

# Cruise Report HE-425, 23. May – 07. June 2014

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## Aim

The aim of this cruise was to assess the abundance, diversity and physiological activity of various members of the *Roseobacter* clade in the water column during a late spring phytoplankton bloom in the northern or central North Sea.

## Cruise track, stations, sampling and parameters studied.

As outlined in Fig. 1, the cruise track went from Bremerhaven to 58 °N and back south, the way north further west than the southward return. In total 47 stations were visited. Satellite images indicated several regions with pronounced phytoplankton blooms, in the southern and eastern North Sea near the German and Danish coast, in the Skagerrak and southwest of the Norwegian coast (Fig. 2). In the latter coccolithophores were abundant, the phytoplankton group of the major interest of this cruise. Therefore, two 24 hour-time series were investigated in this area (stations 21-29, 31-39) and one as a control outside the bloom closer to the Norwegian coast (stations 12-19).

## Results

The phytoplankton in the entire study area was composed of mainly of diatoms and dinoflagellates, but coccolithophores were also present, mainly in the northern region. The measured chlorophyll *a* data verified the three areas of enhanced concentrations and thus of phytoplankton blooms, one southwest of the Norwegian coast, one west of Denmark and the southernmost one in the German Bight (Fig. 3). The zooplankton was always dominated by copepods but other taxonomic groups such as echinoderm larvae, appendicularians and chaetognaths were also present. Bacterial abundance in near surface waters varied from 0.4 to  $6.0 \times 10^6 \text{ ml}^{-1}$  with highest numbers in the German Bight and enhanced numbers also in the other bloom areas (Fig. 4). Bacterial biomass production ranged from 90 to  $\sim 1000 \text{ ng protein l}^{-1} \text{ h}^{-1}$  with highest rates in the southern areas near the German and Danish coast (Fig. 5). The phytoplankton bloom area southwest of the Norwegian coast exhibited also enhanced rates, indicating that the bacterioplankton generally responded to the enhanced input of organic matter in the phytoplankton bloom areas. The data on the composition of the bacterial communities and the DOM are not yet available because these analyses need much more time.

## Conclusions and outlook

The field and experimental work on shipboard was very successful and we were able to achieve the aims of this research cruise. The data on phytoplankton, chlorophyll, bacterial abundance and production indicate that the various water masses and phytoplankton blooms exhibited distinct differences with respect to the biological productivity and activity, being a promising feature to also expect such differences in the community composition of the bacterioplankton.

## Acknowledgements:

We are most grateful to the captain and crew of RV Heincke for their excellent support on shipboard, to the Deutsche Forschungsgemeinschaft for financial support and to the responsible authorities of Denmark and Norway for giving us the permission to do research in the exclusive economic zones of their countries.

