SECTION I.—AEROLOGY.

SOLAR AND SKY RADIATION MEASUREMENTS DURING SEPEMBER, 1918.

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[Dated: Weather Bureau, Washington, D. C., Oct. 31, 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 from normal values given in Table 1 show that direct solar radiation averaged above normal at Madison, Wis., and Lincoln, Nebr., and below normal at Washington, D. C., and Santa Fe., N. Mex. The minus departures at the latter station may be due in part to the fact that owing to an injury to the galvanometer no observations were obtained after the 12th of the month, and radiation intensities usually increase rapidly with the season at this time of the year.

Table 3 shows an excess of about 5 per cent in the total radiation for the month at Lincoln, and a deficiency of about 10 per cent at Washington.

Skylight polarization measurements obtained on 7 days at Washington give a mean of 57 per cent with a maximum of 62 per cent on the 21st. These values are considerably below the September averages. At Madison measurements obtained on 8 days give a mean of 67 per cent, with a maximum of 74 per cent on the 26th.

TABLE 1.—*Solar radiation intensities during September, 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
A. M.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*
Sept. 7	1.35	1.24								
9	1.26	1.14	1.02	0.94	0.87	0.78				
10	1.08	1.02		0.75	0.68	0.62	0.58	0.54	0.51	0.48
13	1.30	1.23	1.10	0.87	0.69	0.56				
19		1.17	1.10	1.03	0.97	0.90	0.84			
21		1.17	1.09	1.01	0.93					
23		1.05	0.91	0.79	0.68	0.60	0.54			
27		1.27	1.19	1.11	1.03					
30		1.15	1.07	0.96	0.87					
Monthly means	**1.25**	**1.16**	**1.07**	**0.93**	**0.84**	**0.69**	**0.65**	**(0.54)**	**(0.51)**	**(0.48)**
Departure from 10-year normal	**−0.07**	**−0.04**	**−0.01**	**−0.06**	**−0.05**	**−0.10**	**−0.06**	**−0.11**	**−0.14**	**−0.14**
P. M.										
Sept. 19			1.09	0.97	0.88	0.80				
23		1.19	1.09	0.99	0.90	0.82	0.76			
30		1.13	0.93	0.76	0.65	0.58	0.51	0.46	0.39	
Monthly means		**(1.16)**	**1.04**	**0.91**	**0.81**	**0.73**	**(0.64)**	**(0.46)**	**(0.39)**	
Departure from 10-year normal		**−0.04**	**−0.02**	**−0.05**	**−0.06**	**−0.06**	**−0.10**	**−0.26**	**−0.29**	

TABLE 1.—*Solar radiation intensities during September, 1918*—Contd.

[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
A. M.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*
Sept. 21		1.39	1.27							
23		1.15	1.01	0.89	0.81	0.73	0.63			
26		1.44	1.35	1.26	1.18	1.13	1.10	1.07		
27		1.32	1.25	1.16	1.08			0.92	0.88	
28		1.25	1.13	1.02	0.92	0.78	0.71	0.65		
Monthly means		**1.31**	**1.20**	**1.08**	**1.00**	**0.88**	**0.81**	**0.88**	**(0.88)**	
Departure from 9-year normal		**+0.06**	**+0.05**	**+0.03**	**+0.02**	**−0.04**	**−0.04**	**+0.03**		
P. M.										
Sept. 16		1.40	1.30	1.22						
21		1.35	1.23							
23		1.13								
26		1.42	1.33	1.24	1.16	1.08	1.00			
28		1.28	1.20	1.14	1.09	1.04	0.98			
30		1.41	1.29	1.22						
Monthly means		**1.33**	**1.27**	**1.20**	**(1.12)**	**(1.06)**	**(0.99)**			
Departure from 9-year normal		**+0.08**	**+0.12**	**+0.15**	**+0.10**	**0.25**	**+0.14**			

Lincoln, Nebr.

