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Frank A. Stromsten
State University of Iowa

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TEMPERATURE STUDIES OF LAKE OKOBOJI FOR 1925

FRANK A. STROMSTEN

Continuing the work begun by Tilton ('15-'16) and Birge and Juday ('19), the writer has, since 1922, made daily observations of the water temperatures of Lake Okoboji. Sample readings have been reported from time to time. Temperature curves for the several years under observation show considerable variation in the degree of zonation. Tilton's curves do not show any marked differentiation into epilimnion, thermocline, and hypolimnion. On the other hand in 1919 Birge and Juday's observations show a very distinct zonation. This is even more marked in the curves for 1922 (Stromsten '23) and reaches its climax in 1923 (fig. 1). In 1924 the zonation becomes less distinct (fig. 1) while in 1925 no distinct thermocline seems to have developed.

This variation is obviously due, in a large part at least, to the weather conditions typical of these years. The summer of 1923 was conspicuous for its long periods of hot, calm weather. The thermocline became established very early in the season so that the epilimnial circulation was soon limited to a comparatively narrow zone. The surface waters reached a much higher temperature than at any of the other years. The oxygen was earlier and more completely exhausted from the hypolimnion than at any other season under observation.

The season of 1925, on the other hand, was cold and windy. The early spring was comparatively warm, but May was very cold and windy. The readings for May 17 (fig. 1) were taken after several days of cold, windy, drizzling weather. On May 16th, especially, the wind blew a gale. The entire lake must have been put into circulation. The curve indicates that there was scarcely more than a degree centigrade difference between the surface and the bottom at 21 meters at the point where the readings were taken. The observations were made from a point on the main axis of the lake, north and south, about midway between Schram's corner and the Inn. This would be in line with the greatest disturbance by the north wind of the day before. By June 15th the surface of the lake had been warmed nearly 7 degrees, or up to 15 degrees centigrade, while the bottom had reached

10 degrees. There is scarcely, if any, indication of zonation (fig. 1). This seems to have been characteristic of the rest of the summer. The curve, showing the average daily temperature of the period July 27 to August 17 is of the same general nature. Compare this curve with those for the corresponding period of 1923 and 1924.

STATE UNIVERSITY OF IOWA,
IOWA CITY, IOWA.

