TABLE 1.—*Solar radiation intensities during October, 1928*—Contd.

Madison, Wis.

Date	Lun'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	1.0	2.0	3.0	4.0	5.0	e.
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
Oct. 2	6.27						1.10				6.02
Oct. 3	7.57				0.92						11.81
Oct. 5	8.18					1.51	1.32	1.16			6.76
Oct. 9	6.50	0.94	1.04	1.14	1.28	1.53					4.95
Oct. 24	4.95		0.99	1.11	1.22		1.25				4.95
Oct. 25	4.75	1.00	1.11	1.21	1.35	1.50					4.75
Oct. 29	2.62	0.99	1.12	1.25	1.39						2.26
Means		0.98	1.06	1.18	1.23	1.51	1.22	1.16			
Departures		+0.20	+0.12	+0.12	+0.04	+0.11	+0.03	+0.14			

Lincoln, Nebr.

Oct. 2	4.95					1.33	1.12	0.94	0.79	0.66	5.56
Oct. 3	8.48					1.29	1.07	0.92	0.77	0.66	9.14
Oct. 5	6.27		0.68	1.01	1.28	1.54	1.27	1.06	0.93	0.81	4.57
Oct. 6	6.27	0.65	0.74		1.08						3.99
Oct. 8	11.38			1.02							6.04
Oct. 9	6.27	0.84	0.87	1.03	1.21	1.53					5.78
Oct. 18	5.94			0.83	1.22						5.56
Oct. 19	4.57	0.97	1.07	1.20	1.36	1.53	1.30	1.03	0.95	0.76	4.95
Oct. 20	5.56				1.25						6.50
Oct. 22	4.17	1.00	1.12	1.25	1.39	1.56					2.49
Oct. 23	7.04								0.98	0.93	4.75
Oct. 26	5.36						1.02				5.56
Oct. 27	4.95				1.18	1.51	1.21	1.01		0.84	6.02
Means		0.86	0.90	1.06	1.25	1.47	1.16	0.99	0.88	0.78	
Departures		−0.02	−0.05	−0.04	−0.03	−0.02	−0.09	−0.09	−0.07	−0.06	

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	Washington	Madison	Lincoln
1928	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*
Oct. 1	345	297	349	275	271	452	+19	+28	+21
Oct. 8	348	227	241	200	233	336	+53	−23	−67
Oct. 15	243	140	258	113	180	390	−29	−81	−45
Oct. 22	316	190	311	127	163	402	+53	−15	+42
Excess or deficiency since first of year on Oct. 28							−1,829	+339	−863

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	
1928	*h. m.*	°	°	°			
Oct. 1 (Naval Observatory).	15 12	−9.0	31.7	+18.5		123	
		+2.5	43.2	−16.0		93	
		+56.0	96.7	−18.0		463	
		+64.0	104.7	−14.5		525	1,204
Oct. 2 (Yerkes)	9 31	+0.5	31.0	+20.0		100	
		+11.9	42.4	−16.7		75	
		+62.5	93.0	−15.0		100	
		+66.0	96.5	−19.5		200	
		+73.0	103.5	−13.0		300	
		+75.0	105.5	−15.5		300	1,075
Oct. 2 (Naval Observatory).	12 17	−63.5	325.6	−15.0	31		
		−60.5	328.6	+16.0	31		
		+2.0	31.1	+19.5		77	
		+13.5	42.6	−16.5		93	
		+64.5	93.6	−15.0	62		
		+68.5	97.6	−20.0		247	
		+76.0	105.1	−14.5		432	973

