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TORONTO
GENERAL METEOROLOGICAL REGISTER
FOR THE YEAR 1893.



REMARKS ON THE METEOROLOGICAL RESULTS AT TORONTO FOR THE YEAR 1893

TEMPERATURE.

The mean temperature of 1893 was $43^{\circ}53$, being $0^{\circ}63$ colder than the average of the previous fifty-three years, and $1^{\circ}08$ colder than 1892. The mean temperature of the several months was in four instances above and in eight below the averages for their respective months, the average excess to the average defect being in the ratio of $2^{\circ}02$ to $2^{\circ}27$. On each of 163 days the mean temperature was above the normal of that particular day, and below on 202 days. The mean temperature of each month, with the difference from the normal, was: January, $14^{\circ}66 - 7^{\circ}81$; February, $19^{\circ}23 - 3^{\circ}46$; March, $29^{\circ}25 + 0^{\circ}56$; April, $39^{\circ}21 - 1^{\circ}60$; May, $51^{\circ}94 - 0^{\circ}13$; June, $46^{\circ}45 + 4^{\circ}32$; July, $68^{\circ}16 + 0^{\circ}55$; August, $65^{\circ}74 - 0^{\circ}55$; September, $57^{\circ}07 - 1^{\circ}49$; October, $48^{\circ}93 + 2^{\circ}63$; November, $37^{\circ}34 - 1^{\circ}25$; December, $24^{\circ}42 - 1^{\circ}80$. Dividing the year into the ordinary seasons, we have for winter, $21^{\circ}05$; spring, $52^{\circ}53$; summer, $63^{\circ}66$; autumn, $36^{\circ}90$. The thermic anomalies differ from the normal temperature proper to the latitude: winter, $-14^{\circ}80$; spring, $-5^{\circ}10$; summer, $-2^{\circ}58$; autumn, $-7^{\circ}44$. The only month during the year in which the observed temperature exceeded the normal value for the latitude was June, which was $1^{\circ}85$ warmer. The mean daily range for the year was $17^{\circ}15$, the greatest monthly average occurring in July ($21^{\circ}60$) and the least in November ($11^{\circ}99$). The greatest daily range ($36^{\circ}3$) occurred on the 25th December, and the least ($3^{\circ}3$) on the 13th of March. The warmest month relatively was June, estimated by its excess ($4^{\circ}32$) above the normal temperature. The coldest absolutely was January ($14^{\circ}66$); it was also the coldest relatively, its mean being $7^{\circ}81$ below its proper normal. The climatic difference was $53^{\circ}50$. The warmest day was the 25th of July, mean temperature $78^{\circ}35$, and the coldest the 10th January, $7^{\circ}88$ below zero, but the warmest day relatively was the 24th December, it being $21^{\circ}00$ above its proper normal, and the coldest the 10th January, which was $29^{\circ}15$ below the normal. The average temperature of the warmest and coldest days from former years was $77^{\circ}90$ and $2^{\circ}06$ below zero. The highest temperature of the year ($93^{\circ}3$) occurred on the 25th July, the lowest ($17^{\circ}8$ below zero) on the 12th of January. The annual range from the extremes was $111^{\circ}1$, being $7^{\circ}4$ more than 1892, and $8^{\circ}3$ above the average annual range. There were eleven instances on which the temperature at the hour of observation was 20° above the normal, and thirty-five when a defect of an equal amount occurred. The most striking deviations from the daily normal curve of temperature have been as follows:—

IN EXCESS.

March 24, mean deviation ...	$13^{\circ}83$	Dec. 23, mean deviation ...	$17^{\circ}68$
June 20 " " " "	... $13^{\circ}25$	" 24 " " " "	... $21^{\circ}00$
Sept. 19 " " " "	... $12^{\circ}02$	" 25 " " " "	... $15^{\circ}30$
Dec. 22 " " " "	... $12^{\circ}92$	" 28 " " " "	... $15^{\circ}63$

IN DEFECT.

