

The plantpigments, Chlorinity and pH Distribution in the Sea Ice of the Syowa Station Area in 1970

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There are several papers dealing with the ice algal communities in the ice-covered sea, in particular Arctic and Antarctic oceans. Most of the investigations of ice algae concentrate in the spring to summer season, when the remarkable proliferation of algae occurs. On the contrary, few works have been undertaken during autumn to winter, in spite of the fact that the ice algae increase in autumn and persist through winter in the sea ice of the polar oceans (Hoshiai, 1981).

In this report, therefore, the present writer records the data on the chlorophyll *a*, phaeophytin, chlorinity and pH distributions in the sea ice obtained at the selected sites in the vicinity of Syowa Station (69°00'S, 39°35'E) from March to December 1970. Based on these data, Hoshiai (1977, 1981) described the ecology of ice algal communities.

Serial data were taken at intervals at one site of the Kita-no-seto Strait (Fig. 1) and two sites, Miharasi A and B, of the Ongul Strait. Supplemental data were obtained by the serial but at distant intervals observations in Kita-no-ura Cove and at the east side of Nesöya and also by the sporadic samplings at the localities denoted by alphabetical letters in Fig. 1.

Sea ice cores were taken with a SIPRE ice coring auger. First, the sea ice thickness and the position and thickness of the colored layer were observed. Successively, the ice core was sawed into several parts of uniform hardness, transparency

and coloration. Furthermore, the middle part of the sea ice which was uniformly hard, transparent and colorless during winter was subdivided into pieces of about 10 cm thick to investigate the detailed algal distribution in it.

After melting the samples at room temperature of 20 °C, chlorophyll a, phaeophytin, pH and chlorinity were determined. Chlorophyll a and phaeophytin were measured according to the method for quantitative determination of phytoplankton pigments by fluorescens (Yentsch and Menzel, 1963). The fluorometer used was Hitachi FPL-2 Type equipped with a red sensitive photomultiplier (Hamamatsu Electric Co. Ltd., R-136). A Hitachi 436 m μ filter was used for excitation and a Toshiba 660 m μ filter was used for the measurement of the emission. The pH was measured by a glass electrode pH-meter, Model HM-5A, TOA Electronics Co. Ltd. Chlorinity was determined by titration with silver nitrate using uranine as the indicator. Since the volume of sample water was 5 ml, the accuracy of the results obtained was not so high but it seemed to be sufficient to represent the fluctuation of chlorinity in the sea ice.

References

- Hoshiai, T. (1977): Seasonal change of ice communities in the sea ice near Syowa Station, Antarctica. *Polar Oceans*, ed. by M. J. Dunbar. Calgary, Arctic Inst. North Am., 307-317.
- Hoshiai, T. (1981): Proliferation of ice algae in the Syowa Station area, Antarctica. *Mem. Natl Inst. Polar Res., Ser. E (Biol. Med. Sci.)*, 34, 1-12.
- Yentsch, C. S. and Menzel, D. W. (1963): A method for the determination of phytoplankton chlorophyll and phaeophytin by fluorescence. *Deep-Sea Res.*, 10, 221-231.

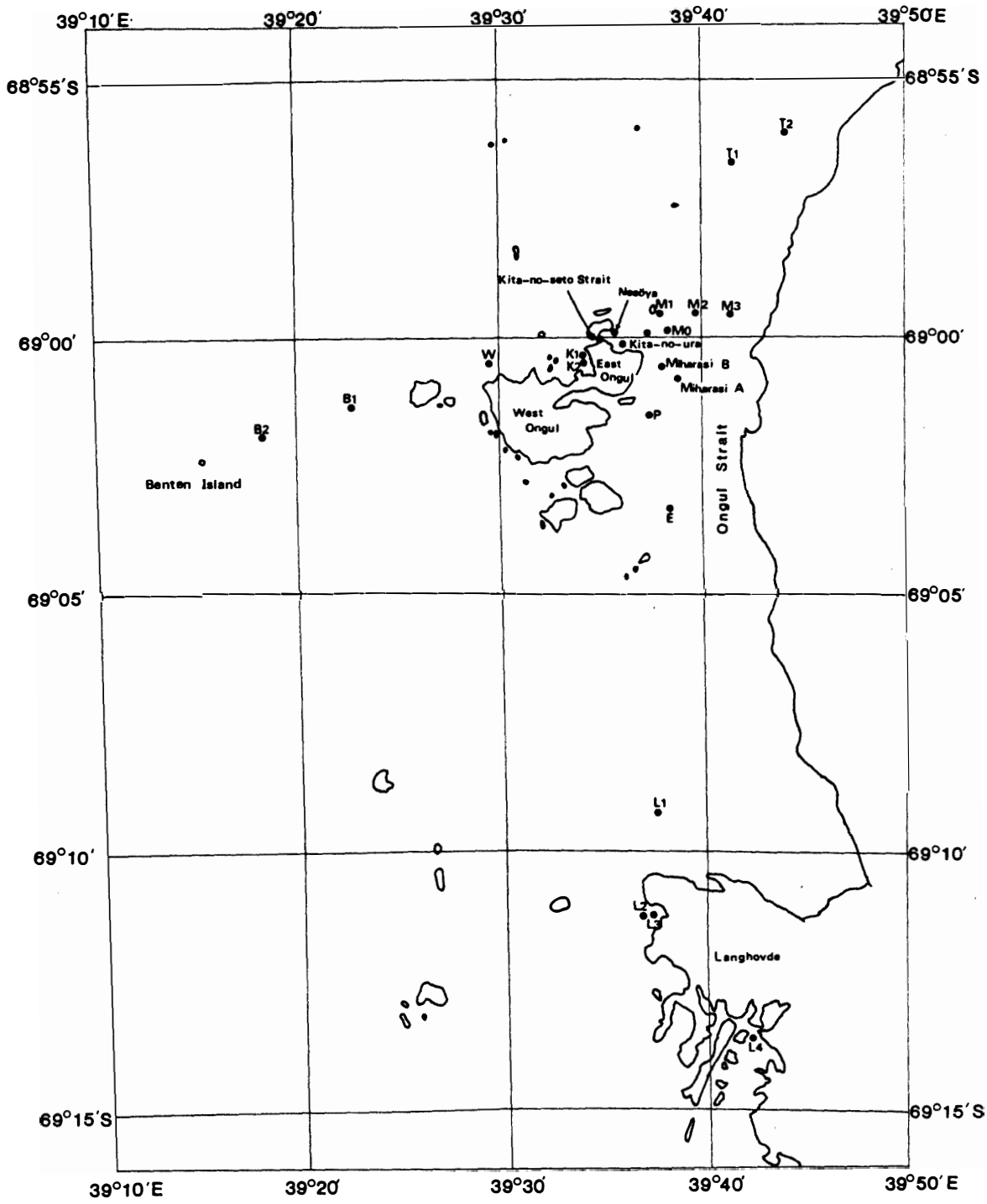


Fig. 1. Sites for sampling ice cores.