Positions and areas of sun spots—Continued

Date	Eastern standard civil time	Heliographic			Area		Total area for each day
		Diff. long.	Longitude	Latitude	Spot	Group	
	h. m.	°	°	°			
Oct. 3 (Yerkes)	9 43	−82.6	294.5	+14.5		200	
		−75.0	302.1	+14.5		250	
		+12.8	29.9	+19.8		75	
		+25.6	42.7	−17.1		40	
		+75.8	92.9	−14.0		100	
		+79.3	96.4	−19.0		300	965
Oct. 3 (Naval Observatory).	11 35	−83.5	292.8	+14.0	123		
		−75.5	300.8	+14.0	154		
		−50.0	326.3	−14.5	15		
		−49.0	327.3	+11.5		77	
		+14.0	30.3	+20.0		77	
		+27.0	43.3	−16.5		77	
		+77.0	93.3	−15.0	77		
		+80.5	96.8	−20.0	231		831
Oct. 4 (Naval Observatory).	11 28	−69.5	293.7	+13.5	139		
		−61.5	301.7	+14.0	262		
		−36.5	326.7	−15.0	15		
		−35.5	327.7	+11.5		62	
		+24.5	27.7	+20.0		93	
		+39.0	42.2	−17.5	15		586
Oct. 5 (Naval Observatory).	11 33	−78.5	272.5	−4.5		154	
		−56.5	294.5	+13.0	123		
		−48.5	302.5	+13.5	170		
		−24.5	326.5	−16.0	15		
		+56.5	47.5	−16.0	15		477
Oct. 6 (Yerkes)	9 25	−77.3	260.8	+18.0		200	
		−43.6	294.5	+13.4		75	
		−35.5	302.6	+13.9		150	425
Oct. 6 (Naval Observatory).	11 44	−77.0	259.7	+17.5	154		
		−64.0	272.7	−5.0		93	
		−44.0	292.7	+12.5		123	
		−34.5	302.2	+13.5	154		
		+68.0	44.7	−17.0		62	586
Oct. 7 (Yerkes)	9 41	−75.4	249.2	+8.7		100	
		−64.0	260.6	+17.9		200	
		−30.5	294.9	+13.0		50	
		−22.7	301.9	+13.7		150	500
Oct. 7 (Naval Observatory).	11 37	−77.5	246.0	+7.5		262	
		−63.5	260.0	+18.0	185		
		−50.5	273.0	−5.0		62	
		−29.0	294.5	+12.5		139	
		−24.0	299.5	+18.5		31	
		−21.5	302.0	+13.0	154		
		−6.5	317.0	−14.0		62	895
Oct. 8 (Naval Observatory).	11 38	−67.5	242.8	+6.5	93		
		−61.0	249.3	+9.0	123		
		−51.0	259.3	+18.5	185		
		−36.0	274.3	−5.0		46	
		−16.0	294.3	+12.0		154	
		−8.5	301.8	+13.5	170		
		+9.0	319.3	−14.5		62	
		+37.0	347.3	−16.5	31		864
Oct. 8 (Yerkes)	13 31	−64.7	244.6	+7.2		100	
		−58.6	250.7	+10.2		60	
		−48.1	261.2	+19.2		200	
		−14.5	294.8	+13.5		50	
		−6.6	302.7	+14.0		300	710
Oct. 9 (Yerkes)	11 20	−53.5	243.5	+6.9		300	
		−46.5	250.5	+9.7		40	
		−38.4	258.6	+18.5		200	
		−2.8	294.2	+13.2		50	
		+4.9	301.9	+14.0		250	840
Oct. 9 (Naval Observatory).	11 43	−52.0	245.1	+8.0		370	
		−38.0	259.1	+18.0	154		
		−21.0	276.1	−5.0		62	
		−3.0	294.1	+12.0		123	
		+5.0	302.1	+13.0	139		848
Oct. 10 (Yerkes)	10 11	−41.4	243.1	+6.9		400	
		−34.8	249.7	+9.7		150	
		−25.3	259.2	+18.7		250	
		+9.7	294.2	+13.2		60	
		+17.3	301.8	+14.0		275	1,135
Oct. 10 (Naval Observatory).	11 42	−40.5	243.4	+6.5	370		
		−35.0	248.9	+8.5		185	
		−24.5	259.4	+18.5	154		
		−14.0	269.9	+10.0		62	
		−10.5	273.4	−5.0	15		
		+11.5	295.4	+11.5		123	
		+18.5	302.4	+13.0	123		
		+67.0	350.9	+2.0		93	1,125
Oct. 11 (Yerkes)	10 3	−29.2	242.5	+6.8		500	
		−21.8	249.9	+9.8		175	
		−12.2	259.5	+18.7		275	
		+23.1	294.8	+13.2		50	
		+30.5	302.2	+13.9		250	1,250

