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SPECIAL OBSERVATIONS.

SOLAR AND SKY RADIATION MEASUREMENTS DURING JANUARY, 1921.

By HERBERT H. KIMBALL, Meteorologist.

[Solar Radiation Investigations Section, Washington, Feb. 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 averaged slightly above the normal for January at all the stations. At Washington, D. C. a noon intensity of 1.43 gram-calories per minute per square centimeter, measured on the 18th and again on the 26th is the highest intensity ever measured at Washington in January.

Table 2 shows a deficiency in the radiation received from the sun and sky at Madison and Lincoln, except during the second week, the deficiency being especially marked during the third and fourth weeks. This deficiency is to be attributed to the cloudiness. The table shows about the normal amount of insolation at Washington.

Sky-light polarization measurements obtained on four days at Madison when the ground was free from snow give a mean of 72 per cent and a maximum of 76 per cent on the 23d. There was practically no snow on the ground during the month at Washington, and sky polarization measurements obtained on four days give a mean of 60 per cent, with a maximum of 65 per cent on the 4th. These are slightly above the January averages at both stations.

TABLE 1.—*Solar radiation intensities during January, 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.*
Jan. 4	4.57	0.76	0.87	0.98	1.19	1.39	.....	1.04	0.87	0.75	5.56
5	6.50	.....	.....	.....	.....	.....	.....	1.01	.....	.....	5.36
17	4.80	0.65	0.76	0.90	1.24	.....	.....	.....	.....	.....	1.52

* Extrapolated.

TABLE 1.—*Solar radiation intensities during January, 1921*—Contd.

WASHINGTON, D. C.—Continued.

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.*
Jan. 18	3.73	1.01	1.13	.....	1.43	1.61	1.42	.....	.....	1.14	1.12
21	3.81	.....	0.69	0.90	.....	.....	.....	.....	.....	.....	4.95
23	7.04	.....	.....	.....	1.26	.....	.....	.....	.....	.....	4.57
24	2.49	0.77	.....	.....	.....	.....	1.09	0.81	0.58	.....	2.62
25	1.32	0.99	1.09	1.21	1.37	1.54	.....	.....	.....	.....	1.24
26	1.12	.....	.....	1.26	1.40	.....	1.38	1.13	.....	.....	1.52
27	1.60	.....	.....	.....	.....	.....	.....	1.05	.....	.....	1.24
28	1.60	0.88	0.97	1.12	1.11	.....	.....	.....	.....	.....	1.96
Means	.....	**0.84**	**0.92**	**1.06**	**1.29**	.....	**1.30**	**1.01**	**(0.72)**	**(0.94)**	
Departures	.....	**+0.07**	**+0.04**	**+0.04**	**+0.06**	.....	**+0.06**	**−0.02**	**−0.16**	**+0.15**	

MADISON, WIS.

Jan. 8	2.74	0.92	1.09	1.29	.....	.....	.....	1.31	.....	.....	3.62
12	0.86	1.11	1.22	1.34	.....	1.60	.....	1.32	.....	.....	1.07
17	0.86	.....	1.13	.....	.....	.....	.....	.....	.....	.....	1.32
23	3.30	.....	1.14	.....	1.40	1.56	.....	.....	.....	.....	3.00
24	2.26	.....	1.03	.....	.....	.....	.....	.....	.....	.....	2.87
26	2.49	.....	.....	.....	.....	.....	.....	1.06	1.01	.....	3.30
Means	.....	**(1.02)**	**1.12**	**(1.32)**	**(1.40)**	.....	.....	**1.23**	**(1.01)**	.....	.....
Departures	.....	**+0.08**	**+0.03**	**+0.06**	**+0.05**	.....	.....	**−0.01**	**−0.12**	.....	.....

LINCOLN, NEBR.

Jan. 11	1.96	.....	.....	.....	1.51	.....	.....	.....	.....	.....	3.30
12	1.24	1.03	1.20	1.31	.....	.....	.....	1.25	1.15	.....	1.78
14	2.26	.....	.....	1.26	.....	.....	.....	.....	.....	.....	3.81
21	4.17	.....	.....	1.09	.....	.....	.....	.....	.....	.....	5.56
Means	.....	**(1.03)**	**(1.20)**	**1.22**	**(1.51)**	.....	.....	**(1.25)**	**(1.15)**	.....	.....
Departures	.....	**+0.07**	**+0.14**	**+0.04**	**+0.14**	.....	.....	**+0.04**	**+0.07**	.....	.....

SANTA FE, N. MEX.