Data at the fixed station of the Kita-no-seto Strait.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
27 III 70	4	15	1.18	7.10	0.28	0.10	0.38	73.68
Ice thickness 30 cm	3	9	2.58	8.13	1.40	0.08	1.48	94.59
	2	5	3.86	7.62	4.75	0.29	5.04	94.25
	1	1	6.86	7.70	86.35	0.00	86.35	100.00

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
3 IV 70	7	5	1.02	7.30	0.14	0.15	0.29	48.28
Ice thickness 31 cm	6	5	0.99	7.20	0.30	0.11	0.41	73.17
	5	5	2.61	7.82	0.32	0.16	0.48	66.67
	4	5	2.64	8.14	5.77	0.43	6.20	93.06
	3	5	3.68	8.33	1.03	0.23	1.26	81.75
	2	3	5.23	7.70	13.96	2.35	16.31	85.59
	1	3	6.03	7.70	138.11	0.00	138.11	100.00

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
9 IV 70	7	7	0.64	7.22	0.67	0.11	0.78	85.90
Ice thickness 31 cm	6	5	1.51	7.79	0.46	0.09	0.55	83.64
	5	5	2.64	8.61	1.16	0.25	1.41	82.27
	4	5	3.14	8.72	3.72	0.61	4.33	85.91
	3	5	4.27	8.18	6.14	1.47	7.61	80.68
	2	2	6.39	7.88	138.80	0.00	138.80	100.00
	1	2	8.55	7.88	829.15	5.03	834.18	99.40

Data at the fixed station of the Kita-no-seto Strait.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
16 IV 70	6	6	0.10	8.35	8.16	0.43	8.59	94.99
	5	6	2.43	8.85	5.11	0.39	5.50	92.91
Ice thickness 30 cm	4	6	3.12	9.04	7.87	0.65	8.52	92.37
	3	4	3.51	8.89	9.26	1.49	10.75	86.14
	2	5	3.96	8.07	24.42	4.39	28.81	84.76
	1	3	5.78	7.72	921.25	73.09	994.34	92.65

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
23 IV 70	8	5	0.85	7.02	0.78	0.25	1.03	75.73
	7	5	2.39	8.38	1.30	0.33	1.63	79.75
Ice thickness 35 cm	6	5	2.77	8.90	2.59	0.58	3.17	81.70
	5	5	3.91	9.00	8.63	1.24	9.87	87.44
	4	5	3.92	9.01	6.00	1.68	7.68	78.13
	3	5	4.60	8.78	29.66	5.32	34.98	84.79
	2	4	5.28	8.00	403.27	52.15	455.42	88.55
1	1	7.44	7.65	75.42	6.76	82.18	91.77	

Data at the fixed station of the Kita-no-seto Strait.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
1 V 70 Ice thickness 42 cm	8	5	0.84	7.61	0.26	0.13	0.39	66.67
	7	5	1.16	7.95	0.45	0.13	0.58	77.59
	6	6	2.38	8.73	0.74	0.16	0.90	82.22
	5	6	3.76	9.10	5.34	0.78	6.12	87.25
	4	6	4.14	9.10	4.45	0.99	5.44	81.80
	3	5	4.14	8.96	16.01	2.61	18.62	85.98
	2	5	3.40	7.90	177.13	13.20	190.33	93.06
	1	4	5.11	7.95	35.46	4.92	40.38	87.82

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
22 V 70 Ice thickness 75 cm	10	7.5	4.65	8.25	0.41	0.14	0.55	74.55
	9	7.5	0.79	7.10	0.24	0.17	0.41	58.54
	8	10	1.11	7.65	0.63	0.19	0.82	76.83
	7	10	2.55	8.50	1.16	0.20	1.36	85.29
	6	7	4.12	8.88	5.27	1.19	6.46	81.58
	5	6	4.28	8.83	4.63	2.68	7.31	63.34
	4	6	3.98	8.35	63.41	31.62	95.03	66.73
	3	5	3.59	7.65	23.84	9.47	33.31	71.57
	2	8	3.20	7.88	12.46	3.36	15.82	78.76
1	8	3.65	8.03	15.36	1.95	17.31	88.73	

Data at the fixed station of the Kita-no-seto Strait.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
3 VII 70	13	8	6.27	8.57	0.22	0.30	0.52	81.36
	12	6	8.09	8.63	0.30	0.44	0.74	40.54
Ice thickness 102.5 cm	11	7	6.66	8.72	0.20	0.13	0.33	60.61
	10	8	5.43	8.40	0.55	0.13	0.68	80.88
	9	7	4.24	8.30	2.78	0.55	3.33	83.48
	8	7.5	1.98	8.30	3.98	1.93	5.91	67.34
	7	8	2.87	8.62	5.85	1.21	7.06	82.86
	6	8.5	3.52	8.24	9.93	3.93	13.86	71.65
	5	9.5	3.79	7.72	8.85	8.35	17.20	51.45
	4	7	3.62	7.78	3.10	5.67	8.77	35.35
	3	8	3.22	7.83	2.07	3.89	5.96	34.73
	2	9	3.33	7.95	2.45	0.27	2.72	90.07
	1	9	3.60	8.00	0.78	0.46	1.24	62.90

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
22 VII 70	13	9	2.94	8.96	0.25	0.09	0.34	73.53
	12	7	1.35	7.62	0.28	0.13	0.41	68.29
Ice thickness 106 cm	11	7	0.42	7.72	0.41	0.15	0.56	73.21
	10	9	3.00	8.92	1.54	0.31	1.85	83.24
	9	10	4.20	9.10	3.53	1.94	5.47	64.53
	8	8	4.17	8.40	30.09	17.49	47.58	63.24
	7	8	3.52	7.59	7.12	9.60	16.72	42.58
	6	8	3.03	7.58	3.36	6.56	9.92	33.87
	5	8	3.03	7.80	0.48	3.25	3.73	12.87
	4	8	2.73	7.83	0.92	1.19	2.11	43.60
	3	8	2.16	7.72	0.98	0.52	1.50	65.33
	2	8	1.76	7.82	0.39	0.16	0.55	70.91
	1	8	3.42	7.99	0.32	0.15	0.47	68.09

Data at the fixed station of the Kita-no-seto Strait.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
18 VIII 70	15	8	2.85	8.48	0.10	0.10	0.20	50.00
	14	7	0.65	7.83	0.19	0.11	0.30	63.33
Ice thickness	13	9	1.82	7.72	0.42	0.12	0.54	77.78
119 cm	12	9	3.37	8.75	3.09	0.39	3.48	88.79
	11	9	3.37	8.85	2.43	0.93	3.36	72.32
	10	6	3.79	8.30	24.47	21.75	46.22	52.94
	9	5	3.89	7.50	11.51	10.92	22.43	51.32
	8	9.5	3.15	7.50	4.03	6.31	10.34	38.97
	7	9.5	3.01	7.45	4.20	4.06	8.26	50.85
	6	9.5	3.01	7.50	0.87	1.17	2.04	42.65
	5	9.5	2.44	7.55	0.30	0.69	0.99	30.30
	4	7	2.36	7.56	0.40	0.26	0.66	60.60
	3	7	2.10	7.53	0.37	0.17	0.54	68.52
	2	7	2.20	7.59	0.19	0.14	0.33	57.58
	1	7	3.67	7.60	0.19	0.12	0.31	61.29

Data at the fixed station of the Kita-no-seto Strait.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
1 IX 70	16	8	3.37	8.60	0.09	0.13	0.22	40.91
	15	5	0.84	6.90	0.17	0.23	0.40	42.50
Ice thickness	14	7	1.71	7.43	0.32	0.09	0.41	78.05
126 cm	13	7	3.37	8.65	0.25	0.27	0.52	48.08
	12	11	4.28	8.80	0.88	0.64	1.52	57.89
	11	8	3.79	7.70	9.78	16.39	26.17	37.37
	10	9	3.05	7.32	2.23	6.33	8.56	26.05
	9	10	2.85	7.40	1.05	4.19	5.24	20.04
	8	9	2.72	7.40	0.30	1.54	1.84	16.30
	7	7	2.33	7.40	0.07	0.63	0.70	10.00
	6	8	2.07	7.46	0.08	0.40	0.48	16.67
	5	8	2.33	7.62	0.10	0.24	0.34	29.41
	4	8	2.33	7.44	0.26	0.14	0.40	65.00
	3	8	1.72	7.30	0.51	0.12	0.63	80.95
	2	8	1.84	7.47	0.34	0.11	0.45	75.56
	1	5	3.63	7.50	0.13	0.16	0.29	44.83

