551.590.2

SOLAR OBSERVATIONS

SOLAR AND SKY RADIATION MEASUREMENTS DURING SEPTEMBER, 1929

By HERBERT H. KIMBALL, Solar Radiation Investigations

For a description of instruments and exposures and an account of the method of obtaining and reducing the measurements, the reader is referred to the REVIEW for January, 1929, **57**: 26.

Table 1 shows that solar radiation intensities averaged below the normal values for September at Madison, Wis., and close to normal at Washington, D. C., and Lincoln, Nebr.

Table 2 shows an excess in the total solar radiation (direct + diffuse) received on a horizontal surface at Washington and Madison, and a decided deficiency at Lincoln, Chicago, and New York.

Skylight polarization measurements obtained on five days at Washington give a mean of 51 per cent and a maximum of 56 per cent on the 24th. At Madison, measurements obtained on seven days give a mean of 50 per cent and a maximum of 69 per cent on the 18th. The values obtained at both stations are below the September averages for the respective stations.

TABLE 1.—*Solar radiation intensities during September, 1929*

[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 mer. time	Air mass									Local mean solar time
		A. M.					P. M.				
	e.	5.0	4.0	3.0	2.0	[1] 1.0	2.0	3.0	4.0	5.0	e.
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
Sept. 3	13.13						0.71	0.55			13.13
Sept. 7	19.89					1.09					19.23
Sept. 9	19.23			0.81	0.93						19.23
Sept. 10	16.79			0.86	1.02						17.96
Sept. 11	9.14				1.18	1.42					7.87
Sept. 12	8.18				1.11						9.83
Sept. 18	8.81						1.24				7.29
Sept. 19	4.57	0.86	0.98	1.11	1.30	1.50					4.37
Sept. 21	6.27			0.72							5.79
Sept. 24	8.81	0.77	0.89	1.03	1.18	1.33	1.06	0.91	0.75	0.62	5.36
Means		(0.82)	(0.94)	0.91	1.12	1.34	1.00	(0.73)	(0.75)	(0.62)	
Departures		+0.12	+0.19	+0.03	+0.07	+0.01	−0.05	+0.12	−0.02	−0.04	

Madison, Wis.

Sept. 3	15.11			0.44	0.63	0.90					14.60
Sept. 11	6.76		0.91	1.02	1.19	1.29					7.04
Sept. 14	6.27		0.99	1.11	1.25	1.40					5.36
Sept. 17	6.27				1.27	1.49					4.37
Sept. 18	4.95		0.95	1.14	1.31	1.51	1.27				5.36
Sept. 21	7.04			0.78	1.02						6.76
Sept. 23	6.76		0.57	0.73	0.97	1.28	1.08				8.18
Sept. 26	8.48				0.78						12.24
Means			0.86	0.87	1.05	1.31	(1.18)				
Departures			−0.05	−0.15	−0.11	−0.06	+0.02				

Lincoln, Nebr.

Sept. 13	10.59			1.04	1.26						9.14
Sept. 14	7.29		0.97	1.09	1.28	1.48			1.03	0.86	7.04
Sept. 16	7.29			1.00	1.14						6.27
Sept. 17	7.87		0.71	0.98	1.13	1.36	1.09	0.91	0.76	0.62	7.29
Sept. 23	11.38						0.84	0.70	0.64		10.21
Sept. 24	10.59						0.94				10.21
Sept. 26	12.68							0.74			13.13
Means			(0.84)	1.03	1.20	(1.42)	0.96	0.78	0.81	(0.74)	
Departures			−0.03	+0.02	+0.01	+0.02	−0.19	−0.19	−0.02	+0.01	

[1] Extrapolated.

TABLE 2.—*Solar and sky radiation received on a horizontal surface*

[Gram-calories per square centimeter of horizontal surface]

Week beginning	Average daily radiation							Average daily departure from normal				
	Washington	Madison	Lincoln	Chicago	New York	Fresno	La Jolla	Washington	Madison	Lincoln	Chicago	New York
1929	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*
Sept. 3	369	314	274	296	182	582	254	−7	−52	−150	−19	−124
Sept. 10	361	338	436	297	281	529	205	−13	−4	+29	+13	−14
Sept. 17	400	437	360	281	288	425	265	+49	+98	−23	+14	+13
Sept. 24	402	267	305	149	202	490	417	+62	−23	−35	−84	−55
Excess or deficiency since first of year on Sept. 30.								+5,789	−539	−3,303	−973	−5,369

REFLECTIVITY OF DIFFERENT KINDS OF SURFACES—A CORRECTION

Dr. L. F. Richardson invites our attention to an error in our paper on the above subject in the REVIEW for July of the current volume, page 291, as follows:

"There is a definite mistake in line 25 from the beginning. You state that 'A_s' is the area of the window. Unfortunately this is hardly even roughly true. There is no short name for A_s. It is not a solid angle. It is the rather complicated idea explained in paragraph 5 (1) of the Prague report.[1]

"Perhaps the best short explanation would be to say $\frac{A_s}{A_G}=\left(\frac{\sin\ \alpha_s}{\sin\ \alpha_G}\right)^2$ where α_G is the semi-vertical angle of a cone having its vertex at the midpoint of the edge of the white wedge and bounded by the iris and where α_s is a similar angle for the sky window."

The reader is referred to the paper by Richardson, above cited, for further details.—*H. H. K. and I. F. H.*

POSITIONS AND AREAS OF SUN SPOTS

[Communicated by Capt. C. S. Freeman, Superintendent U. S. Naval Observatory. Data furnished by Naval Observatory, in cooperation with Harvard, Yerkes, and Mount Wilson observatories. The differences of longitude are measured from central meridian, positive west. The north latitudes are plus. Areas are corrected for foreshortening and are expressed in millionths of sun's visible hemisphere. The total area, including spots and groups, is given for each day in the last column]

Date	Eastern standard civil time	Heliographic			Area		Total area for each day
		Diff. long.	Longitude	Latitude	Spot	Group	
1929	*h. m.*	°	°	°			
Sept. 1 (Naval Observatory).	12 5	−18.0	282.9	−12.5		15	
		−10.0	290.9	+4.5		6	21
Sept. 2 (Naval Observatory).	10 50	−4.0	284.4	−13.0		18	
		+3.5	291.9	+5.0		12	30
Sept. 3 (Naval Observatory)	10 45	−79.0	196.2	+21.5	93		
		−45.5	229.7	+12.5	6		
		−14.0	261.2	−24.5		9	
		+11.5	286.7	−11.0		15	
		+16.0	291.2	+5.0	6		129
Sept. 4 (Naval Observatory).	11 6	−65.5	196.3	+21.0	77		
		−43.5	218.3	+10.0	9		
		+2.5	264.3	−5.5	12		
		+30.0	291.8	+4.5	3		101
Sept. 5 (Naval Observatory).	11 49	−81.5	166.7	−10.0	154		
		−53.0	195.2	+20.5	62		
		−28.5	219.7	+12.5	3		
		−15.0	233.2	+17.2	3		
		+15.0	263.2	−5.0		216	438
Sept. 6 (Naval Observatory).	14 6	−67.0	166.8	−10.5	62		
		−39.0	194.8	+20.5	56		
		+7.5	241.3	−13.5		12	
		+30.5	264.3	−5.0		216	346

[1] Richardson, L. F., 1928. Report on photometers for a survey of the reflectivity of the earth's surface. Union Géodésique et Géophysique Internationale, Section de Météorologie. Troisième Assemblée Générale: Prague, 1927.