

EARLY AND LATE SEASON SNOWFALLS: EVIDENCE OF  
CLIMATE CHANGE?

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One snowstorm does not a winter make. Nor does a single October or a single May snowstorm indicate a climate trend. But when a series of out-of-season snows occur in one period and fail to put in an appearance in the next period, perhaps there is something significant in the air.

A snowstorm is a happenstance, no matter what the season may be. One will develop when sufficient amounts of precipitable moisture and the required coldness are brought together under a favoring circulation pattern in the proper geographical setting. Every New Englander knows that March may linger in the lap of May, and snowflakes may fill the air for a few brief moments as a cold front sweeps in at the tailend of a spring northeaster. Hilltops may be whitened, while valley locations get only a wetting. Here, however, we shall be concerned only with the occurrence of full-fledged snowstorms at sea level on the New England coast at three points where long records are available: Portland, Boston, and New Haven.

Climate historians have employed the foreboding phrase, Little Ice Age, to describe the period of relative coldness which prevailed in western Europe and eastern North America from about 1550 to about 1880--a period of temperatures averaging slightly lower than in the years immediately before or immediately afterwards. It is thought that the main storm track and the westerly jet had shifted temporarily to the southward, permitting polar and arctic air masses to penetrate a bit deeper and more frequently.

A search of some twenty years duration of 18th and early 19th century meteorological records, supplemented by diaries and the local press, has unearthed the occurrence of a number of significant snow events in the month of October and the month of May at sea level in New England. A condensation of the data is listed in the accompanying table. Only snowfalls occurring at or very near sea level have been considered. There were a number of wide-area October and May snowstorms at inland points and at higher elevations during the first years of the 19th century. Though these tend to support the sea level occurrences, they cannot be employed here due to the inherent difficulties in making comparisons of snowfall amounts at places of different elevations where the snow threshold may vary slightly.

The Early 1800's

In the first years of the 19th century there were two notable early-season and two late-season snows affecting both sea level and interior points. The two May storms occurred on 8 May 1803 and 3-4 May 1812 when both Boston and New Haven received measurable snows. Noah Webster measured 2 inches at New Haven on the 1803 date, and Dr. John Gorham noted 4 inches at Boston on the 1812 date. Dr. Edward A. Holyoke, who maintained usable meteorological records for 75 years (1754-1829), confirmed the occurrence of each of these at his sea level observation point in Salem, Massachusetts, just northeast of Boston.