Data at the fixed station of the Kita-no-seto Strait.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
18 IX 70	17	7	3.24	8.40	0.03	0.11	0.14	21.43
	16	13	0.58	7.03	0.03	0.11	0.14	21.43
Ice thickness	15	10	2.31	8.10	0.01	0.08	0.09	11.11
143 cm	14	8	3.76	8.75	0.13	0.17	0.30	43.33
	13	6	4.18	8.91	0.38	0.27	0.65	58.46
	12	5	3.93	8.25	4.73	9.55	14.28	33.12
	11	8	3.51	7.50	3.98	9.34	13.32	29.88
	10	9	2.98	7.28	2.08	5.74	7.82	26.60
	9	8	2.74	7.31	0.96	2.56	3.52	27.27
	8	8	2.74	7.40	0.18	0.90	1.08	16.67
	7	10	2.78	7.62	0.11	0.48	0.59	18.64
	6	10	2.61	7.58	0.10	0.24	0.34	29.41
	5	8	2.72	7.57	0.08	0.14	0.22	36.36
	4	9	2.20	7.48	0.11	0.11	0.22	50.00
	3	9	2.15	7.45	0.48	0.14	0.62	77.42
	2	9	1.96	7.45	1.52	0.11	1.63	93.25
	1	6	3.89	7.60	0.50	0.11	0.61	81.97

Data at the fixed station of the Kita-no-seto Strait.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
10 X 70	17	5	3.15	8.60	0.00	0.07	0.07	0.00
	16	15	1.64	7.92	0.01	0.08	0.09	11.11
Ice thickness	15	11	4.03	8.65	0.80	0.15	0.95	84.21
151 cm	14	9	3.90	8.30	0.07	0.96	1.03	6.80
	13	11	3.21	7.30	0.12	0.97	1.09	11.01
	12	8	2.57	7.30	0.01	0.53	0.54	1.85
	11	8	3.25	7.52	0.04	0.28	0.32	12.50
	10	9	2.33	7.31	0.03	0.18	0.21	14.29
	9	9	2.52	7.31	0.03	0.12	0.15	20.00
	8	9	2.52	7.42	0.06	0.13	0.19	31.58
	7	9	2.38	7.32	0.27	0.12	0.39	69.23
	6	9	2.29	7.65	0.48	0.11	0.59	81.36
	5	9	2.18	7.70	0.16	0.08	0.24	66.67
	4	9	2.14	7.70	0.27	0.09	0.36	75.00
	3	9	2.01	7.51	0.37	0.18	0.55	67.27
	2	7	2.97	7.48	1.30	1.01	2.31	56.28
	1	5	7.06	7.70	42.40	3.82	46.22	91.74

Data at the fixed station of the Kita-no-seto Strait.

Date	Number of Sample	Depth from Bottom (cm)	Chlori- nity (‰)	pH	Chloro- phyll (mg/m ³)	Phaeo- phytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chloro- phyll to sum of chlorophyll and phaeophytin
29 X 70	17	9	1.17	8.70	0.02	0.06	0.08	25.00
	16	9	0.53	7.05	0.05	0.07	0.12	41.67
Ice thickness	15	9	2.30	8.80	0.02	0.06	0.08	25.00
147 cm	14	9	3.90	9.00	0.18	0.08	0.26	69.23
	13	9	4.15	8.80	0.03	0.18	0.21	14.29
	12	9	3.61	7.95	0.07	0.30	0.37	18.92
	11	9	3.27	7.85	0.29	0.25	0.54	53.70
	10	9	3.02	7.85	0.12	0.18	0.30	40.00
	9	9	2.39	7.97	0.15	0.13	0.28	53.57
	8	9	2.45	8.10	0.53	0.08	0.61	86.89
	7	9	2.45	8.20	0.33	0.12	0.45	73.33
	6	9	2.04	8.30	0.07	0.10	0.17	41.18
	5	9	2.03	8.40	0.09	0.09	0.18	50.00
	4	9	1.83	8.47	0.11	0.15	0.26	42.31
	3	9	2.15	8.74	0.08	0.15	0.23	34.78
	2	9	2.77	9.02	0.34	0.34	0.68	50.00
	1	3	5.16	7.78	1143.62	0.00	1143.62	100.00

Data at the fixed station of the Kita-no-seto Strait.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
14 XI 70	18	9	1.40	8.12	0.01	0.08	0.09	11.11
	17	8	0.57	6.98	0.00	0.07	0.07	0.00
Ice thickness	16	16.5	2.66	8.50	0.06	0.07	0.13	46.15
164 cm	15	10.5	4.03	8.80	0.31	0.07	0.38	81.58
	14	10	3.83	8.25	0.43	1.09	1.52	28.29
	13	9.5	3.00	8.03	0.24	0.31	0.55	43.64
	12	9.5	2.90	8.05	0.28	0.13	0.41	68.29
	11	9	2.53	8.05	0.48	0.12	0.60	80.00
	10	9	2.39	8.00	0.32	0.09	0.41	78.05
	9	9	2.59	8.19	0.15	0.06	0.21	71.43
	8	8	2.19	8.07	0.16	0.07	0.23	69.57
	7	8	2.11	8.20	0.15	0.07	0.22	68.18
	6	9	1.89	8.10	0.19	0.08	0.27	70.37
	5	9	1.61	7.91	0.23	0.06	0.29	79.31
	4	9	1.61	8.32	0.36	0.05	0.41	87.80
	3	9	1.74	8.70	0.30	0.05	0.35	85.71
	2	9	2.90	8.30	2.07	0.19	2.26	91.59
	1	3	5.22	7.61	152.56	3.14	155.70	97.98

Data at the fixed station of the Kita-no-seto Strait.

Date	Number of Sample	Depth from Bottom (cm)	Chlori- nity (‰)	pH	Chloro- phyll (mg/m ³)	Phaeo- phytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chloro- phyll to sum of chlorophyll and phaeophytin
28 XI 70	17	12	0.74	8.07	0.09	0.10	0.19	47.37
	16	9	2.01	8.68	0.17	0.10	0.27	62.96
Ice thickness	15	9	2.54	8.75	0.19	0.09	0.28	67.86
150 cm	14	9	3.72	8.78	0.50	0.05	0.55	90.91
	13	9	3.02	8.70	0.66	0.34	1.00	66.00
	12	9	2.16	8.70	0.27	0.07	0.34	79.41
	11	9	2.37	8.80	0.30	0.04	0.34	88.24
	10	9	2.25	9.00	0.50	0.04	0.54	92.59
	9	9	1.86	9.05	0.56	0.06	0.62	90.32
	8	9	1.64	9.11	0.52	0.04	0.56	92.86
	7	9	2.32	9.00	0.43	0.06	0.49	87.76
	6	9	1.89	9.02	0.65	0.03	0.68	95.59
	5	9	1.89	9.15	1.14	0.00	1.14	100.00
	4	9	1.65	9.19	1.79	0.00	1.79	100.00
	3	9	1.86	9.42	3.51	0.00	3.51	100.00
	2	9	2.61	9.50	6.22	0.00	6.22	100.00
	1	3	5.46	9.32	226.04	0.00	226.04	100.00

Data at the fixed station of the Kita-no-seto Strait.

