SOLAR RADIATION DATA FOR APRIL 1949

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.

Eppley 10-junction 180° pyrheliometers have been installed at the Weather Bureau offices in San Antonio and Fort Worth, Tex. and Las Vegas, Nev. A Brown electronic strip-chart recorder is used to obtain hourly values of total solar and sky radiation received on a horizontal surface at Fort Worth, while Brown integrating potentiometers are used at San Antonio and Las Vegas to obtain daily values of the radiation received on a horizontal surface. Beginning with this issue, daily values expressed in langleys will appear regularly in Table 2.

The latitude of San Antonio is 29°12′ N., the longitude is 98°28′ W., and the elevation of the pyrheliometer is 242 meters m. s. l.; the coordinates for Fort Worth are latitude 32°49′ N., longitude 97°21′ W., elevation 219 meters m. s. l.; for Las Vegas latitude 36°05′ N., longitude 115°10′ W., elevation 667 meters m. s. l.

At Fort Worth the instrument is very slightly shaded from the north by the control tower, a building wall, and instrument shelter, with other minor obstructions to the horizon consisting of distant flag and antenna poles, refinery stacks, downtown buildings, a water tower, and standpipes. With the exception of the control tower, all obstructions are low on the horizon. At Las Vegas, a distant flagpole and antenna to the north cause inappreciable shading of the pyrheliometer. The mountains surrounding the station, ranging in altitude from 0.1° to 3.1° on the horizon, delay sunrise and hasten sunset very slightly.

TABLE 1.—*Solar radiation intensities during April 1949*

[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		
April	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mb.*	*mb.*
1	0.75	0.90	1.03	1.24	1.46					3.8	4.4
2	.81	.96	1.10	1.26	1.51					4.2	4.4
4	.71	.90	.98	1.19	1.46	1.15				4.4	4.0
6				1.15	1.40					6.4	6.9
7	.77	.87	1.02	1.24		1.15				6.1	4.6
8	.84	.96	1.10	1.25						4.8	5.8
9	.59	.81	.96	1.24	1.37					3.8	4.4
11	.66	.74	.84	.94	1.34					5.3	5.6
12	.47	.59	.74	.95	1.22	.96				5.6	6.9
13	.50	.59	.75	.95	1.22	.91				6.6	9.1
16	.90	1.02	1.13	1.28	1.46					2.2	4.2
19	.75	.87	1.01	1.16	1.39					5.6	5.6
20	.55	.71	.80	.98	1.21					6.6	7.8
21	.49	.62	.73	.90	1.31					8.1	6.9
22			.94	1.11	1.43					11.0	7.8
23			.69	.84						7.8	5.3
27	.43	.62	.77	.96	1.35					8.1	8.1
28	.69	.87	.99	1.13	1.39					6.1	5.3
29	.64	.74	.87	1.07	1.39					6.6	5.8
30	.41	.54	.69	.81						8.4	10.6
Means	.64	.78	.90	1.08	1.37	1.04					
Departures	−.05	−.06	−.09	−.09	−.03	−.14					

TABLE 1.—*Solar radiation intensities during April 1949*—Con.

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]
BLUE HILL, MASS.											
	Air mass										
	4.86	3.89	2.92	1.94	*0.97	1.94	2.92	3.89	4.86		
April	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mb.*	*mb.*
1						1.36		0.75		4.4	5.1
2	0.84	0.97				1.12				5.7	4.9
5	.80	.91	1.04	1.26						4.6	4.9
9	.82		1.04							6.7	4.3
10	.93	1.04	1.15	1.30						5.0	4.5
11						1.17	1.03	.93	0.84	5.2	3.7
12	.84	.94	1.08	1.20	1.42	1.04	.84	.65	.52	4.6	5.2
13				1.19						10.0	11.5
14							.68	.54	.39	11.0	14.8
19						1.10				11.7	6.5
20	.69	.77	.91	1.15		1.06	.88	.76	.62	6.8	6.2
21	.49	.60	.81	1.00	1.36					6.0	7.1
22	.60	.71	.84	1.04	1.20					7.9	6.7
23	.79	.92	1.07	1.25	1.40					9.4	8.2
24	.68	.84	1.02	1.19						9.1	8.2
25	.77	.84	.96	1.07	1.49					2.8	2.7
27							.89			12.7	9.3
28		.78	.98	1.19	1.50	1.27	1.09	.96	.85	8.4	4.3
29	1.00	1.09	1.18	1.27						3.7	3.3
30	.57	.67	.80	1.05		.72	.45	.32	.26	7.6	7.2
Means	.76	.85	.99	1.17	1.40	1.10	.84	.70	.58		
Departures	−.03	−.04	−.04	−.02	.00	−.04	−.11	−.12	−.11		
LINCOLN, NEBR.											
	Air mass										
	4.77	3.81	2.86	1.91	*0.95	1.91	2.86	3.81	4.77		
April	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mb.*	*mb.*
6					1.30	1.01	0.86			6.1	7.4
7				1.05	1.33	1.14	.99	.86	.75	7.4	7.2
11			0.86	1.11	1.35	1.09	.94	.79	.70	5.6	4.8
12			.88	1.07	1.32	1.10	.94			6.6	9.1
18				1.24	1.42	1.20	1.03	.92		4.6	4.2
23					1.37	1.14	.99	.84	.73	6.6	5.8
Means			.87	1.12	1.35	1.11	.96	.85	.73		
Departures			−.10	−.06	−.10	−.06	.00	+.02	+.03		
TABLE MOUNTAIN, CALIF.											
	Air mass										
	3.76	3.01	2.26	1.51	*0.75	1.51	2.26	3.01	3.76		
April	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mb.*	*mb.*
4				1.36							
10	1.11	1.21	1.31	1.45							
12				1.40							
13				1.38							
14				1.38							
15				1.36							
Means	1.11	1.21	1.31	1.39							
Departures	+.03	+.04	+.03	−.01							
BOSTON, MASS.											
	Air mass										
	4.96	3.96	2.97	1.98	*0.99	1.98	2.97	3.96	4.96		
April	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mb.*	*mb.*
12				1.17		1.06				7.4	7.4
Means				1.17		1.06					
Departures				+.07		+.18					

