54.9634	6.9188	26
15-12-2015	3866.01	294	2	DK4	18:00	18:10	54.9624	6.9246	54.9693	6.9259	28

15-12-2015	3966.05	295	2	GRB	19:00	19:02	55.0930	6.9032	55.0931	6.9026	25
15-12-2015	3966.05	296	2	DK4	19:11	19:21	55.0959	6.9034	55.1063	6.9085	24
15-12-2015	3966.05	297	2	DK4	19:27	19:37	55.0921	6.9110	55.0935	6.8992	24
15-12-2015	3966.05	298	2	DK4	19:47	19:57	55.0901	6.9019	55.0948	6.9107	25
15-12-2015	3967.02	299	2	DK4	22:09	22:19	55.1199	7.2845	55.1265	7.2961	18
15-12-2015	3967.02	300	2	DK4	22:28	22:38	55.1254	7.2917	55.1221	7.3026	18
15-12-2015	3967.02	301	2	DK4	22:45	22:55	55.1253	7.3009	55.1229	7.2890	18
15-12-2015	3967.06	302	2	DK4	23:54	00:04	55.1306	7.5180	55.1309	7.5304	19
16-12-2015	3967.06	303	2	DK4	00:12	00:22	55.1334	7.5257	55.1270	7.5224	19
16-12-2015	3967.06	304	2	DK4	00:29	00:39	55.1278	7.5276	55.1341	7.5211	19



Others

A cruise summary report will be delivered online to

http://seadata.bsh.de/csr/online/V1_index.html.