Jan. 1, mean deviation	.....	14°·72	Feb. 17, mean deviation	....	12°·42
" 10 "	.....	29°·15	" 20 "	....	22°·18
" 11 "	.....	23°·95	" 21 "	....	12°·90
" 12 "	.....	17°·95	Mar. 4 "	....	12°·78
" 13 "	.....	13°·97	" 15 "	....	15°·50
" 14 "	.....	16°·82	" 18 "	....	13°·83
" 15 "	.....	19°·82	Dec. 4 "	....	14°·18
" 16 "	.....	14°·73	" 11 "	....	13°·00
" 17 "	.....	12°·10	" 12 "	....	13°·03
Feb. 4 "	.....	22°·02	" 13 "	....	19°·27
" 8 "	.....	13°·98	" 30 "	....	14°·27

BAROMETRIC PRESSURE.

The mean height of the Barometer was 29·5996 inches, being 0·0196 inches in defect of the average. The month which showed the greatest deviation from the normal was January, 0·131 in defect; April showing the least, 0·005 in excess. Average deviation without reference to sign was small, being only 0·037. The highest reading was 30·467 inches at 2 p.m. of February 4th, and the lowest 28·227 at 6 a.m. of October 14th, giving a range of pressure of 2·240 inches.

The number of days of large abnormal variation in which the average pressure differed by two tenths and upwards from the normal, was 121, the law of their distribution is well marked by their greater frequency in the winter than in the summer months, the greatest number (15) occurring in February and December, and least (2) in July.

HUMIDITY.

The mean humidity of the year was 77, being equal to the average, the greatest monthly humidity was 86, in January, and the least, 71, in April.

There were 26 cases of complete saturation at the hour of observation: 6 in January, 3 in February, 3 in March, 1 in April, 1 in May, 1 in June, 1 in August, 4 in October, and 6 in December. The least humidity of the year at the hour of observation was 25, on the 25th of April, at 4 p.m.

CLOUDS.

The extent of the sky clouded was on the average of the year six-tenths of the whole. July was the clearest month and November the most cloudy. During the year there were 50 days completely clouded, being 20 less than the average (1892-79), the greatest number (12) occurring in December, none being registered in the four months, June to September.

WIND.

The resultant direction of the wind was N. 66° W., showing 12° more southing than 1892, and 2° more southing than the 15 years to 1889. The mean velocity of the wind without reference to direction was 8·59 miles. The most windy month was April, with an average of 10·54 miles per hour, and the least windy was June, with an average of 5·75 miles. The windiest day was October 14th, average velocity 42·71 miles per hour, and the day of least velocity January 23rd, average velocity 0·67 per hour. The highest velocity in one hour was 60 miles, 8 to 9 a.m. of the 20th of April.

RAIN AND SNOW.

The total depth of rain that fell during the year was 31·45 inches, being 3·750 inches greater than the average, and 5·860 greater than the rainfall of 1892. The depth of snow, 85·7 inches, was 16·89 inches more than the average, and 43·5 inches more than the snowfall of 1892. August is the most rainy month as to quantity (5·435), and April, June and July with reference to the number of rainy days. January is the least rainy month, less than six-tenths having fallen, about one-half the usual quantity for that month.

The most rainy day was the 28th of August, when 2.700 inches fell. There were only four other days during the year that over one inch fell: the 20th of April, when 1.82 inches fell; the 16th of May, when 2.330 inches fell; the 14th of October, when 1.260 inches fell, and the 15th of December, when 1.640 inches fell.

The heaviest fall of snow in one day was 8.0 inches, on the 23rd of February. Rain fell on 128 days, being 15 more than the average number and 6 less than 1892. Snow fell on 91 days, being 25 more than the average and 8 more than 1892. There were 156 days in which neither rain nor snow fell; in 1892 the number was 165. The rain occupied 496 hours, and the snow 439 hours in its fall, giving a total of 935 hours, or 38 days and 23 hours when rain or snow was actually falling.