*Extrapolated.
[1] 75th Meridian Time.

TABLE 2.—*Daily totals and weekly means of solar radiation (direct + diffuse) received on a horizontal surface during April 1949*

[Gram-calories per square centimeter]

Date	Honolulu, T. H.	Pearl Harbor, T. H.	San Antonio, Tex.	Fort Worth, Tex.	La Jolla, Calif.	Riverside, Calif.	Santa Maria, Calif.	Inyokern, Calif.	Oak Ridge, Tenn.	Las Vegas, Nev.	Nashville, Tenn.	Fresno, Calif.	Davis, Calif.	Washington, D. C.	Columbia, Mo.	Soda Springs, Calif.	Grand Lake, Colo.	New York, N. Y.	Salt Lake City, Utah	State College, Pa.	Lincoln, Nebr.	Newport, R. I.	Put-in-Bay, Ohio	East Wareham, Mass.	Blue Hill, Mass.	Boston, Mass.	Ithaca, N. Y.	Twin Falls, Idaho	Albany, N. Y.	East Lansing, Mich.	Madison, Wis.	Portland, Maine	Toronto, Canada	Summit, Mont.
1949	*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.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*
Apr. 2	579	610	512	311	247	350	384	594	302	541	339	354	584	542	86	313	369	519	456	578	282	589	590	580	567	521	347	476	583	488	591	----	394	(431)
Apr. 3	450	636	500	456	551	612	630	(627)	184	606	104	624	610	286	----	693	682	368	555	474	324	475	569	478	451	378	118	545	355	522	593	----	321	440
Apr. 4	569	597	210	176	548	614	638	642	536	631	550	619	607	530	608	693	620	207	582	653	407	141	612	140	105	108	386	535	217	514	563	----	545	533
Apr. 5	486	638	634	660	368	347	482	455	60	563	59	555	524	187	----	(666)	684	375	543	305	575	560	115	560	572	490	234	484	520	220	253	----	301	329
Apr. 6	630	579	651	613	311	210	511	237	602	432	601	320	431	358	596	(438)	679	88	607	134	572	136	327	98	70	30	15	535	58	300	459	----	136	517
Apr. 7	662	548	642	607	263	488	431	471	475	347	511	546	596	320	501	(234)	668	464	443	268	584	537	447	417	450	418	182	281	301	220	492	----	283	564
Apr. 8	549	601	452	312	604	564	646	658	599	586	582	654	618	489	620	(669)	196	360	119	297	441	253	549	213	229	184	171	541	462	409	443	----	510	281
Means	561	602	514	478	413	455	532	526	394	529	392	525	567	387	482	529	557	340	472	387	455	384	458	355	349	304	208	485	357	382	485	----	356	442
Departures	−23	+18	----	----	−79	−9	----	----	----	----	−24	+24	+74	+11	+20	−33	+27	−6	−4	+22	+63	−20	+92	−26	−33	−28	−59	+58	----	+76	+113	----	+12	+20
Apr. 9	521	617	152	197	587	656	655	688	530	655	428	636	582	607	485	(716)	531	----	629	626	91	303	623	267	304	220	64	583	230	561	584	----	596	569
Apr. 10	567	472	440	295	598	638	670	687	402	676	457	648	596	631	52	708	542	----	620	635	215	645	595	554	631	607	397	568	606	515	492	----	576	581
Apr. 11	541	414	343	218	487	633	554	681	112	662	166	598	539	212	205	626	723	----	582	483	601	616	621	574	584	542	392	527	593	514	566	----	503	394
Apr. 12	599	589	661	664	346	635	500	688	148	674	157	664	624	299	592	(729)	681	568	434	535	606	613	548	577	627	550	382	330	604	494	577	----	489	202
Apr. 13	684	613	508	638	576	568	444	679	172	672	331	671	642	59	626	(731)	372	224	610	61	506	299	144	314	464	428	102	596	396	465	572	----	246	295
Apr. 14	712	600	625	676	382	442	144	636	572	671	642	620	581	429	89	(689)	287	----	637	435	94	363	535	----	200	167	316	595	476	(430)	236	----	500	473
Apr. 15	492	552	299	471	482	393	516	319	584	619	500	588	624	558	386	723	732	----	642	468	507	298	80	234	167	94	162	584	343	(102)	158	----	59	529
Means	588	551	432	451	494	566	498	625	360	661	369	632	598	399	348	703	552	----	593	463	374	448	450	420	425	372	259	540	464	440	456	----	424	434
