

METEOROLOGICAL SERVICE, DOMINION OF CANADA.

Monthly Weather Review.

DECEMBER, 1897.

INTRODUCTION.

In compiling the present Review the principal data made use of are the telegraph reports of observations received at this office for the purpose of weather forecasts, and reports by mail from voluntary observers and storm signal agents. For the material used in tracing the paths of areas of high and low pressure in the United States, we are indebted to the Chief of the Weather Bureau, Washington, D.C.

REMARKS ON THE WEATHER.

In the greater part of British Columbia the weather was very boisterous and there were some heavy gales along the coast ; otherwise it was about normal in most districts the temperature being only slightly below in some places and the precipitation varying from the mean but little. There was plenty of snow early in the month upon high lands between Nanaimo and Alberni but little or none on the low lands of Vancouver Island. On the Lower Mainland there were only some light falls of snow which soon melted and on the Upper Mainland there was only enough for sleighing for a short time. In the eastern part of the latter district the temperature fell well below zero upon several occasions and -32° was recorded at Donald on the 15th. Chinook winds occurred several times during the month and the snow on the ground was quickly melted.

During the first few days of the month the weather in the North-west Territories was decidedly cold the temperature falling to -30° in Western Assiniboia and -37° in Alberta, whilst in other districts it was also very low. Another cold period occurred about the 14th, when equally low temperatures were recorded, and it was not until the 20th that this severe weather moderated. The Chinook effect was very marked on the 3rd when the temperature rose very rapidly and from this onward to about the 14th it remained comparatively high and there were also some high winds. The precipitation which was generally above the average was mostly in the form of snow and the amount of cloud was also above the average in most districts.

The cold periods in the Territories were only slightly extended in Manitoba, the first continuing to the 3rd day and the second from the 15th to and including the 23rd, -31° being recorded at Russell and -28° at Winnipeg on the 18th. Altogether the weather was unusually fine and enjoyable, there being plenty of bright sunshine and few high winds. Sleighing was poor in most districts but in the vicinity of Brandon it was fair.

In the greater portion of the Province of Ontario the weather though comparatively mild was unpleasantly dull and gloomy the amount of cloud being considerably above the average and the precipitation also somewhat in excess. These conditions were, however, in part reversed in the country lying to the north of Lake Superior where the precipitation was very light and the temperature about 2° below average mean. On or about the 15th the weather took a decided wintry appearance and the precipitation after that date was generally in the form of snow. The storms of the month were of comparatively little importance and very little damage to property was caused thereby.

Up to the 8th the weather in Quebec was comparatively cold the temperature falling to as low as 6° in some districts. At about this date, however, it became milder, the temperature rising above 32° each day up to the 18th excepting on one day, namely, the 13th. On the 18th the weather turned much colder and temperatures below zero were recorded upon several occasions up to the 31st. Throughout the month the sky was frequently clouded and the precipitation, though above average in eastern districts was below elsewhere. Light falls of snow were frequent during the first and last two weeks of the month and heavy rain was fairly general between the 14th and 16th.

The weather in New Brunswick took much the same character as that in the eastern portion of Quebec, the precipitation being above average and the sky frequently overcast, the dates of change in conditions being about two days later than in Quebec. The difference above average mean temperature however was greater in New Brunswick and the small amount of snow that fell was at no time sufficient for sleighing.

In Nova Scotia the weather was for the most part very mild up to the 19th when there was a decided drop in the temperature the weather remaining comparatively cold in most districts to about the 30th. The precipitation which was mostly in the form of rain was generally very light in eastern and southern districts and below average throughout the Province. The most important gale of the month occurred about the 18th, but not much damage was reported.

The weather in Prince Edward Island, as in the last named province, was unusually mild and open, there being no low temperature until the 19th. The precipitation was also light and at the end of the month there was scarcely enough snow upon the ground for sleighing.—F. F. PAYNE.

ATMOSPHERIC PRESSURE.

The mean pressure for the month shows a departure of 0.10 inch above the average in South-western British Columbia. In southern Alberta it was near the average but in northern and eastern Alberta and also in western Assiniboia it was about .05 inches above average. In eastern Assiniboia it was average. From this eastward to eastern Quebec it was average or slightly below; it was the same in southern New Brunswick, but in eastern Quebec, northern New Brunswick and Nova Scotia it was slightly above average.

LOW AREAS.

