

## Institute of Sea Fisheries

Palmaille 9, 22767 Hamburg Telephone +4940 38905-166 Telefax +4940 38905-263 18.12.2013 Az.: Dr Ro/v.S./3720

### Cruise report FRV "Walther Herwig III" Cruise 368 18.09. – 27.09.2013

## International Herring Larvae Survey in the North Sea

Scientist in charge: Dr. Norbert Rohlf

### Summary

The cruise was part of the German contribution to the international herring larvae surveys in the North Sea (IHLS). These surveys are conducted during the autumn and winter herring spawning activity. The studies monitor the spatial distribution and abundance of herring larvae on an annual basis. They are coordinated by ICES. The survey time series dates back to 1972. Almost all countries surrounding the North Sea have participated in the history of the IHLS, while in recent years the Netherlands and Germany contribute most to the surveys. The resulting survey index is used as an important estimator of herring spawning stock biomass and provides valuable information for herring stock assessment and the fixation of fishing quotas.

All stations could be covered as scheduled and enabled an adequate description of the spatial extension on newly hatched larvae. They were abundant in almost the whole sampling area and very large quantities were collected during the plankton hauls.

Since the last four years, a continuous rise of herring larvae abundance is found in the Orkney/Shetlands area, increasing from 9,000 larvae in 2010 to 68,000 in this year's campaign.

However, conclusions for North Sea herring stock spawning biomass can only be drawn when information of larvae abundance from all spawning areas become available prior to the herring assessment working group meeting in March 2014.

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#### Verteiler:

TI - Institut für Seefischerei  
Saßnitzer Seefischerei e. G.  
DFFU

#### per E-Mail:

Bundesanstalt für Landwirtschaft und Ernährung, Hamburg  
Schiffsführung FFS "Walther Herwig"  
BMEL, Ref. 614  
BMEL, Ref. 613  
TI – Präsidialbüro (Michael Welling)  
TI – Verwaltung Hamburg  
TI - für Fischereiökologie  
TI - für Ostseefischerei Rostock  
TI – FIZ-Fischerei  
TI - PR  
MRI - BFEL HH, FB Fischqualität  
N. Rohlf, SF - Reiseplanung Forschungsschiffe

Fahrtteilnehmer  
Bundesamt für Seeschifffahrt und Hydrographie, Hamburg  
Mecklenburger Hochseefischerei GmbH, Rostock  
Doggerbank Seefischerei GmbH, Bremerhaven  
Deutscher Fischerei - Verband e. V., Hamburg  
Leibniz-Institut für Meereswissenschaften IFM-GEOMAR  
H. Cammann-Oehne, BSH  
Deutscher Hochseefischerei-Verband e.V.

## 2. Research programme

The cruise was a component of the international herring larvae surveys. Parts of ICES area IVa should be sampled by double oblique tows with the "Nackthai" (modified GULF III sampler), resulting in herring larval abundance estimates and spatial distribution.

In total, 92 plankton tows were done within the IHLS framework. Physical measurements, e.g. temperature, salinity and conductivity, were conducted via a CTD mounted directly onto the gulf sampler. Sampling was achieved according to the manual of the herring larvae surveys.

## 3. Narrative

FRV "Walther Herwig III" left Bremerhaven on Wednesday, 09/18/13, at noon. With regard to upcoming west wind fronts, it was decided to steam through the Pentland Firth and start sampling on the southwest coast of the Orkneys, where the vessel arrived on Friday morning, 09/20/13. This decision enabled us to cover stations on the west and north of Scotland before westerly wind stress increased and to continue the field work under more sheltered conditions on the east side of the area of investigation. After 70 plankton hauls, technical problems occurred with the CTD probe. Thus profiles on water temperature and salinity are not available for hauls 71, 74, 76 and thereafter.

Having done 92 plankton hauls, the IHLS programme was finished on Tuesday, 09/24/13. Eleven additional hauls were conducted to collect material for fish larvae stomach content analyses and the impact of conservation fluids on the preservation of this material.