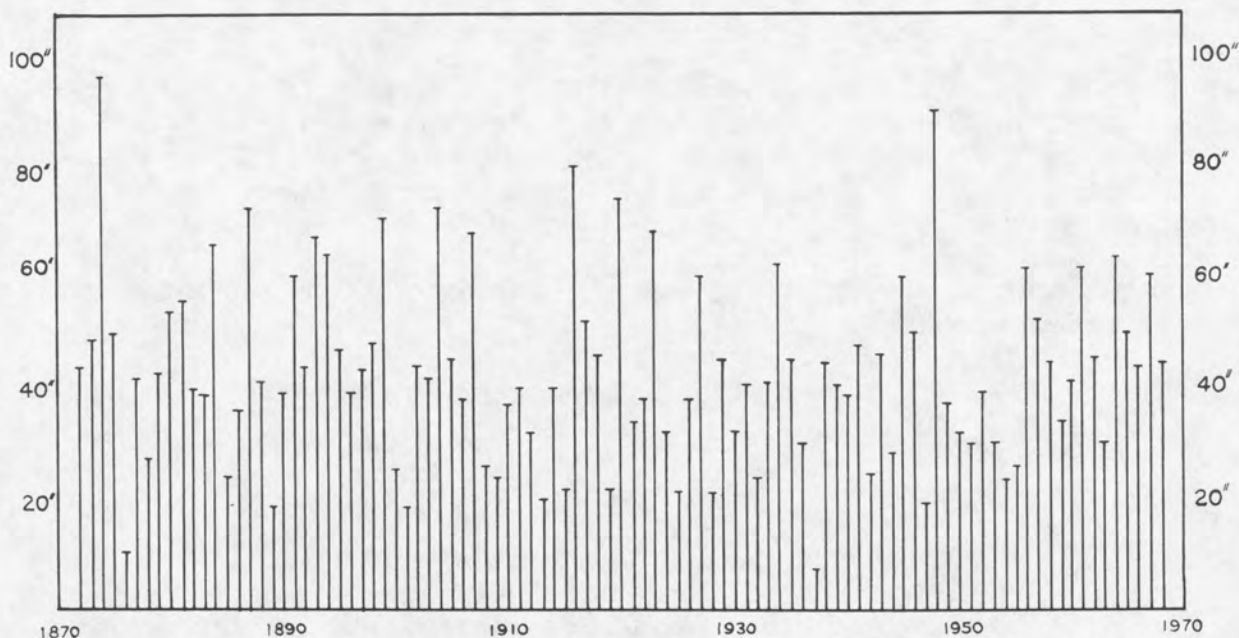
## THE EARLY YEARS

### May Snows

1761	May	4	Dracut (Lowell, Mass)	5".
1769	May	11	Salem	6".
1777	May	1	Dover, N. H.	3".
1799	May	12	Boston:	"large, driving, steady snow."
1803	May	8	Boston:	"snow on the ground."
1812	May	4	Boston:	4".
1816	June	8	Salem & Waltham:	"a flight."
1823	May	5	Boston:	"snow fell for more than one hour."
1832	May	25	Providence:	"snow as to whiten the ground."
1840	May	5	Waltham:	"snow as to whiten hilltops."
1841	May	3	Boston:	"snowing, 34° at 0700."

### October Snows

1703	Oct.	9	Boston:	3 to 4 inches
1746	Oct.	29	Salem:	5+".
1755	Oct.	30	Salem:	2" to 3".
1793	Oct.	29	Salem:	"snowed all day. Ground white for 24 hours."
1804	Oct.	10	West Rock, New Haven:	ground whitened.
1810	Nov.	2	Salem:	6".
1821	Oct.	25	Salem:	snow sufficient to cover ground.
1840	Oct.	25	Providence:	"snow remained on roofs all day."
1841	Oct.	4	New Haven:	3" on village green, remained two days.
1859	Oct.	26	New York City:	4"; Nantucket 1".
1868	Oct.	17	Boston:	2"; Belfast, Me.: "6" fell on sea-board."



Seasonal snowfall in inches at Boston, Massachusetts, from 1871-72 to 1967-68 (thru 31 March 1968). Modern seasonal average at airport location, 1935-1967, is 42.0 inches. The average at the Post Office location, 1871-1935 was 43.8 inches. The record-holding season of 1873-74 measured 96.4 inches, of which 28.3 inches fell in April. The second highest, 1947-48 with 89.2 inches, had none in April or May.

Since the commencement of official records at Boston in 1871, there has not been a measurable May snowfall at observation points near sea level. And on the village green of New Haven there has been no May snowfall sufficient for snowballing since 1876.

Again there were two notable wide-area snowfalls in the very early part of October in the first half of the 19th century. On 9-10 October 1804 a snowstorm of vast proportions covered all western New England, dropping over 24" in Vermont and whitening the landscape southward as far as West Rock, the prominence overlooking the Yale Bowl within view of New Haven harbor. Then on 3-4 October 1841 during a hurricane situation as much as three inches accumulated on the Yale campus in downtown New Haven. The 1804 event did not reach eastward to the shores of Massachusetts Bay as the storm's trajectory carried almost directly over Boston and Salem, but the second event in 1841 was of larger coverage. Snowflakes greeted early-rising Bostonians on the morning of the 4th; at suburban Waltham one inch was reported by Charles Fisk, the local weatherman since 1805; and at Concord, Massachusetts, the press reported three inches.