Jan. 8	1.68	.....	.....	.....	1.54	.....	.....	.....	.....	.....	1.32
14	1.68	.....	.....	1.43	1.52	.....	1.53	1.38	1.29	1.19	2.00
15	2.16	.....	.....	.....	.....	.....	1.48	1.32	.....	.....	3.15
24	1.88	.....	.....	1.44	1.54	.....	.....	1.35	1.18	1.10	2.74
25	2.06	.....	.....	1.41	1.57	.....	1.45	.....	.....	.....	2.62
28	3.81	.....	.....	1.21	.....	.....	.....	.....	.....	.....	4.37
29	3.99	.....	.....	.....	.....	.....	1.51	.....	.....	.....	2.87
Means	.....	.....	.....	**1.37**	**1.54**	.....	**1.49**	**1.35**	**(1.24)**	**(1.14)**	.....
Departures	.....	.....	.....	**−0.01**	**+0.03**	.....	**+0.01**	**+0.01**	**+0.02**	**−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.*
Jan. 1	154	115	173	− 6	−28	−13	− 44	−198	− 91
8	65	159	210	−103	+ 7	+13	−763	−150	± 0
15	228	137	161	+ 52	−31	−49	−398	−368	−344
22	235	150	133	+ 73	−37	−92	+114	−630	−99[illegible]

MEASUREMENTS OF THE SOLAR CONSTANT OF RADIATION AT CALAMA, CHILE, DECEMBER, 1920.

By C. G. ABBOT.

In continuation of the preceding publications, I give in the following table the results obtained at Montezuma, near Calama, Chile, in December, 1920, 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.

Mr. L. H. Abbot succeeded Mr. A. F. Moore as director of this station on December 22.

Date.	Solar constant.	Method.	Grade.	Transmission coefficient at 0.5 micron.	Humidity.			Remarks.
					ρ/ρSC.	V. P.	Relative humidity.	
1920.								
A. M.	*cal.*					*c.m.*	*Per ct.*	
Dec. 3	1.945	$M_{1.5}$	S	0.858	0.589	0.28	18	Clouds in east preventing earlier observations.
	1.943	$M_{1.46}$						
	1.944	W. M.						
4	1.964	M_2	S	.859	.516	.22	17	Clouds prevented earlier observations—in west and low in east.
	1.968	$M_{1.5}$						
	1.966	W. M.						
5	1.936	E_0	VG+	.874	.482	.44	41	Clouds low in east.
	1.974	M_3						
	1.955	$M_{2.5}$						
	1.956	M_2						
	1.955	W. M.						
6	1.959	M_3	S−	.872	.618	.23	21	
	1.963	$M_{2.5}$						
	1.950	M_2						
	1.959	W. M.						
7	1.953	M_3	S	.877	.550	.23	22	
	1.951	$M_{2.5}$						
	1.959	M_2						
	1.954	W. M.						
8	1.949	E_0	VG	.875	.497	.38	40	Some cirri low in east.
	1.969	M_3						
	1.973	$M_{2.5}$						
1920.								
A. M.	*cal.*					*c.m.*	*Per ct.*	
Dec. 8	1.945	$M_{1.04}$						
	1.959	W. M.						
P. M.								
10	1.964	$M_{1.09}$	S−	.865	.663	.49	27	Clouds forming in various directions. Clear around sun.
	1.972	$M_{1.06}$						
	1.962	$M_{1.04}$						
	1.965	W. M.						
A. M.								
11	1.984	E_0	E−	.866	.501	.36	42	
	1.961	M_3						
	1.976	$M_{2.5}$						
	1.979	M_2						
	1.977	W. M.						
12	1.956	$M_{2.5}$	S	.875	.634	.26	27	
	1.960	M_2						
	1.959	W. M.						
13	1.945	M_3	S−	.877	.652	.18	18	Low cirri in east.
	1.954	$M_{2.5}$						
	1.973	M_2						
	1.957	W. M.						
14	1.948	M_3	S	.875	.648	.18	16	Cirri low in east.
	1.946	$M_{2.5}$						
	1.945	M_2						
	1.946	W. M.						
15	1.971	E_0	VG+	.871	.654	.21	21	
	1.945	M_3						
	1.954	$M_{2.5}$						
	1.942	M_2						
	1.949	W. M.						
16	1.954	M_2	S	.872	.706	.30	22	
	1.952	$M_{1.5}$						
	1.953	W. M.						
17	1.960	M_2	S	.873	.703	.34	26	
	1.964	$M_{1.5}$						
	1.962	W. M.						
18	1.948	M_2	S	.864	.626	.34	24	Some cirri in north.
	1.962	$M_{1.5}$						
	1.954	W. M.						
19	1.950	M_2	S−	.875	.740	.26	18	Cirri low in north and east.
	1.968	$M_{1.5}$						
	1.959	W. M.						
20	1.941	M_3	S	.871	.618	.18	18	Do.
	1.959	$M_{2.5}$						
	1.950	W. M.						
P. M.								
22	1.962	$M_{1.12}$	S−	.864	.656	.28	13	Cirri in most of sky preventing earlier observations.
25	1.935	$M_{1.28}$	S−	.856	.503	.38	15	Scattered cirri, especially in east.
	1.953	$M_{1.29}$						
	1.944	W. M.						
A. M.								
30	1.955	$M_{1.80}$	S	.853	.512	.47	40	Small patch of cirri near sun prevented earlier observations.
	1.954	$M_{1.79}$						
	1.954	W. M.						
31	1.959	M_3	S	.856	.415	.54	62	Cirri low in east and north.
	1.972	$M_{2.5}$						
	1.966	W. M.						