FRV "Walther Herwig III" was back in Bremerhaven on Thursday evening (09/26/13) and the scientists left the vessel the day after.

## 4. Preliminary results

Fish eggs and larvae were sorted from the plankton samples after the end of the cruise. Herring larvae were counted and their abundance per square metre estimated. Due to the large amount of caught larvae, length measurements are still in progress and thus length-frequency plots cannot be shown yet. However, as anticipated, it is obvious from the samples that the majority of larvae are newly hatched ones.

Since the last four years, a continuous rise of herring larvae abundance can be seen in the Orkney/Shetlands area, increasing from 9,000 larvae in 2010 to 68,000 in this year's campaign. The cruise track by haul number and the spatial distribution of herring larvae are given in Figure 1. Figure 2 depicts the distribution of near-bottom water temperature and salinity. Abundance estimates and available physical water parameters are listed in Table 1.

## 5. Participants

Name	Institution	Function
1. Norbert Rohlf	TI-SF	Cruise leader
2. Birgit Suer	TI-SF	Technician
3. Michael Sasse	TI-SF	Technician
4. Inken Rottgardt	TI-SF	Student
5. Szymon Urbanski	TI-SF	Student
6. Sven Matern	TI-SF	Volunteer
7. Heike Schwermer	TI-SF	Volunteer

## 6. Acknowledgement

Thanks to Captain Jürgen Vandrei and FRV "Walther Herwig III" crew members for their great support and hospitality and to all participants for their reliable and responsible teamwork.

## 7. Tables and Figures

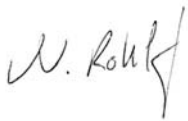
Table 1: Main data of Ichthyoplankton hauls made during WH 368. Hauls 1-92 are part of the IHLS programme, while hauls 93-103 were done additionally and aimed to the collection of fish larvae for stomach content analyses (na = not available).

