SECTION I.—AEROLOGY.

SOLAR AND SKY RADIATION MEASUREMENTS DURING MAY, 1918.

By HERBERT H. KIMBALL, Professor of Meteorology.

[Dated: Weather Bureau, Washington, D. C., June 28, 1918.]

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, 1918, **46**:2.

The monthly means and departures in Table 1 show that at all four stations direct solar radiation intensities differed but slightly from the normal intensities for May.

Table 3 shows an excess of about 7 per cent in the total radiation at Lincoln, Nebr., as compared with the normal amount for May, and only unimportant departures at Washington and Madison, Wis.

Skylight polarization measurements obtained at Washington on 6 days give a mean of 53 per cent with a maximum of 59 per cent on the 11th. These are about average values for Washington in May. Measurements obtained at Madison on 5 days give a mean of 59 per cent with a maximum of 65 per cent on the 1st.

TABLE 1.—*Solar radiation intensities during May, 1918.*

[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
1918. A. M.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*
May 1	.....	.....	0.84	0.64	0.49	.....	.....	.....	.....	.....
2	.....	1.14	1.09	1.00	0.92	0.84	0.78	0.72	0.67	.....
6	1.20	1.03	0.88	0.78	.....	.....	.....	.....	.....	.....
8	1.30	.....	0.97	.....	.....	.....	.....	.....	.....	.....
9	.....	1.12	1.04	0.94	0.87	0.81	.....	.....	.....	.....
11	1.24	1.21	1.14	1.04	0.95	0.88	0.79	0.72	0.67	.....
17	1.21	1.09	0.98	0.86	0.79	0.72	0.66	.....	.....	.....
18	1.29	1.17	1.06	0.96	0.88	0.81	0.74	.....	.....	.....
29	.....	0.70	0.60	.....	.....	.....	.....	.....	.....	.....
Monthly means	1.25	1.07	0.96	0.89	0.82	0.81	0.74	(0.72)	(0.67)	.....
Departure from 10-year normal	−0.04	−0.04	−0.01	±0.00	+0.04	+0.09	+0.04	+0.14	+0.13	.....
P. M.										
May 2	.....	1.29	1.05	0.95	0.87	.081	0.74	0.67	0.61	.....
17	.....	1.13	0.98	0.89	0.82	0.75	0.69	0.64	0.59	.....
18	.....	1.19	.....	.....	.....	.....	.....	.....	.....	.....
Monthly Means	.....	1.20	(1.02)	(0.92)	(0.84)	(0.78)	(0.72)	(0.66)	(0.60)	.....
Departure from 10-year normal	.....	+0.07	+0.04	+0.08	+0.05	+0.04	−0.01	+0.01	−0.02	.....

TABLE 1.—*Solar radiation intensities during May, 1918*—Continued.

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

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
1918. A. M.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*
May 1	1.44	1.36	1.24	1.12	.....	.....	.....	.....	.....	.....
2	1.28	.....	.....	.....	.....	.....	.....	.....	.....	.....
10	1.49	.....	.....	.....	.....	.....	.....	.....	.....	.....
13	1.38	1.31	1.18	1.02	0.88	.....	.....	.....	.....	.....
14	1.30	1.25	1.17	1.10	1.03	0.96	.....	0.85	.....	.....
16	.....	.....	1.03	.....	.....	.....	.....	.....	.....	.....
20	.....	.....	1.17	1.11	1.06	.....	.....	.....	.....	.....
Monthly means	1.38	1.31	1.16	1.09	0.99	(0.96)	.....	(0.85)	.....	.....
Departure from 8-year normal	+0.05	+0.10	+0.07	+0.11	+0.06	+0.07	.....	.....	.....	.....
P. M.										
May 1	.....	.....	.....	1.04	0.97	.....	.....	.....	.....	.....
2	.....	1.12	0.94	.....	.....	.....	.....	.....	.....	.....
10	.....	1.36	.....	.....	.....	.....	.....	.....	.....	.....
13	.....	1.35	.....	.....	.....	.....	.....	.....	.....	.....
Monthly means	.....	1.28	(0.94)	(1.04)	(0.97)	.....	.....	.....	.....	.....
Departure from 8-year normal	.....	+0.06	−0.04	+0.10	.....	.....	.....	.....	.....	.....

Lincoln, Nebr.

