1,600 elevation, 72.5° and 63.5°; Ewa Plantation, 50 elevation, 81° and 67°; United States Magnetic Station, 50 elevation, 81.5° and 61.6°, mean, 74.5°; United States Experiment Station, 350 elevation, 79.6° and 63.8°, mean, 72.5°; W. R. Castle, 60 elevation, highest, 82°; lowest, 59°; mean, 72.7°.

Ewa Mill mean dew-point, 63.8°; mean relative humidity, 72 per cent; Kohala, Dr. B. D. Bond, 65.5° and 78 per cent. Puunene, 65.4° and 78 per cent; Magnetic station, 66.1° and 76 per cent.

The marked features of the month were the rainstorm of the 2d; the easterly storm of the 15th to 18th; and the heavy northerly blow of the 22d. Heavy swell, 6th, 10th, 14th to 20th, and 25th to 30th. Lightning, Hawaii, 29th, 30th. Snow fell on Mauna Loa and Mauna Kea 16th, 29th. Earthquake, Kohala, 9th, 11 a. m. and 10th, 10 p. m., "hard." Hilo, 11th, 6.45 p. m. Kilauea active on the 10th, lava rising 100 feet in the pit of the lake. In the course of ten days action subsided.

Rainfall data for November, 1902.

Stations.	Elevation.	Amount.	Stations.	Elevation.	Amount.
HAWAII.					
HILO, e. and ne.	*Feet.*	*Inches.*	OAHU.	*Feet.*	*Inches.*
Waiakea	50	10.36	Punahou (W. B.), sw	47	9.80
Hilo (town)	100	12.32	Kulaokahua (Castle), sw	50	7.11
Kaumana	1,250	.....	Makiki Reservoir	120	.....
Pepeekeo	100	18.01	U. S. Naval Station, sw	6	6.50
Hakalau	200	19.15	Kapiolani Park, sw	10	5.38
Honohina	300	21.17	Manoa (Woodlawn Dairy), c	285	15.74
Punohua	1,050	36.10	Manoa (Rhodes Gardens)	300	20.54
Laupahoehoe	500	24.05	School street (Bishop), sw	175	11.00
Ookala	400	15.61	Insane Asylum, sw	30	9.43
HAMAKUA, ne.			Kalihi-Uka, sw	480	21.36
Kukaiau	250	13.45	Nuuanu (W. W. Hall), sw	50	9.22
Paauilo	750	11.44	Nuuanu (Wyllie street)	250	12.97
Paauhau (Mill)	300	8.79	Nuuanu (Elec. Station), sw	405	12.40
Honokaa (Muir)	425	8.96	Nuuanu (Luakaha), c	850	26.16
Honokaa (Meinicke)	1,900	.....	Waimanalo, ne	25	9.77
Kukuihaele	700	9.15	Maunawili, ne	300	11.02
KOHALA, n.			Kaneohe	100	7.03
Niulii	200	7.54	Ahuimanu, ne	350	10.54
Kohala (Mission)	521	7.40	Kahuku, n	25	4.33
Kohala (Sugar Co.)	235	8.17	Waialua	20	3.60
Puakea Ranch	.....	6.29	Wahiawa	900	6.69
Hawi	600	.....	Ewa Plantation, s	60	4.56
Puuhue Ranch	1,847	10.39	Waipahu	200	3.34
Waimea	2,720	5.56	Moanalua	15	9.76
KONA, w.			Laniakea (Nahuina)	1,150	18.22
Kailua	950	.....	Tantalus Heights	1,360	18.61
Holualoa	1,350	2.40	U. S. Experiment Station	350	9.95
Kealakekua	1,580	3.67	Upper U. S. Exp. Sta. (Castle)	1,150	.....
Napoopoo	25	1.99	U. S. Magnetic Station	45	3.38
KAU, se.			KAUAI.		
Kahuku Ranch	1,680	2.80	Lihue (Grove Farm), e	200	.....
Honuapo	15	3.14	Lihue (Molokoa), e	300	10.47
Naalehu	650	2.60	Lihue (Kukaua), e	1,000	11.98
Hilea	310	2.60	Vealia	15	7.33
Pahala	850	4.15	Kealia, e	15	.....
Moaula	1,700	.....	Kilauea, ne	325	.....
PUNA, e.			Hanalei, n	10	14.44
Volcano House	4,000	12.10	Waioli	10	14.37
Olaa, Mountain View (Russel)	1,690	18.56	Haena	15	11.13
Kapoho	110	10.26	Waiawa	32	1.13
Pahoa	700	13.55	Eleele	200	3.03
MAUI.			McBryde (Residence)	850	9.80
Lahaina	40	0.69	Wahiawa	2,100	.....
Waiopae Ranch	700	.....	Lawai	200	6.08
Kaupo (Mokulau), s	285	11.87	Lawai	450	7.52
Kipahulu, s	300	11.28	Lawai	800	7.30
Nahiku, ne	1,600	33.57	Wahiawa (Mountain)	3,000	26.70
Nahiku	800	21.01			
Haiku, n	700	10.52	*Delayed October reports.*		
Kula (Erehwon), n	4,500	4.05	Kaumana	1,250	16.56
Kula (Waiakoa), n	2,700	3.02	Haena	.....	8.13
Puuomalei, n	1,400	14.95	McBryde	.....	7.41
Pala	180	5.88	Nahiku	800	19.43
Haleakala Ranch	2,000	.....	Nahiku	1,600	31.14
Wailuku, ne	200	2.83	Mokulau	.....	6.82