Sixteen low areas appeared on the continent during the month, the general movement being from the North-west Territories or British Columbian Coast eastward to the Maritime Provinces or from the South-west States and Southern States northeastward. No. 1 was of fair intensity and gave light snowfalls and local gales in Ontario, Quebec and over the greater part of the Maritime Provinces. It was over the Georgian Bay on the 1st and passed eastward to Newfoundland. Nos. 2 and 3. The first of these was a shallow depression which appeared over Texas on the 3rd and was apparently attracted northward by No. 3 which appeared over Manitoba on the 3rd, but although they merged into one system over the Lakes they each kept their centres distinct until reaching Anticosti when only one centre existed. There was a general fall of snow or rain throughout eastern Canada and high winds or gales from the Lakes to the Atlantic. No. 4 was a shallow depression which moved into British Columbia from the Pacific Ocean on the 4th, and after moving to the north of Lake Superior dispersed, having given light falls of snow in the North-west Territories and along the north shore of Lake Superior. No. 5 appeared at first as an extensive and important Low as it moved into British Columbia from the Pacific Ocean on the 6th, where it gave heavy rain on the Coast. It became less important as it moved eastward across the North-west and apparently dispersed over Hudson's Bay. No. 6 quickly developed over Ontario on the 11th and gave a general fall of sleet or rain from the Lakes to the Gulf of St. Lawrence, dispersing over the Maritime Provinces. Nos. 8 and 9. The first of these started over Indian Territory and Northern Texas on the 12th and attained the proportions of an important Low when over the Mississippi Valley, but decreased in energy when it reached the Lakes, where, however, it gave high easterly winds and a general fall of rain or sleet in Ontario. It was eventually joined over New Brunswick by No. 9 which appeared over Virginia on the 14th. The combined system then redeveloped giving strong winds and a general fall of snow or rain throughout Quebec and the Maritime Provinces. No. 10 starting over western Quebec on the 17th quickly developed and passed eastward to Newfoundland. It caused a fresh to strong westerly gale throughout eastern Canada and a fall of snow or rain, which was generally light except in the Parry Sound and Upper Ottawa sections, where 6 to 7 inches of snow fell. No. 11 was a shallow depression which appeared to the southwestward of the Lake Region on the 20th. It caused a fall of six inches of snow in the Parry Sound District and light snow elsewhere in Ontario, western Quebec and the southern portions of the Maritime Provinces. No. 12 developed over the Lakes and gave light snow in Ontario and western Quebec. It soon diminished in energy and was absorbed into a wide spread low area which had been hovering for some days off the Coast. Steepening gradients then followed and a heavy gale ensued in the Gulf of St. Lawrence on the 24th and 25th. No. 13 was a fairly important area which passing across the North-west and to the north of Lake Superior on the 24th and 25th gave high winds and light local snowfalls, but it apparently dispersed on reaching western Quebec. No. 14 was a quick moving area of small dimensions

which appeared near the Florida Coast on the 25th but displayed little energy ; it passed up the Coast and to the south of Newfoundland. No. 15—Apparently moved into British Columbia from the Pacific Ocean on the 26th accompanied by heavy rain on the Coast. It thence spread to the North-west Territories bringing higher temperature there and a Chinook in Alberta and Assiniboia. High winds and light falls of snow and rain accompanied it as it moved eastward. On reaching the Lakes it decreased in energy and passed over eastern Canada as a shallow depression, giving light snow or rain in most places in the Lake Region and eastern districts and a moderate gale in the Bay of Fundy. No. 16.—This area forming over the Mississippi Valley on the 30th as a secondary to No. 15 increased in energy and gave a fresh to strong gale from the Lakes to the Atlantic with a moderate fall of snow in Quebec and Ontario. The centre passed directly over the Bay of Fundy and thence to the Straits of Belle Isle.

HIGH AREAS.

