TABLE 1.—*Solar radiation intensities during November, 1928*—Con

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

Madison, Wis.

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.
Nov. 3	5.56			1.14							4.37
Nov. 6	4.37	0.87	1.04	1.24	1.38	1.57		1.21			3.45
Nov. 15	7.04		1.00	1.11							6.76
Nov. 24	2.87	1.01	1.10	1.23							3.00
Nov. 26	2.06	0.85	0.98	1.12				1.13			2.62
Means		**0.91**	**1.03**	**1.17**	(1.38)	(1.57)		(1.17)			
Departures		+.02	+.01	+.02	+.08	+.04		+.01			

Lincoln, Nebr.

Nov. 5	5.41	0.81	0.92	1.08	1.25	1.44		1.15	1.03	0.96	5.79
Nov. 6	4.57	0.83		1.03	1.31						5.36
Nov. 15	3.45							1.14	0.98		6.27
Nov. 20	2.74	0.91	1.08	1.25							3.30
Nov. 21	4.17		1.06								4.57
Nov. 22	3.00	1.13	1.22	1.33	1.46	1.61		1.30	1.21	1.10	2.87
Nov. 23	3.81			1.20	1.35	1.51					5.79
Nov. 24	3.00		1.18	1.30	1.44	1.60					2.36
Means		**0.92**	**1.09**	**1.20**	**1.36**	**1.54**		**1.20**	**1.07**	(1.03)	
Departures		−.01	+.05	+.01	+.01	−.02		+.01	+.02	+.09	

[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	Washington	Madison	Lincoln
1928	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*
Oct. 29	266	169	146	122	127		+26	−15	−92
Nov. 5	258	122	242	106	144		+38	−43	+16
Nov. 12	211	114	156	91	109		+15	−24	−44
Nov. 17	182	137	246	91	96		0	+6	+44
Nov. 26	126	83	120	61	96		−27	−39	−64
Deficiency since first of year on Dec. 2							−1,465	−466	−1,843

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.*	°	°	°			
Nov. 1 (Naval Observatory).	11 16	−53.0	301.0	+14.5	108		
		−35.5	318.5	+13.5	15		
		−19.0	335.0	+14.0		15	
		+16.0	10.0	−15.5	31		
		+56.0	50.0	−10.0	123		
		+62.5	56.5	+17.5		77	369
Nov. 2 (Naval Observatory).	13 15	−39.0	300.7	+14.5	93		
		−21.5	318.2	+13.5	15		
		−3.5	336.2	+13.5		31	
		+30.5	10.2	−15.5	15		
		+72.0	51.7	−10.0	123		
		+80.0	59.7	+17.0	62		339
Nov. 3 (Yerkes)	10 58	−71.6	256.2	+21.2		75	
		−71.2	256.6	−15.2		400	
		−26.7	301.1	+15.4		100	575
Nov. 3 (Naval Observatory).	11 39	−72.5	254.9	+21.5	62		
		−72.5	254.9	−16.5	370		
		−46.5	280.9	+8.0	31		
		−27.0	300.4	+14.5	93		
		+86.0	53.4	−10.0	185		74

