tion 5 seconds; 9h 30m p. m., light shock, NNW–SSE, intensity II, duration 5 seconds. October 25, 11h 25m p. m., slight but prolonged tremors, NNW–SSE, intensity II, duration 32 seconds. October 31, 6h 30m p. m., very slight tremors.

TABLE 3.—*Rainfall at stations in Costa Rica, October*, 1901.

Stations.	Amount.	No. rainy days.	Stations.	Amount.	No. rainy days.
	Mm.			*Mm.*	
1. Sipurio (Talamanca)	.....	.....	14. Juan Vinas	359	19
2. Boca Banano	271	18	15. Santiago	256	25
3. Limon	163	16	16 Paraiso	226	20
4. Swamp Mouth	207	16	17. Las Concavas	366	18
5. Zent	146	16	18. Cartago	316	22
6. Gute Hoffnung	194	8	19. Tres Rios	316	22
7. Siquirres	404	16	20. S. Francisco G	464	22
8. Guapiles	489	21	21. San Jose	478	28
9. Sarapiqui	801	30	22. La Verbena	720	26
10. San Carlos	561	26	23. Nuestro Amo	325	25
11. Las Lomas	449	24	24. Alajuela	351	23
12. Peralta	498	27	25. San Isidro Alajuela	698	26
13. Turrialba	.....	.....			

HAWAIIAN CLIMATOLOGICAL DATA.

By CURTIS J. LYONS, Territorial Meteorologist.

Meteorological observations at Honolulu, October, 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	29.85	72	71	83	67	68.0	77	sw-w.	1	2	29.92	29.84	0.18
2	29.89	73	72.3	80	71	71.7	88	s-ne.	1-0	10	29.91	29.83	2.79
3	29.96	72	69.3	77	72	72.5	91	e.	1-0	10	29.99	29.89	0.14
4	30.00	74	66.5	83	70	67.5	73	e-ne.	1	4-1	30.04	29.94	0.00
5	29.95	70	66.5	82	71	64.7	66	ene.	1	1-5	30.03	29.94	0.00
6	29.93	75	68.5	83	70	66.0	72	ene.	3	3	29.99	29.91	0.01
7	29.96	72	69.3	83	71	66.0	68	ne.	2	4	29.99	29.90	0.14
8	30.00	76	67.5	82	71	66.5	70	nne.	2-3	5	30.06	29.95	0.01
9	29.96	75	70	83	75	66.3	70	nne.	4	5	30.05	29.96	0.08
10	29.86	72	68	82	72	67.3	70	ne.	3	5	29.99	29.87	0.02
11	29.86	68	66	82	71	67.0	74	e-s	1-0	4-10	29.91	29.81	0.00
12	29.91	71	68	82	68	67.3	81	n-s.	1	6-10	29.96	29.86	0.01
13	29.89	75	68	83	70	67.7	74	nne.	1-4	6	29.96	29.89	0.08
14	29.89	74	68	82	71	65.5	68	ne.	3	6	29.93	29.85	0.01
15	29.90	72	69	82	73	66.0	69	nne.	3	3	29.94	29.85	0.00
16	29.93	70	68.5	83	69	67.5	74	ne.	3	5-1	29.97	29.90	0.04
17	29.95	74	69	82	69	66.5	75	nne.	3	4	30.00	29.92	0.02
18	29.95	71	68.3	82	72	66.3	69	nne.	3	4	30.00	29.92	0.01
19	29.96	69	67	82	69	67.7	76	ne.	3	5	30.00	29.92	0.04
20	29.99	69	66	83	66	67.7	75	ne.	3	3	30.04	29.96	0.02
21	29.98	66	64.7	83	69	66.5	72	ne.	3-2	2	30.03	29.95	0.00
22	29.93	70	68	83	66	66.7	77	nne.	4-0	1	30.02	29.91	0.00
23	29.92	72	70.5	81	68	69.7	84	ne.	2-0	7	29.98	29.90	0.07
24	29.92	70	69.3	81	72	69.0	78	nne.	1-5	7-1	29.99	29.89	0.03
25	29.94	70	68.7	81	69	68.7	84	ne.	2	6	29.99	29.90	0.03
26	29.95	73	69	80	68	68.5	82	ne.	2-4	8-6	29.99	29.93	0.28
27	29.94	76	70.5	80	70	68.3	75	ne.	3	4	29.99	29.91	0.12
28	30.00	76	71.5	82	72	69.0	73	ne.	4-5	4	30.03	29.94	0.01
29	29.99	76	70	82	74	68.7	73	ene.	3-1	4	30.04	29.95	0.00
30	29.98	74	70.5	82	75	68.7	74	ne.	3-4	3	30.05	29.95	0.00
31	30.00	71	69.7	82	70	71.0	83	ene.	2	4	30.03	29.94	0.00
Sums	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4.14
Means	29.941	72.2	68.7	81.9	70.5	67.8	76.0	.....	2.3	4.7	29.994	29.906	.....
Departure	—0.016	.....	.....	.....	.....	+1.7	+3.5	.....	.....	+.4	.....	.....	+1.68

*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 October, 1901 (6+2+9) ÷ 3=75.8°; normal is 76.3°. Mean pressure for October (9+3) ÷ 2=29.950; normal is 29.966.

