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Recent Trends of Temperature along the New England Coast

by

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Abstract

The recent decline of temperature along the New England coast is documented.

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In a study (Bumpus and Chase 1965) of observations made through 1963, it was found that air and water temperatures along the New England coast had undergone similar fluctuations. There were maxima in about 1931 and 1952 and the general trend for the first half of this century was upward. It had previously been pointed out by Taylor, Bigelow and Graham (1957) that most of the long period rise had taken place in the winter months although some of the short period oscillations were apparent in the summer data as well.

The curves (Bumpus and Chase, 1965) of five-year means of air temperatures at Boston, Massachusetts and New Haven, Connecticut, combined, and of water temperatures for February, August, and the year at Boothbay Harbor, Maine have been extended with the inclusion of data for 1964, 1965, and 1966 (figs. 1 and 2). The continued downward trend prevailing since the high levels of about 1952 is apparent in each curve although the rate of descent has slowed down in some cases. The descent of summer temperatures since 1950-53 to the present has been small.

The recent Boston and New Haven winter air temperature means are comparable with those of the previous minima of about 1946 and 1918. The recent Boothbay Harbor means for August are about equal to those of the minimum of about 1941 which were the lowest on record. The recent annual and February means have not yet reached the levels of previous minima.

Various series of temperature observations have been made at Portland (Maine) Lightship, Boston (Mass.) Lightship, and Nantucket Shoals (Mass.) Lightship. The most recent series, begun in late 1955 is part of a program of bathythermograph observations made by the U.S. Coast Guard in cooperation with the Woods Hole Oceanographic Institution and the U.S. Fish and Wildlife Service.

Surface temperature data from this series are presented in Tables 1-3 with averages from previous series sorted according to small changes in lightship location or length of series. Table 4 contains surface data from the Woods Hole (Mass.) Oceanographic Institution. These data show good agreement with the trends at Boston, New Haven, and Boothbay Harbor in respect to the general warming during the first half of this century and the recent cooling. This recent surface cooling is apparently less prominent in the summer months but the short record of bottom temperatures from the same program shows cooling in all seasons.

Thus the temperatures of New England have had similar trends to those of the surface water in St. Andrews, New Brunswick (Lauzier 1965) and in various areas in the North Atlantic (Beverton and Lee 1965 and Mitchell 1963). They are apparently compatible with the progression of temperature trends across the North Atlantic from St. Andrews to Europe reported to have been noted recently by Rodewald (Costlow 1967)

Beverton, R.J.H. and A.J. Lee, 1965. Hydrographic fluctuations in the North Atlantic Ocean and some biological consequences. In The Biological Significance of Climatic Changes in Britain, Symposia of the Institute of Biology No. 14, edited by C.G. Johnson and L.P. Smith, Academic Press, New York, 1965.

Bumpus, D.F. and J. Chase 1965. Changes in the hydrography observed along the east coast of the United States. Spec. Pub. No. 6, ICNAF Environmental Symposium, Rome 1964, pp. 847-853.

Costlow, J.D., Jr. 1967. Ocean temperatures: the short and long of it. European Scientific Notes. O.N.R. London, Mar. 1967. pp. 50-51.

Lauzier, L.M. 1965. Long term temperature variations in the Scotian Shelf area. Spec. Publ No. 6, ICNAF Environmental Symposium, Rom 1964. pp. 807-816.

Mitchell, J.M. 1963. On the world-wide pattern of secular temperature change. Unesco, Proceedings of the Rome Symposium organized by Unesco and the World Meteorological Organization, pp. 161-181.

Taylor, C.C., H.B. Bigelow, and H.W. Graham 1957. Climatic trends and the distribution of marine animals in New England. Fishery Bulletin 115, Fish. Bull., Fish and Wildlife Service Vol. 57, pp. 293-345.