THUNDER-STORMS.

Of the 35 thunder-storms occurring during the year, the first was on the 4th of April, and the latest on November 1st, 2 were recorded in April, 2 in May, 8 in June, 11 in July, 8 in August, 3 in September and 1 in November. The most severe storms were on the 25th of June, 8th, 15th and 26th of July, 5th, 18th and 25th of August, and 15th of September.

Lightning alone was observed on 3 occasions.

AURORA.

Auroral displays were less numerous than in the previous year. Of the 18 observed 3 were of the first class, 6 of the third class, and 9 of the fourth class. There were 208 nights favourable for observation, the most brilliant displays occurring on the 11th of January, 7th of May, 15th of July, 16th and 18th of August, and 1st November.

SUNSHINE.

The total duration of bright sunshine during the year was 2052.4 hours; number of hours the sun was above the horizon, 4474.4; ratio of registered to possible, 0.46 hours.

MEAN METEOROLOGICAL RESULTS

GENERAL METEOROLOGICAL

MAGNETICAL OBSERVATIONS

Latitude, 43° 39' 4" N. Longitude, 5 h. 17 m. 34' 05" W. Elevation

	JAN.	FEB.	MAR.	APRIL.	MAY.	JUNE.	JULY.
Average temperature.....	14.66	19.23	29.25	39.21	51.94	66.45	68.16
Difference from average (53 years).....	-7.81	-3.46	+0.56	-1.68	-0.13	+4.32	+0.55
Thermic anomaly (lat. 43° 40').....	-18.14	-15.47	-10.85	-10.99	-6.16	+1.85	-0.54
Highest temperature.....	39.8	40.1	61.4	69.3	73.2	90.7	93.3
Lowest temperature.....	-17.8	-6.3	8.4	22.4	37.6	48.5	45.0
Monthly and annual ranges.....	57.6	46.4	53.0	46.9	35.6	42.2	48.3
Average maximum temperature.....	21.64	27.60	35.89	47.42	60.95	76.81	79.08
Average minimum temperature.....	6.35	9.38	21.93	32.07	42.88	56.52	57.48
Average daily range.....	15.29	18.23	13.96	15.35	18.07	20.29	21.60
Greatest daily range.....	26.2	32.3	25.7	33.2	30.4	28.9	35.3
Average height of barometer at 32° Fah..	29.5215	29.6923	29.6311	29.6004	29.4787	29.5887	29.5654
Difference from average (52 years).....	-0.1399	+0.0539	+0.0266	+0.0654	-0.0990	+0.0190	-0.0215
Highest barometer.....	30.029	30.467	30.184	30.137	29.934	29.850	29.839
Lowest barometer.....	28.636	28.751	29.027	28.889	28.839	29.158	29.314
Monthly and annual ranges.....	1.393	1.716	1.157	1.248	1.095	0.701	0.525
Average humidity of the air.....	86	83	76	71	71	75	71
Difference from average.....	+3	+2	-2	0	+1	+2	-1
Average elasticity of aqueous vapour....	0.080	0.094	0.130	0.171	0.274	0.485	0.489
Average temperature of dew point.....	13.5	17.0	24.2	30.6	42.6	58.2	58.9
Average of cloudiness.....	0.74	0.69	0.67	0.70	0.60	0.48	0.43
Difference from average (39 years).....	.00	.00	+ .03	+ .11	+ .04	- .05	- .07
Resultant direction of wind.....	N 49 W	N 60 W	N 53 W	N 35 E	N 40 W	S 75 W	N 82 W
Resultant velocity of the wind.....	2.95	3.77	1.86	1.08	3.07	0.39	2.10
Average velocity (miles per hour).....	7.84	10.50	9.71	10.54	8.60	5.75	5.94
Difference from average (16 years).....							
Total amount of rain in inches.....	0.530	0.740	1.615	4.270	3.860	1.830	2.265
Difference from average (53 years).....	-0.652	-0.238	+0.184	+2.078	+0.928	-1.143	-0.750
Number of days of rain.....	3	6	10	14	13	14	14
Total amount of snow in inches.....	24.6	28.8	4.2	6.3			
Difference from average (50 years).....	+7.54	+11.75	-8.58	+3.99	-0.14		
Number of days of snow.....	23	18	12	6			
Number of fair days.....	7	5	8	11	18	16	17
Number of days completely clouded.....	8	7	6	5	4	0	0
Number of auroras observed.....	1	2	3	0	2	1	1
Possible to see auroras (No. of nights)...	13	14	13	14	19	23	22
Number of thunder-storms.....	0	0	0	3	5	9	12
Number of fogs.....	3	1	0	2	4	7	0
Number of hours of bright sunshine....	77.4	102.4	156.5	155.0	213.4	251.4	290.5
Number of hours of possible sunshine....	285.7	302.5	369.9	406.5	461.1	465.7	470.9

