SOLAR AND SKY RADIATION MEASUREMENTS DURING MAY, 1919.

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[Dated: Solar Radiation Investigations Section, Washington, June 30, 1919.]

For a description of instrumental exposures and an account of the methods of obtaining and reducing the measurements, the reader is referred to the REVIEW for January, 1919, 47:4.

The monthly means and departures from normal in Table 1 show that the radiation measurements averaged slightly below the May normal at Washington and Santa Fe, and slightly above at Madison and Lincoln. Unusually hazy conditions prevailed at Washington after May 23, and at Madison and Lincoln, after May 29, and continued into June. At Washington the haze at times closely resembled cirrus haze, and was, in fact, recorded by one observer as 10 Ci. St. At Madison Mr. E. R. Miller identified it as the usual summer water-haze, which is in accord with my own observations.

Table 3 shows a deficiency of 12 per cent in the total radiation for the month at Washington as compared with the normal amount for May, while Madison and Lincoln show excesses of 2 per cent and 5 per cent, respectively.

The skylight polarization at Washington on May 3 was 58 per cent, and on May 22, 51 per cent. On June 4 it was only 31 per cent. At Madison, measurements made on four days give a mean of 60 per cent, with a maximum of 67 per cent on the 2d. On the 29th the polarization was only 38 per cent.

TABLE 1.—*Solar radiation intensities during May, 1919.*

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

Washington, D. C.

Date.	Sun's zenith distance.									
	0.0°	48.3°	60.0°	66.5°	70.7°	73.6°	75.7°	77.4°	78.7°	79.8°
	Air mass.									
	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5
A. M.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.
May 2	1.41					0.82	0.75			
3	1.37	1.23	1.10	1.02	0.95	0.88	0.80	0.75	0.72	0.68
5		1.14								
13			1.18	1.06						
22	1.29	1.19	1.00	0.88						
23							0.65			
27			0.78	0.66						
28	0.75	0.62	0.51	0.46						
29	0.99									
31		0.60								
Monthly means	1.16	0.96	0.91	0.82	(0.95)	(0.85)	0.73	(0.75)	(0.72)	(0.68)
Departure from 11-year normal	−0.12	−0.14	−0.05	−0.06	+0.16	+0.11	+0.02	+0.15	+0.15	+0.17
P. M.										
May 2		1.27	1.14	1.02						
3		1.18	0.97	0.87	0.73	0.60	0.50			
29		0.72								
Monthly means		1.06	(1.06)	(0.94)	(0.73)	(0.60)	(0.50)			
Departure from 11-year normal		−0.06	+0.08	+0.09	−0.05	−0.12	−0.20			

Madison, Wis.

Date.	0.0°	48.3°	60.0°	66.5°	70.7°	73.6°	75.7°	77.4°	78.7°	79.8°
A. M.										
May 2			1.34	1.27	1.19	1.11	1.03			
7							1.13			
10	1.47	1.38	1.28	1.20		1.03	0.96	0.91	0.85	
17	1.46	1.37	1.30	1.20	1.13	1.07				
29	1.20	1.02	0.88							
Monthly means	1.38	1.26	1.20	1.22	(1.16)	1.07	1.04	(0.91)	(0.85)	
Departure from 9-year normal	+0.04	+0.04	+0.10	+0.20	+0.20	+0.10		+0.03		

TABLE 1.—*Solar radiation intensities during May, 1919*—Continued.

Madison, Wis.—Continued.

Date.	Sun's zenith distance.									
	0.0°	48.3°	60.0°	66.5°	70.7°	73.6°	75.7°	77.4°	78.7°	79.8°
	Air mass.									
	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5
P. M.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.
May 9		1.30	1.15	1.02	0.90	0.79				
10		1.30	1.16	1.07	0.95	0.84				
17		1.33								
Monthly means		1.31	(1.16)	(1.04)	(0.92)	(0.82)				
Departure from 9-year normal		+0.07	+0.14	+0.06	−0.02					

Lincoln, Nebr.