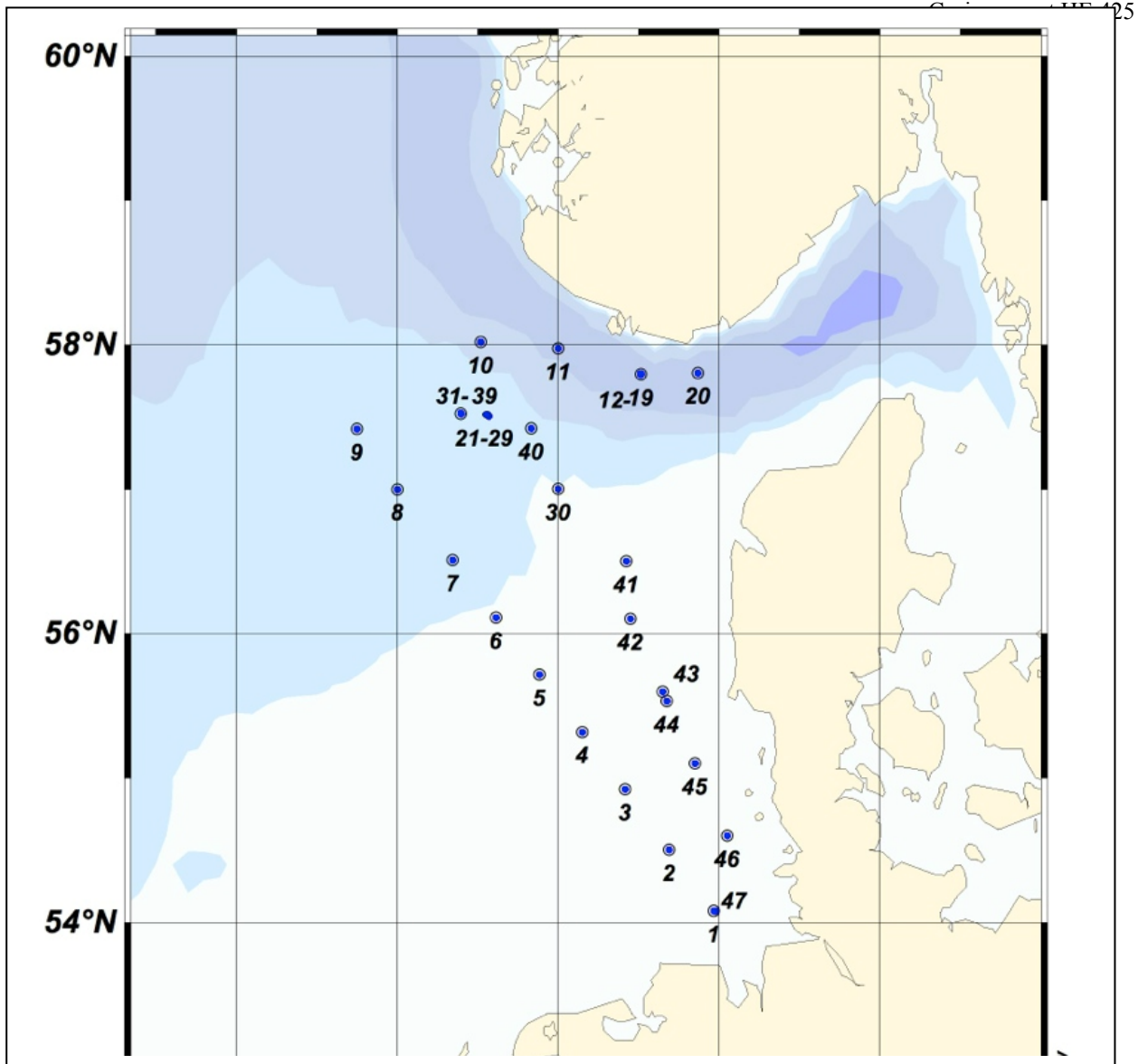


Fig. 1: Cruise track and stations of cruise HE-425. For exact location of the stations see Table 1.

