

toward a period of diminished heat, but rather an irregularity in the distribution of warm and cold years that suggests at once the absence of any system of compensation or any gradual progression from one extreme to the other. Studies of annual means, when broadened to include those from a number of stations scattered over the globe are not devoid of interest, though perhaps they have not as yet yielded results of immediate practical importance.

For the States bordering the Gulf and South Atlantic coasts continuous instrumental records of the temperature previous to 1870 are lacking, although a number of broken series are available. The degree of cold experienced before that date is naturally a matter of considerable uncertainty, and while we may form a general idea of the relative severity of the winters, we are prevented from making as full an examination of the matter as its importance demands.

Taking Florida as a concrete illustration, we find that at least four very disastrous freezes have occurred within the one hundred years ending with 1898. We are inclined to the opinion that the first one, viz, that of 1835, was the most severe. The State then escaped further visitation for a period of fifty-one years, or to January, 1886. The next period of immunity was comparatively brief, viz, seven years, or to December, 1894. Within two months of the last-named date, a second disastrous freeze occurred and there have been a number of dangerously low temperatures since.

The impression that the climate is changing is partly due to the fact that in recent times an account of every severe frost and freeze that occurs in the South is sent broadcast to all parts of the country, whereas, during earlier times no record was preserved except of the very severe freezes. This very lack of information respecting the earlier minor freezes prevents us in a measure from asserting in a more positive manner a rule of climate that appears to be common to all parts of the United States, viz, that periods of great refrigeration generally extend over several years. In support of this assertion, as affecting Florida, reference is made to the fact that the great freeze of 1835 was preceded by two severe winters, 1830-31 and 1831-32, and was immediately followed by a winter of more than average severity, 1836. The freeze of 1886 was preceded by a cold spell in January, 1884 (minimum at Jacksonville 21°), and the temperature fell to 22° at Jacksonville in January of 1887. The two freezes of the winter of 1894-95 were preceded by a cold wave in 1893, in which temperature fell to 24° at Jacksonville. All of this would seem to indicate, as above stated, that cold years are likely to be followed by years of similar character separated by one or more warm years, the complete cycle of events extending over from four to seven years; but we should not forget that this conclusion is not based on sufficient data to establish it firmly.

OBSERVATIONS AT RIVAS, NICARAGUA.

The records contributed for many years by Dr. Earl Flint, at Rivas, Nicaragua, include barometric readings. His present station is at 11° 26' N., 85° 47' W. The observations at 7:17 a. m., local time are simultaneous with Greenwich 1 p. m. The altitude of his barometer is 36 meters above sea level, but until the barometer has been compared with a standard it seems hardly necessary to publish the daily readings. The wind force is recorded on the Beaufort scale, 0-12. When cloudiness is less than $\frac{1}{10}$, the letter "F," or "Few," is recorded.

This station is situated on the western shore of Lake Nicaragua, not far from the eastern end of the western division of the Nicaragua Canal. The volcano Ometepe, on an island in Lake Nicaragua, is about 10 miles northeast of the station. Mr. Flint's records occasionally mention the presence of clouds in the early morning on the summit of this mountain.

Observations at Rivas, Nicaragua, November, 1898.

OBSERVATIONS AT 7:17 A. M. LOCAL (8 A. M. EASTERN STANDARD) TIME.