Stat. Nr.	Haul Nr.	Lat. (° N)	Long.	E/ W	Date (UTC)	Time (UTC)	Duration (min)	Water depth (m)	Catch depth (m)	Flow (m <sup>3</sup> )	Hela (n/m <sup>2</sup> )	Surface		Bottom	
												T (°C)	Sal (psu)	T (°C)	Sal (psu)
597	1	58°45.03	003°28.94	W	20.09.13	05:16	12.54	81	64	70.0	525	12.7	34.83	12.7	34.87
598	2	58°45.07	003°46.95	W	20.09.13	06:10	14.01	76	76	72.3	104	12.9	34.71	12.6	35.07
599	3	58°53.77	003°50.15	W	20.09.13	07:10	16.57	90	87	94.5	31	12.9	34.88	12.5	35.11
600	4	58°54.56	003°31.88	W	20.09.13	08:12	11.54	70	66	63.5	114	13.0	34.73	13.0	34.78
601	5	59°03.89	003°29.53	W	20.09.13	09:09	13.49	69	66	71.3	880	12.9	34.77	12.9	34.77
602	6	59°04.72	003°48.87	W	20.09.13	10:17	18.46	97	94	94.4	12	12.9	34.89	12.3	35.16
603	7	59°14.44	003°51.16	W	20.09.13	11:18	21.10	104	101	111.9	1	12.3	35.15	11.7	35.30
604	8	59°15.16	003°31.74	W	20.09.13	12:21	15.18	87	84	77.8	698	12.3	35.15	11.9	35.28
605	9	59°14.76	003°11.26	W	20.09.13	13:23	10.44	60	57	60.1	2204	12.9	34.78	12.7	34.94
606	10	59°23.64	003°09.97	W	20.09.13	14:18	13.06	68	65	67.4	831	12.6	34.99	12.2	35.17
607	11	59°24.94	003°28.06	W	20.09.13	15:17	16.57	99	96	80.1	151	12.6	35.05	11.7	35.23
608	12	59°25.37	003°48.75	W	20.09.13	16:26	20.58	138	109	100.9	0	12.1	35.23	10.3	35.33
609	13	59°34.47	003°50.12	W	20.09.13	17:40	20.06	152	100	97.6	23	12.3	35.14	11.2	35.24
610	14	59°34.98	003°31.60	W	20.09.13	18:41	22.16	136	110	115.7	172	12.2	35.17	11.8	35.21
611	15	59°44.27	003°29.48	W	20.09.13	19:42	12.04	89	62	64.5	448	12.2	35.10	12.0	35.17
612	16	59°44.51	003°48.23	W	20.09.13	20:55	23.48	141	110	129.5	195	12.1	35.08	11.8	35.18
613	17	59°53.95	003°50.47	W	20.09.13	22:00	22.44	148	110	115.9	5	11.9	35.36	9.8	35.43
614	18	59°55.08	003°31.85	W	20.09.13	23:03	22.37	112	109	122.9	12	11.9	35.32	9.9	35.44
615	19	59°55.01	003°11.55	W	21.09.13	00:04	14.21	77	74	75.7	430	12.1	35.08	11.5	35.22
616	20	59°55.14	002°51.25	W	21.09.13	01:02	13.25	71	68	73.1	213	12.1	35.10	11.9	35.17
617	21	59°45.66	002°49.78	W	21.09.13	02:03	10.46	63	60	54.9	107	12.3	35.05	12.4	35.06
618	22	59°44.87	003°08.56	W	21.09.13	03:02	8.03	50	47	40.8	571	12.2	35.08	12.2	35.09
619	23	59°35.69	003°10.04	W	21.09.13	03:57	21.01	102	99	103.9	586	12.4	35.04	12.4	35.07
620	24	59°34.98	002°51.25	W	21.09.13	05:12	11.36	65	62	62.5	447	12.4	35.01	12.4	35.03
621	25	59°26.03	002°49.93	W	21.09.13	06:11	8.16	45	42	42.3	1506	12.7	34.85	12.7	34.87
622	26	59°25.18	002°30.85	W	21.09.13	07:01	5.57	37	34	30.7	468	12.7	34.86	12.7	34.86
623	27	59°34.24	002°30.09	W	21.09.13	07:56	14.57	82	74	82.9	2484	12.3	35.14	12.3	35.15
624	28	59°44.24	002°29.91	W	21.09.13	08:57	16.18	85	78	89.5	68	12.2	35.15	12.1	35.20
625	29	59°54.16	002°30.26	W	21.09.13	10:00	17.32	85	82	90.4	46	12.2	35.16	12.0	35.23
626	30	59°55.10	002°11.49	W	21.09.13	10:59	16.57	88	85	88.9	1492	11.8	35.26	11.7	35.28
627	31	59°46.20	002°09.53	W	21.09.13	11:59	17.42	96	93	87.6	33	11.9	35.25	11.8	35.26
628	32	59°35.72	002°10.89	W	21.09.13	13:02	16.55	86	83	88.1	11614	12.1	35.19	12.1	35.19
629	33	59°34.90	001°51.19	W	21.09.13	14:04	16.34	89	82	85.2	167	12.0	35.23	12.0	35.23
630	34	59°44.30	001°50.18	W	21.09.13	15:03	20.51	99	97	107.1	137	11.6	35.29	11.6	35.28
631	35	59°54.25	001°50.11	W	21.09.13	16:03	20.25	93	89	106.4	399	11.4	35.29	11.4	35.29
632	36	59°54.93	001°30.36	W	21.09.13	17:28	21.55	103	100	105.5	1142	11.1	35.32	11.0	35.33
633	37	59°45.88	001°29.97	W	21.09.13	18:42	13.21	83	70	68.6	603	11.4	35.30	11.4	35.30
634	38	59°55.00	001°09.88	W	21.09.13	20:09	16.04	94	88	82.6	217	11.8	35.28	11.1	35.31
635	39	59°45.81	001°09.91	W	21.09.13	21:08	17.26	103	91	86.6	24	12.0	35.32	9.0	35.37
636	40	59°35.93	001°10.03	W	21.09.13	22:10	21.50	108	105	105.8	148	11.9	35.30	9.0	35.34
637	41	59°35.30	001°28.82	W	21.09.13	23:26	18.23	88	85	91.7	1181	11.7	35.23	11.7	35.26
638	42	59°26.09	001°11.12	W	22.09.13	00:42	20.25	116	110	96.9	117	11.9	35.30	8.8	35.34
639	43	59°25.01	001°28.51	W	22.09.13	01:49	15.23	82	79	76.5	487	11.7	35.18	11.7	35.26
640	44	59°25.03	001°48.15	W	22.09.13	02:51	18.33	93	90	90.0	259	12.0	35.21	11.9	35.24
641	45	59°25.09	002°08.38	W	22.09.13	03:57	13.49	70	67	66.8	622	12.4	35.07	12.4	35.07