Date	Number of Sample	Depth from Bottom (cm)	Chlori- nity (‰)	pH	Chloro- phyll (mg/m ³)	Phaeo- phytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chloro- phyll to sum of chlorophyll and phaeophytin
12 XII 70	15	15	0.31	6.75	0.04	0.08	0.12	33.33
	14	20	2.36	8.40	0.17	0.04	0.21	80.95
Ice thickness	13	9	2.67	8.80	0.25	0.06	0.31	80.65
154 cm	12	11	2.11	8.80	0.47	0.11	0.58	81.03
	11	11	1.74	8.50	0.46	0.02	0.48	95.83
	10	11	1.80	8.59	0.43	0.02	0.45	95.56
	9	10	1.51	8.40	1.00	0.29	1.29	77.52
	8	10	2.18	8.80	0.54	0.01	0.55	98.18
	7	10	2.05	8.90	0.57	0.00	0.57	100.00
	6	10	1.61	8.75	0.58	0.00	0.58	100.00
	5	10	1.24	8.55	0.58	0.00	0.58	100.00
	4	9	1.05	8.50	0.81	0.00	0.81	100.00
	3	9	0.99	8.30	1.08	0.00	1.08	100.00
	2	9	1.24	8.45	4.45	0.00	4.45	100.00
	1	0	3.88	—	5299.00	20.58	5319.58	99.61

Data at Miharasi A.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
29 IV 70	7	6	3.31	7.90	0.52	0.53	1.05	49.52
	6	6	3.39	7.93	0.50	1.01	1.51	33.11
Ice thickness	5	4	2.82	7.68	0.64	2.95	3.59	17.83
32 cm	4	5	2.84	7.58	1.39	7.88	9.27	14.99
	3	5	2.89	7.60	4.49	3.80	8.29	54.16
	2	3	4.02	7.75	33.78	0.21	33.99	99.38
	1	3	4.78	7.69	5.52	0.45	5.97	92.46

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
3 VI 70	7	7	3.73	8.15	0.91	0.19	1.10	82.73
	6	8	3.03	8.00	0.20	0.33	0.53	60.61
Ice thickness	5	8	3.03	7.90	0.17	0.64	0.81	26.56
54 cm	4	9	2.57	7.80	0.39	1.31	1.70	29.77
	3	9	2.38	7.76	0.54	0.42	0.96	56.25
	2	8	2.54	7.80	1.19	0.60	1.79	66.48
	1	5	3.19	7.65	0.61	0.16	0.77	79.22

Data at Miharasi A.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
27 VIII 70	12	11	5.19	8.30	0.03	0.08	0.11	27.27
	11	9	3.51	7.92	0.04	0.10	0.14	28.57
Ice thickness	10	9	3.41	8.00	0.03	0.04	0.07	42.86
112 cm	9	14	3.15	8.20	0.02	0.06	0.08	25.00
	8	9	3.10	8.10	0.02	0.11	0.13	15.38
	7	10	3.00	8.12	0.04	0.16	0.20	20.00
	6	10	2.62	7.84	0.10	0.10	0.20	50.00
	5	10	2.46	7.39	0.27	2.11	2.38	11.34
	4	8	1.36	7.17	0.49	1.01	1.50	32.67
	3	8	1.95	7.45	0.18	0.25	0.43	41.86
	2	8	2.22	7.58	0.19	0.10	0.29	65.52
	1	6	3.45	7.71	0.20	0.09	0.29	68.97

Data at Miharasi A.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
28 IX 70	16	15	2.20	7.97	0.04	0.08	0.12	33.33
	15	13	1.69	7.68	0.05	0.10	0.15	33.33
Ice thickness	14	10	2.33	7.62	0.10	0.11	0.21	47.62
155 cm	13	10	2.20	7.62	0.23	0.14	0.37	62.16
	12	10	2.24	7.80	0.18	0.12	0.30	60.00
	11	10	3.38	8.10	0.20	0.14	0.34	58.82
	10	10	2.92	8.10	0.14	0.09	0.23	60.87
	9	10	2.67	7.65	0.15	0.12	0.27	55.56
	8	10	2.79	7.70	0.11	0.09	0.20	55.00
	7	9	2.85	7.82	0.08	0.17	0.25	32.00
	6	9	2.72	7.65	0.13	0.29	0.42	30.95
	5	9	2.50	7.69	0.10	1.06	1.16	8.62
	4	8	2.33	7.61	0.50	1.21	1.71	29.24
	3	8	2.33	7.60	0.30	0.22	0.52	57.69
	2	8	2.18	7.55	0.19	0.15	0.34	55.88
	1	6	2.28	7.30	0.36	0.12	0.48	75.00

Data at Miharasi A.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
27 X 70	17	7	3.36	7.82	0.54	0.18	0.72	75.00
	16	10	3.19	8.61	0.30	0.18	0.48	62.50
Ice thickness	15	10	1.46	8.00	0.20	0.13	0.33	60.61
161 cm	14	10	2.17	8.31	0.15	0.08	0.23	65.22
	13	10	2.21	8.45	0.23	0.11	0.34	67.65
	12	10	3.29	8.50	0.35	0.13	0.48	72.92
	11	10	3.35	8.50	0.42	0.19	0.61	68.85
	10	10	3.97	8.40	0.73	0.00	0.73	100.00
	9	10	3.48	8.38	0.75	0.00	0.75	100.00
	8	10	3.40	8.19	0.37	0.25	0.62	59.68
	7	9	3.35	8.10	0.10	0.24	0.34	29.41
	6	9	3.10	8.05	0.27	0.16	0.43	62.79
	5	8	1.87	7.75	0.45	0.15	0.60	75.00
	4	10	2.79	7.80	0.52	0.50	1.02	50.98
	3	10	2.79	7.87	0.42	0.92	1.34	31.34
	2	10	2.20	7.90	0.36	0.34	0.70	51.43
	1	8	2.13	7.62	0.40	0.09	0.49	81.63

Data at Miharasi A.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
26 XI 70	18	9	3.23	8.25	0.91	0.32	1.23	73.98
	17	9	2.23	8.30	0.15	0.20	0.35	42.86
Ice thickness 158 cm	16	8	1.99	8.35	0.19	0.29	0.48	39.58
	15	8	2.10	8.35	0.23	0.26	0.49	46.94
	14	9	3.03	8.43	0.22	1.03	1.25	17.60
	13	9	3.00	8.55	1.13	0.48	1.61	70.19
	12	10	3.35	8.55	1.39	0.59	1.98	70.20
	11	10	3.18	8.49	1.55	0.56	2.11	73.46
	10	9	3.35	8.30	2.27	0.75	3.02	75.17
	9	9	3.18	8.30	2.38	0.78	3.16	75.32
	8	8	3.62	8.30	2.81	0.79	3.60	78.06
	7	9.5	3.02	8.00	1.49	0.62	2.11	70.62
	6	9.5	3.14	7.99	1.15	0.55	1.70	67.65
5	9	2.98	7.71	1.04	0.98	2.02	51.49	
4	9	2.20	7.70	1.58	1.47	3.05	51.80	
3	9	1.74	7.65	0.47	0.28	0.75	62.67	
2	9	2.22	8.02	0.35	0.19	0.54	64.81	
1	5	3.79	8.10	1.24	0.24	1.48	83.78	