NOTE.—The letters n, s, e, w, and c show the exposure of the station relative to the winds.

OBSERVATIONS AT HONOLULU.

The station is at 21° 18′ N., 157° 50′ W. It is the Hawaiian Weather Bureau station Punahou. (See fig. 2, No. 1, in the MONTHLY WEATHER REVIEW for July, 1902, page 365.)

Hawaiian standard time is $10^h\ 30^m$ slow of Greenwich time. Honolulu local mean time is $10^h\ 31^m$ slow of Greenwich.

The pressure is corrected for temperature and reduced to sea level, and the gravity correction, —0.06, has been applied.

The average direction and force of the wind and the average cloudiness for the whole day are given unless they have varied more than usual, in which case the extremes are given. The scale of wind force is 0 to 12, or Beaufort scale. Two directions of wind, or values of wind force, or amounts of cloudiness, connected by a dash, indicate change from one to the other.

The rainfall for twenty-four hours is measured at 9 a. m. local, or 7.31 p. m., Greenwich time, on the respective dates.

The rain gage, 8 inches in diameter, is 1 foot above ground. Thermometer, 9 feet above ground. Ground is 43 feet and the barometer 50 feet above sea level.

Meteorological Observations at Honolulu, November, 1902.

Date.	Pressure at sea level.	Temperature.		During twenty-four hours preceding 1 p. m. Greenwich time, or 1:30 a. m. Honolulu time.									Total rainfall at 9 a. m., local time.
				Temperature.		Means.		Wind.		Average cloudiness.	Sea-level pressures.		
		Dry bulb.	Wet bulb.	Maximum.	Minimum.	Dew-point.	Relative humidity.	Prevailing direction.	Force.		Maximum.	Minimum.	
	*	†	†			‡	‡		§				
1	29.88	72	71.3	83	65	67.0	82	n-se.	1-0	1-4	30.00	29.87	0.62
2	29.86	72	71.5	77	69	73.3	95	var-w.	1-0	10	29.94	29.86	3.10
3	29.93	68	67.5	79	71	71.7	93	sw.	0	10-8	29.94	29.83	2.50
4	29.96	71	69	80	67	68.5	84	se.	1-0	8-4	29.97	29.88	0.00
5	29.99	76	70	82	70	67.5	76	n-ne.	1-3	4	30.01	29.91	0.02
6	29.98	74	70	81	73	67.5	73	nne.	1-3	3-8	30.01	29.94	0.27
7	29.99	74	69	80	72	67.5	77	nne.	3-1	5-3	30.03	29.94	0.01
8	29.93	73	66	80	71	66.0	72	ne.	3	5	30.04	29.94	0.02
9	29.95	66	63.5	78	73	61.8	64	nne.	3-0	4-0	29.99	29.92	0.00
10	30.00	73	67.5	79	64	64.0	72	ne.	2	3	30.02	29.93	0.00
11	30.03	67	66	80	70	66.3	76	ne.	2-0	4	30.06	29.96	0.01
12	30.01	75	69	81	67	67.0	81	ne.	2-0	1-5	30.08	29.96	0.30
13	29.98	74	68	79	70	65.7	71	ne.	2-4	3	30.04	29.92	0.02
14	29.98	72	69	78	72	65.5	71	ne.	4	5	30.02	29.95	0.17
15	29.93	75	70.5	78	71	66.0	75	ne.	5	6	30.03	29.93	0.20