Table 1 continued

Stat. Nr.	Haul Nr.	Lat. (° N)	Long.	E/ W	Date (UTC)	Time (UTC)	Duration (min)	Water depth (m)	Catch depth (m)	Flow (m <sup>3</sup> )	Hela (n/m <sup>2</sup> )	T (°C)	Sal (psu)	T (°C)	Sal (psu)
642	46	59°15.92	002°09.52	W	22.09.13	05:06	14.17	81	73	69.8	507	12.6	34.92	12.6	34.94
643	47	59°15.14	001°51.61	W	22.09.13	06:05	11.54	72	69	62.4	1318	12.3	35.08	12.3	35.14
644	48	59°04.94	001°48.82	W	22.09.13	07:15	13.46	76	72	67.1	2866	12.1	35.17	11.9	35.23
645	49	59°04.83	002°08.78	W	22.09.13	08:21	12.57	76	72	63.9	1334	12.4	35.06	12.4	35.07
646	50	59°04.99	002°23.73	W	22.09.13	09:10	11.34	63	60	58.5	3910	12.6	34.88	12.6	34.91
647	51	58°55.52	002°29.91	W	22.09.13	10:07	12.47	68	65	65.2	2435	12.6	34.87	12.5	35.01
648	52	58°54.99	002°12.05	W	22.09.13	11:03	14.55	75	72	76.5	1010	12.4	35.04	12.4	35.06
649	53	58°54.97	001°51.58	W	22.09.13	12:04	16.28	86	83	81.7	600	12.4	35.07	12.1	35.18
650	54	58°54.52	001°31.20	W	22.09.13	13:08	22.56	102	99	126.3	779	12.0	35.19	11.5	35.27
651	55	59°04.33	001°30.10	W	22.09.13	14:17	19.27	97	94	87.1	6092	12.2	35.18	11.3	35.28
652	56	59°14.41	001°29.74	W	22.09.13	15:23	19.39	90	87	95.1	967	11.8	35.23	11.6	35.26
653	57	59°15.01	001°11.64	W	22.09.13	16:25	19.31	110	93	91.2	246	12.0	35.30	8.5	35.32
654	58	59°05.66	001°10.01	W	22.09.13	17:29	22.08	114	109	108.5	308	12.1	35.30	8.1	35.30
655	59	58°55.92	001°10.01	W	22.09.13	18:34	21.57	117	110	109.0	35	12.0	35.27	8.2	35.29
656	60	58°45.76	001°09.30	W	22.09.13	19:40	18.38	106	101	91.3	111	11.9	35.25	9.1	35.30
657	61	58°44.82	001°28.30	W	22.09.13	20:45	18.07	106	101	87.4	625	11.9	35.17	11.0	35.29
658	62	58°44.73	001°48.46	W	22.09.13	21:54	16.33	85	82	77.4	725	12.3	35.08	11.5	35.25
659	63	58°44.60	002°09.10	W	22.09.13	23:03	14.59	75	72	74.5	955	12.4	35.09	11.9	35.19
660	64	58°44.68	002°28.98	W	23.09.13	00:10	14.44	70	67	71.1	1090	12.6	34.95	12.3	35.10
661	65	58°45.21	002°43.89	W	23.09.13	01:01	13.12	70	67	55.2	842	12.7	34.90	12.5	34.98
662	66	58°33.98	002°47.98	W	23.09.13	02:11	13.29	61	58	69.2	686	12.7	34.88	12.6	34.90
663	67	58°34.91	002°31.13	W	23.09.13	03:21	11.20	69	66	53.9	405	12.8	34.85	12.7	34.86
664	68	58°35.06	002°10.96	W	23.09.13	04:23	14.45	71	68	70.5	490	12.7	34.96	12.0	35.13