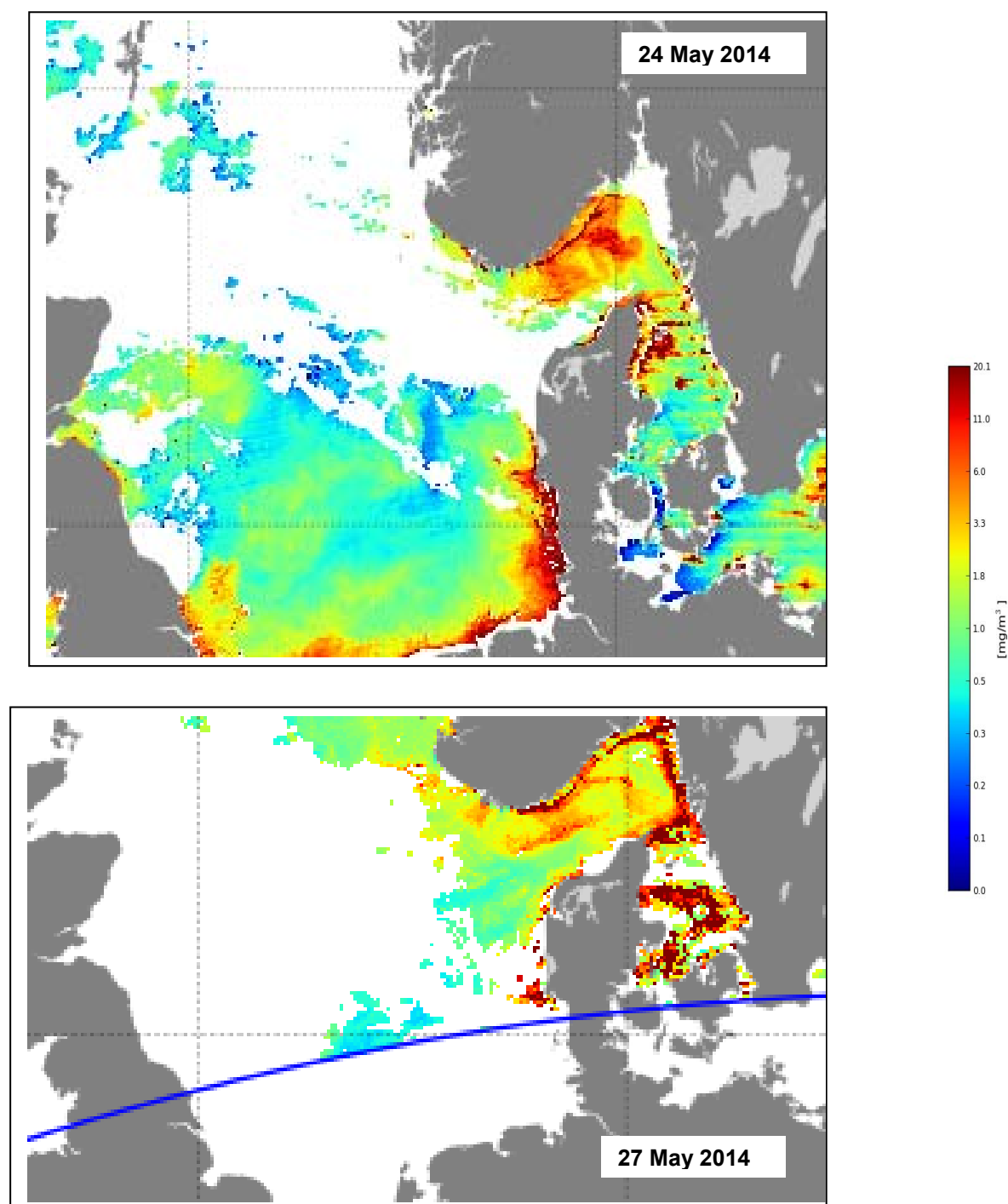


Fig. 2: Satellite image (NASA MODIS) of chlorophyll *a* distribution on May 24 and May 27, 2014, in the North Sea (courtesy of HZG Geesthacht).

