SOLAR RADIATION DATA FOR JULY 1948

[Solar Radiation Investigation Section, I. F. HAND in Charge]

Explanation of Tables 1 and 2 and references to descriptions of instruments, stations, and methods of observation, and to summaries of data, are given in the Monthly Weather Review, vol. 72, No. 1, January 1944, p. 43. A list of pyrheliometric stations is given on page 45 of that issue. An explanation of the formula used in computing the air mass values for each station listed in Table 1 appears in vol. 75, No. 3, March 1947, p. 47.

In mid-July the Bureau installed a Brown Electronik potentiometer to record total solar and sky radiation on a horizontal surface at Blue Hill. Formerly these measurements were made with Harvard equipment. For the time being, the Harvard Eppley pyrheliometer will serve as the receiver for check purposes.

TABLE 1.—*Solar radiation intensities during July 1948*

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

Date	Sun's zenith distance									Vapor pressure	
	A. M.				0.0°	P. M.					
	78.7°	75.7°	70.7°	60.0°		60.0°	70.7°	75.7°	78.7°	7:30 a. m.[1]	1:30 p. m.[1]
MADISON, WIS.											
	Air mass										
	4.81	3.84	2.88	1.92	*0.96	1.92	2.88	3.84	4.81		
July	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mb.*	*mb.*
1	0.76	0.87	0.99	1.15	1.32					11.8	11.0
2			.65	.87	1.20	0.87	0.62			19.0	20.4
3	.64	.75	.88	1.04	1.29					21.1	19.6
5		.59	.71	.81	1.08	.95				21.1	23.4
8	.49	.60	.69	.86	1.07					15.8	18.3
9	.53	.68	.79	.95	1.18					15.3	15.3
10	.32	.41	.53	.68						17.0	17.0
16		.68	.90	1.03	1.36					21.8	16.5
23					1.36					12.7	13.2
24	.75	.84	.94	1.13	1.32					14.8	12.3
26	.84	.92	1.04	1.16	1.33					15.8	11.8
27	.76	.83	.94	1.11	1.36					17.7	12.3
28	.75	.81	.94	.98	1.35	.98	.68	.50		15.3	13.2
30	.81	.91	1.03	1.18	1.39	1.14				14.2	15.8
31	.84	.92	1.06	1.19	1.36					13.2	12.7
Means	.68	.75	.86	1.01	1.28	.98	(.65)	(.50)			
Departures	+.05	+.01	.00	−.03	.00	−.01	−.23	−.23			
LINCOLN, NEBR.											
	Air mass										
	4.77	3.81	2.86	1.91	*.95	1.91	2.86	3.81	4.77		
July	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mb.*	*mb.*
1					1.33	1.06	0.90	0.77	0.64	16.9	21.1
2					1.32	1.03	.82	.64	.54	20.4	21.1
6					1.34	1.08	.84	.67	.56	22.6	21.1
Means					1.33	1.06	.85	.69	.58		
Departures					.00	.00	−.03	−.06	−.08		
BLUE HILL, MASS.											
	Air mass										
	4.86	3.89	2.92	1.94	*0.97	1.94	2.92	3.89	4.86		
July	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mb.*	*mb.*
2	0.68	0.82	0.96	1.14	1.44					14.8	12.8
3	.59	.71	.88	1.11	1.39	1.06	0.75			13.8	16.0
4				1.09	1.30					16.5	15.8
7					1.37	1.15	1.00	0.86	0.75	11.6	11.3
8	.71	.82	.97	1.16	1.34	1.12	.93			13.9	11.9
9					1.28					13.8	12.8
11	.53	.66	.82	1.02		1.02				19.8	22.4
15					1.37	1.11	.91	.78	.66	14.5	17.6
16	.82	.92								16.6	15.7
17				.98						17.5	16.5
20	.59	.69	.83						.56	17.7	18.6
22				1.05	1.49					16.1	14.3
24							.93	.81	.72	16.3	20.9
25	.83	.92	1.05	1.20	1.38		.92	.78	.69	13.9	18.4
26				1.04						14.9	18.4
29	.84	.96	1.08	1.19	1.39					17.4	18.4
30	.71	.80	.93	1.14	1.45					17.7	16.9
31					1.49					26.3	16.5
Means	.70	.81	.94	1.10	1.39	1.09	.91	.81	.68		
Departures	+.06	+.08	+.06	+.06	+.10	+.07	+.07	+.11	+.06		