The tracks of nine high pressure areas have been charted, four of which, Nos. 2, 4, 6 and 9 were of little intensity. Two came from the extreme North-west, one passing eastward and the other southward ; three came from Manitoba or north of Lake Superior and moved south-east or east ; three moved from Middle Pacific Coast or Middle Western Plateau and passed eastward ; one started in western Quebec and travelled southeastward and one towards the end of the month hovered for several days over the Western States and on the 31st extended from the Pacific to the Lakes but it was not possible to trace its path. The more important areas of the month were Nos. 7 and 8. The former appeared over Alberta on the 15th and soon spread over the North-west. It was of great intensity at first and brought extremely cold weather with it. It assumed large proportions and spread to the Lakes on the 18th. There it backed the worst storm of the month over Eastern Canada and, with the exception of in Nova Scotia, brought extremely cold weather everywhere. The latter (No. 8) apparently first started over the Middle Western Plateau where it hovered as an important area for some time, but diminished in energy on its way to the Lakes, reaching which it again increased in energy, whilst an important storm developed over Eastern Canada. It eventually passed off the Middle Atlantic Coast having given the coldest weather of the month over the Lakes and Eastern Provinces.

WINDS.

In British Columbia the most prevalent winds were northerly. In Alberta the winds were for the greater part of the month westerly and blustry, favouring the Chinook. In Assiniboia the same conditions obtained except that the effect of the Chinook on the temperature was not so marked. In Manitoba the prevailing winds were also westerly and brisk for the greater part of the month. In Ontario the northern portion had a preponderance of easterly winds, whilst in the southern portion the direction was variable, the westerly however being more in evidence. On nine occasions the wind attained the force of a gale, three of which gales occurred whilst navigation was open and were duly warned. In Quebec as a whole the directive tendency was westerly, the winds for the most part being fresh or strong, eight gales were recorded, the heaviest being on the 24th and 25th, when it blew a strong gale. In the Maritime Provinces the winds were also mostly westerly. Seven gales occurred here of which six were warned and one only partly warned. A warning was also issued on the 20th but was not followed by a storm. Some of the highest velocities were as follows:—

St. John, N.B., 44 miles per hour from the S. E. on the 1st ; St. John, N.B., 46 miles per hour on the 9th, from the N.W. ; St. John, N.B., 46 N.W. on the 19th and 40 miles S.E. on the 30th ; Esquimalt, B.C., 43 miles S.W. on the 28th ; Swift Current, 56 miles W. on the 14th ; Winnipeg, 40 miles N.W. on the 15th ; Qu'Appelle 45 miles N.W. on the 14th ; Port Stanley 37 miles S.W. on the 4th and 29th ; Toronto 36 miles S.W. on the 5th ; Montreal 49 miles S.W. on the 24th ; Quebec 45 miles N.E. on the 11th ; Father Point 49 miles N.W., on the 4th, 47 miles N.W. on the 5th, 64 miles E., on the 11th, 52 miles W., on the 16th, 56 miles N.W., on the 18th and 43 miles N.W., on the 25th ; Point Escuminac 47 N.W. on the 18th, 55 N.W. on the 19th ; Grand Manan 44 miles S.E. on the 15th, 55 S.E. on the 30th ; Halifax 37 miles S.W. on the 5th ; Sydney 33 miles N.W. on the 20th ; Yarmouth 33 miles N.W. on the 18th ; Low Point, 52 miles N.W. on the 19th, and 50 N., on the 20th.

TEMPERATURE.

There was nothing very remarkable about the distribution of mean temperature. It was slightly above in Northern Alberta ; elsewhere, throughout British Columbia, the North-west Territories, Manitoba, the Lake Superior regions and in the northern and southern Ontario it was average or

slightly below. In Central and Eastern Ontario, also in Quebec and the Maritime Provinces it was average or slightly above. The greatest departures reported were 3° above at Edmonton, 4° above at Chatham, N.B., and 4° below at White River.

The Highest and Lowest Temperatures in each Province during December, 1897, were :

British Columbia,	65°·0 on 28th at Vernon,	—32°·0 on 15th at Donald.
North-west Territories,	60°·0 on 28th at Gategarth,	—45°·0 on 17th at Kneehill.
Manitoba.	40°·0 on 28th at Trehern, }	—32°·2 on 19th at Russell.
	40°·0 on 29th at Elkhorn, }	
Ontario,	62°·0 on 10th at Stony Creek,	—43°·0 on 17th at White River.
Quebec,	51°·0 on 11th at Brome,	—28°·6 on 24th at Richmond.
New Brunswick,	55°·0 on 16th at Sussex,	—10°·7 on 4th at Fredericton.
Nova Scotia,	57°·3 on 15th at Yarmouth,	—11°·7 on 29th at Truro.
P. E. Island,	54°·5 on 16th at Georgetown,	0°·0 on 30th at Georgetown.