Date.	Temperature.		Wind.		Upper clouds.			Lower clouds.			Daily rainfall.
	Air.	Dew-point.	Direction.	Force.	Kind.	Amount.	Direction from.	Kind.	Amount.	Direction from.	
1.....	72	68	nw.	0	cs.-ck.	10	se.	.....	.....	.....	0.00
2.....	71	68	nw.	0	ck.	6	ne.	.....	.....	.....	0.00
3.....	72	69	nw.	0	cs.	10	se.	.....	.....	.....	0.00
4.....	74	71	se.	0	.....	.....	.....	k.	10	se.	0.06
5.....	77	73	se.	1	.....	.....	.....	ks.	Few	se.	0.00
6.....	78	74	ne.	1	cs.	1	ne.	.....	.....	.....	0.00
7.....	76	73	ne.	1	cs.	3	se.	.....	.....	.....	0.10
8.....	77	73	ne.	1	.....	.....	.....	k.	Few	ne.	2.76
9.....	77	74	ne.	1	.....	.....	.....	k.	10	ne.	0.04
10.....	77	73	ne.	2	cs.	5	se.	k.	5	ne.	0.04
11.....	77	74	ne.	1	c.	2	sw.	k.	2	ne.	1.23
12.....	77	75	ne.	0	cs.	8	e.	k.	8	ne.	1.77
13.....	75	74	ne.	2	.....	.....	.....	ks.	10	ne.	0.69
14.....	76	73	ne.	1	c.	5	se.	k.	5	ne.	0.00
15.....	76	74	ne.	2	.....	.....	.....	ks.	10	ne.	0.37
16.....	76.5	71	ne.	1	ck.	2	ene.	.....	.....	.....	0.33
17.....	76	73	ne.	3	.....	.....	.....	ks.	9	ne.	0.00
18.....	76	73	ne.	0	cs.	1	ne.	.....	.....	.....	0.00
19.....	76	73	ne.	2	cs.	3	ne.	.....	.....	.....	0.13
20.....	76	70	ne.	2	.....	.....	.....	ks.	10	ne.	0.00
21.....	76	73	ne.	2	.....	.....	.....	k.	Few	ne.	0.00
22.....	76	73	ne.	2	.....	.....	.....	k.	2	ne.	0.00
23.....	76	71	ne.	1	.....	.....	.....	k.	7	ne.	0.00
24.....	76	73	ne.	1	.....	.....	.....	k.	Few	ne.	0.00
25.....	76	72	ne.	2	c.	Few	se.	ks.	Few	ne.	0.00
26.....	76.5	73	ne.	1	.....	.....	.....	k.	Few	ne.	0.00
27.....	78	74	ne.	2	.....	.....	.....	ks.	10	ne.	0.86
28.....	77	73	ne.	1	.....	.....	.....	ks.	10	ne.	0.31
29.....	77	73	ne.	2	cs.	Few	ne.	k.	Few	ne.	0.00
30.....	76	71	ne.	3	cs.	Few	ne.	ks.	Few	ne.	0.00
Sums.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8.19
Means.....	75.9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Rainfall nearly twice the normal for November.

OBSERVATIONS AT 8:43 P. M. SEVENTY-FIFTH (8 P. M. LOCAL) TIME.

Date.	Temperature.		Wind.		Upper clouds.			Lower clouds.			
	Air.	Dew-point.	Direction.	Force.	Kind.	Amount.	Direction from.	Kind.	Amount.	Direction from.	
											°
1.....	75	72	w.	0.5	cs.-ck.	10	{nw. se.}	.....	.....	.....	.....
2.....	76	73	nw.	0	cs.	10	{nw. se.}	.....	.....	.....	.....
3.....	77	73	nw.	0	{cs. ck.}	10	{sw. ne.}	.....	.....	.....	.....
4.....	80	76	se.	1	c. ck.	6	se.	.....	.....	.....	.....
5.....	79	75	se.	0	ck.	10	se.	ks.	10	.....	.....
6.....	80	76	se.	2	cs.	10	se.	.....	.....	.....	.....
7.....	78	77	se.	0	.....	.....	.....	k.	10	.....	.....
8.....	78	75	se.	1	.....	.....	.....	k.	10	.....	.....
9.....	78	75	e.	0	.....	.....	.....	k.	10	se.	.....
10.....	77	74	se.	0	.....	.....	.....	k.	10	se.	.....
11.....	77	74	se.	0	.....	.....	.....	k.	10	se.	.....
12.....	77	76	ne.	1	.....	.....	.....	n.	10	ne.	.....
13.....	77	76	ne.	1	.....	.....	.....	n.	10	.....	.....
14.....	78	74	ne.	1	.....	0	.....	.....	0	.....	.....
15.....	78	74	ne.	2	.....	.....	.....	ks.	10	ne.	.....
16.....	77	73	ne.	2	.....	.....	.....	ks.	5	ne.	.....
17.....	77	74	ne.	0	.....	.....	.....	ks.	10	ne.	.....
18.....	78	74	ne.	0	.....	.....	.....	ks.	10	ne.	.....
19.....	77	72	e.	1	ck.	8	e. ne.	.....	.....	.....	.....
20.....	77	73	ne.	2	c.	Few	ne.	.....	.....	.....	.....
21.....	79	73	e.	1	cs.	Few	e.	.....	.....	.....	.....
22.....	78.5	75	e.	0	.....	0	.....	.....	0	.....	.....
23.....	80	74	e.	0	.....	0	.....	.....	0	.....	.....
24.....	78	73	ne.	1	.....	.....	.....	k.	6	ne.	.....
25.....	79	75	ne.	1	.....	.....	.....	k.	9	ne.	.....
26.....	79.5	75	e.	1	.....	.....	.....	k.	10	se.	.....
27.....	77	74	se.	1	.....	.....	.....	k.	10	.....	.....
28.....	76	73	e.	0	c.	7	e. ene.	.....	.....	.....	.....
29.....	78	74	ne.	2	cs.	8	.....	.....	.....	.....	.....
30.....	78	72	ne.	2	.....	.....	.....	ks.	9	ne.	.....
Means.....	78.3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

MEXICAN CLIMATOLOGICAL DATA.