Date.	0.0°	48.3°	60.0°	66.5°	70.7°	73.6°	75.7°	77.4°	78.7°	79.8°
A. M.										
May 1		1.29	1.22	1.12	1.03	0.95	0.87	0.80	0.74	
3		1.22								
8	1.41	1.27	1.20	1.03	0.97	0.86				
14		1.34	1.28	1.15	1.01	0.87				
15	1.41	1.25	1.01	0.80						
20		1.21								
21		1.27	1.14	1.03	0.93	0.83				
22		1.10	1.01	0.89						
24		1.18	1.04	0.95						
30					0.80					
31					0.88					
Monthly means	(1.41)	1.24	1.13	1.00	0.94	0.88	(0.87)	(0.80)	(0.74)	
Departure from 4-year normal	+0.06	−0.02	−0.02	−0.03	+0.03	±0.00	+0.05	+0.02	−0.06	
P. M.										
May 1		1.34	1.24	1.13	1.09	1.01	0.94	0.88	0.82	0.77
6		1.35	1.29	1.21	1.14	1.07	1.02	0.96	0.91	
8		1.35	1.20	1.07	0.96	0.86	0.77			0.66
15		1.25	1.10	0.99	0.91	0.83	0.76	0.69	0.63	
29			0.91	0.82	0.72	0.57	0.46		0.37	
Monthly means		1.32	1.15	1.04	0.96	0.87	0.79	0.84	0.68	(0.72)
Departure from 4-year normal		+0.12	+0.10	+0.08	+0.09	+0.08	+0.06	+0.04	−0.01	

Santa Fe, N. Mex.

Date.	0.0°	48.3°	60.0°	66.5°	70.7°	73.6°	75.7°	77.4°	78.7°	79.8°
A. M.										
May 1		1.45			1.07	1.02				
6		1.44	1.37	1.29		1.14				
8		1.41	1.31	1.25	1.17	1.10	1.07	0.97		
12	1.53									
17	1.41	1.29	1.19	1.10	1.02	0.96	0.90	0.83		
20	1.43									
21		1.37								
27		1.29	1.24	1.17		1.03				
31			1.20							
Monthly means	1.46	1.38	1.26	1.20	1.09	1.05	(0.98)	(0.90)		
Departure from 7-year normal	−0.05	−0.01	−0.02	−0.02	−0.07	−0.06	−0.08	−0.11		
P. M.										
May 12		1.30								
Monthly mean		(1.30)								
Departure from 3-year normal		+0.10								

TABLE 2.—*Vapor pressures at pyrheliometric stations on days when solar radiation intensities were measured.*

Washington, D. C.			Madison, Wis.			Lincoln, Nebr.			Santa Fe, N. Mex.		
Date.	8 a.m.	8 p.m.	Date.	8 a.m.	8 p.m.	Date.	8 a.m.	8 p.m.	Date.	8 a.m.	8 p.m.
1919.	mm.	mm.	1919.	mm.	mm.	1919.	mm.	mm.	1919.	mm.	mm.
May 2	10.21	7.29	May 2	4.57	3.81	May 1	6.50	4.57	May 1	5.36	4.17
3	7.29	7.29	7	5.36	5.56	3	10.59	9.14	6	4.57	3.81
5	12.24	14.60	9	4.75	4.75	6	11.38	6.27	8	5.16	3.81
13	7.29	8.48	10	4.57	4.75	8	7.04	5.79	12	4.95	4.37
22	12.68	9.83	17	5.16	4.57	14	7.04	9.47	17	6.76	4.75
23	9.47	10.21	29	8.48	9.47	15	10.59	6.27	20	5.79	6.78
27	11.38	13.61				20	6.27	5.16	21	6.76	6.76
28	9.83	12.68				21	7.04	6.76	27	5.50	7.04
29	13.61	15.11				22	7.04	6.50	31	5.56	6.02
31	9.83	12.24				24	9.47	10.59			
						29	11.81	11.81			
						30	11.81	13.61			
						31	15.65	15.65			

TABLE 3.—*Daily totals and departures of solar and sky radiation during May, 1919.*

[Gram-calories per square centimeter of horizontal surface.]