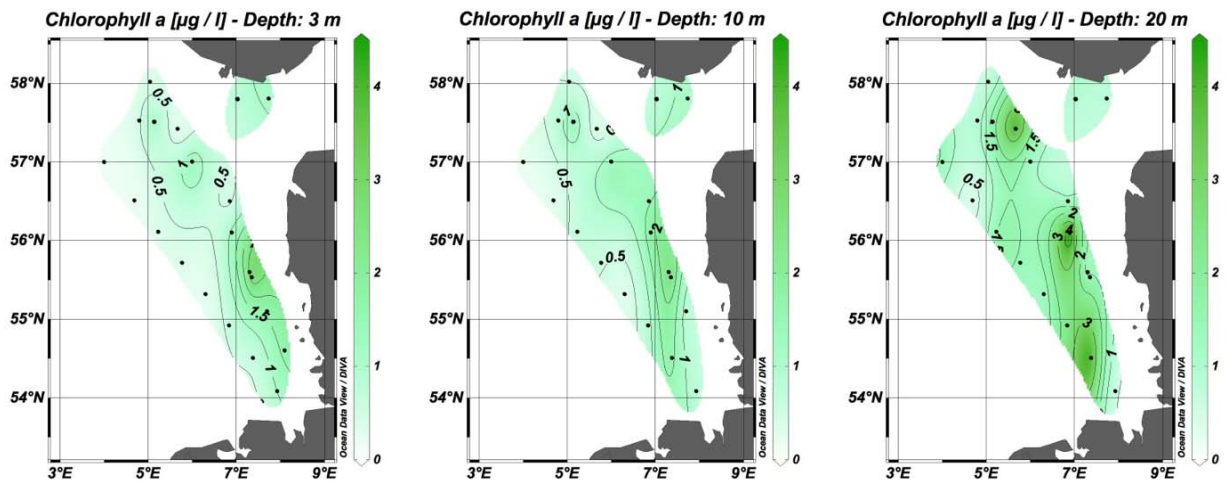


Fig. 3: Chlorophyll *a* at 3 m (left), 10 m (center) and 20 m depth (right) in the North Sea between 23 May and 7 June 2014 during cruise HE-425.

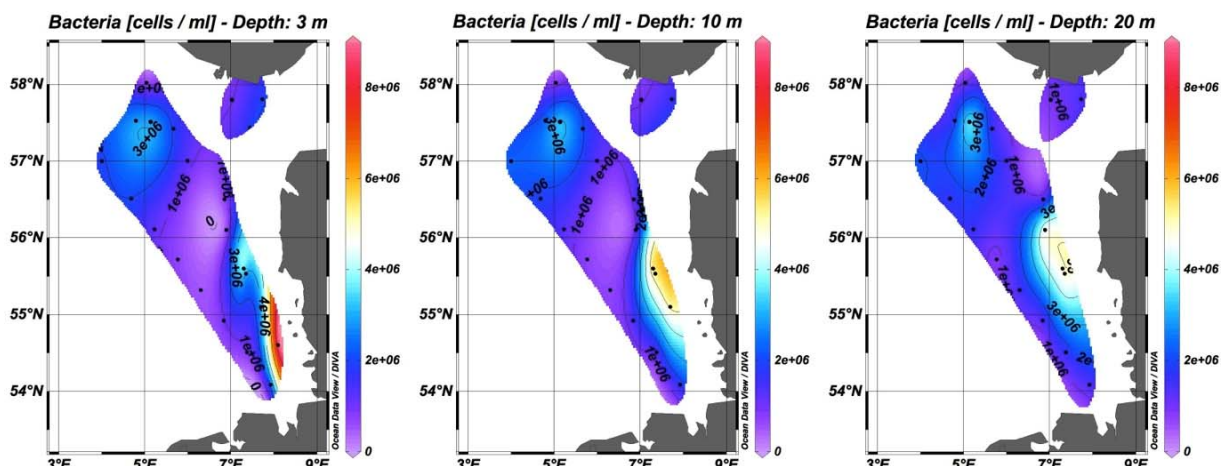


Fig. 4: Bacterial cell numbers at 3 m (left), 10 m (center) and 20 m depth (right) in the North Sea between 23 May and 7 June 2014 during cruise HE-425.

