TABLE 1.—*Solar radiation intensities during June, 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.*
June 4	6.27	0.60	0.72	0.87	1.06	1.31					5.36
June 11	9.14			0.59	0.86	1.12	0.63				8.81
June 12	11.38			0.38	0.60	1.12					12.68
June 13	15.11		0.70	0.87	1.03	1.26					13.13
June 14	14.60					1.17					17.37
June 17	16.20					1.15					14.10
June 18	16.20			0.76	0.94	1.15					14.60
June 19	15.65				0.76						17.37
Means		(0.60)	(0.71)	0.69	0.88	1.18	(0.63)				
Departures		+0.03	+0.05	−0.06	−0.03	−0.04	−0.28				

Madison, Wis.

June 5	7.29					1.36					7.57
June 8	4.75				0.89						7.87
June 15	10.97				1.01	1.27					12.24
June 19	14.60				1.13	1.39					11.38
June 20	12.68					1.41					8.81
June 21	8.81			0.87							7.29
June 25	9.14		0.75	0.92	1.06	1.31					7.57
June 26	10.21			0.98	1.12	1.38					9.83
June 28	9.83			0.81							10.59
June 29	12.24			0.94	1.07						11.38
Means			(0.75)	0.90	1.05	1.35					
Departures			−0.12	−0.06	−0.05	+0.02					

Lincoln, Nebr.

June 9	13.61		0.49	0.63	0.78	1.07					13.59
June 11	17.37		0.62	0.76	0.98	1.21					19.23
June 13	8.48		0.67	0.85	1.07	1.35	1.14	0.88	0.72		7.57
June 14	9.47		0.72	0.89	1.11	1.39					9.47
June 15	12.68		0.62	0.77	0.93	1.11					10.59
June 19	11.38		0.77	0.94	1.14	1.39	1.01				8.18
June 20	8.18						1.19	1.05	0.88		6.27
June 21	8.81			0.90	1.12	1.40					8.48
June 25	10.21		0.69	0.85	1.07	1.38					8.18
June 28	9.47		0.94	1.03	1.24	1.42	1.07	0.91	0.73		9.47
Means			0.69	0.85	1.05	1.30	1.10	0.95	0.78		
Departures			−0.08	−0.08	−0.05	−0.05	±0.00	+0.04	−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	Twin Falls	Fresno	Washington	Madison	Lincoln	Chicago	New York
1929	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*
June 4	542	584	423	491	404	556	627	+56	+67	−105	+70	−8
June 11	634	384	576	276	398	695	673	+132	−115	+40	−136	−10
June 18	518	539	616	410	382	887	762	+46	+19	+56	−4	−17
June 25	460	542	607	346	313	802	726	−52	+2	+19	−96	−88
Excess or deficiency since first on year on July 1								+609	−1,246	−628	−133	−3,388

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.*	°	°	°			
June 1 (Naval Observatory).	10 52	−62.0	16.6	+13.5		46	
		+21.0	99.6	+17.5		22	
		+58.5	137.1	+14.5	417		485
June 2 (Naval Observatory).	12 28	−46.0	18.5	+13.5	15		
		−39.5	25.0	−19.0		77	
		+72.0	136.5	+14.5	432		524
June 3 (Naval Observatory).	11 44	−84.5	327.1	−9.5	123		
		−35.5	16.1	−15.5	6		
		−33.0	18.6	+13.5	22		
		−25.0	26.6	−16.0	12		
		+17.5	69.1	+11.0	9		
		+23.5	75.1	−16.5	6		
		+85.0	136.6	+14.0	463		641
June 4 (Naval Observatory).	11 36	−78.0	320.5	+5.5		216	
		−69.0	329.5	−8.5		139	
		−20.0	18.5	+13.5	15		
		+32.0	70.5	+10.5		25	
		+38.0	76.5	−17.0	9		404
June 5 (Naval Observatory).	11 10	−68.5	317.0	+6.5		262	
		−55.5	330.0	−9.0		185	
		−6.5	19.0	+13.0	9		
		+50.0	75.5	−17.5		123	579
June 6 (Naval Observatory).	11 21	−78.0	294.1	−18.5	123		
		−55.0	317.1	+6.0		201	
		−42.5	329.6	−9.0		216	
		+18.0	30.1	−10.0	9		
		+65.0	77.1	−17.5		231	780
June 7 (Naval Observatory).	11 25	−68.5	290.4	+24.5	15		
		−64.5	294.4	−18.5	93		
		−40.5	318.4	+6.0		139	
		−28.5	330.4	−9.0		262	
		+32.5	31.4	−11.0	3		
		+77.0	75.9	−17.5		340	852
June 8 (Harvard)	12 42	−50.5	293.0	−18.5		148	
		−24.5	319.0	+7.0	166		
		−13.0	330.5	−8.5	466		780
June 9 (Naval Observatory).	14 33	−36.5	294.2	−19.0	93		
		−12.5	318.2	+5.5		108	
		0.0	330.7	−9.5		355	556
June 10 (Naval Observatory).	11 21	−30.0	289.2	−7.0		15	
		−25.5	293.7	−18.5	108		
		+0.5	319.7	+6.5		123	
		+13.0	332.2	−8.5		293	539
June 11 (Naval Observatory).	11 21	−78.0	228.0	−11.0	77		
		−75.0	231.0	+13.0	108		
		−45.5	260.5	−4.0		56	
		−11.5	294.5	−19.0	93		
		+2.5	308.5	+9.5		31	
		+14.0	320.0	+6.5		80	
		+25.5	331.5	−8.5		309	754
June 12 (Naval Observatory).	11 26	−64.5	228.2	−11.5		93	
		−62.0	230.7	+13.5	108		
		−32.0	260.7	−4.5		93	
		−5.0	287.7	−7.0		77	
		+1.0	293.7	−19.0	86		
		+27.0	319.7	+7.0		77	
		+39.5	332.2	−8.0		324	858
June 13 (Naval Observatory).	11 30	−82.0	197.4	−17.0	201		
		−51.5	227.9	−11.0	62		
		−48.0	231.4	+13.5	77		
		+10.0	289.4	−6.0	31		
		+14.5	293.9	−19.5	77		
		+38.0	317.4	+9.5		46	
		+39.0	318.4	+7.0	62		
		+54.0	333.4	−8.5		293	849
June 14 (Naval Observatory).	11 23	−68.5	197.7	−16.5	139		
		−38.5	227.7	−11.0	62		
		−35.0	231.2	+13.5	62		
		+23.0	289.2	−7.5		62	
		+28.0	294.2	−19.5	46		
		+52.5	318.7	+7.0	62		
		+52.5	318.7	+9.5		37	
		+65.0	331.2	−8.5		247	717

