SOLAR RADIATION DATA FOR MARCH 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.

Measurements of total solar and sky radiation received on a horizontal surface at Grand Lake, Colo, will be included in Table 2, beginning with this issue. The station is located at 40°15′ N. lat., 105°51′ W. long., at an elevation of 8,417 feet above sea level. These data are obtained through the cooperation of the Department of the Interior, Bureau of Reclamation, Colorado-Big Thompson Project.

TABLE 1.—*Solar radiation intensities during March 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		
March	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mb.*	*mb.*
9	0.69	0.79								1.4	1.7
12	.84	.98	1.11	1.33	1.48	1.22				.6	1.5
13		.70	.84	1.16	1.44	1.19				1.3	3.0
16						.96				6.9	7.2
17	.72	.84	.98	1.21	1.52	1.16	.95			4.7	5.1
20				1.06						6.1	9.4
22	.98	1.04	1.15	1.34	1.53					4.7	5.6
23	.68	.81	1.01	1.11	1.48	1.19	1.02			4.8	6.6
24	.74	.88	1.02	1.18	1.43	1.15				5.8	5.6
25	.52	.59	.74	.90	1.14					4.8	8.7
Means	.74	.83	.98	1.16	1.43	1.14	(.98)				
Departures	−.06	−.11	−.11	−.11	−.07	−.15	−.18				
LINCOLN, NEBR.											
	Air mass										
	4.77	3.81	2.86	1.91	*0.95	1.91	2.86	3.81	4.77		
March	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mb.*	*mb.*
8				1.27						1.4	2.7
11			.96	1.24	1.50	1.31	1.11			.8	1.2
12				1.31	1.50	1.31	1.11			1.0	2.6
19	.64	.79	.94	1.11	1.42	1.24	1.05	.92	.79	7.4	9.8
22					1.35	1.09	.83	.72	.64	4.4	6.6
23	.79	.92	1.05	1.22	1.45	1.19	1.01	.88	.75	5.1	7.2
24	.68	.79	.94	1.16	1.40	1.17	1.01	.90	.79	6.6	11.8
Means	.70	.83	.97	1.22	1.44	1.22	1.02	.86	.74		
Departures	−.12	−.10	−.10	−.05	−.06	−.04	−.05	−.07	−.07		
CLIMAX, COLO.											
	Air mass										
	3.24	2.59	1.94	1.29	*0.65	1.29	1.94	2.59	3.24		
March	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mb.*	*mb.*
2				1.58							
11						1.54					
12				1.58							
13				1.49							
19				1.49							
21							1.40	1.27	1.16		
22						1.49	1.34	1.24	1.12		
23				1.52		1.49	1.38	1.28	1.20		
24				1.54							
27							1.37	1.27	1.14		
28						1.48	1.36	1.25	1.14		
Means				1.53		1.50	1.37	1.26	1.15		
Departures				+.01		+.02	+.03	+.02	+.01		

TABLE 1.—*Solar radiation intensities duridg March 1948*—Con.