A. M.										
Sept. 4			1.15	1.07	1.00	0.93				
6		1.35	1.29	1.23	1.17	1.07	0.98			
7		1.22	1.19	1.11	1.05	0.96	0.89			0.83
11		1.30	1.18	1.06	0.95	0.87	0.80	0.73	0.68	
12		1.25	1.22	1.12	1.04	0.97				
16		1.42	1.31	1.22	1.14	1.05	0.98			
17		1.32	1.26	1.21						
18		1.30	1.23	1.10	1.01	0.92				
20		1.45	1.35	1.26	1.18	1.10	1.03	0.92		
21		1.36	1.30	1.25	1.14	1.08	1.03	0.95	0.90	
23		1.28	1.20	1.12	1.04	0.97	0.90	0.84		
26		1.40	1.25	1.12	1.05	0.98	0.92	0.87	0.81	
27		1.29	1.09	1.04	0.82	0.76	0.70			
28		1.28	1.19	1.06	0.94	0.84	0.75			
Monthly means		**1.33**	**1.23**	**1.14**	**1.04**	**0.96**	**0.90**	**0.86**	**0.80**	**(0.83)**
Departure from 4-year normal		**+0.04**	**+0.05**	**+0.07**	**+0.05**	**+0.06**	**+0.07**	**+0.09**	**+0.03**	
P. M.										
Sept. 4		1.22	1.09	0.98						
7		1.27	1.04	0.95	0.92			0.74	0.69	0.65
11		1.33	1.24	1.14	1.06	0.98	0.91	0.86	0.81	
12						1.02	0.95	0.89	0.83	0.79
13		1.24	1.14	1.05	0.97	0.90	0.83	0.76	0.70	0.65
20		1.41	1.29	1.18	1.11	1.04	0.97	0.86	0.77	
21		1.34	1.20	1.10	1.02	0.94	0.87	0.80	0.74	0.69
26		1.33	1.23	1.17	1.12	1.02	0.96	0.90	0.85	0.80
28		1.32	1.20	1.11	1.02	0.93	0.86	0.80	0.75	0.69
Monthly means		**1.31**	**1.18**	**1.08**	**1.03**	**0.98**	**0.91**	**0.83**	**0.77**	**0.71**
Departure from 4-year normal		**+0.03**	**+0.04**	**+0.02**	**+0.07**	**+0.08**	**+0.08**	**+0.04**	**+0.03**	**+0.01**

TABLE 1.—*Solar radiation intensities during September, 1918*—Contd.

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

Santa Fe, N. Mex.

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.
Sept. 7	1.48	1.33	1.29	1.26	1.12	.....	.....	0.98	0.94	.....
9	.....	1.29	.....	.....	.....	.....	.....	.....	.....	.....
12	1.42	1.37	1.24	1.16	1.08	1.01	.....	.....	.....	.....
Monthly means	(1.45)	1.33	(1.26)	(1.21)	(1.10)	1.01)	.....	(0.98)	(0.94)	.....
Departure from 2-year normal	−0.06	−0.07	−0.05	−0.03	−0.06	−0.10	.....	−0.02	−0.02	.....
P. M.										
Sept. 6	.....	.....	1.28	1.20	.....	.....	.....	.....	0.90	0.81
10	.....	1.32	1.26	.....	.....	.....	.....	.....	.....	.....
Monthly means	.....	(1.32)	(1.27)	(1.20)	.....	.....	.....	.....	(0.90)	(0.84)
Departure from 2-year normal	.....	−0.14	−0.11	−0.09	.....	.....	.....	.....	−0.03	−0.05

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.
1918.	mm.	mm.	1918.	mm.	mm.	1918.	mm.	mm.	1918.	mm.	mm.
Sept. 7	8.81	10.59	Sept. 16	6.76	6.02	Sept. 4	6.76	6.76	Sept. 6	7.29	6.76
9	9.14	11.38	21	5.16	6.02	6	6.50	6.50	7	6.76	7.29
10	10.21	12.24	23	7.29	10.21	7	8.18	7.57	9	7.29	9.83
13	10.97	10.59	26	5.16	5.16	11	10.21	7.87	10	8.48	10.59
19	12.68	14.10	27	4.75	6.02	12	6.76	4.75	12	8.81	5.56
21	7.04	5.56	28	5.79	6.76	13	7.29	7.29	.....	.....	.....
23	7.29	8.48	30	5.79	4.75	16	6.27	4.17	.....	.....	.....
27	5.56	8.18	.....	.....	.....	17	5.36	10.21	.....	.....	.....
30	7.29	11.38	.....	.....	.....	18	4.95	6.02	.....	.....	.....
.....	.....	.....	.....	.....	.....	20	3.99	3.00	.....	.....	.....
.....	.....	.....	.....	.....	.....	21	3.81	4.57	.....	.....	.....
.....	.....	.....	.....	.....	.....	23	7.29	7.29	.....	.....	.....
.....	.....	.....	.....	.....	.....	26	7.29	9.83	.....	.....	.....
.....	.....	.....	.....	.....	.....	27	4.17	4.57	.....	.....	.....
.....	.....	.....	.....	.....	.....	28	5.16	7.87	.....	.....	.....

