SPECIAL CONTRIBUTIONS.

HAWAIIAN CLIMATOLOGICAL DATA FOR AUGUST.

By CURTIS J. LYONS, Territorial Meteorologist.

Meteorological observations at Honolulu, August, 1901.

The station is at 21° 18′ N., 157° 50′ W.

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

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.

Date.	Pressure at sea level.	Temperature.		During twenty-four hours preceding 1 p. m., Greenwich time, or 2.29 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	30.00	76	69.5	83	71	64.5	63	ne.	3	5	30.03	29.93	0.01
2	29.98	74	69	85	73	65.5	64	ne.	3	3	30.03	29.97	0.07
3	29.94	75	68.5	84	74	66.5	67	ne.	4	3	30.03	29.96	0.11
4	29.93	74	69	84	72	65.5	67	ne.	4-3	4	29.97	29.90	0.07
5	29.93	76	68.5	85	72	65.0	64	ne.	3-2	3	29.97	29.89	0.00
6	29.94	76	69	84	74	65.7	68	ne.	3-4	3	29.96	29.88	0.00
7	29.94	75	68.5	85	75	66.0	63	ne.	3-4	1-4	29.96	29.89	0.01
8	29.92	70	68	85	73	65.3	64	ne	3-1	6	29.97	29.90	0.03
9	29.92	70	67	82	70	67.7	76	ne se.	2-0	7	29.95	29.88	0.00
10	29.96	77	71	87.5	67	67.7	71	sw-ne.	0-3	7-3	29.98	29.90	0.00
11	29.94	78 5	72.5	86	76	69.7	71	ne.	3	6-3	29.99	29.91	0.04
12	29.96	77	70.5	85	76	69.5	69	ene.	4	4-10	30.00	29.92	0.00
13	29.95	76	70.3	86	77	66 7	65	ne.	3	4-1	29.99	29.91	0.00
14	29.94	76	70.5	86	75	69.0	71	ne.	3	4-1	29.99	29.89	0.00
15	29.94	70	68	86	75	66.7	65	ne.	3	3-0	29.97	29.89	0.00
16	29.94	76	69	86	69	67.7	71	ne.	3	4	29.98	29.91	0.00
17	29.94	72	70	86	74	66.5	66	ne.	3	3-6	29.98	29.91	0.16
18	29.93	70	67	86	71	68.3	74	ne.	3-0	4	29.96	29.89	0.00
19	29.96	71	69.7	87	69	69.3	76	ne.	3-0	2-7	29.98	29.89	0.01
20	30.00	76	70	85	70	69.5	75	s-ne.	0-3	7-2	30.01	29.96	0.01
21	29.96	76	70	85	76	67.7	67	ne.	2-4	5	30.03	29.95	0.02
22	29.94	77	69	85	74	67.0	66	ne.	3-4	5-2	30.02	29.91	0.01
23	29 95	77	70	85	76	66.0	64	ne.	4	5	29.97	29.90	0.10
24	29.99	78	71	84	70	67.0	66	ne.	4	5	30.03	29.94	0.01
25	30.01	76	70.5	85	76	67.5	65	ne.	4-5	4	30.05	29.96	0.00
26	30.00	76	68	83	75	66.5	68	ne.	3-5	6	30.07	29.98	0.05
27	29.98	76	69	85	73	68.7	60	ne	4-3	3	30.05	29.95	0.01
28	29.99	77	71.7	85	74	68.3	71	ne	4-2	3	30.03	29.96	0.25
29	30.02	76	70	85	72	70.0	72	ne.	3	5-3	30 05	29.96	0.05
30	30.00	78	71.5	85	74	68.5	69	ne.	3-2	3	30.04	30 00	0.01
31	30.01	78	69.5	85.5	77	68.5	68	ne.	3-4	5-3	30.05	29.99	0.00
Sums	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.03
Means	29.972	75.1	69.5	85.1	73.4	67.3	67.8	.....	3.2	4.0	30.000	29.925	.....
Departure	—0.012	.....	.....	.....	.....	+1.3	—0.2	.....	.....	0.0	.....	.....	—1.09

*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) ÷ 4. §Beaufort scale.