In the modern period of October records at Boston, there have been no measurable snow occurrences in the first 10 days of October, and only one insignificant amount in the entire month since 1884: 0.4" in 1913. At New Haven there have been no measurable snows prior to October 15th, and only two small amounts in the entire month since 1876. A close look at the record indicates a clustering of snowfalls at early and late dates in the 1960's.

## THE 1960's

### October

Boston: only two insignificant snows from 1871 to 1967. Of the 22 traces or more in the 96-year period, five came in consecutive years in the early 1960's. The 2.2" of snow in the mini-blizzard of 15 November 1967 was the heaviest so early in the season in the weather bureau record since 1894.

Portland: of only seven measurable snows in October since 1881, three occurred in the 1960's.

New Haven: only two measurable snows since 1876 (1.3" in 1925 and 1.3" in 1962).

### May

Boston: from 1871 to 1967, no measurable snowfalls in May. Of the 12 traces in the 96-year record, three occurred in the last decade (1958, 1966, 1967). The 0.6" on 24 April 1967 was close to the latest date for measurable snowfall. Rockport, to the east on Cape Ann, had 1" that day.

Portland: of only three measurable snowfalls in May since 1881, two have occurred in the 1960's (2.0" in 1966, 0.1" in 1967).

New Haven: no measurable snowfalls in May since 1876. A trace fell in 1967.



## THE INTERIOR

A check of two Weather Bureau stations in the interior with long records will be of interest, though these stations are not climatically comparable with the sea level stations since they lie at higher elevations and experience different snowstorm regimes. But their records indicate the same trend toward early and late season snowstorms in the 1960's.

Burlington, Vermont, has maintained a snowfall record since the season of 1884-85. During this period station elevations have varied from 280 to 340 feet. There is nothing in the modern record to match the great storms of October 1804 or October 1843 when 10"+ fell. Of the 19 measurable snows in October since 1884, three have occurred in the present decade: 1962, 1964, and 1965. Of the six in the last 36 years, three have been in the present decade.

As for May snowfalls at Burlington, there has been nothing to match the great interior New England snowstorm of 14-15 May 1834 when from 12" to 36" fell. At Burlington since 1885, there have been only three May storms in excess of 1.0", and two of these occurred in 1966 and 1967.

Concord, New Hampshire, has maintained a snowfall record since the season of 1871-72. During this time the station elevation has varied from 280 to 340 feet. There have been only two October snowstorms in excess of 1.0": 1884 had 3.0" and 1925 had 1.3". But from 1960 to 1965 traces fell in each October, though the chances of a trace are about 1 to 3 over the 96-year record.

Concord has had only three May snowfalls since 1872 in excess of 1.0": 1917 with 2.6", 1945 with 5.0", and 1966 with 1.1". Traces also fell in 1963 and 1967, though the chances of a trace in May are about 1 in 4.

### Professor Loomis on Climate Change

Professor Elias Loomis of Yale University undertook an examination of the New Haven meteorological record extending from 1778 to 1865 to determine if there had been any significant change in the local climate in the period of 86 years stretching from the time of the Revolution through the Civil War. He divided the series of years into halves: 1778 to 1820 and 1821 to 1865. The differences in dates between the first snow flakes and the first snow, and the last snow and the last snowflakes over the two series were "slight" and were "sufficiently explained by the loose manner in which many of the journals were kept, without supposing any permanent change of climate during the interval." His study of the first and last frost, as well as the flowering time of the principal fruit trees, led to the same result: "during the past 86 years there has been no permanent change at New Haven either in the mean temperature of the year, or in that of the separate months; and that there has been no permanent change in the average date of occurrence of the last frost of spring, or the first frost of autumn--or the first snow of winter, or the last snow of winter--or in the average date of flowering of fruit trees, such as peach, cherry, etc."

On the mean temperature, and the fluctuations of temperature at New Haven, Conn. "Transactions of the Connecticut Academy of Arts and Sciences." Vol. 1, Part 1. New Haven, 1866. 194-246.