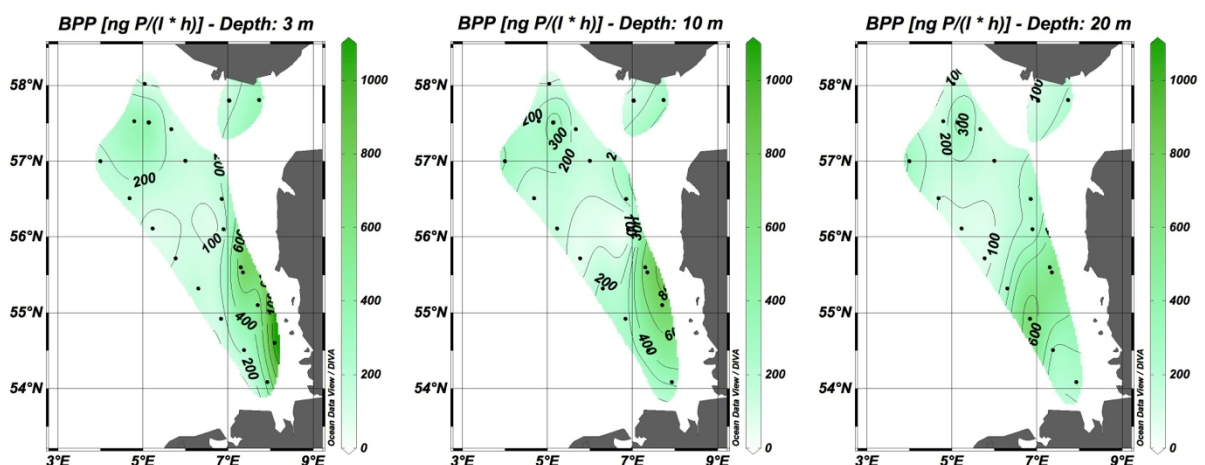


Fig. 5: Bacterioplankton biomass production (BPP) at 3 m (left), 10 m (center) and 20 m depth (right) in the North Sea between 23 May and 7 June 2014 during cruise HE-425.

## Cruise Heincke-425, 23. May - 07. June 2014

Table 1: Station overview, gray: diel cycle

Station	Date	Time (UTC)	Position		Temp 0 m (°C)	Depth (max) (m)
			°N	°E		
1	23.5.	13:08	54.081	7.9313	13.76	33
2	24.5.	06:09	54.504	7.3817	13.12	26
3	24.5.	10:59	54.9207	6.8323	13.97	30
4	25.5.	06:29	55.3187	6.302	13.16	46
5	25.5.	10:25	55.7152	5.7695	12.80	47
6	25.5.	13:45	56.1103	5.2308	12.82	41
7	26.5.	06:26	56.5088	4.684	12.54	59
8	26.5.	11:19	56.9997	4.0027	11.96	57
9	26.5.	17:23	57.5002	3.432	12.34	85
10	27.5.	06:30	58.02	5.0373	13.09	139
11	27.5.	12:00	57.955	6.000	12.45	409
12	28.5.	17:59	57.8015	7.0298	11.50	409
13	28.5.	21:00	57.7972	7.0293	11.46	403
14	29.5.	00:02	57.7972	7.0293	11.46	403
15	29.5.	03:02	57.7972	7.0293	11.54	403
16	29.5.	06:01	57.7972	7.0293	11.68	403
17	29.5.	11:57	57.7972	7.0293	12.99	403
18	29.5.	15:02	57.7972	7.0293	12.99	403
19	29.5.	18:01	57.7972	7.0293	13.23	403
20	30.5.	10:11	57.8062	7.7377	14.00	500
21	31.5.	06:59	57.5087	5.1387	10.96	83
22	31.5.	09:04	57.5085	5.1387	10.86	81
23	31.5.	11:56	57.5085	5.1387	10.86	83
24	31.5.	15:01	57.5085	5.1387	11.21	83
25	31.5.	17:59	57.5085	5.1387	11.63	83
26	31.5.	21:02	57.5085	5.1387	10.74	83
27	31.5.	23:57	57.5085	5.1387	10.61	83
28	31.5.	03:02	57.5085	5.1387	10.76	83
29	01.6	05:57	57.5085	5.1387	11.00	83
30	01.6	11:53	57.0012	5.9968	10.97	47
31	02.6	06:35	57.5247	4.7928	11.59	78
32	02.6	09:09	57.5247	4.7928	11.59	78
33	02.6	11:59	57.5247	4.7928	11.69	78
34	02.6	15:01	57.5247	4.7928	12.12	78
35	02.6	17:57	57.5247	4.7928	12.48	78
36	02.6	20:58	57.5247	4.7928	12.21	78
37	02.6	23:56	57.5247	4.7928	12.08	78
38	03.6	03:02	57.5247	4.7928	12.08	78
39	03.6	05:59	57.5247	4.7928	12.08	78
40	03.6	10:29	57.4197	5.667	12.84	79
41	04.6	06:28	56.5013	6.8487	13.71	36
42	04.6	10:26	56.1027	6.8987	13.96	34
43	04.6	13.54	55.5992	7.3012	15.19	30
44	04.6	16:28	55.5313	7.3522	15.81	28
45	05.6	06:27	55.101	7.7028	14.57	18
46	05.6	10:23	54.5992	8.0997	14.90	9