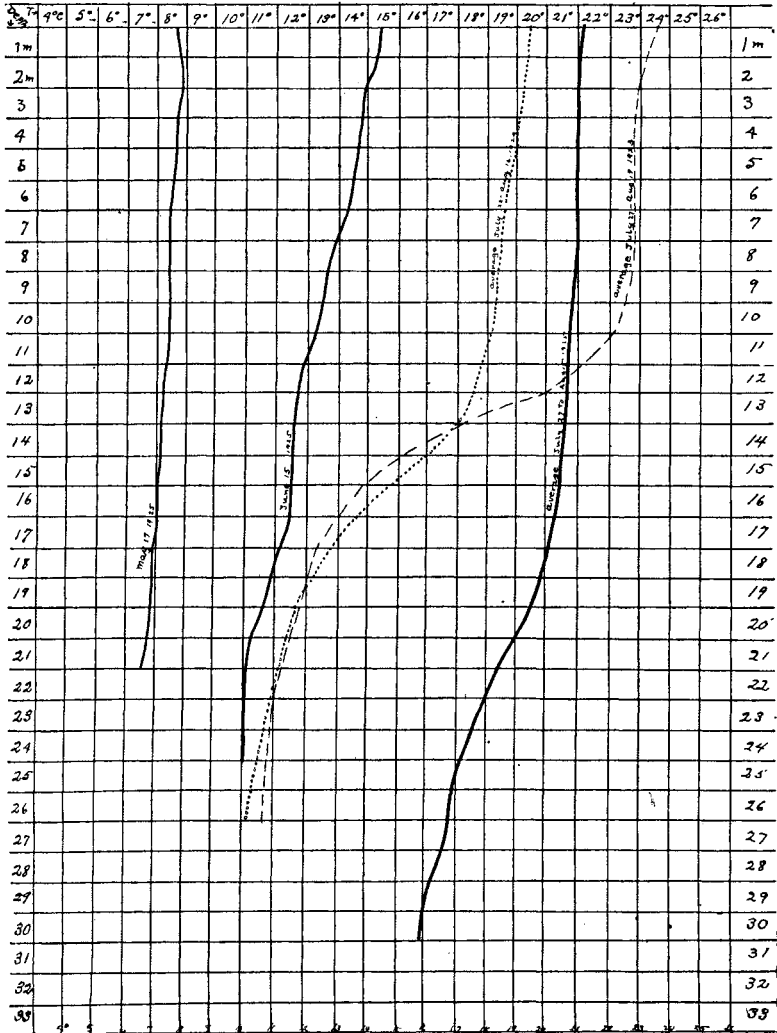


Fig. 1. Curves showing the temperature of the water of Lake Okoboji at various depths for 1923, 1924, and 1925