Through the kind cooperation of Señor Mariano Bárcena, Director, and Señor José Zendejas, vice-director, of the Central Meteorologico-Magnetic Observatory, the monthly summaries

of Mexican data are now communicated in manuscript, in advance of their publication in the *Boletín Mensual*; an abstract translated into English measures is here given in continuation of the similar tables published in the MONTHLY WEATHER REVIEW since 1896. The barometric means have not been reduced to standard gravity, but this correction will be given at some future date when the pressures are published on our Chart IV.

Mexican data for November, 1898.

Stations.	Altitude.	Mean barometer.	Temperature.			Relative humidity.	Precipitation.	Prevailing direction.	
			Max.	Min.	Mean.			Wind.	Cloud.
Leon (Guanajuato)...	5,934	24.30	75.3	34.9	60.6	53	1.14	nw.	sw.
Linares (New Leon)...	1,188	28.73	83.3	42.8	61.5	73	1.79	n.	n.
Mazatlan	35	29.90	85.1	63.7	70.5	83	0.57	nw.	sw.
Merida (Yucatan)....	50	29.91	85.4	61.7	76.5	83	1.49	e.	e.
Mexico (Obs. Cent.)...	7,472	23.06	72.5	36.5	57.2	97	1.23	nw.	sw.
Morelia (Seminario)...	6,401	23.97	74.1	41.4	59.8	75	0.46	sw.	sw.
Oaxaca	5,164	25.07	73.7	42.8	67.1	52	0.08	nw.	ne.
Puebla (Col. Cat.)....	7,112	23.36	77.0	39.5	59.7	73	3.48	ene.	e.
Tuxpan (Vera Cruz)...	30.26	29.6	82.6	52.3	70.7	72	1.44	nw.	s.
Zacatecas	8,015	22.51	77.4	34.2	55.8	59	0.56	sw.	e.
Zapotlan	5,078	.....	78.3	49.3	61.9	79	0.61	se.	sw.

DECEMBER, 1898.

Stations.	Feet.	Inch.	° F.	° F.	° F.	%	Inch.	Wind.	Cloud.
Durango (Seminario)...	6,043	.....	73.4	32.0	.....	0.18	.....	w.	.....
Leon (Guanajuato)...	5,934	24.33	73.8	30.9	56.3	49	T.	sw.	.....
Merida (Yucatan)....	50	30.02	95.2	56.8	73.6	79	6.21	n.	.....
Mexico (Obs. Cent.)...	7,472	23.08	70.3	36.9	54.5	60	0.05	nw.	.....
Morelia (Seminario)...	6,401	24.00	73.0	39.0	55.8	62	0.07	sw.	.....
Oaxaca	5,164	25.12	82.0	38.1	63.0	57	1.41	nw.	sw.
Puebla (Col. Cat.)....	7,112	23.39	73.4	32.9	56.3	70	0.39	ene.	se., sse.
San Isidro .....	.....	.....	67.1	50.9	.....	0.13	w.	.....	.....
Tuxpan (Vera Cruz)...	30.21	29.2	82.2	46.4	63.3	81	T.	nw.	.....
Zapotlan (Seminario)...	5,078	25.14	77.4	41.7	61.5	77	0.01	sse.	sw.

METEOROLOGICAL OBSERVATIONS NEAR CIRCLE CITY, ALASKA.

By J. O. Holt.

Mr. J. O. Holt, formerly a voluntary observer of the Weather Bureau, has kindly furnished a copy of meteorological observations made by him in the Birch Creek Mining District, Alaska, from December, 1896, to June, 1898, inclusive. Mr. Holt's remarks in connection with the observations and his sojourn in Alaska are as follows:

These observations were taken about 75 miles south of Circle City in the mountains at headwaters of Birch Creek. I consider them of value for this reason, that during the colder parts of winter the thermometer stands from 15° to 20° higher here in the mountains than down on the flats, at Circle City, or at any point along the Yukon River. But in summer the thermometer stands highest in the lowlands. These are facts that every old timer has noticed, but I have never heard a satisfactory explanation for them. Of course our coldest weather is perfectly quiet, and as there is much more wind in the gulches than on the flats that is certainly one of the factors. I have seen the temperature run up 30° in 3 hours at the beginning of a wind, and run down as quickly when the wind stopped blowing.

During March, 1897, when the temperature was -42° at the mines it was -65° at Circle City, down on the Yukon, 75 miles away. The divergence became less as the temperature rose toward zero.