Positions and areas of sun spots—Continued

Date	Eastern standard civil time	Heliographic: Diff. long.	Heliographic: Longitude	Heliographic: Latitude	Area: Spot	Area: Group	Total area for each day
1929	H. m.	°	°	°			
June 15 (Naval Observatory).	10 39	−56.5	196.9	−16.5		93	
		−24.5	228.9	−11.5		93	
		−22.0	231.4	+13.5	46		
		+19.0	272.4	+9.0		46	
		+36.5	289.9	−8.5		37	
		+40.5	293.9	−19.0	15		
		+66.0	319.4	+7.0	77		
		+70.0	323.4	+10.0	12		
		+76.0	329.4	−9.5	62		
		+76.0	329.4	−7.0	15		496
June 16 (Naval Observatory).	11 15	−43.0	196.8	−16.0		77	
		−12.5	227.3	−11.5		77	
		−8.0	231.8	+13.5	46		
		−2.0	237.8	+9.5		24	
		+33.0	272.8	+8.5		77	
		+50.5	290.3	−8.5		57	
		+79.5	319.3	+7.0	77		
		+84.0	323.8	+10.5	31		466
June 17 (Naval Observatory).	11 18	−30.0	196.6	−16.0		68	
		+1.0	227.6	−12.0		46	
		+2.5	229.1	+14.0		52	
		+13.0	239.6	+9.0		56	
		+47.5	274.1	+8.0		77	299
June 18 (Naval Observatory).	11 10	−82.0	131.4	−5.5		123	
		−78.5	134.9	+12.5	262		
		−77.0	136.4	−8.5		478	
		−17.0	196.4	−16.5		68	
		+14.0	227.4	−12.0		15	
		+16.0	229.4	+13.5		46	
		+27.5	240.9	+8.5		62	
		+62.5	275.9	+8.0		65	
		+77.5	290.9	−7.0		46	1,165
June 17 (Naval Observatory).	11 17	−69.5	130.6	−5.0		77	
		−64.5	135.6	+12.5	309		
		−62.0	138.1	−9.0		525	
		−3.5	196.6	−15.0		37	
		+27.5	227.6	−12.0	3		
		+31.5	231.6	+13.5	31		
		+41.0	241.1	+9.0		108	
		+42.0	242.1	−7.5	6		
		+74.5	274.6	+7.5		108	1,204
June 20 (Naval Observatory).	11 20	−64.0	122.8	−9.0		62	
		−55.5	131.3	−5.0		77	
		−50.5	136.3	+12.5	370		
		−47.5	139.3	−9.0		448	
		+10.5	197.3	−15.0	12		
		+44.5	231.3	+13.5	15		
		+54.0	240.8	+9.0		170	
		+55.5	242.3	−8.5		77	
		+88.0	274.8	+7.5	62		1,293
June 21 (Naval Observatory).	11 13	−52.0	121.7	−9.5		93	
		−41.0	132.7	−5.0		37	
		−38.0	135.7	+13.0	324		
		−34.0	139.7	−9.0		509	
		−13.0	160.7	+15.0		31	
		+12.0	185.7	−19.5		77	
		+23.5	197.2	−15.0	15		
		+48.0	221.7	+16.0		31	
		+57.5	231.2	+13.5	6		
		+66.5	240.2	+9.0		170	
		+68.5	242.2	−8.5		123	1,416
June 22 (Naval Observatory).	11 2	−79.5	81.0	−17.5	185		
		−38.0	122.5	−9.0		123	
		−29.0	131.5	−5.0		62	
		−25.0	135.5	+13.0	324		
		−21.0	139.5	−9.5		540	
		+1.0	161.5	+14.5		37	
		+26.0	186.5	−17.5		139	
		+37.0	197.5	−15.5	9		
		+61.5	222.0	+15.5		31	
		+81.0	241.5	−9.0	154		1,604
June 23 (Naval Observatory).	11 1	−65.5	81.8	−17.5	154		
		−25.5	121.8	−9.0		185	
		−12.0	135.3	+13.0	309		
		−7.5	139.8	−9.5		571	
		+14.5	161.8	+14.0		37	
		+40.5	187.8	−16.5		154	
		+50.5	197.8	−15.5	12		1,422
June 24 (Naval Observatory).	11 54	−51.5	82.1	−17.5	154		
		−10.5	123.1	−8.5		154	
		+2.0	135.6	+13.0	278		
		+7.5	141.1	−10.0		525	
		+31.5	165.1	+13.0		9	
		+55.0	188.6	−16.5		154	1,274