PRECIPITATION.

The precipitation in British Columbia varied considerably near the Coast, as whilst at River's Inlet it was 8·3 inches below average, at Kuper Island it was 3·7 inches above ; on the Mainland it appears on the whole to have been below rather than above the average. In the North-west Territories it was generally above the average in northern Alberta and Assiniboia, especially so at Prince Albert, where it was 1·5 inches above, whilst in the southern portions of these Territories it was slightly below. In Manitoba it was about average or slightly above ; along the north shore of Lake Superior, in the Lower St. Lawrence Valley, the Gulf and in the Maritime Provinces, it was below the average, and in the eastern and southern portions of these latter Provinces to a considerable extent, Yarmouth being 3·3 inches below, Halifax 1·8 inches below and Sydney 2·1 below ; over the greater part of Ontario and over the extreme western part of Quebec it was above average, Lakefield being as much as 3·0 inches above and Montreal 2·3 inches above. In southern Ontario generally it was nearly average, but locally in the south-eastern portion there appears to have been a small deficiency.

BRIGHT SUNSHINE.

Bright sunshine was below average in nearly all parts of the Dominion, Brandon, Man., alone reporting an amount in excess of the average. The lowest percentage of the possible amount was reported from Woodstock, Ont., where it amounted to but 0·09. The largest number of completely cloudy days occurred in British Columbia and the least number at Brandon, Man., and at Toronto, Ont.

DECEMBER GALES FROM LAKE SUPERIOR TO OUR ATLANTIC COAST DURING THE TWENTY-FIVE YEARS 1873 TO 1897 INCLUSIVE.

In tabulating the gales during the quarter of a century herein embraced the writer has divided the storms into three classes as follows :—The heavy gales of note, the gales that just reached the force of a fresh or strong gale and the moderate gales. It would appear that in the Lake Region 136 gales have occurred, 33 being of the first class, 33 of the second class and 70 of the third class. In the St. Lawrence Valley and the Gulf south to the Miramichi River 132 gales have occurred, 60 being first class, 18 second class and 54 third class. In the Maritime Provinces, embracing the country north to the Miramichi River, 127 gales have occurred, 58 being first class, 11 second class and 58 third class. The heavy gales being those that naturally cause the greatest destruction of property and interfere to a greater or lesser extent with traffic and commerce, it is these storms only that have been thoroughly considered with the intention of endeavouring to find some clue if possible, to the cause of the great atmospheric developments which from time to time occur, and further to see if these gales are more likely to form at one date or in one part of the month more than in another. It is a very common belief that a great gale or gales occur annually about a certain date or dates, and as a table has been prepared of the gales for each month for the last twenty-five years it is proposed to take each month up separately and to prove from actual facts whether or not any credence can be placed in these theories so universally acknowledged by so many to be facts. To return to December ; of the heavy gales that have occurred there has been a preponderance of them during the first half of the month and if we consider the gales by weeks there is a marked absence of heavy storms during the third week, or between the 17th and 23rd, the number being about half what it was during any other period. As to the directions from which the low areas travelled the larger number in all the districts moved from the North-west Territories or the North Pacific Coast, the next largest number were from the region of the Gulf of Mexico. These latter bring the heaviest gales, although those that sweep into the Maritime Provinces from the Atlantic Ocean cause as a rule in that particular portion of Canada the most severe gales of the series, but fortunately their number is not large, 11 only occurred during the term herein treated of. As to the cause of the development of these great storms, many first show two well defined foci comprised in a long trough of comparatively low pressure, others again are the outcome of the coalescing of separate areas, one for instance from the North-west Territories combines with another one from the Gulf of Mexico and so on. It would almost appear that there is no connection between the average low area movement for the month and the average temperature, for in 1876 when of the five low areas that were experienced in Ontario three moved from the North-westward, the temperature for that month in Toronto was 9° below average, whereas in 1891 when of the five Lows experienced three moved from the North-westward, the temperature was 7° above the average. In the Lake Region the years giving the largest number of heavy gales were 1872, 1882, 1884 and 1885. In the St. Lawrence Valley and Gulf 1876, 1883, 1884, 1885, 1888 and 1891. In the Maritime Provinces, 1876, 1882, 1884, 1885 and 1890.—B. C. WEBBER.

PRECIPITATION AT STATIONS REPORTING RAIN, SNOW AND WEATHER DURING
DECEMBER, 1897.

