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SOLAR OBSERVATIONS.

SOLAR AND SKY RADIATION MEASUREMENTS DURING APRIL, 1921.

By HERBERT H. KIMBALL, Meteorologist.

[Solar Radiation Investigations Section, Washington, May 28, 1921.]

For a description of instruments and exposures, and an account of the methods of obtaining and reducing the measurements, the reader is referred to this REVIEW for April, 1920, 48:225.

From Table 1 it is seen that the solar radiation intensities measured very close to normal for April at all stations except Washington, where they were slightly below normal. At Santa Fe, maximum noon intensities of 1.63 cal. on April 8 and 29 are close to the maximum noon reading previously obtained at Santa Fe in April.

Table 2 shows an excess in the radiation received from the sun and sky at Lincoln, a decided deficiency at Madison, and a slight deficiency at Washington during the latter part of the month.

Skylight polarization measurements obtained on three days at Madison when the ground was free from snow give a mean of 60 per cent and a maximum of 67 per cent on the 28th. At Washington, skylight polarization measurements obtained on seven days give a mean of 56 per cent and a maximum of 63 per cent on the 11th. The Washington values are close to average values for April; those for Madison are slightly below the average.

TABLE 1.—*Solar radiation intensities during April, 1921.*

[Gram-calories per minute per square centimeter of normal surface.]

Washington, D. C.

Date.	Sun's zenith distance.										
	8 a.m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	Noon.
	75th meridian time.	Air mass.									Local mean solar time.
		A. M.					P. M.				
	e.	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	e.
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
Apr. 1	4.57	.....	.....	.....	.....	.....	1.22	1.04	0.87	.....	3.81
2	4.37	.....	0.73	0.87	1.04	1.33	1.09	0.8[illegible]	0.7[illegible]	.....	4.37
4	7.57	.....	0.64	0.82	1.05	1.34	0.9[illegible]	0.74	0.58	0.48	4.17
5	9.14	.....	0.64	0.77	0.95	1.27	1.04	0.8[illegible]	0.71	0.58	9.47
6	10.21	.....	.....	.....	.....	1.2[illegible]	.....	.....	.....	.....	10.21
11	1.9[illegible]	.....	.....	.....	.....	1.41	.....	.....	.....	.....	2.49
12	3.15	.....	0.77	0.93	1.12	1.42	.....	.....	.....	.....	3.15
19	4.37	.....	.....	.....	1.15	1.34	.....	.....	.....	.....	3.63
20	4.95	0.56	0.71	0.8[illegible]	1.07	1.2[illegible]	0.94	0.74	0.57	0.51	4.37
25	10.59	0.62	0.73	0.87	1.08	.....	.....	.....	.....	.....	8.48
Means	.....	(0.59)	0.70	0.85	1.07	1.32	1.04	0.85	0.69	0.52	.....
Departures	.....	−0.0[illegible]	−0.04	−0.02	−0.01	−0.05	−0.04	−0.05	−0.06	−0.06	.....

Madison, Wis.

Apr. 10	2.49	.....	.....	.....	1.34	.....	.....	.....	.....	.....	2.49
11	3.15	.....	.....	.....	1.33	.....	.....	.....	.....	.....	4.37
18	3.99	.....	.....	.....	.....	1.43	1.10	0.93	0.76	0.66	4.75
19	4.95	.....	.....	.....	1.10	1.29	.....	.....	.....	.....	6.27
23	5.7[illegible]	.....	.....	.....	.....	1.45	.....	.....	.....	.....	6.27
28	4.17	.....	.....	.....	.....	1.54	.....	.....	.....	.....	5.56
29	4.57	.....	.....	.....	.....	1.44	.....	.....	.....	.....	5.16
Means	.....	.....	.....	.....	1.26	1.43	(1.10)	(0.93)	(0.76)	(0.66)	.....
Departures	.....	.....	.....	.....	+0.02	+0.02	−0.14	−0.14	−0.11	−0.02	.....

Lincoln, Nebr.

Apr. 7	3.63	.....	.....	1.14	1.29	1.44	.....	.....	.....	.....	3.81
11	4.17	.....	.....	1.06	.....	.....	.....	.....	.....	.....	4.75
18	3.81	.....	.....	.....	.....	1.4[illegible]	1.11	0.88	0.7[illegible]	0.56	4.95
19	5.73	.....	.....	0.95	1.19	1.31	.....	.....	.....	.....	16.20
21	6.7[illegible]	.....	.....	.....	1.19	.....	.....	.....	.....	.....	7.21
22	5.7[illegible]	0.94	1.05	1.11	1.32	1.48	1.23	1.07	0.93	0.81	4.17
23	5.73	.....	.....	.....	.....	.....	.....	0.93	0.7[illegible]	0.66	7.04
29	5.3[illegible]	.....	.....	0.80	1.22	.....	.....	.....	.....	.....	6.04
Means	.....	(0.94)	(1.05)	1.01	1.24	1.41	(1.17)	0.96	0.81	0.68	.....
Departures	.....	+0.16	+0.20	±0.00	+0.01	−0.06	+0.01	−0.02	−0.01	−0.02	.....

Santa Fe, N. Mex.