665	69	58°35.01	001°51.21	W	23.09.13	05:25	17.50	92	88	80.2	529	12.5	35.02	11.4	35.25
666	70	58°34.99	001°31.69	W	23.09.13	06:28	18.28	107	102	96.3	248	12.0	35.18	10.8	35.28
667	71	58°35.02	001°11.45	W	23.09.13	07:31	17.53	102	97	93.1	151	12.22	35.12	na	na
668	72	58°25.74	001°09.54	W	23.09.13	08:35	17.19	98	93	90.6	204	12.17	35.15	10.84	35.25
669	73	58°25.09	001°28.29	W	23.09.13	09:38	17.47	100	97	92.1	103	12.44	35.08	10.91	35.25
670	74	58°24.74	001°47.78	W	23.09.13	10:39	17.53	93	90	91.9	385	12.39	35.11	na	na
671	75	58°24.86	002°08.33	W	23.09.13	11:46	15.08	78	75	83.7	493	12.87	34.83	12.70	34.88
672	76	58°24.32	002°28.96	W	23.09.13	12:51	13.24	62	59	82.8	348	12.86	34.85	na	na
673	77	58°25.01	002°49.12	W	23.09.13	13:53	12.38	59	57	66.0	357	na	na	na	na
674	78	58°15.31	003°09.24	W	23.09.13	15:08	9.12	58	53	50.1	204	na	na	na	na
675	79	58°05.65	003°29.50	W	23.09.13	16:25	6.43	37	33	34.2	2	na	na	na	na
676	80	58°04.31	003°10.89	W	23.09.13	17:22	8.09	43	39	37.8	15	na	na	na	na
677	81	58°04.20	002°51.23	W	23.09.13	18:16	5.17	39	35	26.3	93	na	na	na	na
678	82	58°04.98	002°30.83	W	23.09.13	19:18	9.34	59	56	46.8	5383	na	na	na	na
679	83	58°05.00	002°11.31	W	23.09.13	20:16	11.37	62	59	60.4	1091	na	na	na	na
680	84	58°04.96	001°51.60	W	23.09.13	21:16	15.00	84	71	77.5	284	na	na	na	na
681	85	58°04.97	001°32.02	W	23.09.13	22:16	13.39	68	65	69.0	86	na	na	na	na
682	86	58°04.97	001°12.19	W	23.09.13	23:15	22.19	97	94	113.6	234	na	na	na	na
683	87	58°14.15	001°10.18	W	24.09.13	00:19	22.23	101	98	116.8	90	na	na	na	na
684	88	58°14.54	001°28.98	W	24.09.13	01:30	23.50	126	110	122.1	310	na	na	na	na
685	89	58°14.65	001°48.47	W	24.09.13	02:41	19.30	95	93	90.7	260	na	na	na	na
686	90	58°15.51	002°08.98	W	24.09.13	03:50	14.34	67	67	71.8	281	na	na	na	na
687	91	58°14.85	002°28.99	W	24.09.13	04:50	8.33	49	44	41.2	216	na	na	na	na
688	92	58°14.60	002°48.75	W	24.09.13	05:46	7.58	40	36	38.5	305	na	na	na	na
689	93	58°23.993	002°30.27	W	24.09.13	07:01	8.49	62	56	40.0	na	na	na	na	na
690	94	58°34.580	002°29.95	W	24.09.13	07:57	11.16	70	65	54.3	na	na	na	na	na
691	95	58°44.261	002°29.84	W	24.09.13	08:49	11.16	69	69	56.5	na	na	na	na	na