16	29.94	75	70	79	72	68.0	79	ene.	4-6	8	29.99	29.92	0.60
17	30.00	75	69.5	79	72	67.0	75	ene.	6-4	6	30.01	29.91	0.06
18	29.98	75	68	78	73	66.0	72	ene.	6-4	6	30.02	29.92	0.12
19	29.93	74	70	78	72	65.3	72	ne.	5	6	30.00	29.87	0.20
20	29.94	71	70	78	72	67.0	76	ne.	4-3	4	29.96	29.89	0.01
21	29.94	68	67	80	70	69.5	88	s-n.	1-0	4-7	29.98	29.90	0.36
22	29.99	68	66	81	68	67.0	79	se-ne.	1-0	1-7	30.02	29.90	0.80
23	30.00	69	61	74	68	60.5	72	nne.	6-8	9	30.03	29.97	0.15
24	29.95	66	60.5	73	68	53.0	57	nne.	4-1	6-10	30.05	29.96	0.00
25	29.86	61	60	74	66	58.5	74	nw.	1-0	10-8	29.96	29.84	0.00
26	29.85	60	59	76	59	62.3	87	nw.	1-0	3	29.90	29.81	0.10
27	29.84	62	61.3	77	59	61.7	85	nnw.	1-0	5	29.90	29.80	0.01
28	29.84	72	66.5	78	60	64.3	88	n.	1-0	4	29.90	29.79	0.00
29	29.83	65	63.7	77	66	64.7	78	nne.	1	6	29.89	29.81	0.15
30	29.89	71	69	78	63	65.3	85	se.	1	3	29.92	29.80	0.00
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sums	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9.80
Means	29.949	70.5	67.0	78.4	68.6	65.5	77.8	.....	2.2	5.5	29.990	29.894	.....
Departure	—.017	.....	.....	.....	.....	0.0	+1.8	.....	.....	+0.9	.....	.....	+4.65

Mean temperature for November, 1902, $(6+2+9)\div 3=73.3$; normal is 73.8. Mean pressure for November, 1902, $(9+3)\div 2=29.940$; normal is 29.957.

* This pressure is as recorded at 1 p. m., Greenwich time. † These temperatures are observed at 6 a. m., local, or 4.31 p. m., Greenwich time. ‡ These values are the means of $(6+9+2+9)\div 4$. § Beaufort scale.

NOVEMBER GALES FROM THE GREAT LAKES TO THE MARITIME PROVINCES.

By B. C. WEBBER, Meteorological Service, Toronto, Canada, dated December 23, 1902.

In the MONTHLY WEATHER REVIEW for January of the current year a paper was published treating of the gales which have occurred in Canada from the Great Lakes to the Maritime Provinces in January from 1874 to 1902, inclusive. Some interest in this paper having been shown, a similar review for November, 1873 to 1902, has been attempted, hoping that it will prove as instructive to other weather forecasters as it has to the writer.

The number of lows charted, the percentage of storms caused by them, and the percentage of storms caused by lows approaching from the several directions are as follows:

Number of lows and the direction from which they came.

Total number	347	Southwest	83
Northwest	168	Atlantic	31
West	59	Erratic	6

Total percentage of lows causing gales, also percentage of gales due to lows approaching from the several directions.