Data at Miharasi A.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
23 XII 70	15	12	1.27	8.00	0.14	0.14	0.28	50.00
	14	8	1.38	8.10	0.12	0.15	0.27	44.44
Ice thickness	13	10	1.70	8.28	0.22	0.12	0.34	64.71
145 cm	12	10	1.79	8.38	0.37	0.17	0.54	68.52
	11	10	1.74	8.56	1.19	0.23	1.42	83.80
	10	10	1.80	8.61	2.49	0.50	2.99	83.28
	9	10	2.04	8.51	2.42	0.43	2.85	84.91
	8	10	1.96	8.40	2.61	0.31	2.92	89.38
	7	10	2.31	8.21	2.67	0.59	3.26	81.90
	6	10	1.99	8.28	2.49	0.43	2.92	85.27
	5	10	2.11	8.10	2.60	1.01	3.61	72.02
	4	10	1.61	7.90	3.20	2.09	5.29	60.49
	3	10	1.61	7.80	1.90	0.27	2.17	87.56
	2	10	1.61	7.80	2.30	0.22	2.52	91.27
	1	5	2.54	7.98	3.38	0.10	3.48	97.13

Data at Miharasi B.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
29 IV 70	6	5	2.90	7.85	0.33	0.58	0.91	36.26
	5	5	2.59	7.90	0.72	1.01	1.73	41.62
Ice thickness	4	5	2.77	7.71	0.70	2.86	3.56	19.66
26 cm	3	5	2.95	7.78	1.35	6.68	8.03	16.81
	2	3	3.28	7.80	8.46	3.35	11.81	71.63
	1	3	3.92	7.79	10.55	0.67	11.22	94.03

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
3 VI 70	6	7	3.17	8.10	0.14	0.41	0.55	25.45
	5	9	2.71	7.85	0.17	0.50	0.67	25.37
Ice thickness	4	8	3.00	7.85	0.45	3.09	3.54	12.71
46 cm	3	9	3.00	7.90	0.40	0.35	0.75	53.33
	2	8	2.73	7.78	1.38	0.21	1.59	86.79
	1	5	3.03	7.70	1.66	1.16	2.82	58.87

Data at Miharasi B.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
27 VIII 70	12	8	2.33	7.30	0.02	0.11	0.13	15.38
	11	8	2.07	7.40	0.02	0.05	0.07	28.57
Ice thickness 102 cm	10	8	2.15	7.62	0.02	0.08	0.10	20.00
	9	9	2.72	8.72	0.03	0.09	0.12	25.00
	8	9	2.98	8.32	0.04	0.12	0.16	25.00
	7	10	2.75	8.00	0.05	0.22	0.27	18.52
	6	10	2.75	7.67	0.08	0.44	0.52	15.38
	5	9	2.20	7.49	0.17	1.15	1.32	12.88
	4	8	1.50	7.28	0.16	0.46	0.62	25.81
	3	8	1.82	7.40	0.16	0.20	0.36	44.44
2	9	1.66	7.52	0.15	0.18	0.33	45.45	
1	6	3.50	7.78	0.16	0.11	0.27	59.26	

Data at Miharasi B.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
28 IX 70	15	9	4.80	8.40	0.05	0.10	0.15	33.33
	14	10	4.91	8.20	0.07	0.09	0.16	43.75
Ice thickness 135 cm	13	9	3.76	7.91	0.04	0.10	0.14	28.57
	12	9	2.61	7.75	0.07	0.09	0.16	43.75
	11	9	3.24	7.92	0.05	0.09	0.14	35.71
	10	9	4.02	8.38	0.26	0.13	0.39	66.67
	9	10	4.12	8.40	0.49	0.18	0.67	73.13
	8	9	3.64	8.20	0.55	0.25	0.80	68.75
	7	8	4.02	8.25	0.45	0.29	0.74	60.81
	6	8	2.92	7.91	0.61	0.60	1.21	50.41
	5	9	2.76	7.91	1.01	0.49	1.50	67.33
	4	10	3.63	8.17	0.44	0.24	0.68	64.71
	3	10	1.75	7.49	0.27	0.20	0.47	57.45
	2	10	1.78	7.50	0.30	0.13	0.43	69.77
	1	6	3.09	7.70	0.47	0.14	0.61	77.05

Data at Miharasi B.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
27 X 70	16	7	4.71	8.61	0.03	0.07	0.10	30.00
	15	9	4.71	8.51	0.08	0.07	0.15	53.33
Ice thickness 140 cm	14	9	4.17	8.35	0.08	0.06	0.14	57.14
	13	10	3.72	8.40	0.10	0.07	0.17	58.82
	12	10	4.87	8.80	0.49	0.11	0.60	81.67
	11	10	4.39	8.60	0.49	0.13	0.62	79.03
	10	8	8.31	8.67	0.93	0.12	1.05	88.57
	9	9	5.46	8.70	1.47	0.12	1.59	92.45
	8	9	3.47	8.60	1.52	0.17	1.69	89.94
	7	9	3.47	8.60	2.62	0.17	2.79	93.91
	6	8	2.86	8.56	3.00	0.32	3.32	90.36
	5	8	2.88	8.30	2.31	0.35	2.66	86.84
4	8	2.11	8.05	2.00	0.45	2.45	81.63	
3	8	1.57	7.87	1.76	0.61	2.37	74.26	
2	10	2.12	7.92	1.17	0.34	1.51	77.48	
1	8	2.86	7.95	2.08	0.44	2.52	82.54	

Data at Miharasi B.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
25 XI 70	15	7	4.03	8.50	1.10	0.13	1.23	89.43
	14	10.5	2.60	8.60	0.45	0.09	0.54	83.33
Ice thickness	13	10.5	1.75	8.21	0.13	0.07	0.20	65.00
139 cm	12	10	2.63	8.40	0.16	0.10	0.26	61.54
	11	10	3.05	8.60	0.31	0.07	0.38	81.58
	10	10	2.62	8.69	0.47	0.07	0.54	87.04
	9	8	4.47	8.80	0.83	0.04	0.87	95.40
	8	9	3.48	8.88	1.22	0.09	1.31	93.13
	7	9	3.48	8.94	1.57	0.16	1.73	90.75
	6	10	3.35	8.95	1.58	0.53	2.11	74.88
	5	10	2.85	8.85	2.26	0.67	2.93	77.13
	4	10	2.33	8.75	2.17	0.41	2.58	84.11
	3	10	1.71	8.49	1.11	0.31	1.42	78.17
	2	10	1.64	8.32	0.89	0.39	1.28	69.53
	1	5	4.22	8.40	70.23	0.66	70.89	99.07

Data at Miharasi B.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
22 XII 70	14	8	2.02	7.80	0.19	0.09	0.28	67.86
	13	11	1.82	8.30	0.17	0.08	0.25	68.00
Ice thickness	12	11	2.17	8.50	0.19	0.07	0.26	73.08
133 cm	11	10	2.48	8.61	0.15	0.06	0.21	71.43
	10	10	2.61	8.65	0.18	0.09	0.27	66.67
	9	10	2.85	8.98	0.23	0.05	0.28	82.14
	8	10	2.85	9.00	0.27	0.08	0.35	77.14
	7	10	2.46	9.00	0.54	0.10	0.64	84.38
	6	10	2.30	8.85	0.54	0.63	1.17	46.15
	5	9	1.49	8.65	0.50	0.39	0.89	56.18
	4	9	1.25	8.44	0.83	0.11	0.94	88.30
	3	10	1.24	8.40	1.17	0.06	1.23	95.12
	2	10	1.49	8.78	1.65	0.00	1.65	100.00
	1	5	2.62	8.80	37.82	1.81	39.63	95.43