Mean temperature for August, 1901 (6+2+9) ÷ 3=78.7°; normal is 77.6°. Mean pressure for August (9+3) ÷ 2=29.964; normal is 29.976.

GENERAL SUMMARY FOR AUGUST, 1901.

Temperature mean for the month, 78.7; normal, 77.6; average daily maximum, 85.1; average daily minimum, 73.4; average daily range, 11.7; greatest daily range, 20.5; least daily range, 3.0; highest temperature, 87.5; lowest, 67.

Barometer average, 29.964; normal, 29.976 (correcting for gravity by —.06); highest, 30.07, on the 31st; lowest, 29.88, on the 17th; greatest 24-hour change, .06. Pressure was low during the first half of the month, and high during the last half. This is the fifth successive month of barometer lower than normal.

Relative humidity, 67.8 per cent; normal, 68; mean dew point, 67.3; normal, 66.0; mean absolute moisture, 7.31 grains to the cubic foot; normal, 7.01.

Rainfall, 1.03 inches; normal, 2.12; rain record days, 19; normal, 18; greatest rainfall in one day, 0.25; total at Luakaha, 4.61; at Kapiolani Park, 0.15. Total rainfall since January 1, 23.97; normal, 22.74.

The artesian well at Punahou is not in order for record; from other wells no record. The average daily mean sea level was 10.38 feet on the scale, 10.00 representing the assumed annual mean.

For the latter half of the month there were almost no upper current clouds.

Trade wind days 30 (0 of north-northeast); normal for August, 29. Average force of wind (during daylight), Beaufort scale, 3.2. Cloudiness, tenths of sky, 4.0; normal, 4.0.

Rainfall data for the Hawaiian Service.

Stations.	Elevation.	August, 1901.
HAWAII.		
HILO, e. and ne.	*Feet.*	*Inches.*
Waiakea	50	6.86
Hilo (town)	100	5.89
Kaumana	1,250	10.09
Pepeekeo	100	5.92
Hakalau	200	.....
Honoh na	300	.....
Laupahoehoe	500	.....
Ookala	400	1.34
HAMAKUA, ne		
Kukaiau	250	0.27
Paauilo	750	0.38
Paauhau Mill (Gibb)	300	0.08
Paauhau (Greig)	1,150	0.24
Honokaa (Muir)	425	0.39
Honokaa (Rickard)	1,900	0.61
Kukuihaele	700	1.52
KOHALA, n.		
Awini Ranch	1,100	.....
Niulli	200	1.21
Kohala (Mission)	521	0.69
Kohala (Sugar Co.)	235	0.58
Hawi	300	.....
Hawi Mill	600	.....
Waimea	2,720	1.82
KONA, w.		
Kailua	950	5.20
Kealakekua	1,580	5.31
Napoopoo	25	.....
KAU, se.		
Kakuku	1,680	3.34
Honuapo	15	1.97
Naalehu	650	3.49
Hilea	310	1.30
Pahala	850	0.95
Moaula	1,700	1.54
PUNA, e.		
Volcano House	4,000	2.13
Olaa	.....	.....
Olaa	.....	.....
Kapoho	110	4.80
Kalapana, se	8	.....
MAUI.		
Olowalu	.....	.....
Lahaina	.....	.....
Waiopae Ranch, s	700	0.36
Kaupo (Mokulau), s	285	4.44
Kipahulu, s	300	5.57

