SECTION I—AEROLOGY.

SOLAR AND SKY RADIATION MEASUREMENTS DURING JUNE, 1916.

By HERBERT H. KIMBALL, Professor of Meteorology.

[Dated: Washington, D. C., July 25, 1916.]

For a description of instrumental exposures, and an account of the methods of obtaining and reducing the measurements, the reader is referred to the REVIEWS for January, April, and May, 1916, 44:2, 179, 180, and 244.

The monthly means and departures from normal values given in Table 1 show that direct solar radiation intensities were below normal at Washington, above normal at Madison, and of about normal value at Santa Fe. A noon maximum intensity of 1.53 gram-calories per minute per square centimeter, measured at Santa Fe on the 21st, exceeds by 1 per cent any previous June noon measurement at that station.

At Santa Fe, on the morning of the 15th, the afternoon of the 23d and 28th, and on both morning and afternoon of the 26th and 27th, the measurements indicate steady sky conditions throughout the respective half-day periods. Extrapolated to zero atmosphere, and reduced to mean solar distance of the earth, the measurements give radiation intensities of 1.80, 1.79, 1.79, 1.76, and 1.72, on the respective dates. Applying the Smithsonian "Abridged procedure for determining approximately the value of the solar constant," utilizing in the process the vapor pressures of Table 2, we obtain 1.90, 1.89, 1.91, 1.86, and 1.84, respectively, or values a little lower than Abbot's mean values.

Skylight polarization measurements made at Washington on 4 days give a mean of 46 per cent, with a maximum of 59 per cent on the 1st. This latter is about the mean of monthly maximum polarization measurements for June at Washington.

TABLE 1.—*Solar radiation intensities during June, 1916.*

[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.	*Gr.-cal.*	*Gr.-cal.*	*Gr.-cal.*	*Gr.-cal.*	*Gr.-cal.*	*Gr.-cal.*	*Gr.-cal.*	*Gr.-cal.*	*Gr.-cal.*	*Gr.-cal.*
June 1	1.38	1.27								
2	1.22	1.13	0.84							
6		0.93								
12		0.98	0.83	0.71						
13		0.94	0.80	0.67	0.58					
17	1.26									
19			0.95	0.86						
22		1.13	1.07	0.94	0.80	0.71	0.65			
24			0.77							
28			0.66		0.54	0.48				
Monthly means	1.29	1.06	0.85	0.80	0.64	(0.60)	(0.65)			
Departure from 8-year normal	±0.00	−0.06	−0.08	−0.07	−0.19	−0.19	−0.12			

TABLE 1.—*Solar radiation intensities during June, 1916*—Continued.

Madison, Wis.

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.	*Gr.-cal.*	*Gr.-cal.*	*Gr.-cal.*	*Gr.-cal.*	*Gr.-cal.*	*Gr.-cal.*	*Gr.-cal.*	*Gr.-cal.*	*Gr.-cal.*	*Gr.-cal.*
June 3	1.40	1.32	1.23	1.12						
15	1.33	1.22	1.08	0.94						
17			1.15	1.06						
19	1.34		1.12	1.02						
21		1.29	1.16	1.09						
24	1.40	1.31	1.20	1.15		0.99	0.95			
25			1.23	1.10						
27	1.42	1.32	1.23	1.16	1.10	1.04				
Monthly means	1.38	1.29	1.18	1.08	(1.10)	(1.02)	(0.95)			
Departure from 6-year normal	+0.09	+0.09	+0.07	+0.03						
P. M.										
June 19		1.22								
Monthly means		(1.22)								
Departure from 6-year normal		+0.09								

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.										
June 3		1.38	1.30	1.22						
4	1.35	1.24	1.14	1.05	0.97	0.89				
7		1.39	1.30	1.21	1.13	1.05				
8		1.41	1.30	1.16	1.10	1.00	0.90			
9	1.44	1.35	1.27	1.20	1.09	1.02	0.87			
12			0.89							
14	1.31		1.07	0.99	0.92	0.83	0.69			
16		1.32	1.22	1.12	1.03	0.94	0.88			
17	1.27					0.88	0.79			
23	1.47	1.36								
24	1.36	1.32	1.20		1.02	0.91	0.83			
26	1.37									
29	1.27						0.73			
30	1.38	1.33	1.23	1.14	1.07	1.00	0.91			
Means	1.36	1.34	1.19	1.14	1.04	0.95	0.82			
P. M.										
June 3						0.86	0.74			
9		1.31	1.16	1.11	1.04	0.99	0.93			
16			1.14	1.05	0.97	0.91	0.85			
23		1.37	1.23	1.16	1.10	1.04	0.83			
24		1.17	1.11	0.99	0.89	0.83	0.69			
26			1.15	1.04	0.97	0.90	0.82			
28		1.18	1.08	0.96	0.88	0.80	0.73			
29		1.18	1.09	0.98	0.86	0.80	0.76			
Means		1.24	1.14	1.04	0.96	0.89	0.79			