Table 1 continued															
Stat. Nr.	Haul Nr.	Lat. (° N)	Long.	E/W	Date (UTC)	Time (UTC)	Duration (min)	Water depth (m)	Catch depth (m)	Flow (m <sup>3</sup> )	Hela (n/m <sup>2</sup> )	T (°C)	Sal (psu)	T (°C)	Sal (psu)
692	96	58°54.261	002°29.96	W	24.09.13	09:44	12.20	70	66	63.0	na	na	na	na	na
693	97	59°04.395	002°25.61	W	24.09.13	10:44	11.03	62	55	53.0	na	na	na	na	na
694	98	59°05.031	002°11.33	W	24.09.13	11:30	14.54	75	71	68.9	na	na	na	na	na
695	99	59°05.346	001°51.36	W	24.09.13	12:31	15.57	77	73	80.1	na	na	na	na	na
696	100	58°55.540	001°49.76	W	24.09.13	13:30	15.20	86	82	69.5	na	na	na	na	na
697	101	58°45.421	001°50.30	W	24.09.13	14:51	16.01	86	80	94.8	na	na	na	na	na
698	102	58°35.788	001°50.05	W	24.09.13	15:47	17.24	93	80	101.1	na	na	na	na	na
699	103	58°25.669	001°49.92	W	24.09.13	16:48	20.16	101	95	125.6	na	na	na	na	na



(Dr. Norbert Rohlf)