TABLE I
TEMPERATURE READINGS FOR LAKE OKOBOJI FOR 1925

Date	July 27	28	29	30	31	Aug. 1	2	3	4	5	6	7	8	10	11	12	13	14	15	
Time	10:30am	10:00	9:00	9:00	9:00	8:00	1:30pm	8:30am	9:00	9:00	9:00	9:00	8:30	8:30	8:30	2:30pm	8:30am	8:00	10:00	
Air.	20.C	20.C	20.C	19.C	18.C	20.C	23.5	23.5	22.C	22.C	23.5	20.C	22.C	24.C	22.8	25.C	19.5	23.C	22.5	
Wind.	N.E.	N.N.E.	N.	N.W.	N.E.	N.W.	N.W.	S.	S.	S	S.W.	S.E.	S.	W.	S.E.	N.W.	N.E.		SSW.	
Veloc.	1000	1000	315	1440	1450	500	393	360	970	1020	863	660	789	145	920	584	1380	310	1420	
Hum.	61%	49%	80%	60%	87%	76%	80%	90%	80%	90%	94%	88%	75%	70%				90%	96%
Sky	Clr.	Clr.	Clr.	Clr.	Cldy	Clr.	Clr.	Hazy	Clr.	Cldy	Cldy	Cldy	Cldy	Clr						Sprinkle
Bar.	30.08	30.09	29.97	30.00	30.07	30.13	30.07	30.01	30.05	30.01	29.90	29.88	29.88	29.98	29.95	29.78	30.01	30.15	29.87	
Surf.	21.60	21.40	21.10	21.00	20.40	20.30	21.30	21.30	20.20	20.10	20.70	20.80	21.00	21.30	21.00	20.60	20.40	20.75	20.50	
1. m.	21.60	21.40	21.10	21.00	20.50	20.30	21.25	21.30	20.20	20.10	20.70	20.80	21.00	21.25	21.00	20.60	20.30	20.75	20.30	
2.	21.60	21.40	21.10	21.00	20.50	20.30	20.70	21.20	20.20	20.10	20.60	20.80	21.00	21.20	21.00	20.60	20.30	20.70	20.30	
3.	21.60	21.40	21.10	21.00	20.50	20.20	20.50	21.00	20.20	20.00	20.60	20.70	21.00	21.20	21.00	20.50	20.30	20.60	20.30	
4.	21.60	21.40	21.10	21.00	20.50	20.20	20.30	20.80	20.20	20.00	20.60	20.65	21.00	21.20	21.00	20.50	20.30	20.55	20.30	
5.	21.60	21.40	21.10	21.00	20.50	20.20	20.30	20.50	20.20	20.00	20.50	20.65	21.00	21.15	21.00	20.50	20.30	20.50	20.30	
6.	21.50	21.40	21.10	21.00	20.50	20.20	20.20	20.30	20.20	20.00	20.40	20.60	20.90	21.15	20.90	20.40	20.30	20.50	20.30	
7.	21.50	21.40	21.00	21.00	20.50	20.20	20.20	20.30	20.00	20.00	20.40	20.60	20.60	21.15	20.90	20.40	20.30	20.50	20.30	
8.	21.50	21.30	21.00	21.00	20.50	20.20	20.20	20.20	20.00	20.00	20.30	20.40	20.50	21.00	20.80	20.20	20.30	20.50	20.30	
9.	21.50	21.30	21.00	21.00	20.50	20.20	20.20	20.20	20.00	20.00	20.30	20.30	20.30	21.00	20.20	20.10	20.30	20.48	20.30	
10.	21.40	21.30	21.00	21.00	20.50	20.20	20.20	20.20	20.00	20.00	20.00	20.30	20.30	20.30	20.00	19.90	20.20	20.48	20.30	
11.	21.30	21.30	20.98	21.00	20.50	20.20	20.10	20.20	20.00	20.00	20.00	20.30	20.00	20.00	19.90	19.80	20.20	20.45	20.30	
12.	21.30	21.30	20.95	21.00	20.40	20.20	20.10	20.20	20.00	20.00	20.00	20.30	20.00	19.90	19.70	19.65	20.20	20.42	20.30	
13.	21.30	21.30	20.93	21.00	20.40	20.20	20.10	20.00	20.00	20.00	19.80	20.10	20.00	19.70	19.60	19.55	19.75	20.10	20.20	
14.	21.20	21.20	20.90	20.95	20.40	20.20	20.00	19.90	19.90	19.90	19.70	20.00	19.90	19.50	19.50	19.40	19.60	19.50	20.00	
15.	21.00	21.00	20.63	20.90	20.40	20.00	19.85	19.70	19.90	19.90	19.60	20.00	19.80	19.30	19.40	19.30	19.50	19.25	20.00	
16.	21.00	20.80	19.35	20.80	20.20	20.00	19.60	19.50	19.80	19.80	19.60	19.75	19.60	19.10	19.10	19.10	19.30	19.00	19.90	
17.	21.00	19.80	18.98	20.50	20.00	19.40	19.60	19.40	19.80	19.70	19.40	19.20	19.20	18.70	18.90	18.90	19.10	18.98	19.80	
18.	20.00	18.60	18.18	19.40	18.60	18.70	19.50	19.10	19.60	19.30	19.10	18.50	18.90	18.60	18.70	18.45	18.80	18.50	19.80	
19.	19.50	18.20	17.65	18.90	18.50	18.30	19.40	18.40	19.00	19.20	18.80	18.30	18.90	18.20	18.50	17.90	18.75	18.00	19.70	
20.	17.60	17.90	17.30	18.50	18.20	17.80	17.80	18.00	18.50	18.60	17.50	17.60	18.80	17.40	18.10	17.50	18.50	17.60	18.80	
21.	17.40	17.80	17.10	18.40	18.00	17.20	17.20	17.20	18.00	17.60	16.90	17.20	17.60	17.20	17.65	17.10	18.10	16.85	18.40	
22.	17.10	17.40	16.85	17.90	17.90	16.80	16.85	16.80	17.70	16.80	16.70	16.70	17.20	16.80	17.20	16.50	17.70	16.65	18.00	
23.	16.90	16.90	16.30	17.30	16.80	16.50	16.40	16.60	17.00	16.40	16.50	16.60	16.60	16.50	16.60	16.15	17.60	16.50	17.80	
24.	16.40	16.80	16.30	17.30	16.80	16.30	16.10	16.50	16.80	16.30	16.40	16.60	16.50	16.25	16.20	16.00	16.20	16.00	17.60	
25.	16.10	16.50	16.22	16.90	16.80	16.25	15.95	16.30	16.60	16.20	16.20	16.10	16.40	16.10	16.10	15.60	16.10	15.90	17.10	
26.	16.00	16.20	16.00	16.80	.....	16.00	15.80	16.00	16.50	16.10	15.90	16.00	16.20	15.80	16.00	15.45	15.90	15.70	16.80
27.	15.90	16.10	15.75	16.60	.....	15.60	15.80	15.90	16.30	16.00	15.90	15.90	16.10	15.70	15.90	15.30	15.50	15.50	16.70
28.	15.90	16.10	15.70	16.30	.....	15.60	15.70	15.80	16.10	15.90	15.80	15.80	16.00	15.70	15.80	15.15	15.40	15.38	16.60
29.	15.80	16.00	15.60	16.00	15.50	15.60	15.60	16.00	15.90	15.70	15.70	15.90	15.50	15.60	15.00	15.40	15.35	16.40	
30.	15.80	15.90	15.60	15.90	15.50	15.50	15.50	15.80	15.60										

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