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.										
June 13	1.50									
15		1.29	1.17	1.05	0.96					
16	1.41	1.18	1.10	1.03	0.96	0.87				
17		1.30	1.20	1.11	1.00	0.95				
19	1.46	1.37	1.28	1.19		1.08	1.00			
20	1.53		1.33	1.26	1.20	1.13				
21	1.54	1.43	1.37	1.32	1.27	1.22				
22	1.53	1.44	1.30	1.26	1.23	1.19				
23	1.53	1.44	1.38	1.33	1.28	1.23				
24		1.41	1.32	1.23		1.12	1.07			
26	1.52	1.44	1.37	1.31	1.26	1.21	1.16	1.11		
27		1.34	1.24	1.15	1.07	1.09	1.03			
28	1.53	1.39	1.31	1.27	1.14	1.08				
29	1.49	1.42	1.29		1.24	1.18	1.10			
30	1.44	1.38	1.32	1.24	1.20	1.15				
Monthly means	1.50	1.37	1.28	1.21	1.15	1.12	1.07	(1.11)		
Departure from 4-year normal	±0.00	−0.01	−0.02	−0.02	±0.00					
P. M.										
June 13		1.43	1.36	1.29	1.19					
15		1.27	1.23	1.09	1.03					
16						0.89	0.84			
20		1.41	1.32	1.23						
21			1.42							
22		1.39	1.33	1.26	1.20	1.14	1.09			
23		1.43	1.34	1.26	1.14	1.10				
26		1.40	1.31	1.22	1.15	1.06	1.01			
27			1.28	1.21	1.14	1.08				
28		1.44	1.35	1.28	1.19					
29		1.36								
30		1.39	1.34	1.24	1.19	1.15	1.10			
Monthly means		1.39	1.33	1.23	1.15	1.07	1.01			

From Table 3 it is seen that at both Washington and Madison there was a deficiency of radiation for the month, amounting at Washington to 4.6 per cent of the average June total, and at Madison to 1.2 per cent. At Washington the deficiency since the first of the year is 7.1 per cent, while at Madison the departure from the normal is insignificant.

TABLE 2.—*Vapor pressure 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.
1916.	*Mm.*	*Mm.*	1916.	*Mm.*	*Mm.*	1916.	*Mm.*	*Mm.*	1916.	*Mm.*	*Mm.*
June 1	5.79	8.81	June 3	9.14	8.81	June 3	7.57	12.24	June 13	3.99	2.74
2	9.47	11.38	15	9.47	8.48	4	8.81	9.47	15	3.15	2.16
6	9.47	11.38	17	9.47	9.83	7	6.76	5.56	16	4.75	3.45
12	13.13	12.68	19	8.81	10 97	8	6.50	6.50	17	4.95	3.99
13	11.81	14.60	21	7.04	7.29	9	7.04	6.76	19	5.79	2.16
17	12.68	14.10	24	9.83	8.81	12	13.13	11.81	20	2.74	2.36
19	13.61	14.60	25	9.83	11.38	14	11.81	9.47	21	3.00	2.36
22	8.48	9.14	27	8.48	9.83	16	8.18	7.57	22	3.00	2.74
24	12.68	16.20		.....	.....	17	8.48	12.68	23	3.81	2.26
28	16.20	16.20		.....	.....	23	11.38	9.83	24	3.45	3.30
	.....	.....		.....	.....	24	10.59	12.24	26	3.00	2.74
	.....	.....		.....	.....	26	14.10	10.97	27	3.30	4.57
	.....	.....		.....	.....	28	14.10	18.59	28	5.79	2.62
	.....	.....		.....	.....	29	17.96	17.37	29	3.30	3.63
	.....	.....		.....	.....	30	17.37	17.37	30	5.56	3.99

TABLE 3.—*Daily totals and departures of solar and sky radiation during June, 1916.*

[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.	Washington.	Madison.
	Gr.-cal.	*Gr.-cal.*	*Gr.-cal.*	*Gr.-cal.*	*Gr.-cal.*	*Gr.-cal.*	*Gr.-cal.*
June 1	739	548	240	245	60	245	60
2	671	323	597	176	−167	421	−107
3	445	684	700	− 51	192	370	85
4	686	708	687	189	213	559	298
5	575	689	405	77	192	636	490
6	378	293	649	−121	−207	515	283
7	134	55	596	−367	−448	148	−165
8	608	198	652	106	−309	254	−474
9	319	270	753	−185	−241	69	−715
10	351	449	356	−154	− 66	− 85	−781
11	543	642	439	36	123	− 49	−658
12	638	627	570	130	104	81	−554
13	555	440	547	45	− 87	126	−641
14	547	632	707	36	101	162	−540
15	66	518	482	−447	− 16	− 285	−556
16	164	425	737	−351	−112	− 636	−668
17	640	646	653	122	107	− 514	−561
18	627	672	585	107	130	− 407	−431
19	456	765	560	− 67	221	− 474	−210
20	508	438	407	− 17	−108	− 491	−318
Decade departure	.....	.....	.....	.....	.....	− 406	463
21	309	730	153	−219	182	− 710	−136
22	711	335	466	181	−214	− 529	−350
23	705	462	756	173	− 90	− 356	−440
24	629	750	731	96	197	− 260	−243
25	315	755	677	−219	201	− 479	− 42
26	580	429	726	46	−125	− 433	−167
27	462	731	662	− 73	176	− 506	9
28	570	689	689	35	134	− 471	143
29	580	506	685	45	− 49	− 426	94
30	283	264	704	−253	−291	− 679	−197
Decade departure	.....	.....	.....	.....	.....	− 188	121
Excess or deficiency since first of year. gr.-cal.	.....	.....	.....	.....	.....	−4,736	− 69
Excess or deficiency since first of year. per cent.	.....	.....	.....	.....	.....	− 7.1	−0.1