Data at east side of Nesöya.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
20 IV 70	10	25	—	—	—	—	—	—
	9	5	2.04	8.60	1.15	0.49	1.64	70.12
Ice thickness	8	5	2.74	8.84	1.18	0.34	1.52	77.63
71 cm	7	5	2.64	8.90	1.98	0.41	2.39	82.85
	6	8	2.26	8.90	2.94	0.53	3.47	84.73
	5	5	2.53	9.18	8.96	0.53	9.49	94.42
	4	5	2.88	9.39	23.45	3.20	26.65	87.99
	3	5	2.77	8.90	48.27	7.25	55.52	86.94
	2	5	3.50	8.20	138.09	11.45	149.54	92.34
	1	3	4.27	8.01	5.77	3.07	8.84	65.27

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
5 VI 70	12	7	0.16	6.33	0.01	0.12	0.13	7.69
	11	7	0.60	6.97	0.11	0.30	0.41	26.83
Ice thickness	10	8	0.16	6.40	0.08	0.12	0.20	40.00
86 cm	9	7	1.11	7.70	0.29	0.34	0.63	46.03
	8	8	3.22	8.78	0.52	0.04	0.56	92.86
	7	7	2.32	8.55	1.95	0.00	1.95	100.00
	6	5	4.25	8.30	14.61	0.00	14.61	100.00
	5	5	4.73	7.49	36.04	2.03	38.07	94.67
	4	8	4.05	7.83	13.95	20.82	34.77	40.12
	3	8	3.25	7.83	4.39	4.76	9.15	47.98
	2	8	3.14	7.85	4.80	3.79	8.59	55.88
	1	8	3.65	7.50	4.17	0.79	4.96	84.07

Data at east side of Nesöya.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and Phaeophytin
23 IX 70	18	20	0.17	6.18	0.00	0.07	0.07	0.00
	17	10	0.91	7.57	0.01	0.08	0.09	11.11
Ice thickness	16	10	2.07	8.20	0.00	0.07	0.07	0.00
165 cm	15	11	2.48	8.70	0.01	0.11	0.12	8.33
	14	10	2.34	8.80	0.05	0.10	0.15	33.33
	13	7	3.38	8.70	1.05	0.69	1.75	60.00
	12	5	4.15	7.72	8.46	14.49	22.95	36.86
	11	7	2.62	7.62	0.17	1.38	1.55	10.97
	10	9	2.14	7.50	0.07	0.27	0.34	20.59
	9	9	2.06	7.52	0.04	0.20	0.24	16.67
	8	10	2.05	7.55	0.04	0.12	0.16	25.00
	7	8	2.17	7.60	0.08	0.12	0.20	40.00
	6	8	2.33	7.71	0.11	0.10	0.21	52.38
	5	9	2.52	7.81	0.09	0.17	0.26	34.62
	4	9	2.31	7.90	0.14	0.11	0.25	56.00
	3	9	2.52	7.84	0.27	0.15	0.42	64.29
	2	9	2.62	8.00	1.68	0.51	2.19	76.71
	1	5	4.21	7.80	7.60	1.37	8.97	84.73

Data at Kita-no-ura.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
12 V 70	17	10	0.05	6.20	0.06	0.14	0.20	30.00
	16	15	0.29	7.00	0.50	0.65	1.15	43.48
Ice thickness	15	10	1.14	8.80	2.26	3.04	5.30	42.64
140 cm	14	8	0.82	8.50	2.09	2.82	4.91	42.57
	13	12	1.41	9.04	4.63	1.14	5.77	80.24
	12	9	0.79	8.10	4.67	2.28	6.95	67.19
	11	8	0.95	8.60	2.29	0.10	2.39	95.82
	10	7	1.25	8.60	1.97	0.13	2.10	93.81
	9	7.5	1.32	8.49	2.44	0.21	2.65	92.08
	8	7.5	1.75	8.12	6.56	0.52	7.08	92.66
	7	7.5	2.17	8.23	4.96	0.65	5.61	88.41
	6	9	2.92	8.40	14.32	0.75	15.07	95.02
	5	7.5	3.33	7.92	8.47	1.84	10.31	82.15
	4	7.5	3.05	7.79	6.04	1.92	7.96	75.88
	3	7.5	2.84	7.74	7.92	2.88	10.80	73.33
	2	5	2.71	7.78	32.47	8.11	40.58	80.01
	1	2	5.71	7.60	28.44	4.07	32.51	87.48

Data at Kita-no-ura.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
28 X 70	15	14	0.13	6.40	0.07	0.21	0.28	25.00
	14	11	0.55	7.81	0.16	0.65	0.81	19.75
Ice thickness 140 cm	13	10	2.20	8.90	0.77	0.12	0.89	86.52
	12	10	2.93	8.71	2.25	0.17	2.42	92.98
	11	9	3.15	8.58	3.17	0.44	3.61	87.81
	10	10	2.51	8.53	4.96	1.45	6.41	77.38
	9	8.5	2.06	8.60	7.92	2.92	10.84	73.06
	8	8.5	2.05	8.35	9.51	4.09	13.60	69.93
	7	8	2.28	8.25	14.54	5.23	19.77	73.55
	6	9	1.67	7.86	13.59	3.96	17.55	77.44
	5	9	1.95	7.90	16.19	2.47	18.66	86.76
	4	8	2.37	7.68	9.91	3.28	13.19	75.13
3	9	2.10	7.68	5.31	2.57	7.88	67.39	
2	8	2.54	7.75	2.02	0.25	2.27	88.99	
1	8	2.78	7.75	0.55	0.20	0.75	73.33	

Data at station M0.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
31 V 70	7	7	5.08	8.34	0.13	0.29	0.42	30.95
	6	7	2.53	7.97	0.16	0.36	0.52	30.77
Ice thickness	5	6	2.70	7.91	0.38	2.13	2.51	15.14
43 cm	4	6	2.38	7.85	0.68	2.03	2.71	25.09
	3	7	2.68	8.00	1.37	0.35	1.72	79.65
	2	5	3.09	7.97	1.22	0.21	1.43	85.31
	1	5	4.65	7.90	0.86	0.20	1.06	81.13

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
12 VI 70	11	6	2.86	8.40	0.24	0.05	0.29	82.76
	10	6	0.29	6.62	0.01	0.06	0.07	14.29
Ice thickness	9	8	0.19	6.30	0.41	0.10	0.51	80.39
81 cm	8	8	0.19	6.85	0.54	0.22	0.76	71.05
	7	9	0.73	7.30	0.65	1.12	1.77	36.72
	6	9	0.63	7.50	0.57	0.30	0.87	65.52
	5	9	1.11	7.67	0.70	1.75	2.45	28.57
	4	6	0.97	7.67	1.63	1.81	3.44	47.38
	3	6	1.78	7.80	4.61	1.85	6.46	71.36
	2	5	3.01	7.84	12.21	5.21	17.42	70.09
	1	9	3.17	8.00	9.80	2.43	12.23	80.13

Data at station M1.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
29 IV 70	7	5	3.78	8.22	0.53	0.35	0.88	60.23
	6	5	4.80	8.42	0.26	0.34	0.60	43.33
Ice thickness	5	5	2.65	8.10	1.80	2.76	4.56	39.47
30 cm	4	4.5	2.23	7.73	1.08	4.47	5.55	19.64
	3	4.5	2.89	7.80	1.00	3.93	4.93	20.28
	2	3	4.85	7.82	6.30	2.86	9.16	68.78
	1	3	5.28	8.10	4.45	0.96	5.41	82.26

Data at station M2.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
9 VI 70	7	6	4.52	8.42	0.10	0.17	0.27	37.04
	6	6	2.54	8.00	0.17	0.32	0.49	34.69
Ice thickness	5	8	2.86	8.05	0.26	1.29	1.55	16.77
52 cm	4	8	2.86	7.96	0.38	1.32	1.70	22.35
	3	8	2.49	7.90	0.47	0.34	0.81	58.02
	2	8	2.38	7.90	1.21	0.23	1.44	84.03
	1	8	2.94	7.97	0.76	0.12	0.88	86.36