MEXICAN CLIMATOLOGICAL DATA.

Through the kind cooperation of Señor Manuel E. Pastrana, Director of the Central Meteorologic-Magnetic Observatory, the monthly summaries of Mexican data are now communicated in manuscript, in advance of their publication in the Boletin 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 are now reduced to standard gravity.

Mexican data for October, 1901.

Stations.	Altitude.	Mean barometer.*	Temperature.			Relative humidity.	Precipitation.	Prevailing direction.	
			Max.	Min.	Mean.			Wind.	Cloud.
	Feet.	*Inch.*	° *F.*	° *F.*	° *F.*	%	*Inch.*		
Chihuahua	4,669	25.28	84.2	55.4	65.8	65	2.29	e.	.....
Guadalajara (Obs del. Est.)	5,186	24.94	78.3	55.4	68.4	70	4.60	nw.	.....
Guanajuato	6,640	23.69	83.3	43.7	64.4	53	0.28	ene.	.....
Leon (Guanajuato)	5,906	24.29	78.3	41.4	63.3	71	0.94	ne.	.....
Linares	1,188	28.44	88.7	53.6	73.9	76	3.39	s.	.....
Mazatlan	25	29.84	89.4	72.9	81.7	78	2.12	nw.	.....
Merida	50	29.87	95.0	62.1	78.3	81	1.28	ne.	.....
Mexico (Obs. Cent.)	7,472	23.05	74.5	42.8	58.8	66	1.14	n.	.....
Monterrey (Sem.)	1,626	28.34	101.1	48.2	71.4	74	3.28	ene.	.....
Morelia (Seminario)	6,401	23.87	75.9	47.5	61.7	73	1.59	ne.	.....
Puebla (Col. Cat.)	7,125	23.37	76.6	47.1	62.4	66	0.36	ene.	.....
Puebla (Col. d. Est.)	7,118	23.34	77.0	43.0	62.1	65	0.26	ene.	.....
Queretaro	6,070	24.20	78.3	47.3	62.8	61	0.15	e.	.....
S. Isidro (Hac. de Gto)	.....	.....	73.8	61.7	.....	.....	1.38	.....	.....
Toluca	8,812	21.95	70.9	34.9	54.9	68	1.13	w.	.....
Zapotlan	5,078	25.06	80.6	53.2	67.8	68	4.24	n.	.....

*Reduced to standard temperature and gravity.

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:

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—— Vorläufiger Bericht über die internationale Ballonfahrt vom 1 August, 1901. Pp. 461-462.
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—— Sonnenreflektor. P. 472.
—— Frank Very über seine Experimentaluntersuchen über atmosphärische Strahlung. Pp. 472-473.
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—— Meteorologische Beobachtungen zu Norway-House, Hudsonsbailänder. P. 475.
—— Direkte Erzeugung der X-Strahlen in der Luft. P. 476.
Wolfer, A. Provisorische Sonnenflecken-Relativzahlen für das III Quartal 1901. P. 476.

THE MEASUREMENT OF SUNSHINE AND THE PRELIMINARY EXAMINATION OF ANGSTRÖM'S PYRHELIOMETER.

C. F. MARVIN, Professor in charge Instrument Division.

While the writer was in attendance last August at the convention of Weather Bureau officials held in Milwaukee he was plied with numerous questions pertaining to the instrumental work of the Weather Bureau, many of which related to the measurement and registration of sunshine, especially in varying degrees of intensity. The sunshine recorders[1] at present in use at Weather Bureau stations are recognized as at best but imperfect, and the records only approximate and incomplete.

The urgent need of decidedly improved apparatus for this purpose is keenly appreciated by many of our officials whose close daily relation with agricultural interests emphasizes the incomplete character of the data at present available. The subject is one, however, which is but imperfectly understood by the majority of those who discussed the question with me, and it seems appropriate, therefore, at this opportunity to preface the present account of the comparison of pyrheliometers with a few brief statements of the general principles underlying measurements of solar radiation.

The present state of our knowledge of this intricate and deeply involved problem has just been summarized by Mr. Frank W. Very[2] in an excellent article which is recommended to everyone studying this question. This writer, however, as necessity compells in so condensed a summary, presupposes a reasonable acquaintance with the subject on the part of his readers, whereas, it is desired in what follows, to set forth briefly such elementary facts and principles as will help the

[1] Annual Report of the Chief of the Weather Bureau, 1891-92, p. 30; Annual Report of the Chief of the Weather Bureau, 1893, p. 18.
[2] The Solar Constant. MONTHLY WEATHER REVIEW, August, 1901, p. 357.