BIBLIOGRAPHY

C. FITZHUGH TALMAN, in Charge of Library

RECENT ADDITIONS

The following have been selected from among the titles of books recently received as representing those most likely to be useful to Weather Bureau officials in their meteorological work and studies:

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Verdunstung, Bodenfeuchtigkeit und Sickerwasser unter natürlichen Verhältnissen. p. 204–219. figs. 23½ cm. (Sonderab.: Ztschr. für Forst- und Jagdwesen. 65. Jahrg. April 1933.)

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Proceedings of the founder's meeting . . . held at Columbia university, New York, January 26, 1933. Membership list 1933. New York. 1933. 85 p. 24 cm.

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SOLAR OBSERVATIONS

SOLAR RADIATION MEASUREMENTS DURING JUNE 1933

By IRVING F. HAND, Assistant in Solar Radiation Investigations

For a description of instruments employed and their exposures, the reader is referred to the January 1932, REVIEW, page 26.

Beginning with June 1933 values of the total solar radiation (direct+diffuse) as received at Riverside, Calif. (altitude 1,070 feet above sea level, latitude 33° 58′ north, longitude 117° 20′ west) will be included in table 2 through the courtesy and cooperation of Dr. E. R. Parker of the College of Agriculture, University of California.

Table 1 shows that solar radiation intensities averaged above normal for the three Weather Bureau stations at which normal incidence measurements are made. Observations have not been taken long enough at the Blue Hill Observatory to derive normals.

Table 2 shows a decided excess in the total solar and sky radiation received on a horizontal surface at all stations except Twin Falls, La Jolla, and Gainesville.

Table 3 shows low values of turbidity on the 14th only, with the exception of the very early morning readings of the 15th.

Polarization observations obtained at Washington on 4 days give a mean of 46 percent with a maximum of 52 percent on the 14th. At Madison, observations taken on 9 days give a mean of 60 percent with a maximum of 71 percent on the 13th. The values for Washington are below normal for June, while those at Madison are somewhat above normal.

TABLE 1.—*Solar-radiation intensities during June 1933*

[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	1.0 [1]	2.0	3.0	4.0	5.0	e.
	mm	*cal*	*cal*	*cal*	*cal*	*cal*	*cal*	*cal*	*cal*	*cal*	*mm*
June 2	5.16			1.10	1.21	1.49	1.20				4.37
June 7	17.37	0.35	0.48	.61	.80						18.59
June 9	22.76		.54								22.00
June 12	16.79			.67	.84						15.11
June 14	6.27		.88	1.04	1.25	ffi					5.16
June 15	6.27	.72	.82	.98	1.12						5.79
June 21	14.60		.40	.60	.75	1.20					17.96
June 23	10.97				1.00						10.21
June 24	13.13					1.19					10.21
Means		(.54)	.62	.83	1.00	1.29	(1.20)				
Departures		−.04	−.04	+.05	+.06	+.05	+.26				

[1] Extrapolated.

TABLE 1.—*Solar-radiation intensities during June 1933*—Continued

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	1.0 [1]	2.0	3.0	4.0	5.0	e.
	mm	*cal*	*cal*	*cal*	*cal*	*cal*	*cal*	*cal*	*cal*	*cal*	*mm*
June 1	9.83			0.94	1.12	1.34					10.59
June 2	11.81				1.14	1.33					11.81
June 3	13.13					1.20					14.10
June 6	16.79				.90	1.19					19.89
June 7	16.79					1.37					17.96
June 9	11.81			.93	1.08						11.38
June 10	12.24				1.00	1.30					15.65
June 13	6.27				1.26	1.50					5.16
June 14	4.95			1.13	1.26	1.48	1.23				5.16
June 17	13.61				.98						15.11
June 19	12.24			.89	1.09	1.33	1.04				10.59
June 20	10.59			.89	1.09	1.30	1.10	.93			12.68
June 22	13.13			.95		1.42					9.83
Means				.96	1.09	1.34	1.12	(.93)			
Departures				+.01	+.08	+.02	+.03	+.01			

LINCOLN, NEBR.

June 1	12.24					1.32	1.00	0.79			9.47
June 3	13.13					1.37	1.08	.83	0.67		14.60
June 10	15.11		0.88	1.02	1.18	1.36					11.81
June 13	6.27						1.17	.97	.83	0.69	4.95
June 15	6.50			.96	1.17	1.32					7.04

TABLE 1.—*Solar-radiation intensities during June 1933*—Continued

LINCOLN, NEBR.—Continued

Date	Sun's zenith distance										
	8a.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*
June 16	8.18			1.03	1.21	1.43	1.16	.98	.82	.68	7.04
June 17	7.04		.90	1.03	1.21	1.42					7.29
June 19	10.59		.71	.82	1.04	1.25					10.97
June 22	10.97			.91	1.09	1.34					13.61
June 28	15.65			.94	1.12	1.35					17.96
Means			.83	.96	1.15	1.35	1.10	.89	.77	(.68)	
Departures			+.06	+.03	+.05	±.00	±.00	−.01	−.02	+.04	

BLUE HILL, MASS.