Table 1. Sea Surface Temperature at Portland (Maine) Lightship
°C

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	A
1925-41	2.9	1.6	1.6	3.1	7.0	11.5	14.3	14.9	13.6	10.2	9.3	4.9	7.9
1947-56	4.5	3.3	3.1	4.7	7.7	11.3	15.4	16.1	13.9	12.3	8.8	6.6	9.0
1956	3.4	3.8	2.3	3.8	6.8	10.4	15.1	14.7	13.7	11.3	9.3	6.6	8.4
1959	-	3.6	3.2	4.4	8.5	12.4	16.8	16.8	14.0	10.6	8.3	5.2	-
1958	4.4	3.7	3.9	6.4	8.0	10.2	15.2	15.3	13.6	(11.4)	8.7	5.9	(8.9)
1959	4.3	3.2	2.8	5.1	8.3	9.8	14.2	14.9	13.2	-	-	6.4	-
1960	4.3	(3.1)	2.8	4.6	9.3	13.2	14.7	15.7	(13.7)	12.1	9.0	6.4	(9.1)
1961	3.3	2.2	2.6	3.4	6.3	10.6	14.0	15.6	14.0	11.4	8.9	6.5	8.2
1962	4.6	3.4	2.4	4.6	7.4	12.4	13.8	15.3	13.7	10.7	6.8	5.0	8.3
1963	3.2	3.0	3.2	5.2	-	12.4	15.7	15.5	13.2	12.0	8.8	5.0	-
1964	3.5	3.1	2.4	4.2	7.7	11.1	15.5	13.7	12.4	9.6	7.8	5.4	8.0
1965	2.8	0.4	1.8	4.0	8.4	11.0	14.6	14.4	13.0	9.7	6.7	4.1	7.6
1966	3.4	2.5	2.3	4.8	7.1	11.9	15.1	15.3	14.0	10.5	7.4	4.9	8.3

Table 2. Sea Surface Temperature at Boston (Mass.) Lightship
°C

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	A
1925-41	3.5	2.1	2.1	4.1	8.1	13.3	15.6	16.8	15.8	12.2	8.8	5.9	9.0
1956	3.3	2.5	2.5	4.3	7.1	12.6	16.1	17.9	14.8	12.3	10.1	6.9	9.2
1957	4.2	2.3	3.4	5.3	9.6	15.3	17.6	17.9	15.3	12.1	10.1	5.1	10.0
1958	5.0	2.6	-	5.9	9.4	11.6	14.8	14.7	13.6	12.0	8.9	6.4	-
1959	3.6	2.3	2.5	5.3	9.6	13.3	15.4	18.0	17.7	13.5	9.8	7.1	9.8
1960	4.4	3.6	2.7	5.2	10.8	14.7	14.7	17.5	16.5	12.2	9.6	6.6	9.8
1961	3.3	3.2	2.9	4.4	8.2	12.4	16.2	17.0	17.2	13.4	9.9	7.1	9.6
1962	4.2	2.8	2.6	5.5	8.8	13.8	-	15.9	15.9	12.3	9.1	6.7	-
1963	3.9	2.5	2.4	5.0	8.7	13.6	18.1	16.7	14.4	12.8	-	6.7	-
1964	-	2.5	2.8	4.6	9.6	12.6	16.7	15.8	16.1	10.8	8.8	5.4	-
1965	-	1.1	1.8	3.3	9.9	14.1	14.9	15.5	13.6	10.4	7.6	5.5	-
1966	3.6	1.8	2.4	4.9	7.6	13.5	16.0	15.4	16.0	10.6	-	-	-

Table 3. Sea Surface Temperature at Nantucket (Mass.) Lightship
°C

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	A
1896-1912	4.3	2.9	3.3	4.5	6.9	10.6	14.2	17.1	15.8	13.7	10.4	6.6	9.2
1923-41	5.1	3.6	3.3	4.6	7.0	10.9	14.3	17.1	16.0	13.2	11.0	9.4	9.4
1947-52	6.3	5.3	5.0	6.6	8.1	12.7	16.3	18.8	17.7	15.2	12.0	9.4	11.1
1953-55	5.6	5.7	4.7	6.2	8.4	11.3	14.9	14.9	15.2	12.4	10.8	-	-
1956	5.4	4.7	3.8	4.7	7.5	11.3	14.4	15.8	18.4	15.7	12.8	-	-
1957	-	4.4	5.2	-	-	-	-	-	-	14.8	-	-	-
1958	-	4.3	-	5.6	7.6	-	-	17.2	-	-	-	-	-
1959	3.7	3.4	3.3	4.2	6.6	9.2	12.1	12.6	13.6	11.3	8.8	5.7	7.9
1960	(5.9)	(5.2)	3.6	4.9	7.2	9.8	13.2	17.6	16.7	14.2	11.1	8.1	(9.8)
1961	4.6	3.4	4.2	5.1	6.6	10.4	16.3	17.1	19.1	15.8	10.9	7.8	10.1
1962	5.5	-	4.4	6.4	-	-	-	16.6	14.6	12.9	-	5.8	-
1963	-	(3.9)	4.0	5.8	9.0	11.9	15.1	16.4	15.5	13.3	11.0	-	-
1964	5.2	4.0	4.3	4.8	7.8	9.5	13.6	16.0	15.1	12.3	10.4	7.0	9.2
1965	-	3.6	3.6	3.8	6.3	9.7	15.6	17.8	15.0	12.8	10.1	7.5	-
1966	4.9	2.8	3.5	4.7	6.7	11.6	16.8	17.7	16.5	13.1	10.3	8.6	9.8