Departures	−6	+6	----	----	−27	+85	----	----	----	----	−3	+82	+46	+1	−4	+59	−14	----	+45	+69	−35	+41	+70	+26	+52	+26	−33	+84	----	+91	+49	----	+48	−4
Apr. 16	732	416	587	698	-------	623	530	676	191	675	486	624	545	336	677	728	697	----	632	139	523	425	391	447	296	258	57	580	169	558	617	----	230	476
Apr. 17	737	620	406	647	-------	664	419	546	551	272	448	548	547	618	662	572	734	----	482	654	623	199	329	172	163	139	440	576	279	218	73	----	602	627
Apr. 18	673	365	284	646	191	320	260	674	673	672	675	676	563	205	472	484	572	----	560	194	668	305	122	406	250	334	41	547	144	42	277	----	31	616
Apr. 19	648	521	54	116	284	157	680	545	650	533	672	644	645	471	657	600	651	----	405	153	424	570	559	491	438	411	130	290	212	561	644	----	133	(367)
Apr. 20	653	561	191	170	574	640	584	667	495	684	390	646	541	634	490	683	372	----	447	611	335	576	630	588	630	534	409	523	647	534	592	----	508	245
Apr. 21	596	512	185	244	582	654	696	692	163	699	85	696	633	568	479	714	650	----	553	547	184	565	608	563	605	561	363	572	555	528	578	----	482	279
Apr. 22	435	329	490	223	525	644	669	631	421	680	507	642	592	64	634	712	561	300	655	155	574	551	380	524	566	514	141	603	431	443	575	----	121	488
Means	639	475	314	392	431	529	548	633	449	602	466	639	581	414	582	642	605	----	533	350	476	456	431	456	421	393	226	527	348	412	479	----	301	442
Departures	+29	−36	----	----	−65	+19	----	----	----	----	+4	+51	+4	−5	+109	−17	+22	----	−6	−48	+31	+36	+2	+40	+28	+11	−63	+43	----	+23	+72	----	−51	−16
Apr. 23	732	546	253	282	385	654	671	611	617	698	638	624	584	394	718	549	722	362	553	276	661	510	577	507	526	474	161	336	298	422	422	----	353	456
Apr. 24	490	603	72	286	252	625	636	704	----	608	698	638	583	472	723	(758)	670	394	552	278	641	562	196	440	463	467	45	614	338	286	638	----	438	653
Apr. 25	313	440	284	244	311	447	657	568	704	486	729	459	640	674	643	(777)	463	654	469	683	610	703	556	652	690	620	374	636	736	423	383	----	300	508
Apr. 26	452	428	352	337	319	491	487	681	612	700	474	506	669	626	115	(777)	286	457	588	551	416	482	272	373	378	335	132	629	210	188	369	----	156	560
Apr. 27	627	565	411	335	530	558	720	717	108	708	249	704	499	174	287	693	571	614	660	657	486	486	588	438	558	533	351	574	640	562	639	----	440	632
Apr. 28	751	696	352	409	545	602	674	646	391	656	417	626	518	607	721	406	781	746	424	731	645	705	728	557	670	563	464	422	543	589	683	----	642	486
Apr. 29	637	522	528	361	470	443	717	719	148	695	131	759	672	645	723	593	503	660	224	711	639	568	639	484	617	522	263	603	380	573	668	----	344	314
Means	572	543	322	322	402	546	652	664	430	650	476	616	595	513	561	650	571	555	496	555	585	574	508	493	557	502	256	545	449	435	543	----	382	516
Departures	−31	+13	----	----	−108	+65	----	----	----	----	+43	+38	+42	+64	+106	+12	−26	+107	−27	+128	+156	+102	+81	+35	+108	+113	−113	+37	----	+64	+104	----	+54	+25

ACCUMULATED DEPARTURES ON APRIL 29, 1949

----------	+56	+70	----	----	−4,095	+63	----	----	----	----	+1,092	+4,277	+1,092	−1,092	+266	+434	----	----	−175	+1,624	−1,722	+161	+2,212	−938	+441	+434	−8,099	+2,296	----	−903	+1,953	----	+224	+336

Note—Figures in parentheses are interpolated.

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 April 1949*

Date	2	3	4	5	6	7	8	Mean	9	10	11	12	13	14	15	Mean	16	17	18	19	20	21	22	Mean	23	24	25	26	27	28	29	Mean
Gm cal/cm²	388	299	43	371	26	267	125	217	140	372	333	358	260	88	60	230	130	61	107	220	307	303	286	202	249	189	310	170	260	289	268	248

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