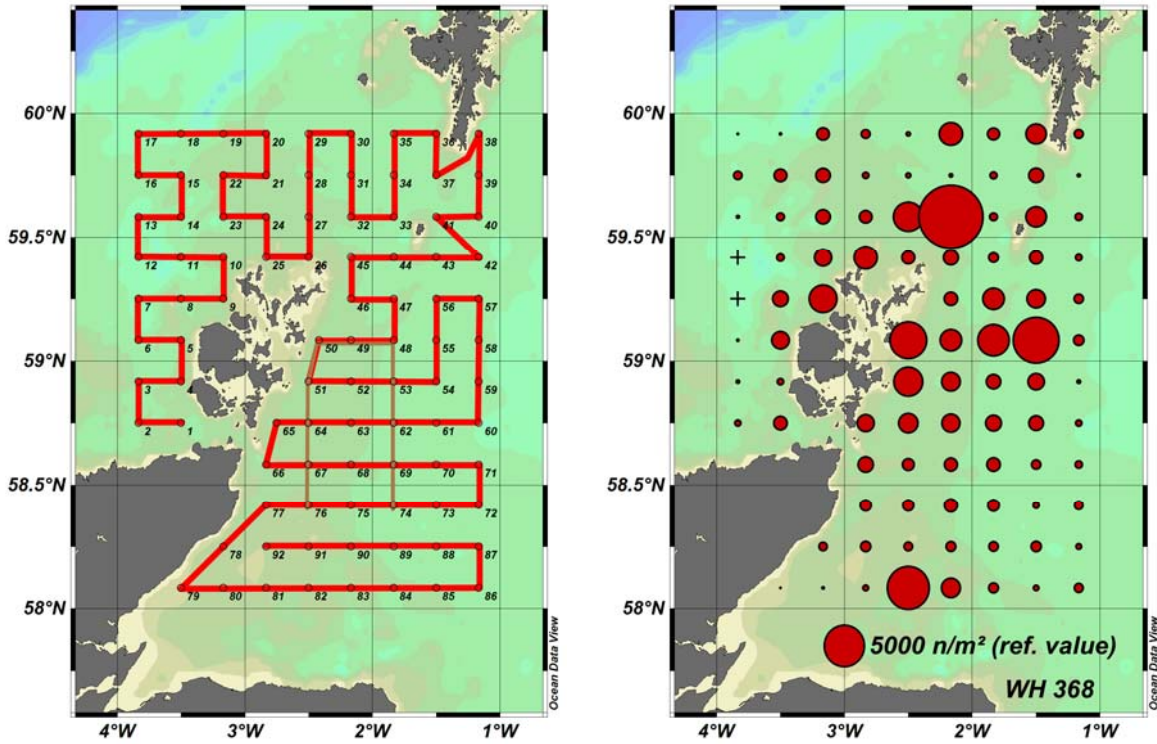


Figure 1: Cruise track (by haul number, left panel) and corresponding abundance of herring larvae in the Orkney/Shetland area ( $n/m^2$ , right panel). The symbol size corresponding to 5000 larvae per square metre is indicated in the figure.

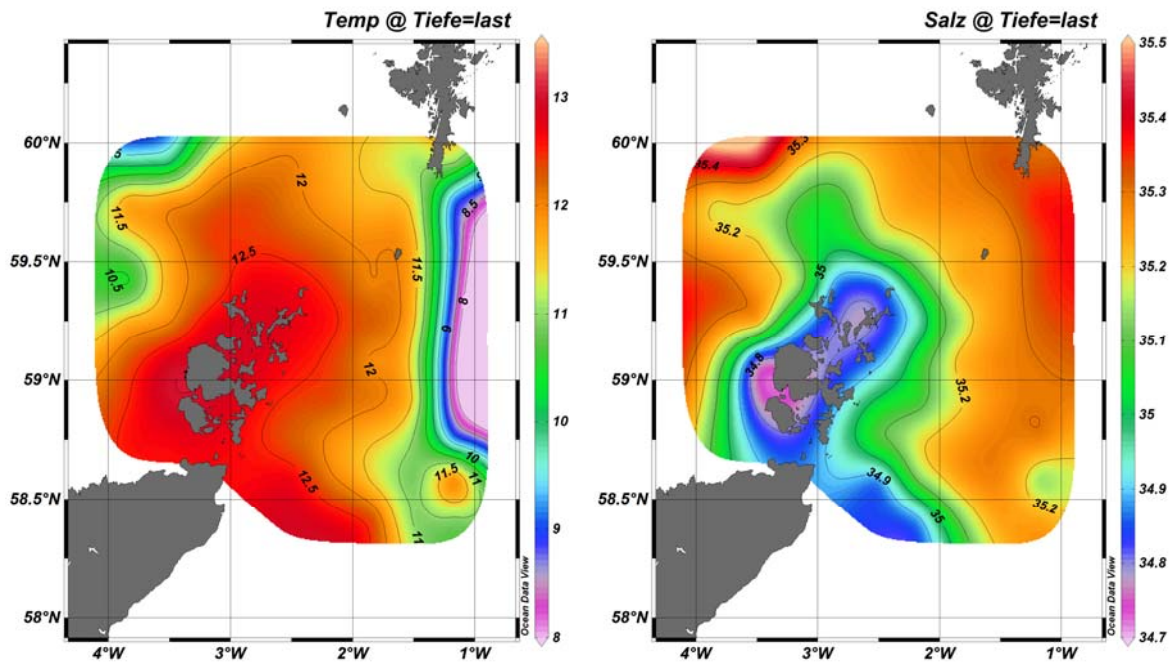


Figure 2: Distribution of near-bottom temperature ( $^{\circ}C$ , left panel) and salinity (psu, right panel) in the Orkney/Shetland area.