Data at station M3.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
3 II 70	6	6	6.58	8.42	0.19	0.22	0.41	46.34
	5	7	3.40	8.10	0.19	0.51	0.70	27.14
Ice thickness	4	9	2.86	8.04	0.29	2.09	2.38	12.18
46 cm	3	8	2.86	7.97	0.47	1.09	1.56	30.13
	2	8	2.86	7.97	0.91	0.29	1.20	75.83
	1	8	3.17	7.85	0.73	0.15	0.88	82.95

Data at station K1.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of Chlorophyll and phaeophytin
12 VII 70	12	7	5.24	8.55	0.87	0.27	1.14	76.32
	11	7	2.70	8.12	1.59	0.41	2.00	79.50
Ice thickness	10	9	1.94	8.44	1.90	0.24	2.14	88.79
87.5 cm	9	7	3.38	8.45	1.39	0.95	2.34	59.40
	8	4.5	3.54	7.50	35.14	29.10	64.24	54.70
	7	5	3.54	7.85	15.20	9.65	24.85	61.17
	6	8	3.01	7.65	5.48	5.26	10.74	51.02
	5	8	2.70	7.70	2.07	2.96	5.03	41.15
	4	8	2.54	7.71	0.87	1.25	2.12	41.04
	3	8	2.41	7.76	0.64	0.85	1.49	42.95
	2	8	1.92	7.60	0.47	0.45	0.92	51.09
	1	8	2.38	7.48	0.42	0.33	0.75	56.00

Data at station K2.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
12 VII 70	13	10	0.16	6.40	0.04	0.16	0.20	20.00
	12	10	0.33	6.85	0.13	0.22	0.35	37.14
Ice thickness	11	10	0.36	7.00	0.09	0.25	0.34	26.47
115 cm	10	10	0.49	7.20	0.09	0.34	0.43	20.93
	9	10	0.79	7.31	0.11	0.32	0.43	25.58
	8	10	1.60	7.85	0.26	0.49	0.75	34.67
	7	5	1.25	7.50	0.37	0.84	1.21	30.58
	6	9	0.76	7.70	0.70	1.23	1.93	36.27
	5	9	2.98	8.05	1.47	2.21	3.68	39.95
	4	5	0.98	7.40	1.18	2.94	4.12	28.64
	3	9	2.38	8.02	0.42	0.52	0.94	44.68
	2	9	1.90	7.97	0.34	0.21	0.55	61.82
	1	9	2.79	8.10	0.46	0.15	0.61	75.41

Data at station P.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
24 VII 70	10	8	4.93	8.53	0.03	0.11	0.14	21.43
	9	8	4.33	8.33	0.03	0.13	0.16	18.75
Ice thickness	8	7	7.13	8.33	0.06	0.50	0.56	10.71
79 cm	7	8	5.32	8.32	0.15	0.52	0.67	22.39
	6	8	2.59	7.70	0.16	0.99	1.15	13.91
	5	8	2.36	7.80	0.34	2.78	3.12	10.90
	4	8	2.09	7.70	0.44	0.82	1.26	34.92
	3	8	1.82	7.60	0.42	0.33	0.75	56.00
	2	8	2.50	7.91	0.22	0.19	0.41	53.66
	1	8	3.57	8.08	0.34	0.14	0.48	70.83

Data at station Tl.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
9 IX 70	15	13	0.16	5.90	0.00	0.07	0.07	0.00
	14	11	0.22	6.14	0.01	0.06	0.07	14.29
Ice thickness	13	11	0.71	6.85	0.01	0.09	0.10	10.00
125 cm	12	9	1.31	7.20	0.02	0.09	0.11	18.18
	11	9	2.14	7.46	0.21	0.81	1.02	20.59
	10	6	2.61	7.50	0.06	0.79	0.85	7.06
	9	8	2.35	7.50	0.02	0.19	0.21	9.52
	8	7	2.26	7.48	0.13	0.11	0.24	54.17
	7	7	2.26	7.45	0.04	0.10	0.14	28.57
	6	7	1.85	7.31	0.04	0.11	0.15	26.67
	5	7	2.20	7.55	0.02	0.11	0.13	15.38
	4	8	2.49	7.76	0.35	0.26	0.61	57.38
	3	8	2.28	7.67	0.50	0.25	0.75	66.67
	2	8	2.49	7.65	1.48	0.46	1.94	76.29
	1	6	3.79	7.60	1.89	0.36	2.25	84.00

Data at station T2.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
14 IX 70	16	13	0.27	6.51	0.01	0.07	0.08	12.50
	15	13	0.32	6.51	0.01	0.05	0.06	16.67
Ice thickness	14	11	0.66	6.95	0.01	0.07	0.08	12.50
150 cm	13	10	0.80	7.00	0.01	0.07	0.08	12.50
	12	10	1.18	7.70	0.01	0.07	0.08	12.50
	11	10	2.33	8.60	0.09	0.12	0.21	42.86
	10	9	1.69	8.30	0.72	0.63	1.35	53.33
	9	6	3.01	7.79	5.94	8.07	14.01	42.40
	8	9	3.00	7.78	0.20	0.98	1.18	16.95
	7	9	2.45	7.71	0.14	0.80	0.94	14.89
	6	9	1.98	7.60	0.07	0.11	0.18	38.89
	5	9	1.83	7.55	0.10	0.11	0.21	47.62
	4	9	2.14	7.62	0.10	0.11	0.21	47.62
	3	9	2.46	7.70	0.19	0.15	0.34	55.88
	2	9	2.59	7.75	0.44	0.18	0.62	70.97
	1	5	4.67	7.86	0.40	0.12	0.52	76.92

Data at station B1.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
15 IX 70	12	10	0.13	6.60	0.05	0.18	0.23	21.74
	11	7	0.40	6.88	0.12	0.15	0.27	44.44
Ice thickness	10	9	0.78	7.15	0.25	0.10	0.35	71.43
105 cm	9	9	1.10	7.32	0.20	0.14	0.34	58.82
	8	9	1.69	8.10	0.32	0.14	0.46	69.57
	7	9	2.48	7.92	0.82	0.40	1.22	67.21
	6	9	2.10	7.72	1.36	1.02	2.38	57.14
	5	9	2.33	7.65	1.87	1.94	3.81	49.08
	4	9	2.49	7.62	0.51	0.41	0.92	55.43
	3	9	2.20	7.71	0.42	0.11	0.53	79.25
	2	9	2.24	7.80	0.81	0.05	0.86	94.19
	1	7	2.65	7.90	0.22	0.06	0.28	78.57

Data at station B2.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
15 IX 70	13	10	0.36	6.90	0.09	0.08	0.17	52.94
	12	9	0.39	6.92	0.10	0.11	0.21	47.62
Ice thickness	11	10	1.02	7.16	0.15	0.08	0.23	65.22
125 cm	10	12	1.14	7.20	0.20	0.09	0.29	68.97
	9	10	1.30	7.65	0.20	0.14	0.34	58.82
	8	12	1.44	7.35	1.61	0.85	2.46	65.45
	7	11	1.95	7.62	1.47	0.27	1.74	84.48
	6	10	1.61	8.00	0.39	0.23	0.62	62.90
	5	8	2.40	7.62	0.69	0.52	1.21	57.02
	4	9	1.98	7.60	0.58	0.34	0.92	63.04
	3	9	1.79	7.35	0.61	0.21	0.82	74.39
	2	9	2.00	7.70	1.71	0.16	1.87	91.44
	1	6	2.94	7.82	0.64	0.10	0.74	86.49

Data at station W.