Stations.	Elevation.	August, 1901.
MAUI—*Continued.*	*Feet.*	*Inches.*
Hamoa Plantation, se	60	3.43
Nahiku, ne	60	4.28
Nahiku (Lemon), ne	850	9.28
Haiku, n	700	1.87
Kula (Erehwon), n	4,500	.....
Puuomalei, n	1,400	.....
Paia, n	180	0.38
Haleakala Ranch, n	2,000	0.53
Wailuku	200	.....
LANAI.		
Keomuku, e	6	.....
OAHU.		
Punahou (W. B.), sw	47	1.08
Kulaokahua, sw	50	0.54
Kewalo (King street), sw	15	0.50
United States N. S., sw	6	0.33
Kapiolani Park, sw	10	0.15
Manoa (Woodlawn Dairy), c	285	3.58
Makiki Reservoir	150	1.04
School street (B. shop), sw	50	1.41
Pacific Heights, sw	700	2.98
Insane Asylum, sw	30	1.21
Kalihi-uka	260	3.29
Nuuanu (W. W. Hall), sw	50	1.06
Nuuanu (Wyllie street), sw	250	2.95
Nuuanu (Elec. Station), sw	405	3.01
Nuuanu (Luakaha) c	850	4.61
Waimanalo, ne	25	0.57
Maunawili, ne	300	2.32
Kaneohe, ne	100	.....
Ahuimanu, ne	350	3.82
Kahuku, n	25	1.76
Waialua, n	20	.....
Wahiawa, c	900	.....
Ewa Plantation, s	60	.....
Waipahu, s	200	0.00
Moanalua, sw	15	0.69
KAUAI.		
Lihue (Grove Farm), e	200	3.79
Lihue (Molokoa), e	300	2.90
Lihue (Kukaua), e	1,000	5.27
Kealia, e	15	.....
Kilauea, ne	325	4.83
Hanalei, n	10	5.32
Waiawa, sw	32	0.24
Eleele, s	200	2.42
Waiawa, Mountain, s	2,100	12.19
McBrides (Res.)	850	5.30

Records not hitherto published, July, 1901.

Kohala Sugar Company	.....	1.27	Kahikinui (Maui)	.....	0.34
Kapoho	.....	4.89	Kealia Kauai	.....	4.27
Laupahoehoe	.....	2.74	Hilo	.....	7.24

NOTE.—The letters n. nw. e. sw. se ne. and s. attached to each name indicate the exposure or direction toward which localities face; "c," central locality.

Percentages of district rainfall as compared with normal: Hilo, 50 per cent; Hamakua, 8; Kohala, 20; Waimea, 52; Kona, 80; Kau, 45; Puna, 100; Maui, variable, 25 to 100; Oahu, 50, except north point, 100; Kauai, 100. The drought in north Hawaii is very serious, and is accompanied by destructive forest fires. The entire absence of any shifts in the trade wind either toward north or east may be an immediate cause of the lack of rain.

Mean temperatures: Pepeekeo, Hilo district, 100 feet elevation, average maximum, 79.9; average minimum, 71.0;

Walmea, Hawaii, 2,730 elevation, 76.5 and 66.8; Kohala, 521 elevation, 82.3 and 72.4; Kulaokahua, W. R. Castle's, 60 feet elevation, highest, 89; lowest, 69; mean, 78.6.

Sea was smooth first half of month; heavy swell noted toward the end of month.

Snow still visible on Mauna Kea. No earthquakes reported.

A sudden rise of the sea, or "tidal wave" of about four feet occurred at Kailua, west coast of Hawaii, on the 8th about 11 a. m. It was noticed down that coast to the southward, but not elsewhere, and barely appeared as a disturbance of about two inches on the Honolulu tide gage. According to the papers seismic disturbances took place in Japan about that time, but not early enough for the passage of a wave to this port. The limited range of this wave would seem to indicate a near source for the disturbance.

CLIMATOLOGICAL DATA FOR JAMAICA.

Through the kindness of Mr. Maxwell Hall, the following data are offered to the MONTHLY WEATHER REVIEW in advance of the publication of the regular monthly weather report for Jamaica:

Jamaica, W. I., climatological data, August, 1901.