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Aug.
65.74
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-2.76
89.8
48.7
40.1
76.74
56.64
20.10
29.6
29.6079
-0.0115
29.900
29.193
0.707
7.0
0.470
57.2
0.37
-0.13
N 12 W
1.66
6.90
5.755
+2.925
12
19.0
3.27
8.2
272.7
434.5

MEAN METEOROLOGICAL RESULTS.

TEMPERATURE.

	1893.	Average of 53 years.	EXTREMES.	
			o	o
Average temperature of the year.....	43.53	44.17	47.09 in 1878	40.77 in 1873
Warmest month	July	July	July, 1868	Aug., 1860
Average temperature of the warmest month....	68.16	67.61	75.80	64.46
Coldest month.....	January	January	Feb., 1875	Feb., 1848
Average temperature of the coldest month....	14.66	22.47	10.16	26.00
Difference between the temperature of the warmest and coldest month	53.50	45.14	....	....
Average of deviations of monthly means from their respective averages of 51 years, signs of deviations being disregarded.....	2.17	2.59	3.62	....
Month of greatest deviation without regard to sign.....	January	January	Feb., 1875	....
Corresponding magnitude of deviation.....	7.81	4.07	12.53	....
Warmest day.....	25 July	....	July 14, '68	July 31, '44
Average temperature of the warmest day.....	78.55	77.90	84.50	72.75
Coldest day.....	10 Jan.	....	Feb. 6, 1855	Dec. 22, '42
Average temperature of the coldest day.....	-7.88	-2.06	Jan. 22, '59	9.57
Date of the highest temperature.....	25 July	....	-14.33	Aug. 19, '40
Highest temperature.....	93.8	90.30	Aug. 24, '54	82.4
Date of lowest temperature.....	10 Jan.	....	99.2	82.4
Lowest temperature.....	-17.8	-12.05	Jan. 10, '59	Jan. 2, 1842
Range of the year.....	111.1	102.85	-26.5	1.9
			118.2	87.0

BAROMETER.

	1893.	Average of 52 years.	EXTREMES.	
Average pressure of the year.....	29.5996	29.6194	{ 29.6779 in 1849	29.5602 in 1864
Month of the highest average pressure.....	February	Sept.	Jan. 1849	June, 1864
Highest monthly average pressure.....	29.6923	29.6670	29.8046	29.6525
Month of the lowest average pressure.....	May	June	March, 1859	Nov., 1859
Lowest monthly average pressure.....	29.3787	29.5695	29.4143	29.5886
Date of the highest pressure in the year.....	4 Feb.	....	Jan. 8, 1866	March 7, '78
Highest pressure.....	30.467	30.356	30.940	30.139
Date of the lowest pressure in the year.....	4 Oct.	....	Jan. 2, 1870	March 7, '45
Lowest pressure.....	28.227	28.693	28.166	28.939
Range of the year.....	2.240	1.663	{ 2.240 in 1893.	1.303 in 1845.