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	
1928	*h. m.*	°	°	°			
Nov. 4 (Yerkes)	10 38	−58.9	256.0	+21.0		75	
		−58.6	256.3	−15.5		375	
		−14.1	300.7	+15.0		175	625
Nov. 4 (Naval Observatory).	12 55	−75.0	238.5	−16.5		247	
		−58.5	255.0	+21.0	46		
		−58.5	255.0	−16.5	556		
		−31.5	282.0	+8.0	15		
		−13.0	300.5	+14.5	93		957
Nov. 5 (Yerkes)	11 34	−73.4	227.7	+13.0		250	
		−60.1	241.1	−16.1		250	
		−45.4	255.6	+21.0		100	
		−45.0	256.1	−16.0		350	
		−0.1	301.0	+15.1		125	1,075
Nov. 5 (Naval Observatory).	11 48	−74.0	227.0	+12.5	154		
		−60.5	240.5	−16.5		185	
		−46.0	255.0	+21.0	31		
		−46.0	255.0	−16.0	432		
		+0.5	301.5	+15.0		93	895
Nov. 6 (Naval Observatory).	11 38	−61.5	226.4	+12.5	201		
		−48.0	239.9	−16.5		154	
		−32.5	255.4	+21.0	31		
		−32.0	255.9	−16.5	463		
		+12.5	300.4	+15.0	93		942
Nov. 7 (Naval Observatory).	11 19	−48.5	226.4	+12.5	185		
		−34.5	240.4	−17.0		139	
		−20.0	254.9	+21.0	31		
		−19.5	255.4	−16.5	478		
		+26.0	300.9	+15.5	93		926
Nov. 8 (Naval Observatory).	11 28	−35.0	226.6	+12.5	170		
		−19.5	242.1	−17.0		154	
		−7.0	254.6	+21.0	31		
		−5.5	256.1	−16.5	478		
		+40.0	301.6	+16.5	93		926
Nov. 9 (Naval Observatory).	11 36	−22.0	226.3	+12.5	123		
		−7.5	240.8	−17.0		108	
		−7.0	241.3	+9.0		139	
		+6.0	254.3	+20.0	31		
		+8.0	256.3	−17.0	401		
		+34.0	282.3	+6.5		46	
		+53.0	301.3	+15.5	93		941
Nov. 10 (Naval Observatory).	13 40	−8.0	226.0	+12.5		154	
		+8.0	242.0	−17.0		93	
		+9.5	243.5	+9.0		293	
		+20.0	254.0	+20.5	15		
		+22.5	256.5	−16.5	432		
		+68.0	302.0	+16.0	77		1,064
Nov. 11 (Naval Observatory).	11 24	−85.0	137.1	+14.0		216	
		+4.0	226.1	+12.5		139	
		+20.5	242.6	−16.5		62	
		+21.5	243.6	+9.5		386	
		+32.0	254.1	+21.0	15		
		+35.0	257.1	−16.5	525		
		+80.0	302.1	+15.5	77		1,420
Nov. 12 (Naval Observatory).	11 24	−70.0	138.9	+14.0		154	
		+18.0	226.9	+12.5	108		
		+33.0	241.9	−16.5		93	
		+35.5	244.4	+9.5		417	
		+45.0	253.9	+21.0	15		
		+48.5	257.4	−16.5	463		1,250
Nov. 13 (Naval Observatory).	11 40	−70.5	125.1	−14.5	46		
		−58.0	137.6	+15.0		170	
		−29.5	166.1	−14.5		62	
		+30.5	226.1	+12.5		108	
		+50.0	245.6	+10.0		262	
		+58.5	254.1	+21.5	15		
		+62.0	257.6	−16.0	355		1,018
Nov. 13 (Yerkes)	12 3	−57.0	139.4	+15.7		190	
		+31.1	226.5	+13.2		200	
		+45.4	240.8	+9.6		100	
		+53.0	248.4	+9.7		100	
		+63.0	258.4	−15.7		625	1,215
Nov. 14 (Naval Observatory).	11 36	−59.0	123.4	−14.5		62	
		−44.5	137.9	+15.5		123	
		−36.5	145.9	−22.0	15		
		−15.0	167.4	−14.5		77	
		+43.5	225.9	+13.5		77	
		+60.0	242.4	−16.5	15		
		+62.5	244.9	+9.5		216	
		+76.5	258.9	−16.0	247		832
Nov. 14 (Yerkes)	12 53	−44.3	137.4	+16.6		150	
		−12.9	168.8	−14.6		75	
		+44.9	226.7	+13.5		125	
		+66.8	248.5	+9.4		150	
		+78.7	260.2	−15.4		500	1,000
Nov. 15 (Naval Observatory).	11 38	−45.5	123.7	−14.0	46		
		−31.5	137.7	+15.0		139	
		0.0	169.2	−16.5		139	
		+6.5	175.7	+11.5	31		
		+57.5	226.7	+12.5	31		
		+79.5	248.7	+10.0	247		633