June 2	6.3			1.12		1.47	1.20				7.7
June 3	9.5			.96	1.12	1.50	.99	0.77			11.2
June 6	13.1						.71				11.2
June 9	14.1			.78	.96	1.28					16.8
June 11	13.1				1.03	1.37	1.12	1.00	0.87	0.70	14.8
June 14	7.3				1.09	1.31					7.1
June 15	6.5			1.03	1.17						6.5
June 18	8.2			1.00		1.45	1.20	1.06	.95	.91	7.7
June 23	8.2			1.00		1.45	1.20	1.06	.95	.91	7.7
June 24	10.6			1.04	1.17						10.9
June 28	16.8							.80	.67	.57	19.1
Means				.99	1.10	1.40	1.04	.91	.83	.73	

TABLE 2.—*Average daily totals of solar radiation (direct+diffuse) received on a horizontal surface*

Week beginning—	Washington	Madison	Lincoln	Chicago	New York	Fresno	Pittsburgh	Fairbanks	Twin Falls	La Jolla	Gainesville	Miami	New Orleans	Riverside
	Gram calories per square centimeter													
	cal.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*
June 4	592	607	643	582	601	629	535	496	529	369	516	625	534	513
June 11	556	614	748	480	593	748	459	391	586	326	454	481	600	687
June 18	697	569	581	625	559	760	587	622	652	438	394	455	441	691
June 25	482	460	576	422	428	718	427	441	559	428	496	635	468	667
	Departures from weekly normals													
June 4	+94	+94	+95	+152	+178	−35	+54		−65	−44	+8	+101		
June 11	+63	+109	+210	+48	+57	+64	−29		−49	−82	−10	−27		
June 18	+206	+45	+17	+185	+197	+56	+93		−28	−26	−46	−66		
June 25	−44	−76	−24	−21	−8	+19	−51		−105	−69	+28	+73		
	Accumulated departures on July 1													
	+6,083	−3,983	+1,680	+6,321	+6,538	+4,431	+1,134		−28	−6,288	−9,716	−1,897		

TABLE 3.—*Solar-radiation measurements, and determinations of atmospheric turbidity factor, β, Washington, D.C., June 1933*

[Values in italics have been interpolated]

Date and solar-hour angle	Solar altitude, *h*.	Air mass, *m*.	I_m	I_y	I_r	β	Blueness of sky	Atmospheric dust particles per cubic centimeter	Notes: (sky-light polarization, P.) clouds, etc.
June 7									
			gr. cal.	*gr. cal.*	*gr. cal.*				
5:07a	24-02	2.45	0.673	*0.551*	0.442	0.190		766	
4:57a	25-58	2.28	.748	.508	*.447*	.145	5		P=36.8%
4:08a	25-26	1.71	.859	.642	*.571*	.195			
4:01a	36-44	1.67	.885	*.647*	.532	.195			
3:18a	45-12	1.41	.968	.717	.570	.195			
3:12a	45-56	1.39	.991	.718	*.576*	.190			
June 14									
5:59a	14-30	3.94	.916	.709	*.597*	.065		296	
5:55a	15-14	3.77	.942	*.714*	.600	.060			
5:33a	19-23	2.99	1.038	*.776*	.636	.060			
5:27a	20-30	2.84	1.047	.779	*.641*	.060			
5:15a	22-50	2.57	1.153	.830	*.658*	.045			
5:09a	23-56	2.46	1.170	*.835*	.662	.045			
4:50a	27-34	2.15	1.162	*.879*	.679	.070			
4:44a	28-42	2.08	1.213	.883	*.684*	.060	6		P=52.0%
June 15									
5:56a	15-07	3.79	.853	.703	*.505*	.050		548	
5:52a	15-52	3.63	.910	*.708*	.508	.038			
5:29a	20-22	2.85	1.006	*.776*	.634	.080			
5:25a	20-58	2.78	1.019	.779	*.636*	.080			
5:21a	21-43	2.69	1.031	.803	*.649*	.085			
5:16a	22-39	2.59	1.031	*.808*	.652	.090			
4:54a	26-52	2.20	1.093	*.854*	.676	.160			
4:48a	28-02	2.12	1.119	.856	*.677*	.170			
4:44a	28-43	2.07	1.125	.846	*.685*	.175			
4:39a	29-43	2.01	1.125	*.849*	.688	.180	5		P=46.0%