District.	Total number of gales.	Percentage.	Per cent from—			
			NW.	W.	SW.	Atlantic.
Lakes	188	54.2	49.4	69.5	67.5	0.7
Lower St. Lawrence and Gulf	152	43.8	31.0	45.8	60.2	50.7
Maritime Provinces	142	40.9	25.0	40.7	59.0	70.0

In explanation, it is stated that northwest lows are those originating in or moving from the British Columbia coast east-

ward as far as Manitoba; west lows, those from the Pacific coast States and Western States between latitudes 48° and 35°; southwest lows, from Lower California, Mexico, Texas, and the Gulf of Mexico; Atlantic lows, as designated; erratic lows, developing anywhere from the lakes east to the Maritime Provinces, including the New England States.

The lows comprise all those occurring which were sufficiently well defined to be traced on the charts.

In November the number of storms caused by erratic lows is very few in number, even less than in the January series.

The diminution of storms attributable to northwest lows in their eastward advance is also more marked than in January. The number of storms caused by west lows decreases as they progress eastward even more rapidly than does the number caused by northwest lows. This is somewhat opposed to the January conditions. The percentage of storms caused by southwest lows is considerably larger in November in the Lake region than it is either in the lower St. Lawrence Valley and the Gulf or in the Maritime Provinces. This is contrary to what occurs in January and proves pretty conclusively that the southwest low has a tendency to travel more inland in the autumn months than later in the winter. This is certainly instructive. The general characteristics of the Atlantic lows vary very little from those of January, except that their number appears to be slightly greater, and on rare occasions they spread sufficiently far inland to cause a storm on the lakes.

November is generally asserted to be the stormiest month of the year in the Lake region. It is undoubtedly on the average the stormiest month during the season of navigation; the number of heavy gales that occur is not, however, very large although greater than in December, and, whereas, some Novembers may be excessively stormy, others are comparatively free from storms.

In the lower St. Lawrence Valley and the Gulf, also in the Maritime Provinces, November is not as stormy a month as the three succeeding it.

The gales of November have been divided into three classes, those of a very heavy type, the fresh gales, and the moderate storms. Adding the first two classes together the percentage of the fresh to very heavy gales for the districts is as follows: Lower Lakes, 43.1 per cent; lower St. Lawrence and Gulf, 61.8; Maritime Provinces, 49.3. Consequently fresh to heavy gales are more numerous in the lower St. Lawrence Valley and the Gulf than in the Maritime Provinces and much more so than on the Lakes. In the Lake region the gales of a marked heavy type were 43, this number being considerably greater than in the January series. In the lower St. Lawrence Valley and the Gulf the number was 49 which is 19 less than in January, and in the Maritime Provinces, 34, which number is 20 less than in January. As before mentioned the November series embraces one year more than that for January.

The southwest low is responsible for the greatest number of heavy gales and the northwest low is the next, with about half the number.

Apparently no hard and fast rules can be laid down for the development of any gale from the most severe to the most moderate, but there is unquestionably a tendency for types of conditions to be repeated and for a series of storms either to develop in much the same locality or else to move from much the same quarter, their general conditions and accompaniments being very similar; this at times is particularly marked.

The low area with two foci and the low area with the extensive trough, in which the subsidiary development so often occurs in its southern quadrant, are two classes of depressions responsible for some of the heaviest storms.

RECENT PAPERS BEARING ON METEOROLOGY.

W. F. R. PHILLIPS, in charge of Library, etc.

The subjoined titles have been selected from the contents of the periodicals and serials recently received in the library of the Weather Bureau. The titles selected are of papers or other communications bearing on meteorology or cognate branches of science. This is not a complete index of the meteorological contents of all the journals from which it has been compiled; it shows only the articles that appear to the compiler likely to be of particular interest in connection with the work of the Weather Bureau. Unsigned articles are indicated by a ——.

Scientific American Supplement. New York. Vol. 14.

Dexter, Edwin G. Weather Superstitions. Pp. 22534–22535.

—— Congress for Protection against Hail in Lyons. Pp. 22536–22537.

—— Cobalt Weather Barometer. P. 22538.

Journal of the Manchester Geographical Society. Manchester. Vol. 17.