METEOR OF JUNE 28, 1916, OVER NORTHEASTERN TEXAS.

By HOWARD H. MARTIN, Assistant Observer, Weather Bureau.

[Dated Fort Worth, Tex., July 14, 1916.]

At $9^h\ 11^m\ 30^s$ p. m. 90th Meridian Time, of June 28, a magnificent meteor burst into view in the southeastern sky. Its magnitude was somewhat greater than that of any first magnitude star. Although its course was relatively short, the time occupied in covering it was

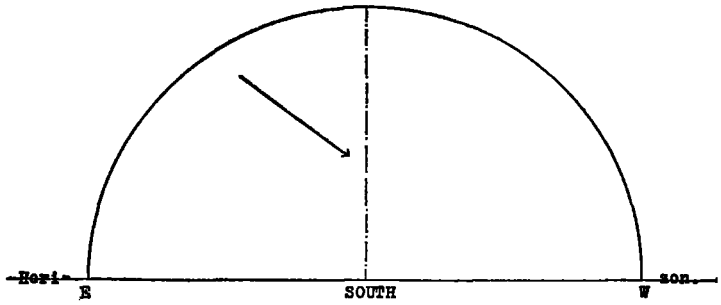

FIG. 1.—Approximate position of meteor observed at Fort Worth, Tex., June 28, 1916, $9^h\ 11^m\ 30^s$, p. m. (90th Mer. time).

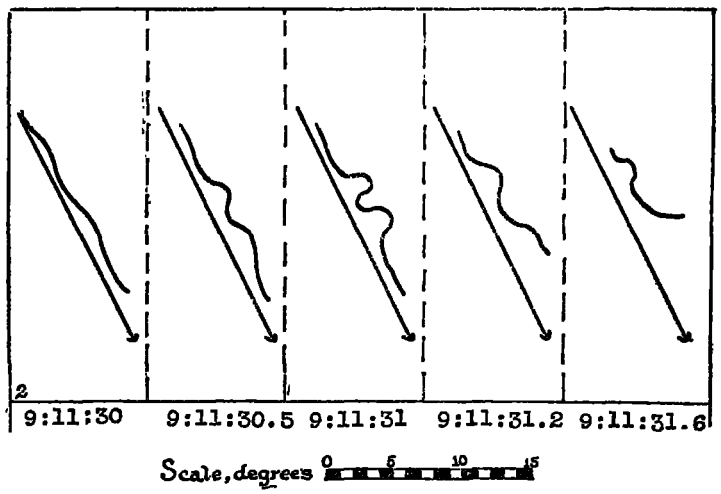

FIG. 2.—Successive relative positions of path and train of meteor at Denton, Tex,. June 28, 1916, $9^h\ 11^m\ 30^s$, p. m.

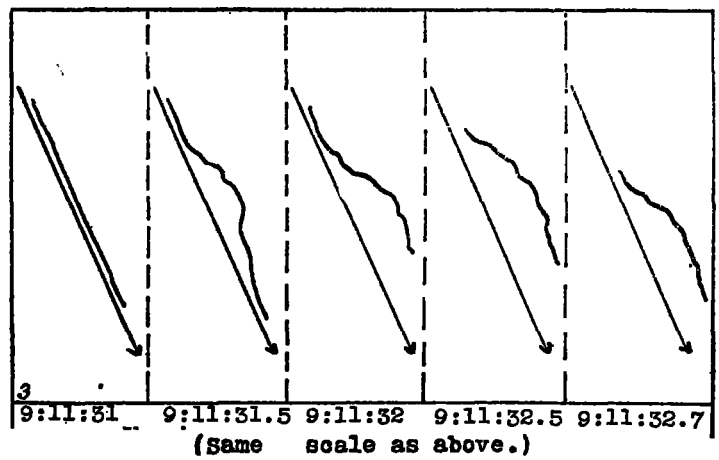

FIG. 3.—Successive relative positions of path and train of meteor at Fort Worth, Tex., June 28, 1916, $9^h\ 11^m\ 30^s$, p. m.