POSITIONS AND AREAS OF SUN SPOTS

[Communicated by Capt. J. F. Hellweg, Superintendent United States Naval Observatory. Data furnished by Naval Observatory, in cooperation with Harvard, Perkins, 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	
1933	*h*	*m*	°	°	°			
June 1 (Perkins Observatory)	11	40	No spots			------	------	------
June 2 (Naval Observatory)	11	10	−71.0	150.7	−7.0	6	------	6
June 3 (Naval Observatory	10	28	−57.0	151.9	−7.0	6	------	6
June 4 (Naval Observatory)	14	7	−42.0	151.7	−7.0	6	------	6
June 5 (Naval Observatory)	13	24	−30.0	150.8	−7.0	6	------	6
June 6 (Naval Observatory)	10	32	−17.0	152.2	−7.0	3	------	3
June 7 (Naval Observatory)	10	41	No spots			------	------	------
June 8 (Naval Observatory)	11	2	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	
1933	*h*	*m*	°	°	°			
June 9 (Naval Observatory)	10	26	No spots			------	------	------
June 10 (Mount Wilson)	9	5	No spots			------	------	------
June 11 (Naval Observatory)	11	50	No spots			------	------	------
June 12 (Naval Observatory)	14	38	−55.0	32.5	+4.0	------	37	37
June 13 (Naval Observatory)	11	2	−43.0	33.2	+4.0	------	77	77
June 14 (Mount Wilson)	8	20	−29.0	35.4	+4.0	------	92	92
June 15 (Naval Observatory)	11	8	−14.0	35.7	+4.0	------	129	129
June 16 (Mount Wilson)	9	30	−1.0	36.4	+5.5	------	112	112
June 17 (Naval Observatory)	10	32	+13.0	36.6	+5.0	56	------	56
June 18 (Naval Observatory)	12	38	+27.0	36.2	+5.0	43	------	43
June 19 (Naval Observatory)	11	9	+40.0	36.7	+5.0	46	------	46
June 20 (Naval Observatory)	11	7	+53.0	36.5	+6.0	46	------	46
June 21 (Naval Observatory)	13	10	+67.0	36.2	+6.0	53	------	53
June 22 (Naval Observatory)	13	58	+81.0	36.5	+6.0	53	------	53
June 23 (Naval Observatory)	11	50	No spots			------	------	------
June 24 (Naval Observatory)	10	33	No spots			------	------	------
June 25 (Mount Wilson)	10	0	No spots			------	------	------
June 26 (Perkins Observatory)	15	0	No spots			------	------	------
June 27 (Naval Observatory)	14	20	No spots			------	------	------
June 28 (Naval Observatory)	10	44	No spots			------	------	------
June 29 (Perkins Observatory)	14	15	No spots			------	------	------
June 30 (Perkins Observatory)	12	45	No spots			------	------	------
Mean daily area for June	------		------	------	------	------	------	26

The Perkins Observatory report for May, received too late for inclusion in the last issue, indicates that there were no spots on May 4, 8, 10, 11, 25, and 30. The mean daily area for May should therefore be changed to 12.

PROVISIONAL SUN-SPOT RELATIVE NUMBERS FOR JUNE 1933

(Dependent alone on observations at Zurich and its station at Arosa)

[Data furnished through the courtesy of Prof. W. Brunner, Eidgen-Sternwarte, Zurich, Switzerland]

June 1933	Relative numbers	June 1933	Relative numbers	June 1933	Relative numbers
1	0	11	0	21	8
2	7	12	0	22	------
3	7	13	*Ec* 12	23	0
4	7	14	16	24	0
5	7	15	19	25	0
6	14	16	14	26	0
7	0	17	10	27	0
8	0	18	8	28	0
9	0	19	8	29	0
10	0	20	8	30	0

Mean: 29 days=5.0.

c=New formation of a center of activity· E, on the eastern part of the sun's disk; W, on the western part; M, in the central zone.

AEROLOGICAL OBSERVATIONS

[Aerological Division, W. R. Gregg, in charge]

By L. T. SAMUELS

Free-air temperatures during June were mostly above normal with the largest departures occurring at Chicago and Omaha. (See table 1.) Free-air relative humidities averaged below normal at practically all stations and levels.

At 1,000 meters above sea level the resultant wind directions over the country east of the Rockies were in general close to normal and the resultant velocities above normal over the northern stations and below normal over the southern stations. (See table 2.) At 4,000 meters the resultant winds were more southerly than normal at several far western and southern stations. Resultant velocities were mostly above normal over the northern sections of the country and below normal over the South.