Table 4. Sea Surface Temperature at Woods Hole, Mass.
°C

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	A
1880-1956	1.1	0.2	1.8	6.1	11.4	16.7	20.6	21.3	19.4	14.9	9.7	4.3	10.6
1927-50	1.4	0.3	1.9	6.3	11.4	16.4	20.8	21.3	19.3	14.9	9.9	4.3	10.7
1951-56	2.0	1.4	3.4	7.0	11.8	17.2	21.3	21.8	19.9	15.7	10.6	5.4	11.4
1956	0.2	1.0	1.8	5.3	9.9	16.1	20.0	21.2	19.2	14.8	10.9	6.6	10.6
1957	0.7	1.3	3.4	7.1	12.9	18.7	22.2	21.8	20.5	15.4	11.2	6.3	11.8
1958	2.8	0.0	2.2	6.7	11.0	15.8	19.6	21.1	18.9	14.3	10.1	2.5	10.4
1959	-0.4	-0.4	1.9	6.2	11.7	16.6	20.4	21.6	20.9	16.6	10.3	5.7	10.5
1960	+1.4	+1.5	1.0	5.4	11.9	17.4	21.1	21.3	19.4	15.4	10.6	4.0	10.9
1961	+0.3	-1.0	2.1	5.6	10.7	16.4	19.6	21.4	21.0	16.2	10.5	4.9	10.7
1962	1.6	+0.1	2.2	7.9	12.1	17.8	20.1	21.0	18.9	15.1	9.0	4.2	10.8
1963	0.0	-1.0	1.6	6.6	11.7	17.2	20.8	21.5	17.9	15.0	11.1	4.5	10.6
1964	0.5	+0.2	2.8	6.2	12.4	16.9	20.7	20.4	19.3	14.4	10.6	4.9	10.8
1965	0.9	-1.2	1.8	5.0	11.6	16.6	20.3	21.9	18.8	14.3	9.2	5.0	10.4
1966	1.2	-0.1	2.9	6.3	10.5	16.5	21.1	21.2	19.2	14.7	10.7	5.6	10.8

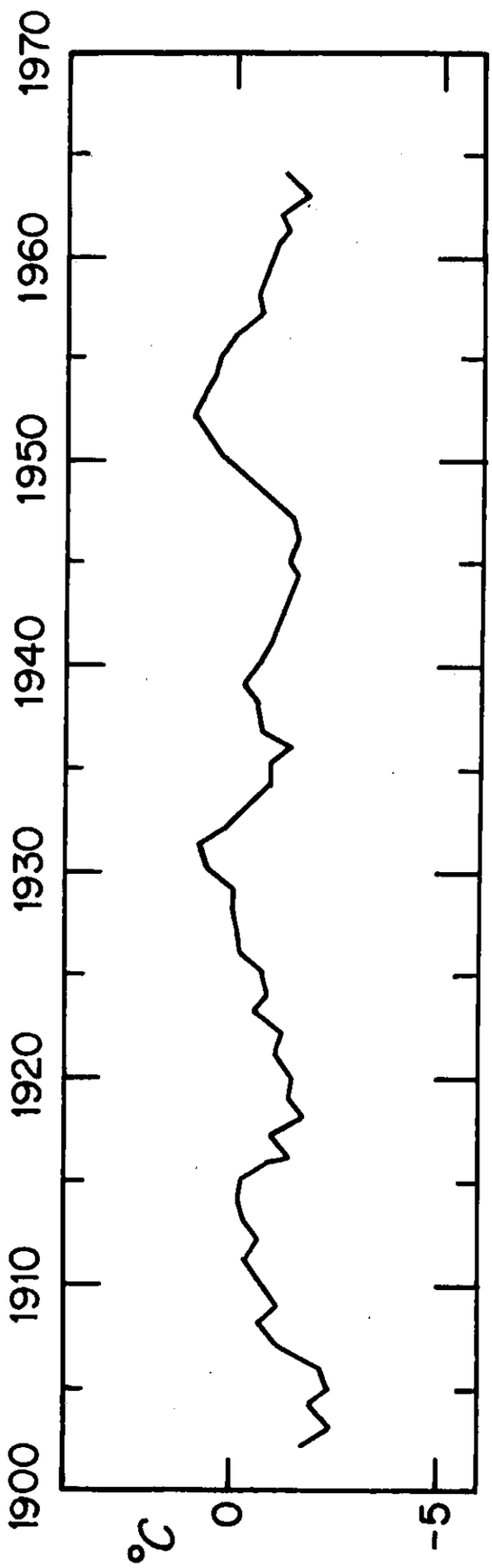

Figure 1. 5-yr means of winter (Dec., Jan., Feb.) air temperature at Boston, Massachusetts and New Haven, Connecticut, combined.