Apr. 8	2.16	.....	1.2[illegible]	1.37	1.4[illegible]	1.63	.....	1.27	1.08	.....	1.24
9	1.60	.....	.....	.....	.....	1.58	1.33	1.17	1.03	0.94	1.96
11	3.3	0.74	0.8[illegible]	0.98	1.1[illegible]	1.51	.....	1.04	.....	.....	3.45
13	3.45	.....	1.02	1.16	.....	.....	.....	.....	.....	.....	3.45
16	2.26	.....	0.95	1.04	1.1[illegible]	1.5[illegible]	1.34	.....	.....	.....	1.88
17	2.74	.....	.....	.....	.....	1.57	.....	.....	.....	.....	2.62
18	2.87	.....	.....	.....	.....	.....	1.32	1.12	0.95	0.8[illegible]	2.62
20	2.26	0.75	0.8[illegible]	1.05	1.29	.....	.....	.....	.....	.....	2.26
21	3.3[illegible]	.....	.....	.....	.....	1.55	.....	.....	.....	.....	3.00
22	2.87	.....	1.11	1.2[illegible]	1.37	1.6[illegible]	.....	.....	.....	.....	2.87
23	3.45	0.93	1.04	1.16	1.33	.....	.....	.....	.....	.....	3.15
27	1.88	.....	0.89	.....	1.27	1.54	.....	.....	.....	.....	1.60
28	2.2[illegible]	.....	.....	1.24	1.3	.....	.....	.....	.....	.....	2.36
29	2.87	.....	1.14	1.27	1.40	1.65	1.3[illegible]	.....	.....	.....	2.74
Monthly means	.....	0.81	1.01	1.17	1.32	1.58	1.34	1.15	1.02	(0.87)	.....
Departures	.....	−0.10	−0.06	±0.00	−0.02	+0.04	+0.11	+0.07	±0.00	−0.01	.....

* Extrapolated.

TABLE 2.—*Solar and sky radiation received on a horizontal surface.*

Week beginning—	Average daily radiation.			Average daily departure for the week.			Excess or deficiency since first of year.		
	Washington.	Madison.	Lincoln.	Washington.	Madison.	Lincoln.	Washington.	Madison.	Lincoln.
	cal.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*
Apr. 2	444	4[illegible]3	434	+51	+18	+ 12	+ 983	−4195	−1164
9	433	311	3[illegible]5	+27	−8[illegible]	− 50	+1173	−4787	−1514
16	410	468	62[illegible]	−14	−45	+2[illegible]4	+1672	−5102	− 85
23	382	428	556	−63	− 5	+114	+ 634	−5138	+ 712

MEASUREMENTS OF THE SOLAR CONSTANT OF RADIATION AT CALAMA, CHILE, MARCH, 1921.

By C. G. ABBOT, Assistant Secretary.

[Smithsonian Institution, Washington, May 24, 1921.]

In continuation of preceding publications, I give in the following table the results obtained at Montezuma, near Calama, Chile, in March, 1921, for the solar constant of radiation. The reader is referred to this REVIEW for February, August, and September, 1919, for statements of the arrangement and meaning of the table.

Date.	Solar constant.	Method.	Grade.	Transmission coefficient at 0.5 microns.	Humidity.			Remarks.
					p/p s.c.	V. P.	Rel. hum.	
1921.								
A. M.	*cal.*					*cm.*	*Per cent.*	
Mar. 1	1.957	$M_{1.27}$	S−	0.867	0.643	0.47	29	Some cloud in east in early morning, later cloudless.
	1.966	$M_{1.20}$	.....	.....	.....	.....	.....	
	1.963	W.M.	.....	.....	.....	.....	.....	
2	1.954	$M_{1.04}$	S−	.864	.670	.59	32	Small patches of cloud scattered about sky.
3	1.938	$M_{1.10}$	S−	.868	.638	.53	30	Cirri in east prevented earlier observations.
	1.951	$M_{1.07}$	.....	.....	.....	.....	.....	
	1.959	W.M.	.....	.....	.....	.....	.....	
4	1.932	M_3	S−	.867	.472	.52	52	Cirri low over high peaks.
	1.945	M_2	.....	.....	.....	.....	.....	
	1.956	W.M.	.....	.....	.....	.....	.....	
P. M.								
5	1.943	$M_{2.17}$	S−	.862	.487	.52	25	Clouds over high peaks.
	1.910	$M_{2.55}$	.....	.....	.....	.....	.....	
	1.943	W.M.	.....	.....	.....	.....	.....	
A. M.								
6	1.942	$M_{1.28}$	S−	.858	.570	.55	33	Small cumuli disappearing in east.
	1.957	$M_{1.18}$	.....	.....	.....	.....	.....	
	1.945	W.M.	.....	.....	.....	.....	.....	
7	1.955	$M_{1.19}$	S−	.859	.563	.58	32	Cumuli over high peaks, also in west.
	1.947	$M_{1.14}$	.....	.....	.....	.....	.....	
	1.952	W.M.	.....	.....	.....	.....	.....	
10	1.957	$M_{1.05}$	S−	.864	.648	.38	17	Clouds scattered about sky.
13	1.949	$M_{1.31}$	S−	.858	.545	.58	40	Cirri in various parts of sky.
P. M.								
14	1.868	$M_{1.51}$	U	.863	.498	.48	21	Cirri scattered about sky.
A. M.								
17	1.955	$M_{1.11}$	S−	.867	.672	.39	15	Clouds over high peaks.
	1.943	$M_{1.01}$	.....	.....	.....	.....	.....	
	1.950	W.M.	.....	.....	.....	.....	.....	
18	1.913	M_2	S	.858	.483	.33	24	Do.
	1.916	$M_{1.76}$	.....	.....	.....	.....	.....	
	1.915	W.M.	.....	.....	.....	.....	.....	
P. M.								
19	1.946	$M_{1.25}$	S−	.861	.594	.47	22	Few clouds over high peaks.
	1.952	$M_{1.20}$	.....	.....	.....	.....	.....	
	1.948	W.M.	.....	.....	.....	.....	.....	