A. M.										
May 1	1.39	1.30	1.21	1.11	1.01	0.92	0.85	0.80	0.77	.....
3	1.37	.....	.....	.....	.....	.....	.....	.....	.....	.....
4	1.40	1.21	1.10	1.00	0.92	0.84	0.76	.....	.....	.....
14	.....	1.15	1.05	0.97	0.84	0.78	0.70	0.63	.....	.....
19	1.35	.....	.....	.....	.....	.....	.....	.....	.....	.....
21	1.30	.....	.....	.....	0.69	.....	.....	.....	.....	.....
Monthly means	1.36	1.22	1.12	1.03	0.86	0.85	0.77	(0.72)	(0.77)	.....
Departure from 3-year normal	+0.01	−0.04	−0.04	−0.01	−0.09	−0.03	−0.05	−0.06	−0.05	.....
P. M.										
May 1	.....	1.19	1.06	0.96	0.87	0.78	0.71	0.63	0.57	.....
3	.....	1.25	1.14	1.04	0.91	0.83	0.77	0.71	0.67	.....
19	.....	1.17	.....	.....	.....	.....	.....	.....	.....	.....
Monthly means	.....	1.28	(1.10)	(1.00)	(0.89)	(0.80)	(0.74)	(0.67)	(0.62)	.....
Departure from 3-year normal	.....	+0.06	+0.10	+0.10	+0.08	+0.07	+0.06	−0.08	−0.07	.....

Santa Fe, N. Mex.

A. M.										
May 21	.....	1.37	1.26	1.20	1.15	.....	.....	.....	.....	.....
23	.....	.....	.....	.....	1.07	1.02	.....	.....	.....	.....
28	1.48	.....	1.24	.....	.....	.....	.....	.....	.....	.....
31	.....	1.33	1.19	1.13	.....	.....	.....	.....	.....	.....
Monthly means	(1.48)	(1.35)	1.23	(1.16)	(1.11)	(1.02)	.....	.....	.....	.....
Departure from 6-year normal	−0.04	−0.04	−0.06	−0.06	−0.06	−0.10	.....	.....	.....	.....
P. M.										
May 31	.....	.....	1.22	.....	1.12	.....	.....	.....	.....	.....
Monthly means	.....	.....	(1.22)	.....	(1.12)	.....	.....	.....	.....	.....
Departure from 2-year normal	.....	.....	+0.12	.....	.....	.....	.....	.....	.....	.....

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.		
Dates.	8 a.m.	8 p.m.	Dates.	8 a.m.	8 p.m.	Dates.	8 a.m.	8 p.m.	Dates.	8 a.m.	8 p.m.
1918.	*mm.*	*mm.*	1918.	*mm.*	*mm.*	1918.	*mm.*	*mm.*	1918.	*mm.*	*mm.*
May 1	6.27	5.16	May 1	4.57	6.27	May 1	3.99	6.02	May 21	3.45	3.63
2	4.17	4.37	2	6.02	9.14	3	6.50	7.04	23	4.57	3.63
6	10.21	11.38	10	4.95	3.99	4	9.83	9.83	28	2.87	2.26
8	11.81	6.02	13	4.17	3.63	14	6.50	6.50	31	2.36	4.57
9	6.27	10.59	14	3.99	6.27	19	13.13	6.27	.....	.....	.....
11	7.04	8.81	16	10.59	9.14	21	13.61	14.10	.....	.....	.....
17	10.59	7.04	20	6.27	6.50	.....	.....	.....	.....	.....	.....
18	12.24	14.60	.....	.....	.....	.....	.....	.....	.....	.....	.....
29	15.65	10.97	.....	.....	.....	.....	.....	.....	.....	.....	.....

TABLE 3.—*Daily totals and departures of solar and sky radiation during May, 1918.*

