

On the Dissolved Oxygen and Chlorinity of the Water of Mutsu Bay during 1950

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Quantity of Chlorine.

Because Mutsu Bay is connected with the open sea by the Tairadate Strait which is less than 10 km in width, the bay is like a lagoon and owing to the drainage of fresh water from the land the quantity of chlorine is variable throughout the year. Especially the surface layer is largely affected. Observations on the variation in quantity of chlorine at definite stations in 1950 show that the quantity from January to March in the 10-30 m layer was invariable but the surface layer was subject to some change. In April the surface layer showed a remarkable low value owing to the water from the snow melt of the Hakkoda mountains being carried by every stream and river into the bay; this condition continues to the early part of May.

From the latter part of June to the early part of July there is again a low value in the quantity of chlorine owing to the surface layer being supplied with water of the rainy season. In August and September the heat from solar radiation causes an increase in evaporation, thus the surface layer showed a high value, but during the latter part of September the observed value of the surface layer showed high salinity which became lower toward the bottom layer owing to the fact that in autumn the water of low salinity in the surface layer descends to the bottom layer because of the lowering of water temperature. After this season to March of the following year each form layers. In general the change in chlorine quantity in Mutsu Bay as stated above is repeated yearly. The quantity of chlorine for each year depends upon the strength of the open sea current, amount of water drained from the land and other phenomena. Details concerning the aforementioned are reserved for another opportunity.

Oxygen Content

The change in oxygen content throughout the year of 1950 in Mutsu Bay shows that during the winter season of January and February it was about 6.50 cc/L but oversaturation never occurs. Because of the low water temperature and bad weather during the winter season the waves stir up the water, thus

Tabel 1. Chlorine Content of Sea water in Mutsu Bay during 1950.

Depth (m)	Cl (%)											
	I.14	II.3	II.16	III.5	III.19	IV.1	IV.16	V.2	V.17	VI.4	VI.15	VII.6
0	18.70	18.07	18.57	18.52	18.42	16.78	14.66	15.85	18.07	18.12	17.15	17.31
5	18.72	18.57	18.68	18.55	18.61	18.58	18.00	18.18	18.48	18.49	18.36	18.19
10	18.72	18.68	18.68	18.63	18.63	18.64	18.54	18.52	18.50	18.51	18.45	18.39
20	18.72	18.68	18.68	18.63	18.63	18.70	18.61	18.47	18.58	18.51	18.48	—
30	18.72	18.68	18.68	18.63	18.63	18.72	18.68	18.39	18.58	18.51	18.48	18.60
	VII.21	VIII.4	VIII.15	IX.7	IX.23	X.3	X.15	XI.3	XI.18	XII.4	XII.16	
0	16.72	18.45	18.32	18.67	18.68	18.26	18.49	17.69	17.61	18.22	17.78	
5	18.23	18.58	18.66	18.72	18.68	18.49	18.52	18.49	18.35	18.57	18.35	
10	18.39	18.69	18.70	18.76	18.67	18.57	18.57	18.51	18.47	18.67	18.49	
20	18.49	18.71	18.68	18.76	18.67	18.59	18.57	18.51	18.53	18.67	18.67	
30	18.60	18.74	18.79	18.80	18.65	18.60	13.55	18.51	18.59	18.68	18.67	

Table 2. Oxygen Content and its Saturation in Sea water of Mutsu Bay during 1950.

Depth (m)	Oxygen (cc/L)									
	I.14	II.3	II.16	III.5	III.19	IV.1	IV.16	V.2	V.17	VI.4
0	6.26	6.56	6.53	7.28	7.06	7.26	7.12	6.54	6.50	6.21
5	6.27	6.45	6.54	7.27	6.97	7.17	7.18	6.66	6.69	6.36
10	6.33	6.49	6.55	7.21	7.02	7.25	7.45	6.78	6.69	6.39
20	6.36	6.59	6.56	7.23	7.10	6.94	7.51	7.09	6.70	6.28
30	6.30	6.50	6.49	7.15	6.98	6.70	7.44	6.58	6.47	5.75
	VII.21	VIII.4	VIII.15	IX.23	X.3	XI.3	XI.18	XII.4	XII.16	
0	5.26	5.00	4.66	4.80	5.14	5.58	5.79	5.86	6.21	
5	5.26	5.42	4.62	4.91	4.97	5.33	5.65	5.70	6.14	
10	5.34	5.46	4.69	5.06	4.88	5.30	5.60	5.69	6.01	
20	5.43	5.44	4.94	5.06	4.93	5.24	5.56	5.67	5.99	
30	4.95	5.19	4.89	5.02	4.76	5.24	5.42	5.71	5.90	

Depth (m)	Oxygen (%)									
	I.14	II.3	II.16	III.5	III.19	IV.1	IV.16	V.2	V.17	VI.4
0	94.6	95.9	98.9	106.0	103.5	108.0	105.0	97.5	103.5	103.4
5	94.7	96.0	98.8	106.1	103.7	109.0	111.5	102.5	108.8	106.4
10	95.6	96.7	99.1	105.4	104.0	108.2	114.8	106.3	109.5	105.6
20	96.1	97.3	99.2	106.2	104.6	103.3	113.4	113.6	109.8	101.9
30	95.2	96.0	98.2	105.0	102.6	98.8	112.2	107.9	107.5	92.6
	VII.21	VIII.4	VIII.15	IX.23	X.3	XI.3	XI.18	XII.4	XII.16	
0	100.8	99.2	94.7	93.0	96.6	94.9	95.9	95.1	95.5	
5	101.3	104.8	94.3	95.2	94.3	92.9	94.6	95.2	97.5	
10	100.4	103.2	93.6	97.9	92.1	92.3	94.4	95.8	96.5	
20	101.5	101.7	96.5	97.9	94.1	91.2	94.1	95.5	97.7	
30	92.0	95.4	91.4	97.1	90.8	91.2	91.9	96.1	96.2	

the oxygen content can be said to be rather large. In March the increase in solar radiation; vegetation of coastal sea-weeds, and an increase in plant plankton, carbon assimilation causes an increase of more than 7 cc/L, thus the percentage saturation exceeds 100% to reach a condition of oversaturation. The maximum value of oxygen in Mutsu Bay appears during this season. In the summer season, because of the increase in water temperature and chlorine content and decay of organisms, the quantity of oxygen decreases down about to 4.5 cc per litre, thus in early autumn, a minimum value is found. In late autumn together with the increase of autumn diatoms and decrease in water temperature there is an increase of oxygen content. This condition continues to the March of the following year. The change in oxygen content in Mutsu Bay throughout the year is as stated above. The quantity of oxygen is affected by the physical properties (temperature, salinity), biological conditions (plant plankton), wind, waves and tides, therefore to understand the slight changes or annual differences further study is necessary.