RELATIVE HUMIDITY.

	1893.	Average of 52 years.	EXTREMES.	
Average humidity of the year.....	77	77	82 in 1851	73 in 1858
Month of greatest humidity.....	January	January	Jan., 1857	Dec., 1858
Greatest average monthly humidity.....	86	83	89	81
Month of least humidity.....	{ Ap., May, July	May	Feb., 1843	April, 1849
Least average monthly humidity.....	63	70	58	76

EXTENT OF SKY CLOUDED.

	1893.	Average of 40 years.	EXTREMES.	
Average cloudiness of the year.....	0.59	0.62	0.66 in '69 '76	0.57 in 1856
Most cloudy month.....	Jan., Dec.	Dec.	.....	.....
Greatest monthly average of cloudiness.....	0.74	0.77	0.89	0.73
Least cloudy month.....	July	July.	.....	.....
Least monthly average of cloudiness.....	0.37	0.50	0.29	0.50

WIND.

	1893.	Average of 16 years.	EXTREMES.	
Resultant direction.....	N. 66° W.	N. 61° W.	.....	.....
Resultant velocity in miles.....	1.95	2.51	.....	.....
Average velocity without regard to direction...	8.59	9.64	10.54 in '80	8.32 in '78
Month of greatest average velocity.....	April	March	April, '80	Dec., 1875
Greatest monthly average velocity.....	10.54	11.49	13.88	10.42
Month of least average velocity.....	June	July	July, '78	July, 1881
Least monthly average velocity.....	5.75	7.56	5.93	8.43
Day of greatest average velocity.....	Oct. 14	.....	Nov. 17, '70	Feb. 10, '85
Greatest daily average velocity.....	42.71	28.12	41.67	22.79
Day of least average velocity.....	Jan. 23	.....	.....	.....
Least daily average velocity.....	0.67	.....	.....	.....
Hour of greatest absolute velocity.....	April 20 } 8 to 9 } a.m.	..... } ..... } ..... }	April 20th, } 8 to 9 a.m. }	Jan. 17, '85, } 10 to 11 a.m. }
Greatest velocity.....	63.0	43.77	60.0	39.0

NOTE.—During the year 1893, the wind has been obtained from the records of the anemograph at the Island and the entries at observation hours, and no comparison has been made with the result of former years.

RAIN.

	1893.	Average of 53 years.	EXTREMES.	
Total depth of rain in inches.....	31.145	27.395	43.555 in '43	17.574 in '74
Number of days on which rain fell.....	128	113	145 in 1890	80 in 1841
Month on which the greatest depth of rain fell.	August	Sept.	Sept., 1843	June, 1887
Greatest depth of rain in one month.....	5.755	3.284	9.760	2.655
Month in which the days of rain were most frequent.....	April, June and July	Oct.	{ Jan., '69 } { Oct., '90 }	{ May, 1841 }
Greatest number of rainy days in one month...	14	13	23	11
Day on which the greatest amount of rain fell.	Aug. 28	.....	Sept. 14, '43	Sept. 14, '48
Greatest amount of rain in one day.....	2.700	1.908	3.455	1.000

MEAN METEOROLOGICAL RESULTS FOR 1893.

SNOW.

	1893.	Average of 50 years.	EXTREMES.	
Total depth of snow in inches	85.7	68.8	122.9 in '70.	34.6 in '88.
Number of days on which snow fell	91	66	87 in 1859.	33 in '48.
Month in which the greatest depth of snow fell	Feb.	January.	March, '70.	Dec., 1851.
Greatest depth of snow in one month	28.8	17.1	62.4	10.7
Month in which the days of snow were most frequent	January.	January.	Dec., 1872.	Feb., 1848.
Greatest number of days of snow in one month	23	14	24	8
Day in which the greatest amount of snow fell	23rd Feb.	—	{ Feb. 5, '63.	{ 4.6 Jan '88
Greatest fall of snow in one day	8.0	8.9	{ Mar. 27, '70.	{ 3.0
			16.0	

SUNSHINE.