[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]
TABLE MOUNTAIN, CALIF.											
	Air mass										
	3.76	3.01	2.26	1.51	*0.75	1.51	2.26	3.01	3.76		
March	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mb.*	*mb.*
2				1.48							
3				1.50							
4				1.53							
5				1.50							
6				1.50							
7				1.45							
9				1.49							
10				1.49							
15				1.47							
20				1.49							
21				1.43							
22	1.08	1.17	1.29	1.44							
23				1.45							
25				1.47							
27				1.45							
31	1.08	1.18	1.30	1.46							
Means	(1.08)	(1.18)	(1.30)	1.48							
Departures	−.05	−.04	−.03	+.02							
BOSTON, MASS.											
	Air mass										
	4.96	3.96	2.97	1.98	*0.99	1.98	2.97	3.96	4.96		
March	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mb.*	*mb.*
5				1.24		1.30	1.12			.8	1.0
9				.82		.70				4.0	4.8
12				1.21		1.14	1.01			2.1	1.7
13				1.16						1.7	1.9
18				.97						3.8	5.8
25				1.28						2.2	2.6
26				1.01						5.1	5.3
29				.97						3.2	4.0
Means				1.08		1.05	(1.06)				
Departures				+.05		−.02	+.14				
BLUE HILL, MASS.											
	Air mass										
	4.86	3.89	2.92	1.94	*0.97	1.94	2.92	3.89	4.86		
March	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mb.*	*mb.*
1	0.86	0.95	1.06	1.33		1.35	1.21	1.03	0.89	1.7	2.7
5	1.08	1.18	1.29	1.43		1.48	1.29	1.18	1.07	.6	1.0
6	1.10	1.19	1.30	1.44						.7	1.3
11	.60	.67	.74							3.5	3.0
12				1.20		1.41	1.22	1.10	1.02	2.1	1.8
13	.94	1.05	1.19	1.37		1.32	1.14	1.02	.87	1.5	1.7
14	.90	1.02	1.14	1.30						2.2	2.7
15				.90						6.1	7.3
18	.65	.75	.85	1.10		1.00	.88	.80	.66	3.8	4.7
20	.81	.92	1.06	1.19		1.23	1.05	.93	.79	8.4	7.6
24						1.19	1.07	.96	.86	6.8	8.3
25	1.00	1.10	1.22	1.33		1.29	1.13	.95	.82	2.5	1.7
26		.96		1.28						5.8	6.2
28		.95		1.22						4.8	4.4
29	.97	1.09	1.19	1.31		1.31				2.8	3.0
Means	.89	.99	1.10	1.26		1.29	1.12	1.00	.87		
Departures	+.02	+.03	+.02	+.02		+.06	+.07	+.07	+.05		
RATIO, BOSTON/BLUE HILL ON COMPARABLE DATES											
				0.87		(0.85)	(0.84)				

*Extrapolated.
[1] 75th meridian time.

Table 3 gives the values of solar and sky radiation plus the radiation reflected from the ground, as received on a vertical surface facing south at Blue Hill, Mass.