[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.
1918.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*
May 1	422	703	697	−48	249	234	−48	249	234
2	656	640	666	183	185	201	135	434	435
3	415	626	687	−62	170	220	73	604	655
4	264	536	642	−216	79	173	−143	683	828
5	567	573	433	84	115	−38	−59	798	790
6	582	195	573	97	−264	100	38	534	890
7	390	378	570	−97	−82	95	−59	452	985
8	612	381	628	123	−80	151	64	372	1,136
9	570	223	536	80	−239	57	144	133	1,193
10	515	683	693	23	220	212	167	353	1,405
11	649	246	654	155	−218	171	322	135	1,576
12	569	263	515	73	−202	30	395	−67	1,606
13	352	670	632	−146	204	145	249	137	1,751
14	379	691	584	−120	225	95	129	362	1,846
15	508	625	656	8	158	165	137	520	2,011
16	567	657	638	67	190	145	204	710	2,156
17	662	419	322	162	−48	−173	366	662	1,983
18	664	567	610	164	99	113	530	761	2,096
19	508	248	686	8	−220	187	538	541	2,283
20	563	664	650	63	196	149	601	737	2,432
Decade departure							434	384	1,027
21	462	352	592	−38	−116	89	563	621	2,521
22	589	580	428	89	112	−77	652	733	2,444
23	458	624	270	−42	155	−237	610	888	2,207
24	376	224	529	−123	−245	20	487	643	2,227
25	383	346	495	−116	−123	−15	371	520	2,212
26	537	554	182	39	84	−330	410	604	1,882
27	493	199	184	−5	−272	−330	405	332	1,552
28	508	196	245	11	−276	−271	416	56	1,281
29	564	102	464	68	−371	−54	484	−315	1,227
30	153	420	498	−342	−54	−22	−142	−369	1,205
31	403	609	401	−91	134	−121	51	−235	1,084
Decade departure							−550	−972	−1,348
Excess or deficiency since first of year						calories	−944	+630	+505
						per cent	−1.9	+1.3	+0.9

CONSTANT σ IN THE STEFAN-BOLTZMANN LAW.[1]

By M[ARYA] KAHANOWICZ.

[*Reprinted from* Science Abstracts, Sect. A, Mar. 31, 1918, § 288.]

In Stefan's Law the energy exchanged between two elements of area of black bodies at absolute temperatures T and T_0 is expressed by the formula

$$\sigma k (T^4 - T_0^4),$$

where k is a geometrical coefficient depending on the form of the elements, their dimensions and their distance apart, and σ is the Stefan constant to be determined. A critical résumé and discussion follows of the methods of the investigators named below:

Kurlbaum, bolometer.....σ=5.32, or corrected for reflection, 5.45.
Scheiner, Ångström pyrheliometer.4.73.
Féry, conical receiver.....6.3 and 6.3.
Bauer and Moulin, Ångström pyrheliometer.....5.7.
Valentiner, Kurlbaum bolometer...5.38 and 5.58.
Féry and Drecq, thermometer.....6.51.
Gerlach, Paschen receiver.....5.803 and 5.9.
Puccianti, bolometer.....5.96 and 5.96.
Puccianti, thermometer.....6.15.
Keene, thermometer.....5.89.
Coblentz, modified Paschen receiver.....[a]5.65 and 5.79.
Kahanowicz, modified Amerio receiver.....5.60, or corrected for reflection, 5.61.

The author gives the above result of her own new determination.—*A. D[aniell]*.

[1] *See* Nuovo cimento, Feb.-Mar., 1917, 13: 142-167.

[a] The value preferred by Coblentz and adopted for radiation work in the Weather Bureau, is $\sigma=5.7\times10^{-12}$ watt per sq. cm. per deg.[4]. *See* Bull. U. S. Bur. Standards, Washington, 1916, 13: 470—EDITOR.

HALO OBSERVATIONS AT YORK, N. Y., 1917.

Our cooperative observer at York, N. Y., Mr. Milroy N. Stewart, writing to correct a few misapprehensions incorporated in the article on page 119 of this REVIEW for March, 1918, states:

The average interval between halo and precipitation which you give [loc. cit.] as 17.3 hours is true for the lunar halos which I did not use at all in Table 2 [of the REVIEW, Sept. 1915, p. 444]. For 317 solar halos the interval was 20.4 hours. I have never paid much attention to results from the lunar halos because nearly all are seen between 8 and 11 p. m. and then only near the full moon.

My total observations were 325 solar + 64 lunar=389, halos. There was a maximum in March of 5.4 solar, or of 6.7 solar + lunar halos. The minimum was not in June; for solar alone it was 2.3 in December, and for both it was 3.9 in August.

[These corrections to Mr. Martin's paper in the March issue are not important to his conclusions; but are published here to correct the quotation from Stewart's tables.]

For 1917 Mr. Stewart finds the following results of his observations at York, N. Y.

Relation of halos to subsequent precipitation, York, N. Y., 1917.

Class of halo.	Total.	Mean interval to precipitation.	Precipitation next day.	Precipitation on second day.	No precipitation in 48 hours.
	1	2	3	4	5
Solar	83	(a) 20.8 hrs.	28	48	9
Lunar	12	(b) 12.8 hrs.	9	.....	3
Both	95	.....	37	48	12
Mean	.....	(c) 19.8 hrs.	.....	.....	.....

(c) = ⅓ (7a + b).

There is duplication in columns 3 and 4, and no account was taken of precipitation occurring the same day as the halo.