STATIONS.	RAINFALL.					SNOWFALL.				THUNDER STORMS.
	Amount in inches.	No. of Days '01 or Over.	No. of Fair Days.	Heaviest Fall in Month.	Date.	Amount in inches.	No. of Days.	Heaviest Fall in Month.	Date.	
BRITISH COLUMBIA—										
Goldstream Lake.....	20.23	20	11	4.16	27					
Langley.....	10.06	15	14	1.55	27	1.5	2	1.0	16	
Hatzic.....	12.15	18	11	1.88	5	0.6	2	0.5	15	
Union.....	12.26	18	12	1.68	6	7.0	2	6.0	13	
McCoy Lake.....	16.81	18	13	2.33	7	1.0	2	1.0	13	
Beaver Creek.....	11.86	18	12	1.87	27	2.5	1	2.5	1	
Nanaimo.....	12.94	15	16	3.10	7					
Royal Oak.....	11.52	20	11	2.55	27					
Salt Spring Island.....	11.52	16	15	2.82	13					
Valdez Island.....	12.19	24	7	1.44	13	1.0	1	1.0	12	6th
N. W. TERRITORIES—										
W. Beaver Hill.....	0.15	1	8	0.5	28	4.2	7	1.8	13	
Manitoba.....										
MANITOBA—										
Rathwell.....						4.8	9	2.5	6	
Pembina Crossing.....							8			
Norquay.....						3.8	7	1.0	6	
Mary Hill.....	R	0	19	R	28	20.5	11	7.0	5	
Morden.....	R	0	23	R	27-28	3.5	8	2.0	5	
Belmont.....							4			
Rapid City.....						6.2	7	3.2	5	
Pilot Mound.....						5.0	3	2.0	10	
Turtle Mountain.....						1.3	7	1.0	27	
Hartney.....						6.0	10	1.5	31	
ONTARIO—										
Deer Park.....	2.44	6	20	1.42	15	9.5	5	4.0	17	
Hubrey.....	0.35	2	25	0.35	14	8.0	4	3.0	17	
Thompson.....	0.51	1	28	0.51	9	9.0	2	5.0	28	
Sparrow Lake.....	1.58	6	11	1.08	10	37.3	16	8.5	17	
Coldstream.....	1.25	3	19	1.12	10	20.7	10	5.0	17	
Parma.....	2.30	4	22	1.55	15	10.0	5	4.0	18	
Dealtown.....	0.97	6	20	0.41	13	5.5	7	3.0	17	
Kitley.....	2.20	5	20	2.20	7	12.5	6	3.0	17	
Goderich.....	2.02	6	7	1.00	11	31.0	12	5.0	1	
Midland.....	2.37	6	16	1.15	11	22.0	10	7.0	17	
Georgetown.....	1.78	7	10	1.23	14	20.7	15	4.6	17	
Croydon.....	3.11	6	20	0.97	14	15.5	6	2.0	20	
Aurora.....	1.22	5	9	0.75	14	16.8	10	4.3	17	
Warton.....	1.84	3	15	1.50	10	34.0	13	4.0	27	
Montague.....	0.95	2	26	0.61	10	6.0	3	2.0	17	
Emsdale.....	1.89	5	17	1.29	11	26.7	17	4.5	23	
Arden.....	2.92	9	9	1.32	14	16.0	7	4.0	17	
Mount Forest.....	1.20	6	16	0.46	11	25.8	19	3.5	1	
Lansdowne.....	1.60	3	19	1.05	15	6.0	8	3.0	17	
Westport.....	2.91	6	13	0.93	15	9.8	11	3.3	17	
Jermyn.....	2.14	3	24	0.52	14	18.0	6	6.0	18	
Orangeville.....	1.91	2	14	1.91	15	20.1	13	4.5	17	
Sunshine.....	2.51	2	10	1.32	11	21.2	14	5.0	18	
Lion's Head.....	2.00	2	7	1.75	10					
Wooler.....	2.71	2	18	2.18	15	18.1	7	4.2	30	
Wyoming.....	1.23	5	21	0.50	11	10.0	5	3.0	7	
Cowal.....	1.20	4	26	0.60	10	4.0	2	4.0	29	
Watford.....	0.95	3	7	0.60	11					
Presqu'Isle.....	1.60	2	17	1.60	10	27.0	12	15.0	22-23	
Scarborough.....	2.57	9	6	0.89	15	11.7	16	5.0	17	
Cherry Valley.....	1.44	4	19	1.09	14	15.0	7	4.0	23	
Roblin's Mills.....	3.10	5	24	2.10	14	7.0	3	3.0	17	
Ennismore.....	1.10	2	21	0.65	14	24.0	8	6.0	1	
Huntsville.....	1.27	2	19	0.80	10	17.5	10	3.0	23	
Providence Bay.....	1.68	3	18	1.65	11	34.0	10	12.0	1	
Princeton.....	1.07	2	22	0.78	15	16.5	7	8.0	17	
Elgin.....	1.60	3	21	1.06	14	14.5	7	4.5	17	
Ursa.....	1.39	5	17	0.93	14	30.0	9	5.0	17	
Oliver's Ferry.....	2.18	3	24	1.25	11	10.0	4	3.0	17	
QUEBEC—										
Perce.....	1.10	6	12	0.58	16	29.5	15	8.0	12	
NEW BRUNSWICK—										
Point Escuminac.....	1.10	4	20	0.43	5	12.5	9	5.0	12	
NOVA SCOTIA—										
Port Morien.....	1.42	5	24	0.75	11	3.0	2	3.0	27	