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	
1928	h. m.	°	°	°			
Nov. 16 (Naval Observatory).	12 37	−31.0	124.5	−14.0	31		
		−18.0	137.5	+15.5		123	
		+14.5	170.0	−16.0		170	
		+19.0	174.5	+12.0		185	
		+70.5	226.0	+12.5	15		524
Nov. 17 (Naval Observatory).	11 32	−17.0	125.9	−15.5		46	
		−5.5	137.4	+16.0		93	
		+28.0	170.9	−16.5		139	
		+33.0	175.9	+12.5		185	463
Nov. 18 (Naval Observatory).	11 44	−70.0	59.6	+17.5	15		
		−63.0	66.6	−13.5		31	
		−5.0	124.6	−14.0		31	
		+7.5	137.1	+15.0		93	
		+42.0	171.6	−17.5	93		
		+44.5	174.1	+11.5		185	448
Nov. 19 (Naval Observatory).	11 30	−57.5	59.1	+17.5	15		
		−48.5	68.1	−13.5		62	
		+9.5	126.1	−14.5	15		
		+21.0	137.6	+15.5		77	
		+55.5	172.1	−17.5	108		
		+59.0	175.6	+11.0		93	370
Nov. 20 (Naval Observatory).	11 42	−44.5	58.8	+18.0	15		
		−34.0	69.3	−13.0		31	
		+34.0	137.3	+15.0	62		
		+68.0	171.3	−18.0	108		
		+73.0	176.3	+11.0		93	309
Nov. 21 (Naval Observatory).	11 35	−32.0	58.1	+18.0	15		
		−20.5	69.6	−12.5		31	
		+46.5	136.6	+15.0	62		
		+80.0	170.1	+12.0	62		
		+85.0	175.1	−17.5	108		278
Nov. 22 (Naval Observatory).	11 33	−53.5	23.5	+18.5	15		
		−16.0	61.0	+15.5		31	
		−4.0	73.0	−12.5	15		
		+34.0	111.0	+16.5	15		
		+60.5	137.5	+15.0	77		153
Nov. 23 (Naval Observatory).	11 57	−42.5	21.1	+19.5		77	
		+1.0	64.6	+15.5	9		
		+46.5	110.1	+16.5	6		
		+73.5	137.1	+15.0	93		185
Nov. 25 (Naval Observatory).	12 16	(1)	(1)	(1)	(1)	(1)	
Nov. 26 (Yerkes)	11 22	(1)	(1)	(1)	(1)	(1)	

[1] No spots.

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	
1928	h. m.	°	°	°			
Nov. 26 (Naval Observatory).	11 51	−15.0	9.1	+14.0	9		
		+39.5	63.6	+15.5	3		
		+55.0	79.1	+22.5		46	58
Nov. 27 (Naval Observatory).	13 49	−80.5	289.3	+13.5	46		
		+29.5	39.3	−14.0		62	
		+69.5	79.3	+22.5		154	262
Nov. 28 (Naval Observatory).	11 24	−68.0	290.0	+13.5	31		
		+41.0	39.0	−14.5	15		
		+84.0	82.0	+22.5		216	262
Nov. 29 (Harvard)	11 43	−56.0	344.5	+3.5	21		21
Nov. 30 (Mount Wilson)	12 00	−82.0	228.4	+11.0	19		
		−75.0	235.4	−16.0	99		
		−65.0	245.4	+8.0		238	
		−41.0	269.4	+13.0		7	
		−30.0	280.4	+8.0	2		365
Mean daily area for November							584

PROVISIONAL SUN SPOT RELATIVE NUMBERS FOR NOVEMBER, 1928

[Data furnished by Prof. W. Brunner, University of Zurich, Switzerland]

November, 1928	Relative numbers	November, 1928	Relative numbers	November, 1928	Relative numbers
1	53	11	84	21	37
2	47	12		22	28
3	49	13	101	23	
4		14	73	24	16
5	60	15	77	25	
6	70	16		26	29
7	66	17	49	27	
8	53	18	52	28	
9		19	58	29	8
10		20	38	30	28

Number of observations, 21; mean, 51.2.