Positions and areas of sun spots—Continued

Date	Eastern standard civil time	Heliographic			Area		Total area for each day
		Diff. long.	Longitude	Latitude	Spot	Group	
	h. m.	°	°	°			
Oct. 11 (Naval Observatory).	11 45	−45.0	225.7	−7.5		31	
		−28.0	242.7	+6.5		478	
		−20.5	250.2	+10.0	123		
		−11.5	259.2	+18.5	123		
		0.0	270.7	+10.0		77	
		+5.0	275.7	−5.0		31	
		+24.5	295.2	+12.0		93	
		+31.5	302.2	+13.0	123		
		+82.5	353.2	+2.0	62		1,141
Oct. 12 (Naval Observatory).	11 43	−34.0	223.5	−8.0	15		
		−16.0	241.5	+6.5		293	
		−9.0	248.5	+8.5		216	
		−8.0	249.5	−16.5		15	
		+1.5	259.0	+18.5	123		
		+14.5	272.0	+9.0		77	
		+37.5	295.0	+12.5	46		
		+45.0	302.5	+13.0	123		908
Oct. 13 (Naval Observatory).	11 45	−81.5	162.8	−18.0	123		
		−2.5	241.8	+6.0		293	
		+5.0	249.3	+8.0		170	
		+5.5	249.8	−16.5		15	
		+14.5	258.8	+19.0	123		
		+28.0	272.3	+9.0		108	
		+50.0	294.3	+12.5		62	
		+59.0	303.3	+13.5	123		1,017
Oct. 14 (Harvard)	13 56	−63.0	167.0	−18.0	26		
		−14.0	216.0	+14.0		342	
		+18.0	248.0	+7.0		552	
		+31.0	261.0	+18.5	216		
		+44.5	274.5	+9.0		36	
		+73.5	303.5	+13.5		240	1,412
Oct. 15 (Yerkes)	9 12	−84.0	135.0	+16.8		250	
		+23.5	242.5	+6.7		400	
		+32.7	251.7	+9.7		125	
		+39.8	258.8	+18.7		250	1,025
Oct 15 (Harvard)	14 7	−78.5	138.0	+18.0	264		
		−53.5	163.0	−16.5		121	
		−1.5	215.0	+10.5	29		
		+30.0	246.5	+8.0		451	
		+42.0	259.0	+20.0	239		
		+58.0	274.5	+8.5		21	
		+72.5	289.0	+14.5		25	1,150
Oct. 16 (Naval Observatory).	12 1	−68.0	136.6	+16.5	201		
		−41.0	163.6	−17.5		77	
		+16.5	221.1	+12.5		123	
		+38.0	242.6	+6.5		201	
		+47.5	252.1	+10.0		46	
		+55.0	259.6	+19.0	123		771
Oct. 17 (Naval Observatory).	11 54	−68.0	123.5	−7.5	15		
		−63.0	128.5	+15.0		154	
		−57.0	134.5	−11.0	15		
		−55.0	136.5	+16.5	216		
		−29.0	162.5	−18.0		31	
		+32.0	223.5	+12.5		278	
		+51.5	243.0	+6.5		108	
		+61.0	252.5	+9.0		46	
		+68.5	260.0	+19.0	123		986
Oct. 18 (Naval Observatory).	11 12	−49.5	129.2	+15.0		139	
		−42.5	136.2	−9.5		31	
		−41.5	137.2	+16.5	201		
		−13.0	165.7	−17.0	31		
		+46.5	225.2	+12.5		309	
		+65.0	243.7	+6.5		62	
		+81.0	259.7	+19.5	123		896
Oct. 19 (Yerkes)	11 6	−36.3	126.9	+16.2		100	
		−25.4	137.8	+16.6		300	
		−22.4	140.8	+14.0		150	
		+62.7	225.9	+12.8		200	750
Oct. 19 (Naval Observatory).	11 52	−34.0	131.2	+13.5		170	
		−27.5	137.7	+15.0	185		
		−27.5	137.7	−10.0		62	
		−18.0	147.2	+8.0	15		
		+1.5	166.7	−18.5	15		
		+59.5	224.7	+12.0		309	
		+76.5	241.7	+6.5	46		802
Oct. 20 (Yerkes)	9 4	−16.1	137.0	+13.9		100	
		−15.1	138.0	+16.5		250	
		−11.2	141.9	+13.8		75	
		+72.2	225.3	+13.3		200	625
Oct. 20 (Naval Observatory).	11 40	−35.0	117.0	−11.0		46	
		−20.0	132.0	+13.5		154	
		−13.5	138.5	+15.5	247		
		−12.0	140.0	−9.5		31	
		−6.5	145.5	+9.0	31		
		+74.0	226.0	+12.5		185	694
Oct. 21 (Naval Observatory).	11 38	−15.0	123.9	−9.0	15		
		−12.5	126.4	+14.5		201	
		−0.5	138.4	+15.0		262	
		+3.5	142.4	−9.5	15		
		+8.5	147.4	+9.5	31		524
Oct. 21 (Yerkes)	13 2	−15.9	122.2	+17.5		50	
		−12.2	125.9	+16.2		200	
		−0.2	137.9	+16.5		300	
		+0.2	138.3	+13.8		60	610