TABLE 1.—*Solar radiation intensities during July 1948*—Continued

Date	Sun's zenith distance									Vapor pressure	
	A. M.				0.0°	P. M.					
	78.7°	75.7°	70.7°	60.0°		60.0°	70.7°	75.7°	78.7°	7:30 a. m.[1]	1:30 p. m.[1]
CLIMAX, COLO.											
	Air mass										
	3.24	2.59	1.94	1.29	*0.65	1.29	1.94	2.59	3.24		
July	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mb.*	*mb.*
2			1.08	1.18							
21			1.13	1.29							
22			1.15	1.30		1.22	1.09	1.01	0.94		
30						1.28	1.14	1.03	.94		
31								1.01	.90		
Means			1.12	1.26		(1.25)	(1.12)	1.02	.93		
Departures			−.07	+.07		−.04	−.06	−.03	−.02		
TABLE MOUNTAIN, CALIF.											
	Air mass										
	3.76	3.01	2.26	1.51	*0.75	1.51	2.26	3.01	3.76		
July	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mb.*	*mb.*
2				1.43							
3	1.12	1.21	1.30	1.42							
4				1.42							
5				1.43							
7				1.46							
8				1.46							
9				1.45							
10				1.48							
11				1.47							
12				1.47							
13				1.51							
14				1.46							
15				1.36							
16				1.40							
19				1.41							
20				1.42							
21				1.40							
24				1.47							
25				1.49							
28				1.37							
29	1.10	1.18	1.29	1.40							
30				1.38							
31				1.37							
Means	(1.11)	(1.20)	(1.30)	1.43							
Departures	.00	.00	.00	+.03							
BOSTON, MASS.											
	Air mass										
	4.96	3.96	2.97	1.98	*0.99	1.98	2.97	3.96	4.96		
July	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mb.*	*mb.*
2				1.01						15.3	13.2
8				1.13						12.3	9.3
20				.89						17.7	15.7
29				1.13						17.7	15.3
30				.99						17.0	15.7
Means				1.03							
Departures				+.07							
RATIO, BOSTON/BLUE HILL ON COMPARABLE DATES											
				0.91							

* Extrapolated.
[1] 75th meridian time.

TABLE 2.—*Daily totals and weekly means of solar radiation (direct + diffuse) received on a horizontal surface*

[Gram-calories per square centimeter]