	1893.	Average 1882 to 1892.
Total duration of bright sunshine in hours	2052.4	2028.3
Ratio to possible amount	0.46	0.45
Month of greatest relative amount	August.	July.
Ratio to possible amount	0.63	0.61
Month of least relative amount	December.	December.
Ratio to possible amount	0.27	0.19
Number of days completely clouded	50	70
Day of greatest relative amount	November 6.	—
Ratio to possible amount	0.92	0.91

DIFFERENCES OF CERTAIN METEOROLOGICAL ELEMENTS FOR 1893 FROM THE NORMAL VALUES FOR EACH QUARTER AND YEAR.

	Bar.	Tem.	Rain.	Days Rain.	Snow.	Days Snow.	Clouded Sky.
	in.	°	in.		in.		p. c.
Winter	+ .0168	+ 3.57	+ 0.706	+ 3.04	+ 10.71	+ 14.75	+ 0.01
Spring	— .0249	+ 0.84	+ 1.863	+ 6.87	+ 3.85	+ 2.02	+ 0.03
Summer	— .0276	— 0.50	+ 0.141	+ 4.28	—	—	— 0.07
Autumn	— .0091	+ 0.69	+ .452	+ 0.47	+ 2.33	+ 8.15	— 0.07
Year	— .0196	— 0.63	+ 3.750	+ 14.66	+ 16.89	+ 24.92	— 0.03

PERIODICAL OR OCCASIONAL EVENTS, 1893.

- January10. Coldest day of winter; mean 7°. 88 below zero.
 February 7. Lowest water in Bay. 16th. Crows numerous.
 March 7. Sleighing ended, has been excellent up to this date. 15th. Grey bird seen.
 17. Blue birds seen, Catbirds. 18th. Grackles. 20th. Robins. 29th. Grey birds numerous.
 31. Highholder seen.
 April 1. Schooner came in light. 4th. First vessel with freight.
 4. First thunder of year. 7. Bay clear of ice; Geese flying N.
 8. Juncos seen; Meadow lark; Bank Swallow; Cow Birds.
 9. Butterflies; Gulls flying N. 11th. Frogs piping; Phoebe birds.
 15. Soft maple in bloom. 17th. Golden crested kinglet; Kingfisher.
 18. Butterflies; Woodcock; Partridge drumming.
 20. Last snow; furious gale all day. 22nd. Hypatica and Trailing arbutus in bloom.
 26. Ice on pools; Last frost.
 May 2. Swamps willows in blown; Bees numerous; Robins building; Swallows numerous; Whip-poor-will. 3rd. Pippet.
 8. Humble bees; Hard maple in bloom; Elder in leaf and bud; White crowned sparrow.
 9. Catbird; Humming bird; King bird; Black Duck. 10th. Orioles.
 13. Wild Strawberry in bloom. 15th. Bobolink. 19th. House wren; Ground Lark seen. 22nd. Elder in full bloom.
 23. Japonica and flowering almond in bloom.
 24. Red Tanager; Night Hawks. 25th. Peach in blossom.
 26. Apples in blossom; Wax Wings.
 June 1. Robins fledged; Highest water in bay, 27 in. above zero.
 3. Mountain ash in bloom; Horse Chesnut in bloom.
 10. Humming birds numerous; fireflies seen. 11th. Yellow birds.
 September ..13. Swallows last seen. 15th. Robins and blackbirds numerous.
 23. Humming birds last seen. 26th. First frost.
 30. House wren last seen.
 October18. Geese flying S. 28th. First snow. 29th. First ice.
 November .. 1. Last thunder of year.
 December . . 8. Bay frozen over, 28 days earlier than in 1892; this was broken up by wind. Boats out on 25th; again frozen over on 30th.
 25. Very mild; musquitos active; rapid change of temperature by night with very cold wind.