Day of month.	Daily totals.			Departures from normal.			Excess or deficiency since first of month.		
	Washington.	Madison.	Lincoln.	Washington.	Madison.	Lincoln.	Washington.	Madison.	Lincoln.
	cal.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*
1	69	120	681	−391	−329	225	−391	−329	225
2	661	613	210	197	162	−250	−194	−167	−25
3	671	88	567	204	−365	103	10	−532	78
4	558	198	627	88	−257	158	98	−789	236
5	474	290	355	0	−167	−118	98	−956	118
6	186	140	452	−290	−318	−25	−192	−1,274	93
7	285	695	546	−192	235	64	−384	−1,039	157
8	105	431	747	−374	−30	261	−758	−1,069	418
9	195	681	530	−285	219	39	−1,043	−850	457
10	87	728	505	−395	265	10	−1,438	−585	467
11	211	644	186	−272	180	−313	−1,710	−405	154
12	422	567	130	−63	102	−373	−1,773	−303	−219
13	661	679	441	175	213	−66	−1,598	−90	−285
14	308	414	656	−180	−53	145	−1,778	−143	−140
15	527	273	745	38	−195	230	−1,740	−338	90
16	167	372	622	−323	−96	106	−2,063	−434	196
17	213	727	491	−278	258	−26	−2,341	−176	170
18	703	593	443	211	124	−74	−2,130	−52	96
19	656	569	672	164	100	155	−1,966	48	251
20	227	305	678	−266	−164	161	−2,232	−116	412
Decade departure							**−794**	**469**	**−55**
21	230	74	709	−264	−396	192	−2,496	−512	604
22	582	313	635	88	−157	148	−2,408	−669	752
23	405	450	643	−30	−20	126	−2,498	−689	878
24	352	602	630	−144	131	113	−2,642	−558	991
25	620	652	567	124	181	49	−2,518	−377	1,040
26	630	604	403	134	132	−118	−2,384	−245	922
27	637	621	252	141	147	−272	−2,243	−98	650
28	599	630	684	103	155	157	−2,140	57	807
29	644	626	686	148	149	156	−1,992	206	963
30	609	551	602	113	72	69	−1,879	278	1,032
31	554	522	292	58	41	−245	−1,821	319	787
Decade departure							**+411**	**+435**	**+375**
Excess or deficiency since first of year. gr.—cal.							**−2,360**	**−4,083**	**−2,588**
Excess or deficiency since first of year. per cent							**− 4.8**	**− 8.4**	**− 4.7**

MEASUREMENTS OF THE SOLAR CONSTANT OF RADIATION AT CALAMA, CHILE, APRIL, 1919.

By Dr. C. G. ABBOT.

[Dated Astrophysical Observatory, Smithsonian Institution, Washington, June 17, 1919.]

I communicate the following results of the measurements of the solar constant of radiation which were made by the Smithsonian observers, Messrs. A. F. Moore and L. H. Abbot, at Calama, Chile, in the month of April, 1919.

The arrangement of the observations in the table is the same as that employed in the preceding REVIEWS.

TABLE 1.—*Solar-radiation observations at Calama, Chile, April, 1919.*

Date.	Solar const.	Grade.	Transmission coefficient at 0.5 microns.	Humidity air mass 3.			Remarks.
				ρ/ρ_{80}	V. P.	Rel. hum.	
A. M.	*cal.*				*cm.*	%	
Apr. 1	1.960	E−	0.846	0.366	0.56	56	
2	1.946	E−	.853	.408	.41	40	
3	1.960	VG+	.828	.340	.57	65	
4	1.973	E−	.818	.299	.61	64	
5	1.938	VG	.852	.375	.53	55	
6	1.935	VG+	.854	.413	.38	36	
7	1.940	VG+	.852	.459	.35	37	
8	1.962	E−	.852	.495	.31	32	
9	1.947	VG	.864	.583	.24	23	
10	1.922	E−	.872	.621	.21	22	
11	1.925	E	.873	.588	.19	21	Cirri in west and south.
12	1.898	VG	.867	.432	.32	34	
13	1.928	E−	.868	.429	.36	37	Cloudless, except small patches of cirri in west and south.
14	1.984	VG+	.850	.440	.41	42	Cirri in distant south.
15	1.950	E−	.868	.523	.29	27	Cirri in north and east just below sun.
16	1.967	G+	.861	.525	.20	24	Cirri in north and east, moving rapidly south.
18	1.994	VG	.846	.441	.32	34	Some cirri in southeast.
19	1.970	VG+	.848	.418	.31	32	Some cirri.
22	2.004	G+	.853	.343	.55	64	Cumuli and cirri scattered about sky.
P. M.							
Apr. 23	1.920	VG+	.874	.571	.36	20	Cirri in north and east.
A. M.							
Apr. 24	1.900	E	.885	.591	.16	19	
25	1.930	E−	.877	.562	.19	22	Small patch of cirrus in west.
26	1.932	E−	.871	.549	.23	21	
27	1.953	E−	.868	.552	.19	19	
28	1.969	E−	.871	.608	.16	20	
29	1.916	E	.867	.569	.15	18	
30	1.943	E	.873	.589	.15	21	