	Negril Point Lighthouse.	Morant Point Lighthouse.
Latitude (north)	18° 15′	17° 55′
Longitude (west)	78° 23′	76° 10′
Elevation (feet)	33	8
Mean barometer { 7 a. m.	29.914	29.924
Mean barometer { 3 p. m.	29.885	29.888
Mean temperature { 7 a. m	78.6	.....
Mean temperature { 3 p. m	83.5	.....
Mean of maxima	87.9	.....
Mean of minima	73.6	.....
Highest maximum	90.0	.....
Lowest minimum	69.0	.....
Mean dew-point { 7 a. m	74.2	.....
Mean dew-point { 3 p. m	77.4	.....
Mean relative humidity { 7 a. m.	86.0	.....
Mean relative humidity { 3 p. m.	82.0	.....
Total rainfall (inches)	7.54	8.23
Average wind direction { 7 a. m	var.	ene.
Average wind direction { 3 p. m	var.	ne.
Average hourly velocity, miles { 7 a. m	6.9	8.2
Average hourly velocity, miles { 3 p. m	10.0	10.6
Average cloudiness (tenths):		
7 a. m. { Lower clouds	0.3	1.4
7 a. m. { Middle clouds	1.2	2.0
7 a. m. { Upper clouds	3.6	1.2
3 p. m. { Lower clouds	1.4	1.4
3 p. m. { Middle clouds	6.4	2.0
3 p. m. { Upper clouds	0.5	1.1

NOTE.—The pressures are reduced to standard temperature and gravity, to the Kew standard, and to mean sea level. The thermometers are exposed in Stevenson screens.

Comparative table of rainfall for August.

(Based upon the average stations only.)

Divisions.	Relative area.	Number of stations.	Rainfall. Average.	Rainfall. 1901.
Northeastern division	25	22	7.27	5.73
Northern and subcentral division	22	50	4.47	5.10
Western-central division	26	22	9.86	9.47
Southern division	27	31	5.18	5.67
General means	100	125	6.69	6.49

In taking the average rainfall Mr. Hall uses only those stations for which he has several years of observation, so that the column of averages represents fairly well the normal rainfall for each division, while the column for the current month represents the average rainfall at those same stations. The relative areas of the divisions are very nearly the same and are given in the preceding table as expressed in percentages of the total area of Jamaica. The number of rainfall stations utilized in each area varies slightly from month to month, according as returns have come in promptly or not, but will not differ greatly from the numbers in the second column of the table.

CLIMATOLOGY OF COSTA RICA.

Communicated by H. PITTIER, Director, Physical Geographic Institute.

TABLE 1.—*Hourly observations at the Observatory, San Jose de Costa Rica, during August,* 1901.

Hours.	Pressure. Observed, 1901.	Pressure. Normal, 1889-1900.	Temperature. Observed, 1901.	Temperature. Normal, 1889-1900.	Relative humidity. Observed, 1901.	Relative humidity. Normal, 1889-1900.	Rainfall. Observed, 1901.	Rainfall. Normal, 1889-1900.	Rainfall. Duration, 1901.
	660+ Mm.	660+ Mm.	° C.	° C.	%	%	Mm.	Mm.	Hrs.
1 a. m	3.80	3.76	17.42	17.40	90	91	0.0	0.7	0.00
2 a. m	3.43	3.36	17.22	17.49	89	91	0.0	0.5	0.00
3 a. m	3.17	3.11	16.84	17.07	91	92	0.0	0.4	0.00
4 a. m	3.17	3.07	16.52	16.92	91	91	0.0	0.3	0.00
5 a. m	3.27	3.19	16.41	16.78	90	91	0.0	0.5	0.00
6 a. m	3.50	3.44	16.47	16.72	89	91	0.0	0.7	0.00
7 a. m	3.78	3.74	18.13	18.03	85	88	0.1	1.1	0.17
8 a. m	4.03	4.03	20.15	20.01	76	81	0.2	2.0	0.25
9 a. m	4.27	4.23	22.37	21.83	69	75	0.0	1.3	0.00
10 a. m	4.38	4.28	23.97	23.33	66	70	0.0	2.2	0.00
11 a. m	4.28	4.12	24.67	24.17	65	70	0.0	3.1	0.00
12 m	3.91	3.75	25.62	24.49	64	69	8.0	6.1	1.58
1 p. m	3.37	3.36	25.18	24.21	66	70	4.1	9.4	2.67
2 p. m	2.94	2.92	24.24	23.46	72	72	10.7	23.2	2.50
3 p. m	2.67	2.64	22.99	22.32	77	76	31.3	30.5	4.82
4 p. m	2.67	2.59	21.38	21.14	83	82	52.8	33.2	5.37
5 p. m	2.95	2.91	20.21	20.26	86	84	63.7	43.3	9.26
6 p. m	3.42	3.25	19.52	19.55	90	87	78.9	30.6	10.74
7 p. m	3.84	3.65	19.07	18.90	92	90	34.4	26.1	9.00
8 p. m	4.07	4.00	18.70	18.59	92	89	31.1	18.8	8.26
9 p. m	4.28	4.27	18.47	18.28	92	90	22.2	7.8	6.67
10 p. m	4.43	4.44	18.17	18.02	93	92	4.0	3.7	3.89
11 p. m	4.38	4.39	17.99	17.80	90	90	0.1	2.1	0.66
Midnight	4.18	4.14	16.72	17.65	91	91	0.0	1.2	0.00
Mean	663.68	663.61	19.98	19.75	83	84	.....	.....	.....
Minimum	661.5	660.63	14.4	13.2	.....	.....	.....	.....	.....
Maximum	665.8	666.72	29.1	29.3	.....	.....	18.4	.....	.....
Total	.....	.....	.....	.....	.....	.....	341.6	248.8	65.84