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

[Gram-calories per square centimeter of normal 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.
Sept. 1	548	492	288	141	99	−157	141	99	−15[illegible]
2	465	195	319	60	−196	−124	201	−97	−28[illegible]
3	378	230	51	−26	−158	−391	175	−255	−67[illegible]
4	382	178	565	−20	−207	124	155	−462	−54[illegible]
5	329	539	545	−72	157	105	83	−305	−44[illegible]
6	152	493	576	−247	115	138	−164	−190	−30[illegible]
7	456	281	583	59	−94	148	−105	−284	−15[illegible]
8	127	450	548	−269	79	116	−374	−205	−4[illegible]
9	451	202	173	57	−165	−257	−317	−370	−29[illegible]
10	455	267	188	63	−96	−239	−254	−466	−53[illegible]

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

[Gram-calories per square centimeter of normal 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.
Sept. 11	235	143	573	−156	−216	149	−410	−682	−388
12	209	151	584	−120	−204	163	−530	−886	−225
13	486	432	453	99	81	35	−431	−805	−190
14	446	208	469	60	−139	54	−371	−944	−136
15	416	456	136	32	113	−276	−339	−831	−412
16	204	415	541	−178	75	132	−517	−756	−280
17	228	296	454	−151	−40	47	−668	−796	−233
18	145	357	520	−232	21	116	−900	−772	−117
19	446	419	529	72	90	127	−828	−682	10
20	35	200	581	−337	−126	182	−1,165	−808	192
Decade departure							−911	−342	729
21	272	476	573	−98	154	176	−1,263	−654	368
22	448	455	544	80	136	150	−1,183	−518	518
23	434	429	455	69	114	64	−1,114	−404	582
24	380	378	282	17	66	−107	−1,097	−338	475
25	401	278	357	40	−30	−29	−1,057	−368	446
26	189	459	544	−169	154	161	−1,226	−214	607
27	434	435	522	80	133	141	−1,146	−81	748
28	315	417	483	−36	119	105	−1,182	38	853
29	362	123	444	15	−172	68	−1,167	−134	921
30	424	392	66	80	100	−307	−1,087	−34	614
Decade departure							+78	+774	+422
Excess or deficiency since first of year. gr.-cal.							−2,353	+904	+890
Excess or deficiency since first of year. per cent							−2.2	+0.9	+0.8

WOLFER PROVISIONAL SUNSPOT RELATIVE NUMBERS.

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The provisional relative sunspot numbers given in the table herewith are in continuation of the *observed relative* and the *smoothed relative* sunspot numbers published in the REVIEW for July, 1915, **43**:314.

While these provisional numbers are subject to slight revision, and later will be smoothed by the method described in the REVIEW for April, 1902, **30**:171, they are sufficiently accurate to show that at the crest of the maximum of 1917 the relative sunspot number was in excess of 100, which is unusually high.

The epoch of the last preceding maximum was 1906.4, so that the interval between the two has been very close to 11 years.

Wolfer provisional sunspot relative numbers, January, 1915–March, 1918.

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Mean.
1915[1]	25.7	35.6	34.9	42.2	35.0	69.9	71.0	68.6	44.7	53.5	38.2	32.7	46.0
1916[2]	44.3	55.4	66.5	73.3	71.4	67.7	53.0	34.1	41.4	56.0	60.7	41.0	55.4
1917[2]	76.2	71.8	86.6	63.7	112.7	113.8	117.0	143.2	121.9	71.4	90.1	116.8	98.8
1918[2]	96.3	83.4	72.2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

[1] Met. Zeit, 1915, **32**: 188, 364, 508, and 1916, **33**: 42.
[2] Terr. Mag. Sept., 1918, **23**: 136.