Aurora recorded—

Where the class of aurora is noted by the observer, it is given, (I) being the brightest, (IV) the feeblest in brilliancy.

1. Savanne, Minnedosa, III ; Channel Island, IV.
2. Savanne, Battleford, IV ; Prince Albert, I.
3. Savanne.
4. Battleford, IV.
9. W. Beaver Hills.
10. Medicine Hat, II ; W. Beaver Hills.
12. Belmont.
14. Belmont.
15. Regina, IV ; Russell, III ; Hillview, III ; Cannington Manor, Minnedosa, III ; Battleford, IV ; W. Beaver Hills ; Aweme, III.
16. Russell, II.
17. Russell, III ; Hillview, IV ; Minnedosa, IV ; Haileybury, IV ; Channel Island, IV ; Aweme, III.
18. Truro, IV ; Minnedosa, IV ; W. Beaver Hills ; Pembina Crossing, IV.
19. Regina, IV ; Chicoutimi, Russell, I ; Treherne, Savanne ; Belmont.
20. Truro, IV ; Dalhousie, N. Nicomen, Russell, III ; Hillview, II ; Cannington Manor, Savanne, Father Point, III ; Minnedosa, II ; Winnipeg, IV ; Edmonton, II ; Medicine Hat, III ; Channel Island, III ; Haileybury, III ; Abitibi.
21. Truro, IV ; Chicoutimi, Savanne, Alton, II ; Pincher Creek, Father Point, III ; Minnedosa, I ; Haileybury, IV ; Channel Island, III.
22. Truro, IV ; Chicoutimi, N. Nicomen, Savanne, Minnedosa, I ; Medicine Hat, III ; Swift Current, III ; W. Beaver Hills ; Pembina Crossing, III ; Channel Island, IV.
23. Hillview, IV ; Savanne, Medicine Hat, IV.
24. Henrietta, II ; Savanne, W. Beaver Hills ; Aweme, II.
25. Hillview, IV ; Belmont ; Pilot Mound, IV ; Aweme, III.
26. Medicine Hat, IV ; W. Beaver Hills ; Channel Island, IV.
27. W. Beaver Hills.
28. Pictou, Father Point, III ; Medicine Hat, IV ; W. Beaver Hills ; Pembina Crossing, II.
29. Truro, IV ; Fredericton, IV ; Pictou, Russell, I ; Father Point, III ; Minnedosa, II ; Battleford, II.
30. Regina, III ; Battleford, IV ; Medicine Hat, IV ; Qu'Appelle, W. Beaver Hills ; Pilot Mound, I.
31. Moose Jaw, Winnipeg, IV ; Battleford, IV ; Qu'Appelle ; Pembina Crossing, III.

Thunder recorded on—

6. Beaver Creek, Salt Spring Island.
7. Kuper Island.
8. Beaver Creek.
10. Quatsino.
11. St. Ann's.
15. Bermuda.
27. Rivers Inlet.
28. Beaver Creek.

PROPORTION OF BRIGHT SUNSHINE REGISTERED IN EACH HOUR OF THE DAY DURING WHICH THE SUN WAS ABOVE THE HORIZON IN THE MONTH OF DECEMBER, 1897.