Date	Washington, D. C.	Madison, Wis.	Lincoln, Nebr.	New York, N. Y.	Fresno, Calif.	Fairbanks, Alaska	Columbia, Mo.	Boston, Mass.	Nashville, Tenn.	Twin Falls, Idaho	La Jolla, Calif.	Riverside, Calif.	Blue Hill, Mass.	Newport, R. I.	Salt Lake City, Utah	State College, Pa.	Davis, Calif.	Toronto, Canada	Ithaca, N. Y.	Boulder, Colo.	East Wareham, Mass.	Honolulu, T. H.	Pearl Harbor, T. H.	East Lansing, Mich.	Summit, Mont.	Soda Springs, Calif.	Grand Lake, Colo.
1948	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*
July 2	706	688	744	748	773	215	774	706	657	630	507	641	724	750	578	404	753	604	520	-----	643	643	571	308	812	844	484
July 3	500	739	735	429	811	374	488	524	598	448	654	677	710	759	-----	361	759	648	311	-----	686	738	633	568	760	854	621
July 4	541	435	741	666	801	622	271	631	557	520	664	743	670	716	752	592	735	524	513	-----	660	528	426	533	696	805	803
July 5	594	656	488	528	799	408	506	375	468	643	684	763	464	605	739	494	507	366	396	-----	579	408	579	472	699	775	583
July 6	586	692	590	524	788	281	774	349	602	716	687	745	506	535	725	450	654	479	209	-----	443	578	649	491	649	454	657
July 7	323	678	730	293	784	487	674	611	689	701	646	774	642	570	737	256	704	700	337	-----	615	763	657	536	579	745	635
July 8	667	677	752	697	788	156	737	633	-----	515	593	732	735	750	711	736	731	635	524	568	643	755	687	628	739	831	769
Means	560	652	650	555	792	364	603	547	595	596	634	725	636	669	707	470	692	565	402	-----	610	631	600	505	705	758	650
Departures	+43	+97	+58	+44	+87	−100	−28	+7	+94	−13	+64	+102	+70	+103	+20	−38	−26	+27	−125	-----	+65	+5	+25	−15	-----	-----	-----
July 9	737	675	512	636	793	397	780	565	-----	702	655	729	681	671	769	754	709	605	486	711	574	593	625	578	712	816	815
July 10	633	557	469	628	764	384	688	573	-----	680	470	706	637	630	746	698	714	579	487	386	566	706	677	383	475	789	384
July 11	510	580	380	617	804	650	633	606	-----	493	603	694	682	700	770	538	717	509	399	707	627	775	680	499	372	832	755
July 12	633	461	434	555	797	487	325	539	-----	685	484	689	618	619	686	428	708	424	382	694	571	320	414	458	800	820	648
July 13	413	252	631	196	776	426	571	200	-----	472	372	612	283	323	490	250	703	300	143	645	339	766	443	145	756	786	744
July 24	148	613	671	543	734	647	478	287	-----	614	272	719	300	420	726	569	696	631	450	611	306	696	678	432	618	787	814
July 15	418	156	410	602	731	569	412	667	-----	696	232	734	719	670	719	551	694	692	518	574	654	669	378	555	414	790	801
Means	499	471	519	540	771	509	555	491	-----	620	441	698	560	576	701	541	706	534	409	618	520	646	556	436	592	802	708
Departures	0	−77	−70	+59	+73	+11	−49	+22	-----	+3	−147	+94	9−45	+54	+14	−3	+12	+18	−91	+62	+9	+5	−38	−7	-----	-----	-----
July 16	548	710	634	508	738	534	628	571	-----	685	236	736	680	734	717	584	712	133	383	499	679	619	568	334	388	786	756
July 17	336	622	507	212	742	533	598	528	-----	558	454	685	642	636	620	388	702	519	258	429	631	624	548	493	740	805	630
July 18	666	610	585	344	766	356	257	494	-----	658	466	682	560	516	670	471	681	653	398	406	526	662	590	408	284	804	401
July 19	439	650	459	465	760	287	374	390	-----	657	394	630	468	519	501	516	691	460	254	448	476	428	547	480	226	800	573
July 20	391	382	600	426	753	107	255	502	-----	683	387	680	611	670	713	400	685	517	445	667	628	768	665	395	231	785	416
July 21	464	554	593	454	722	323	597	372	-----	680	569	707	454	390	699	373	696	348	267	443	522	733	693	219	520	776	503
July 22	540	376	418	524	722	580	387	603	-----	507	338	555	674	682	580	455	689	247	394	-----	697	778	698	244	699	773	816
Means	484	558	553	419	743	389	442	494	-----	632	406	668	584	592	643	455	694	411	343	482	594	659	616	368	441	790	585
Departures	−3	+22	−21	−40	+59	−40	−156	+68	-----	+15	−135	+86	+92	+107	+3	−29	+3	−53	−149	−15	+110	+10	+14	−88	-----	-----	-----
July 23	414	634	706	78	751	320	789	215	-----	614	456	642	282	358	262	300	710	342	216	-----	356	764	681	181	599	793	771
July 24	692	738	728	666	767	343	770	453	-----	622	387	689	573	567	544	638	644	638	330	379	482	768	688	512	638	791	296
July 25	728	304	628	665	751	572	456	559	-----	678	612	714	649	654	681	594	670	455	492	491	646	773	686	374	655	784	561
July 26	632	709	491	514	766	239	650	404	516	647	566	649	499	535	640	400	683	194	165	654	557	765	637	524	721	796	648
July 27	324	686	714	392	767	234	484	233	208	606	507	571	290	337	689	578	672	318	389	522	350	747	599	414	454	791	628
July 28	504	688	642	532	735	354	688	352	324	636	614	616	383	500	492	529	684	601	363	275	380	599	495	499	134	778	306
July 29	591	310	629	647	717	517	563	538	661	667	629	701	659	700	694	705	654	594	498	696	646	626	604	478	216	561	773
Means	555	581	610	499	750	368	629	394	440	638	539	655	477	522	572	535	674	449	350	503	488	720	627	426	488	788	569
Departures	+60	+62	+57	+50	+72	−37	−71	−29	−38	+59	+21	+96	+14	+31	+1	+44	+16	−1	−104	−12	+26	+73	+23	−53	-----	-----	-----
ACCUMULATED DEPARTURES ON JULY 29, 1948																											
	−1624	+3451	+3885	−6328	+9401	----	----	−4781	----	−2352	−2359	+10367	−4543	−2478	−847	−3675	−3668	+2128	−15603	----	−3122	----	-----	+434	----	-----	-----

TABLE 3.—*Daily totals and weekly means of solar and sky radiation plus the radiation reflected from the ground, as received on a vertical surface facing south at Blue Hill, Mass., during July 1948*

Date	2	3	4	5	6	7	8	Mean	9	10	11	12	13	14	15	Mean
Gm cal/cm²	232	241	231	200	210	224	238	225	242	245	244	251	130	116	250	211

Date	16	17	18	19	20	21	22	Mean	23	24	25	26	27	28	29	Mean
Gm cal/cm²	239	243	246	191	231	192	244	226	132	243	234	209	123	175	271	198