Greenwood, W. Nelson. The Life of a Wave from its Cradle to its Grave. Pp. 197–222.

Black, J. M. Heat Wave—United States. P. 229.

Science. New York. Vol. 16.

Barus, Carl. Preliminary Results on the Changes of Atmospheric Nucleation. Pp. 948–952.

Symons's Meteorological Magazine. London. Vol. 37.

Schuster, Arthur. Meteorology at the British Association. Address to Sub-section of Astronomy and Cosmical Physics. Pp. 155–159.

Shaw, W[illiam] N[apier]. Radiation in Meteorology. Pp. 159–161.

Ventosa, V. The Moon and Thunderstorms. P. 161.

Nature. London. Vol. 67.

Shaw, W[illiam] N[apier]. The Second Installation of the Ben Nevis Observatory. Pp. 61–62.

M., A. B. Summer and Winter. P. 81.

Solomon, Maurice. The Present State of Wireless Telegraphy. Pp. 131–133.

London, Edinburgh, and Dublin Philosophical Magazine. London. Vol. 4.

Cunningham, J. A. The Discharge of Electricity through Gases and the Temperature of the Electrodes. Pp. 684–704.

Rutherford, E. and Allen, S. J. Excited Radioactivity and Ionization of the Atmosphere. Pp. 704–723.

Journal of Geography. Lancaster. Vol. 1.

Jefferson, M. S. W. The Influence of Ponds and Rivers on Atmospheric Temperatures. P. 400–407.

Astrophysical Journal. Chicago. Vol. 16.

Cortie, A. L. Minimum Sun-Spots and Terrestrial Magnetism. Pp. 203–211.

Ciel et Terre. Bruxelles. 23me Année.

Lancaster, A. Étude pluviométrique sur le Bassin de la Meuse. [Note on article by D. Vanhove.] P. 457–460.

L., V. D. L'état actuel de la question du tir contre la grêle. Pp. 460–461.

—— De l'origine des "Mistpoeffers." [Note on work by M. Oldham.] Pp. 461–462.

—— L'ozote des eaux de pluie et des eaux de drainage. P. 462.

L., V. D. Une ascension aérostatique célèbre. Pp. 465–472.

—— Échanges de chaleur entre le sol, l'eau et l'atmosphère. [Note on article by Schubert.] P. 488.

Annuaire de la Société Météorologique de France. Paris. 50me Année.

Angot, Alfred. Rapport sur la Conférence Internationale tenue à Graz (Styrie) du 20 au 25 juillet 1902, pour l'étude des tirs contre la grêle. Pp. 193–197.

Moureaux, Th. Pertubation atmosphérique du 13 juillet 1902. Pp. 195–199.

Comptes Rendus de l'Académie des Sciences. Paris. Tome 135.

Guillaume, J. Observations du soleil, faites à l'Observatoire de Lyon pendant le troisième trimestre de 1902. Pp. 887–889.

Archives des Sciences Physiques et Naturelles. Genève. 4me période. Tome 14.

Gautier, R. Observations météorologiques faites aux fortifications de Saint-Maurice pendant les mois de décembre 1901, janvier, février et mars 1902. Pp. 303–311.

Gautier, R. Observations météorologiques faites aux fortifications de Saint-Maurice pendant les mois d'avril, mai, juin et juillet 1902. Pp. 442–449.

Gautier, R. Résumé météorologique de l'année 1901 pour Genève et le Grand Saint-Bernard. Pp. 564–589.

Annales Agronomiques. Paris. Tome 28.

Giustiniani, E. Sur la végétation de certaines plantes à la lumière solaire directe et à l'obscurité. [Note on article by N. Passerini.] Pp. 576–577.

Annalen der Hydrographie und Maritimen Meteorologie. Hamburg. 30 Jahrgang.

Hoeck, —. Barometrische Depressionen an der äquatorialen Grenze des Golfstromes im Februar 1902. Pp. 559–563.

Das Wetter. Berlin. 19 Jahrgang.

Sprung, A. Einige Gedanken zum Rüstzeug eines Meteorologischen Observatoriums. Pp. 241–246.