	HOURS ENDING															
	5 A.M.	6 A.M.	7 A.M.	8 A.M.	9 A.M.	10 A.M.	11 A.M.	NOON.	1 P.M.	2 P.M.	3 P.M.	4 P.M.	5 P.M.	6 P.M.	7 P.M.	8 P.M.
ESQUIMALT				0'00	0'01	0'10	0'17	0'13	0'12	0'18	0'12	0'4	..	..	..	..
KUPER ISLAND.....				'00	'00	'03	'09	'11	'16	'18	'18	'11	..	..	..	..
AGASSIZ, B. C.....				'00	'00	'10	'20	'17	'17	'17	'13	'07	..	..	..	..
BATTLEFORD.....				0'01	'22	'30	'37	'46	'38	'38	'10	'00	..	..	..	..
INDIAN HEAD.....				'00	'00	'15	'23	'42	'45	'46	'15	'00	..	..	..	..
BRANDON.....				'00	'08	'30	'31	'33	'48	'54	'35	'00	..	..	..	..
WINNIPEG.....				'07	'23	'38	'36	'40	'42	'34	'12	'00	..	..	..	..
DURHAM.....				'02	'08	'09	'10	'11	'10	'10	'08	'00	..	..	..	..
WOODSTOCK.....				'03	'06	'12	'16	'15	'10	'06	'07	'02	..	..	..	..
TORONTO.....				'00	'09	'16	'22	'24	'26	'27	'31	'16	6	..	..	..
LEDSAY.....				8	'06	'06	'13	'12	'21	'23	'23	'16	'04	..	..	..
BARRIE.....				8	'07	'09	'12	'16	'12	'15	'15	'06	..	..	..	..
KINGSTON.....				'03	'19	'19	'26	'28	'29	'26	'23	'16	6	..	..	..
MONTREAL.....				'00	'08	'20	'23	'24	'23	'25	'31	'12	..	..	..	..
FREDERICTON.....				'04	'28	'41	'48	'48	'40	'40	'38	'18	'00	..	..	..

	ESQUIMALT.	KUPER ISLAND.	AGASSIZ.	BATTLEFORD.	INDIAN HEAD.	BRANDON.	WINNIPEG.	DURHAM.	WOODSTOCK.	TORONTO.	LEDSAY.	BARRIE.	KINGSTON.	MONTREAL.	FREDERICTON.
MEAN PROPORTION FOR MONTH..... (Constant sunshine being 1.)	0'10	0'10	0'12	0'28	0'23	0'36	0'29	0'09	0'09	0'19	0'14	0'10	0'21	0'22	0'34
DIFFERENCE FROM AVERAGE.....	-.05	-.04	-.02	-.03	-.01	+.05	+.07	..	-.12	-.03	-.07	-.06	-.05	-.07	-.02
MAXIMUM DAILY AMOUNT.....	0'77	0'65	0'67	0'77	0'64	0'81	0'74	0'80	0'57	0'84	0'98	0'84	0'92	0'91	0'89
DATE.....	14-15	15	30	12	17	2	17	19	2	24	19	24	19	2-19	22
NO. OF DAYS COMPLETELY CLOUDED.....	21	18	23	18	14	9	14	24	17	9	17	15	13	14	13

FORECASTS.

The forecasts issued by this office at 11 p.m. each night are posted up at every telegraph station in Canada, and are for the 24 hours beginning at 8 a.m. the following day.
The number of forecasts issued during the month was 1,074. These were divided as follows:—

DISTRICT.	No. Issued.	VERIFIED.			
		No. Fully.	No. Partly.	No. Not.	Percentage.
MANITOBA.....	110	79	16	15	79'1
LAKE SUPERIOR.....	108	72	26	10	78'7
LOWER LAKE REGION.....	135	91	32	12	79'3
GEORGIAN BAY.....	135	88	32	15	77'0
OTTAWA VALLEY.....	112	73	19	20	73'7
UPPER ST. LAWRENCE.....	117	69	30	18	71'8
LOWER ST. LAWRENCE.....	116	81	24	10	80'9
GULF.....	110	76	18	16	77'3
MARITIME PROVINCES.....	132	84	33	15	76'1
TOTAL.....	1,074	718	230	131	77'1

In order to obtain the percentage of verification of the forecasts, the number partly verified is divided by two and added to the number fully verified, and the result divided by the total number issued.