Positions and areas of sun spots—Continued

Date	Eastern standard civil time	Heliographic			Area		Total area for each day
		Diff. long.	Longitude	Latitude	Spot	Group	
	h. m.	°	°	°			
Oct. 22 (Naval Observatory).	11 41	−1.5	124.1	−9.0	31		
		+1.0	126.6	+15.0		247	
		+13.0	138.6	+15.0		401	
		+17.0	142.6	−9.5	31		710
Oct. 23 (Yerkes)	14 54	−68.7	41.8	−13.1		100	
		−63.4	47.1	−11.0		300	
		+11.0	121.5	+17.1		60	
		+15.9	126.4	+16.4		200	
		+27.4	137.9	+16.7		250	910
Oct. 24 (Yerkes)	10 25	−57.0	42.8	−12.5		150	
		−51.9	47.9	−10.8		300	
		+27.3	127.1	+16.1		150	
		+37.9	137.7	+14.2		25	
		+39.6	139.4	+14.1		25	
		+38.8	138.6	+16.5		200	850
Oct. 24 (Naval Observatory).	11 42	−63.0	36.2	+18.0		62	
		−53.5	45.7	−10.5		278	
		+27.5	126.7	+15.5		231	
		+39.5	138.7	+14.5		324	895
Oct. 25 (Yerkes)	10 43	−43.0	43.4	−12.5		150	
		−37.9	48.5	−10.3		200	
		+41.0	127.4	+15.7		175	
		+51.7	138.1	+14.2		5	
		+52.5	138.9	+16.4		225	
		+53.5	139.9	+14.1		60	815
Oct. 25 (Naval Observatory).	11 40	−38.0	48.1	−10.5		247	
		+29.0	115.1	−8.5		31	
		+41.5	127.6	+15.5		154	
		+52.5	138.6	+15.0		216	648
Oct. 26 (Yerkes)	10 9	−24.5	49.2	−9.5		275	
		+53.9	127.6	+15.9		200	
		+65.2	138.9	+16.8		250	725
Oct. 26 (Naval Observatory).	11 41	−25.0	47.9	−10.5		185	
		+42.0	114.9	−8.5		31	
		+60.0	132.9	+14.5		340	556
Oct. 27 (Naval Observatory).	10 38	−12.5	47.8	−10.5		201	
		+67.0	127.3	+13.5	108		
		+79.0	139.3	+15.0	123		432
Oct. 28 (Naval Observatory).	13 7	−36.5	9.2	−13.5		31	
		+3.0	48.7	−10.0		201	
		+81.0	126.7	+14.0	93		325
Oct. 29 (Yerkes)	10 15	+15.1	49.2	−9.5		250	250
Oct. 29 (Naval Observatory).	11 38	−23.0	10.4	−13.5		31	
		+15.5	48.9	−10.0		170	201
Oct. 30 (Yerkes)	10 20	−78.8	309.6	+15.2		100	
		+28.5	49.1	−9.6		200	300
Oct. 30 (Naval Observatory).	11 41	−79.0	301.1	+13.0	93		
		−62.5	317.6	+12.5	15		
		−9.0	11.1	−15.5		46	
		+29.5	49.6	−10.0		139	
		+35.0	55.1	+19.0		31	324
Oct. 31 (Naval Observatory)	11 39	−66.5	300.5	+14.5	93		
		−48.5	318.5	+14.0	15		
		−33.0	334.0	+14.5		31	
		+4.0	11.0	−15.5		62	
		+42.5	49.5	−10.0	123		
		+49.5	56.5	+17.5		62	386
Mean daily area for October							773

PROVISIONAL SUN SPOT RELATIVE NUMBERS FOR OCTOBER, 1928

[Data furnished by Prof. A. Wolfer, University of Zurich, Switzerland]

October, 1928	Relative numbers	October, 1928	Relative numbers	October, 1928	Relative numbers
1	16	11	92	21	
2	69	12	71	22	
3	58	13		23	76
4	45	14	79	24	74
5	42	15	70	25	65
6	25	16	80	26	30
7	41	17	74	27	22
8	56	18	73	28	28
9	52	19	46	29	22
10	67	20	62	30	
				31	48

Number of observations, 27; mean, 56.7.