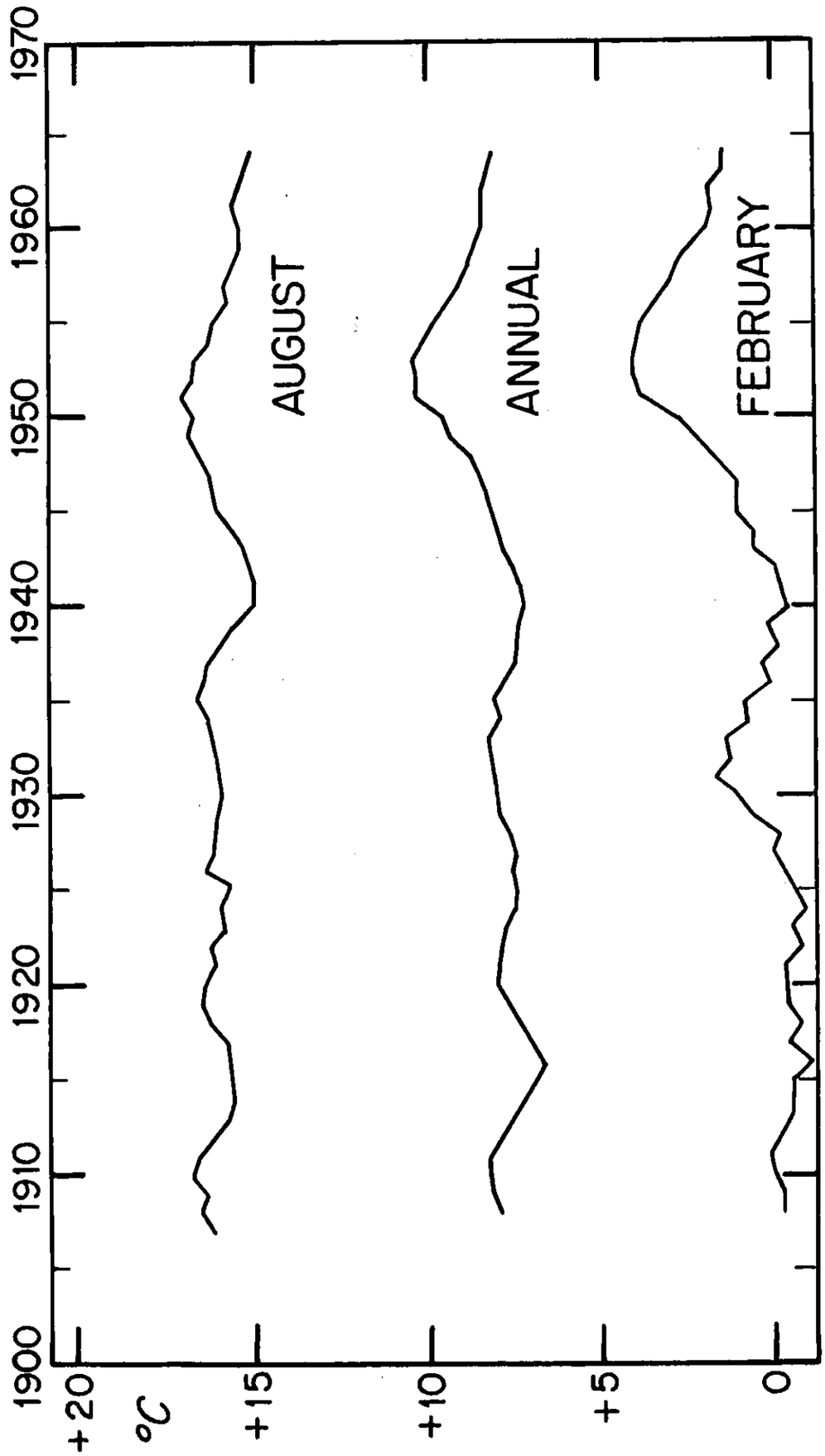

Figure 2. 5-yr means of water temperature at Boothbay Harbor, Maine for August, the year, and February.