In ascertaining to what extent the forecasts have been verified, the reports from the agents at all observing stations, as well as the telegraphic reports, are used.

The forecasts and storm warnings for December were issued by Forecast Official H. V. Payne.

TORONTO OBSERVATORY.

MAGNETIC REPORT FOR DECEMBER, 1897.

Mean westerly declination..... 4° 54' 0

Mean horizontal force..... 0.16640

This month the magnets were more disturbed than for many months past; disturbances on the morning of the 11th and night of the 20th, were very pronounced, especially the former, where a range of 1° 4' in a short time was registered.

Declination.—The magnet was slightly disturbed on the early hours of the 1st and again from 22^h until 6^h of the 2nd. On the 4th, at 3^h 12^m a small abnormal westerly movement of the needle was shown at 3^h 28^m; it was considerably accelerated and after reaching its maximum the needle gradually returned to normal position. Between 20^h of the 4th and 6^h of the 5th and again at a corresponding time the following day the magnet was decidedly disturbed, but no large deviations occurred. After this there was a comparatively quiet period until 12^h 26^m of the 9th, when a quick westerly deflection set in and was followed by a gradual return to the normal reading. On the morning of the 10th, small changes were going on but passed off about 10^h and appeared again at 20^h when a disturbed period began. At 23^h 28^m of the 10th, the movements increased, a westerly deviation then taking place followed by irregular movements with the needle somewhat west of its mean position. By 4^h a well marked storm had developed. The westerly extreme occurred at 5^h 40^m and the easterly at 5^h 56^m, the total range was 1° 4'. Shortly after 6^h the disturbance commenced to abate but perturbations prevailed all morning, in fact up to 14^h. During the night signs of disturbance again appeared and the needle continued slightly disturbed all morning of the 12th. Abnormal movements were recorded on the early hours of the 15th, and a sharp westerly hitch at 20^h followed by a more prolonged easterly movement, was well marked. A slight disturbance then continued until the morning of the 16th. The 17th was slightly disturbed, especially during the afternoon. Occasional movements were noticed on the 18th, also between 22^h and 24^h the following night. On the morning and night of the 20th a marked disturbance was shown. The movements during the night being the more rapid. From 7^h 20^m to 12^h the needle was west of its mean position. Very rapid swings were noted after 20^h and at 21^h 41^m a westerly swing of 41' was recorded, the maximum taking place at 21^h 48^m the reading being then 33' 6 west of the monthly mean. The minimum reading occurred at 20^h 55^m being 19' 3 east of the mean. At 23^h the needle was quieter, but a disturbed magnet prevailed up to 6^h of the 22nd when the trace failed owing to an accident to the driving clock. The afternoon and night of the 22nd was somewhat disturbed, in fact up to the 25th. On the morning of the 28th irregular movements were again noticed and continued to the end of the month.

Horizontal Force.—The first marked change was a remarkably sudden decrease at 12^h 26^m of the 9th, lasting a short time. The change was not very large, but appears very striking, as the trace was smooth previous to this change; it was followed by a gradual recovery. On the 11th, during the early morning the force was changing rapidly and was generally below its normal value. At 5^h 28^m a series of rapidly decreasing swings set in and by 5^h 44^m it had decreased 00350 C. G. S., it then quickly recovered, the needle moving in sharp swings. A second minimum was noted at 6^h 41^m, a recovery swing then began and the needle became much quieter. The total range of H. F. was 00504 C. G. S., slight changes were going on during the early hours of the 15th, also on the afternoon and night. And after 6^h of the 20th a decided but gradual decrease of this component set in the needle giving a minimum reading a little later than 10^h, after which a steady recovery began. All afternoon the force was changing slightly and between 20^h and 22^h 20^m some rapid little swings were noticed. After 22^h 20^m the disturbance became less active but a disturbed period prevailed up to the morning of the 24th, when the curves became more uniform. On the morning of the 29th slight changes again began and were noticeable to the end of the month.

Aurora.—There were no auroras observed during the month. On the 1st, 16th, 17th, 22nd 23rd, 24th and 27th, the sky was clear but no aurora was observed, on all other nights clouds or haze would have hidden any aurora which might have existed.

R. F. STUPART,
Director.

MAGNETIC OBSERVATORY,
TORONTO, 27^h January, 1898.