Date	Number of Sample	Depth from Bottom (cm)	Chlori- nity (‰)	pH	Chloro- phyll (mg/m ³)	Phaeo- phytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chloro- phyll to sum of chlorophyll and phaeophytin
25 IX 70	17	11	0.13	6.65	0.01	0.10	0.11	9.09
	16	10	0.54	6.80	0.03	0.08	0.11	27.27
Ice thickness	15	10	0.29	6.69	0.03	0.08	0.11	27.27
150 cm	14	10	0.84	7.18	0.08	0.09	0.17	47.06
	13	10	1.56	7.75	0.18	0.04	0.22	81.82
	12	10	2.01	8.02	0.40	0.07	0.47	85.11
	11	10	0.96	7.00	0.49	0.13	0.62	79.03
	10	6	1.08	7.00	0.58	0.30	0.88	65.91
	9	10	2.61	8.22	3.28	3.38	6.66	49.25
	8	8	3.11	7.70	1.80	2.15	3.95	45.57
	7	10	2.59	7.60	0.69	1.01	1.70	40.59
	6	9	2.44	7.60	0.47	0.40	0.87	54.02
	5	8	2.07	7.45	0.36	0.22	0.58	62.07
	4	8	2.20	7.52	0.14	0.20	0.34	41.18
	3	8	2.20	7.55	0.13	0.14	0.27	48.15
	2	6	2.32	7.55	0.20	0.12	0.32	62.50
	1	6	3.76	7.60	0.26	0.15	0.41	63.41

Data at station E.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
29 IX 70	15	12	4.03	8.95	1.20	1.00	2.20	54.55
	14	11	2.15	7.30	8.68	6.34	15.02	57.79
Ice thickness	13	11	3.31	7.30	20.78	10.62	31.40	66.18
145 cm	12	11	2.71	7.42	0.47	0.43	0.90	52.22
	11	9	2.76	7.60	0.04	0.29	0.33	12.12
	10	9	2.71	7.65	0.03	0.35	0.38	7.89
	9	9	2.39	7.43	0.03	0.33	0.36	8.33
	8	9	2.27	7.45	0.03	0.24	0.27	11.11
	7	11	2.49	7.60	0.08	0.19	0.27	29.63
	6	10	2.74	7.60	0.10	0.12	0.22	45.45
	5	10	2.78	7.62	0.12	0.11	0.23	52.17
	4	10	2.67	7.70	0.28	0.13	0.41	68.29
	3	10	2.86	7.80	0.95	0.14	1.09	87.16
	2	8	2.53	7.55	1.93	0.20	2.13	90.61
	1	5	3.90	7.60	4.69	0.14	4.83	97.10

Data at station L1.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
11 VIII 70	13	11	4.03	8.28	0.11	0.17	0.28	39.29
	12	7	3.15	7.99	0.35	0.74	1.09	32.11
Ice thickness	11	7	1.82	7.71	0.47	2.18	2.65	17.74
99 cm	10	7	2.05	7.90	0.83	6.41	7.24	11.46
	9	6	3.10	7.95	0.56	1.21	1.77	31.64
	8	6	2.63	7.95	0.39	0.83	1.22	31.97
	7	10	2.46	8.00	0.15	0.60	0.75	20.00
	6	9	2.46	8.08	0.19	0.46	0.65	29.23
	5	9	2.46	8.12	0.16	0.31	0.47	34.04
	4	9	2.72	8.26	0.44	0.38	0.82	53.66
	3	6	2.75	8.02	1.79	0.32	2.11	84.83
	2	6	2.10	7.80	2.09	0.28	2.37	88.19
	1	6	3.37	7.88	0.69	0.20	0.89	77.53

Data at station L2.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
12 X 70	17	9	1.89	8.00	0.00	0.07	0.07	0.00
	16	10	2.90	8.45	0.00	0.09	0.09	0.00
Ice thickness	15	7	2.52	8.20	0.00	0.07	0.07	0.00
150 cm	14	8	4.15	8.87	0.00	0.08	0.08	0.00
	13	9	3.27	7.85	0.01	0.13	0.14	7.14
	12	9	2.48	7.15	0.07	0.55	0.62	11.29
	11	9	2.66	7.19	0.05	0.27	0.32	15.63
	10	9	2.40	7.29	0.03	0.08	0.11	27.27
	9	9	2.14	7.30	0.07	0.08	0.15	46.67
	8	9	2.01	7.62	0.06	0.08	0.14	42.86
	7	9	2.20	7.60	0.02	0.17	0.19	10.53
	6	9	2.20	7.60	0.32	0.08	0.40	80.00
	5	9	2.01	7.80	0.13	0.08	0.21	61.90
	4	10	1.89	7.95	0.32	0.15	0.47	68.09
	3	10	1.93	7.78	0.16	0.06	0.22	72.73
	2	10	2.18	8.20	0.24	0.30	0.54	44.44
	1	5	3.52	8.10	36.81	9.76	46.57	79.04

Data at station L3.

Date	Number of Sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
12 X 70	17	7	2.74	8.00	0.00	0.12	0.12	0.00
	16	13	3.40	8.70	0.00	0.11	0.11	0.00
Ice thickness 145 cm	15	8	3.78	8.30	0.02	0.39	0.41	4.88
	14	10	3.06	7.42	0.02	0.39	0.41	4.88
	13	9	2.54	7.27	0.02	0.26	0.28	7.14
	12	10	2.90	7.40	0.03	0.18	0.21	14.29
	11	10	3.03	7.51	0.02	0.22	0.24	8.33
	10	9	3.02	7.65	0.02	0.13	0.15	13.33
	9	9	2.66	7.60	0.02	0.08	0.10	20.00
	8	9	3.02	7.76	0.02	0.08	0.10	20.00
	7	9	2.90	7.76	0.01	0.06	0.07	14.29
	6	8	3.05	7.98	0.01	0.07	0.08	12.50
	5	8	2.77	7.85	0.01	0.07	0.08	12.50
4	9	2.62	7.85	0.02	0.11	0.13	15.38	
3	10	2.39	7.71	0.02	0.11	0.13	15.38	
2	4	3.08	7.70	0.07	0.15	0.22	31.82	
1	3	4.28	7.79	0.57	0.52	1.09	52.29	

Data at station L4.

Date	Number of sample	Depth from Bottom (cm)	Chlorinity (‰)	pH	Chlorophyll (mg/m ³)	Phaeophytin (mg/m ³)	Chlorophyll and Phaeophytin (mg/m ³)	Percent of chlorophyll to sum of chlorophyll and phaeophytin
11 VIII 70	13	11	3.70	8.90	0.20	1.35	1.55	12.90
	12	11	2.31	8.10	0.32	1.31	1.63	19.63
Ice thickness	11	9	3.50	8.42	1.12	2.43	3.55	31.55
114 cm	10	7	3.68	8.41	6.15	1.77	7.92	77.65
	9	8	2.98	8.20	4.25	2.82	7.07	60.11
	8	9	3.24	7.80	3.37	3.17	6.54	51.53
	7	7	2.85	7.60	1.79	2.56	4.35	41.15
	6	7	3.11	7.60	3.30	2.26	5.56	59.35
	5	11	2.59	7.80	0.99	2.68	3.67	26.98
	4	8	2.80	7.97	0.61	0.95	1.56	39.10
	3	8	2.07	7.70	1.60	0.32	1.92	83.33
	2	9	1.85	7.72	0.85	0.29	1.14	74.56
	1	9	2.72	7.68	0.61	0.21	0.82	74.39