Positions and areas of sun spots—Continued

Date	Eastern standard civil time	Heliographic: Diff. long.	Heliographic: Longitude	Heliographic: Latitude	Area: Spot	Area: Group	Total area for each day
1929	H. m.	°	°	°			
June 25 (Naval Observatory).	11 18	−72.0	48.7	−13.0	12		
		−38.5	82.2	−17.5	154		
		−30.0	90.7	−17.0	6		
		+2.0	122.7	−8.0		77	
		+15.0	135.7	+13.0	309		
		+21.0	141.7	−10.0		478	
		+45.0	165.7	+13.5	6		
		+67.5	188.2	−16.5		216	1,258
June 26 (Naval Observatory).	14 48	−77.0	28.5	−18.0		139	
		−67.0	38.5	+6.5	6		
		−57.5	48.0	−13.0	9		
		−24.0	81.5	−17.5	154		
		−15.0	90.5	−17.0	3		
		+17.0	122.5	−8.0		46	
		+30.0	135.5	+12.5	324		
		+36.5	142.0	−10.0		448	
		+80.0	185.5	−16.5	31		1,160
June 27 (Naval Observatory).	11 19	−64.5	29.7	−17.5		123	
		−56.0	38.2	+7.0	6		
		−45.5	48.7	−11.0		9	
		−12.5	81.7	−17.0	154		
		−9.5	84.7	+11.5		6	
		+30.0	124.2	−7.0		15	
		+41.5	135.7	+13.5	324		
		+48.0	142.2	−9.0		463	1,100
June 28 (Mount Wilson).	13 30	−75.0	4.8	−10.0	4		
		−75.0	4.8	+5.0	9		
		−51.0	28.8	−18.0		11	
		−45.0	34.8	+8.0		41	
		+2.0	81.8	−18.0	200		
		+56.0	135.8	+13.0	442		
		+60.0	139.8	+8.0		10	
		+65.0	144.8	−9.0		463	1,180
June 29 (Naval Observatory).	10 31	−88.0	340.2	−10.0		170	
		−70.5	357.7	−14.0	6		
		−64.5	3.7	−9.5		37	
		−64.5	3.7	+6.5		46	
		−36.5	31.7	−19.0		15	
		−33.0	35.2	+7.5		93	
		+13.0	81.2	−16.5	154		
		+67.5	135.7	+13.0	309		
		+77.5	145.7	−9.5	262		1,092
June 30 (Naval Observatory).	11 16	−74.0	340.5	−9.0		432	
		−57.0	357.5	−13.0	6		
		−49.5	5.0	−8.5		18	
		−49.5	5.0	+6.5		154	
		−19.5	35.0	+8.0		53	
		−15.5	39.0	−12.0		15	
		+26.0	80.5	−16.5	154		
		+75.5	130.0	−5.0	12		
		+81.0	135.5	+12.5	247		1,091
Mean daily area for June							895

PROVISIONAL SUN-SPOT RELATIVE NUMBERS FOR JUNE, 1929

[Data furnished through the courtesy of Prof. W. Brunner, University of Zurich, Switzerland]

June, 1929	Relative numbers	June, 1929	Relative numbers	June, 1929	Relative numbers
1	27	11	82	21	M [1] 101
2	30	12	[4] 88	22	[2] 110
3	26	13	84	23	104
4	W [1 2] 47	14	79	24	[3] 84
5	54	15	M [1] 80	25	[4] 80
6		16	M [1] 76	26	85
7		17	[4] 64	27	62
8	68	18	[2] 76	28	E [4 1] 65
9	[3] 58	19	[4] 70	29	E [1] 79
10	[4] 68	20	91	30	[2] 84

Mean (28 days) = 72.2.

[1] New formation of a large or average-sized center of activity: E, on the eastern part of the sun's disk; W, on the western part; M, in the central zone.
[2] Entrance of a large or average-sized center of activity on the east limb.
[3] Passage of a large group through the central meridian.
[4] Passage of an average-sized group through the central meridian.