**Station overview, sampling depths**  
**Heincke 425, 23. May -7. June 2014**

Station	Date	Time (UTC)	Position		Sampling depths (m)
			°N	°E	
1	23.5.	13:08	54.081	7.9313	3, 10, 20
2	24.5.	06:09	54.504	7.3817	3, 10, 20
3	24.5.	10:59	54.9207	6.8323	3, 10, 20
4	25.5.	06:29	55.3187	6.302	3, 10, 25, 35
5	25.5.	10:25	55.7152	5.7695	3, 10, 30
6	25.5.	13:45	56.1103	5.2308	3, 10, 20, 30
7	26.5.	06:26	56.5088	4.684	3, 10, 25, 35 45
8	26.5.	11:19	56.9997	4.0027	3, 10, 30, 45
9	26.5.	17:23	57.5002	3.432	3, 20, 40, 60
10	27.5.	06:30	58.02	5.0373	3, 10, 40, 100
11	27.5.	12:00	57.955	6.000	3, 10, 40, 100
12	28.5.	17:59	57.8015	7.0298	3, 10, 20, 50, 150, 250
13	28.5.	21:00	57.7972	7.0293	3, 20, 40
14	29.5.	00:02	57.7972	7.0293	3, 20, 40
15	29.5.	03:02	57.7972	7.0293	3, 20, 40
16	29.5.	06:01	57.7972	7.0293	3, 20, 40
17	29.5.	11:57	57.7972	7.0293	3, 20, 40
18	29.5.	15:02	57.7972	7.0293	3, 20, 40
19	29.5.	18:01	57.7972	7.0293	3, 20, 40
20	30.5.	10:11	57.8062	7.7377	3, 10, 40, 150
21	31.5.	06:59	57.5087	5.1387	3, 20, 50
22	31.5.	09:04	57.5085	5.1387	3, 20, 50
23	31.5.	11:56	57.5085	5.1387	3, 20, 50
24	31.5.	15:01	57.5085	5.1387	3, 20, 50
25	31.5.	17:59	57.5085	5.1387	3, 20, 50
26	31.5.	21:02	57.5085	5.1387	3, 20, 50
27	31.5.	23:57	57.5085	5.1387	3, 20, 50
28	31.5.	03:02	57.5085	5.1387	3, 20, 50
29	01.6	05:57	57.5085	5.1387	3, 20, 50
30	01.6	11:53	57.0012	5.9968	3, 20, 40
31	02.6	06:35	57.5247	4.7928	3, 20, 50
32	02.6	09:09	57.5247	4.7928	3, 20, 50
33	02.6	11:59	57.5247	4.7928	3, 20, 50
34	02.6	15:01	57.5247	4.7928	3, 20, 50
35	02.6	17:57	57.5247	4.7928	3, 20, 50
36	02.6	20:58	57.5247	4.7928	3, 20, 50
37	02.6	23:56	57.5247	4.7928	3, 20, 50
38	03.6	03:02	57.5247	4.7928	3, 20, 50
39	03.6	05:59	57.5247	4.7928	3, 20, 50
40	03.6	10:29	57.4197	5.667	3, 10, 25, 55
41	04.6	06:28	56.5013	6.8487	3, 10, 25, 35
42	04.6	10:26	56.1027	6.8987	3, 14, 24
43	04.6	13:54	55.5992	7.3012	3, 8, 12, 20
44	04.6	16:28	55.5313	7.3522	3, 12, 20
45	05.6	06:27	55.101	7.7028	3, 15
46	05.6	10:23	54.5992	8.0997	3