The fact that interior Alaska is as dry as eastern Washington is hard to believe even by one who has spent years in the country. For eight months everything is buried under snow, and for the other four the country is covered with lakes, sloughs, swamps and soggy moss reaching to the very mountain tops, yet the annual rainfall is only 12 or 13 inches.

The two winters which these records cover were, from all reports, very mild ones for this locality.

Observations in the interior of Alaska during the short summer have an important bearing upon the agricultural possibilities of that region. Besides the observations made by Mr. Holt only two other series are known to extend throughout the summer season, viz, that of the United States Coast Survey at Camp Davidson (see MONTHLY WEATHER REVIEW

June, 1897, p. 248), and that by Mr. Wm. Ogilvie, Land Surveyor of the Dominion of Canada (see the Scottish Geographical Magazine, Vol. XIV, No. 7). A summary of Mr. Ogilvie's observations appears in the MONTHLY WEATHER REVIEW of June, 1898, pp. 253-254.

It is quite possible that the mountainous country, where the observations above referred to were made, is not adapted to the purposes of agriculture. The minimum temperatures which must prevail at lower altitudes and nearer the coast. Mr. Holt's observations have been summarized in the Division of Records and Meteorological Data, and the results are given in the table following.

In June, 1897, the temperature fell to 40° or below on three days; in July on but one day; in August on fifteen days, and the minimum temperature was 40° or below continuously from the 18th of August to the 31st. In June, 1898, the temperature fell to 40° or below on four days. At Camp Davidson, the site occupied by the United States Coast Survey party of 1889-90, the temperature in June fell to 40° or below on twelve days, and the minimum of the month was 29.8° on June 27; in July the temperature fell to 40° or below on five days; in August on eleven days.

It would seem from the above that frost and freezing temperatures are to be expected in the latter part of August, and that there is indeed a possibility of frost in every month of the summer season.

Observations at Circle City (near), Alaska.

Latitude, 65° 30' north; longitude, 144° - west.

MEAN MAXIMUM TEMPERATURE.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1896.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8.6*
1897.....	-4.3	-3.5	3.5	27.6	43.3	65.5	63.3	56.7	33.3	19.3	6.1	5.0
1898.....	-0.2	-7.6	25.4	34.0	46.2	67.0	.....	.....	.....	.....	.....	.....

MEAN MINIMUM TEMPERATURE.

1896.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	-14.6*
1897.....	-9.3	-9.1	-13.2	18.1	28.7	50.4	50.0	40.6	22.8	6.4	-0.3	-1.9
1898.....	-6.2	-14.8	13.9	18.4	30.4	49.0	.....	.....	.....	.....	.....	.....

ABSOLUTE MAXIMUM TEMPERATURE.

1896.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9*
1897.....	22	28	29	38	59	84	83	70	52	38	28	28
1898.....	23	24	38	49	78	84	.....	.....	.....	.....	.....	.....

ABSOLUTE MINIMUM TEMPERATURE.

1896.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	-34*
1897.....	-31	-25	-42	-8	8	34	40	26	2	-12	-21	-18
1898.....	-31	-38	0	4	6	32	.....	.....	.....	.....	.....	.....

MEAN TEMPERATURE.

1896.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	-11.6*
1897.....	-6.8 ^b	-6.3	-4.8	20.4 ^c	36.0	58.0 ^d	56.6	48.6	28.0 ^e	12.8	2.9	1.6 ^f
1898.....	-3.2	-11.2	19.6	26.3 ^g	38.3	58.0	.....	.....	.....	.....	.....	.....

TOTAL RAIN AND MELTED SNOW.

1897.....	1.65	0.10	h	1.10	1.45	0.70 ⁱ	2.30	1.65	1.50	1.15	0.10	0.40
1898.....	0.20	0.40	1.60	0.75	0.75	0.39	.....	.....	.....	.....	.....	.....

TOTAL SNOWFALL.

1896.....	16.5	1.0	.....	11.0	12.5	0.00 ^k	0.00	0.00	15.5	11.5	1.0	4.0
1897.....	2.0	1.0	16.0	7.5	2.5	0.00	.....	.....	.....	.....	.....	.....

* Fourteen days missing. ^b Great irregularity in range caused by starting or stopping of wind. ^c Mean temperature above freezing April 11. ^d Flowers blooming in profusion. ^e On 19th the temperature fell below freezing and remained there. ^f South wind always raises temperature, which falls when wind stops blowing. ^g General average rose above freezing for the first time April 13. ^h Precipitation was something less than one inch during month. ⁱ Considerable thunder but little rain. ^j Snow all gone by 10th.