REMARKS.—The barometer is 1,169 meters above sea level. Readings are corrected for gravity, temperature, and instrumental error. The dry and wet bulb thermometers are 1.5 meters above ground and corrected for instrumental errors. The hourly readings for pressure, wet and dry bulb thermometers, are obtained by means of Richard registering instruments, checked by direct observations every three hours from 7 a. m. to 10 p. m. The hourly rainfall is as given by Hottinger's self-register, checked once a day. Under maximum, the greatest hourly rainfall for the month is given. The standard rain gage is 1.5 meters above ground. In the Costa Rican system the San Jose local time is used, which is 0h 36m 13 3s slower than seventy-fifth meridian time.

TABLE 2.

Time.	Sunshine. Observed 1901.	Sunshine. Normal, 1889-1 00.	Cloudiness observed, 1901.	Temperature of the soil at depth of— 0.15 m.	0.30 m.	0.60 m.	1.20 m.	3.00 m.
	Hours.	Hours.	%	° C.	° C.	° C.	° C.	° C.
7 a. m	15.85	7.82	.....	21.17	21.48	22.03	21.86	21.56
8 a. m	25.13	18.22	.....	.....	.....	.....	.....	.....
9 a. m	25.25	19.93	.....	.....	.....	.....	.....	.....
10 a. m	21.19	17.86	.....	21.50	21.53	22.08	21.88	.....
11 a. m	19.00	15.63	.....	.....	.....	.....	.....	.....
12 m	13.21	12.96	.....	.....	.....	.....	.....	.....
1 p. m	13.21	12.37	.....	21.97	21.68	22.07	21.79	.....
2 p. m	11.71	11.22	.....	.....	.....	.....	.....	.....
3 p. m	8.59	9.03	.....	.....	.....	.....	.....	.....
4 p. m	4.16	5.87	.....	22.04	21.72	22.04	21.83	.....
5 p. m	1.84	2.72	.....	.....	.....	.....	.....	.....
6 p. m	0.75	0.83	.....	.....	.....	.....	.....	.....
7 p. m	.....	.....	.....	21.91	21.73	22.00	21.82	.....
8 p. m	.....	.....	.....	.....	.....	.....	.....	.....
9 p. m	.....	.....	.....	.....	.....	.....	.....	.....
10 p. m	.....	.....	.....	21.74	21.69	22.03	21.82	.....
11 p. m	.....	.....	.....	.....	.....	.....	.....	.....
Midnight	.....	.....	.....	.....	.....	.....	.....	.....
Mean	.....	.....	.....	21.72	21.67	22.03	21.84	21.56
Total	159.89	134.09	.....	.....	.....	.....	.....	.....