CRUISE SUMMARY REPORT	FOR COLLATING CENTRE USE
<p><b>SHIP</b> enter the full name and international radio call sign of the ship from which the data were collected. and indicate the type of ship. for example. research ship; ship of opportunity. naval survey vessel; etc.</p> <p><b>Name:</b> <b>Heincke</b> <span style="float: right;"><b>Call Sign:</b> <b>HE</b></span></p> <p><b>Type of ship:</b> <b>Research Vessel</b></p>	<p>Centre: <b>DOD</b> Ref. No.:</p> <p>Is data exchange <input type="checkbox"/> <input type="checkbox"/></p> <p><input type="checkbox"/> restricted <span style="margin-left: 100px;">Yes</span> <span style="margin-left: 100px;">In part</span></p> <p><b>No</b></p>
<p><b>CRUISE NO. / NAME</b> <b>425</b></p>	<p>enter the unique number, name or acronym assigned to the cruise (or cruise leg, if appropriate).</p>
<p><b>CRUISE PERIOD</b> start <u>23/5/14</u> to <u>07/6/14</u> end  <small>(set sail) day/ month/ year day/ month/ year (return to port)</small></p> <p><b>PORT OF DEPARTURE</b> (enter name and country) <b>Bremerhaven. Germany</b></p> <p><b>PORT OF RETURN</b> (enter name and country) <b>Bremerhaven. Germany</b></p>	
<p><b>RESPONSIBLE LABORATORY</b> enter name and address of the laboratory responsible for coordinating the scientific planning of the cruise</p> <p><b>Name:</b> <b>ICBM. University of Oldenburg</b></p> <p><b>Address:</b> <b>POBox 2503. D-26111 Oldenburg</b></p> <p><b>Country:</b> <b>Germany</b></p>	
<p><b>CHIEF SCIENTIST(S)</b> enter name and laboratory of the person(s) in charge of the scientific work (chief of mission) during the cruise.</p> <p><b>Sara Billerbeck, ICBM, University of Oldenburg</b></p>	
<p><b>OBJECTIVES AND BRIEF NARRATIVE OF CRUISE</b> enter sufficient information about the purpose and nature of the cruise so as to provide the context in which the report data were collected.</p> <p><b>The Roseobacter clade during phytoplankton blooms in the North Sea</b></p>	







**TRACK CHART:** You are strongly encouraged to submit, with the completed report, an annotated track chart illustrating the route followed and the points where measurements were taken.

Insert a tick(✓) in this box if a track chart is supplied



**GENERAL OCEAN AREA(S):** Enter the names of the oceans and/or seas in which data were collected during the cruise – please use commonly recognised names (see, for example, International Hydrographic Bureau Special Publication No. 23, 'Limits of Oceans and Seas').

North Sea

**SPECIFIC AREAS:** If the cruise activities were concentrated in a specific area(s) of an ocean or sea, then enter a description of the area(s). Such descriptions may include references to local geographic areas, to sea floor features, or to geographic coordinates.

**Please insert here the number of each square in which data were collected from the below given chart**

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**GEOGRAPHIC COVERAGE - INSERT 'X' IN EACH SQUARE IN WHICH DATA WERE COLLECTED**