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.	La Jolla, Calif.	Riverside, Calif.	Blue Hill, Mass.	Newport, R. I.	Salt Lake City, Utah	Put-in-Bay, Ohio	State College, Pa.	Davis, Calif.	Toronto, Canada	Ithaca, N. Y.	Boulder, Colo.	East Wareham, Mass.	Honolulu, Hawaii	Pearl Harbor, Hawaii	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.*
Feb. 26	209	331	120	21	359	106	377	64	86	299	451	114	82	298	385	166	375	77	22	366	90	275	273	110	408	432
Feb. 27	385	23	24	342	390	135	110	268	186	294	212	306	211	267	149	355	169	200	215	368	267	458	466	116	104	397
Feb. 28	340	129	326	33	337	152	473	22	434	281	175	39	47	229	63	188	317	15	34	193	55	400	437	271	127	247
Feb. 29	376	151	103	283	438	161	435	133	376	450	491	149	190	424	141	69	445	269	148	189	148	531	466	230	462	388
Mar. 1	357	142	111	364	466	157	54	370	256	220	334	460	464	414	110	363	439	223	321	124	420	538	502	184	490	202
Mar. 2	39	49	286	33	403	170	56	44	270	366	243	101	98	196	20	14	378	56	71	423	111	458	378	278	340	447
Mar. 3	163	279	396	64	510	181	114	203	164	380	458	190	177	274	141	43	477	322	99	149	196	496	494	387	518	386
Mean	267	158	195	163	415	152	231	158	253	327	338	194	181	300	144	171	372	166	130	259	184	451	431	225	350	357
Departure	−11	−111	−107	−88	+57	+24	−30	−50	−3	−49	−10	−87	−92	+18	−75	−51	+51	−34	−86	−49	−65	-----	-----	-----	+21	-----
Mar. 4	96	442	293	54	502	190	451	72	102	474	537	114	237	421	481	176	442	441	254	235	240	526	439	470	507	323
Mar. 5	498	317	178	449	482	184	138	427	347	467	516	508	498	418	484	476	324	389	388	348	471	469	515	421	325	406
Mar. 6	301	86	377	401	495	181	56	389	33	448	498	466	482	428	146	318	484	286	337	418	449	533	481	132	380	412
Mar. 7	219	336	493	47	503	200	419	37	451	446	492	74	114	425	226	118	468	51	103	417	126	633	407	239	513	485
Mar. 8	432	292	501	353	243	186	336	244	413	423	505	269	340	160	223	209	72	237	90	388	286	361	348	273	90	284
Mar. 9	31	436	436	234	279	205	207	328	140	330	262	374	394	286	436	263	357	265	218	219	369	144	116	423	400	346
Mar. 10	261	410	320	139	314	104	182	22	417	399	538	48	24	398	307	225	514	257	116	334	36	462	391	482	545	450
Mean	263	331	371	240	403	178	256	217	272	426	478	265	298	362	329	255	380	275	215	337	282	447	385	349	394	387
Departure	−49	+33	+48	−33	+1	+33	−53	−37	−9	+5	+56	−28	−4	+37	+45	−22	+16	+32	−33	−17	−1	-----	-----	-----	+39	-----
Mar. 11	46	497	541	86	473	130	540	96	99	476	512	103	161	480	382	42	411	165	63	532	189	378	359	-----	473	580
Mar. 12	514	473	543	457	431	143	595	415	476	444	529	458	510	394	518	495	144	418	367	532	399	340	344	-----	406	594
Mar. 13	448	478	473	432	74	84	497	442	480	449	329	466	510	260	477	415	111	393	356	506	474	511	424	-----	117	575
Mar. 14	404	451	498	323	297	154	363	382	448	352	220	430	443	95	477	385	194	303	331	-----	457	628	530	264	224	443
Mar. 15	411	159	252	291	568	146	307	259	53	502	548	307	314	430	112	201	413	16	116	298	339	504	436	380	485	289
Mar. 16	126	347	418	150	156	107	498	136	120	485	474	110	94	360	345	194	192	219	159	475	114	578	396	393	133	561
Mar. 17	412	492	304	435	450	160	490	226	471	150	309	222	235	236	301	90	451	347	171	375	160	616	573	153	484	273
Mean	337	414	433	310	350	132	470	279	307	440	417	300	324	322	373	260	274	266	223	453	304	508	438	298	332	474
Departure	+17	+101	+94	+30	−55	−62	+140	−11	+22	+50	+24	−4	+12	−62	+88	−3	−93	+4	−11	+53	+10	-----	-----	-----	−65	-----
Mar. 18	425	312	272	321	443	163	316	428	366	244	596	463	492	392	430	387	369	355	303	375	377	605	602	158	239	360
Mar. 19	122	155	541	62	492	220	462	210	279	243	192	245	261	104	154	12	442	12	49	441	302	560	573	172	359	490
Mar. 20	455	383	424	495	601	217	421	452	305	485	612	497	516	459	451	470	532	440	348	260	504	604	595	170	439	459
Mar. 21	426	163	225	216	580	224	52	226	410	522	592	280	252	460	79	221	526	153	82	385	295	615	548	152	544	624
Mar. 22	332	459	533	231	554	246	105	288	115	537	549	280	290	523	311	104	230	268	27	432	284	618	566	90	360	527
Mar. 23	37	509	549	95	530	305	338	96	219	542	581	91	97	465	332	44	118	275	97	566	125	490	446	193	165	617
Mar. 24	333	498	537	328	221	230	554	320	386	334	136	380	457	194	501	447	176	500	325	564	468	614	554	303	87	619
Mean	304	354	440	250	489	239	321	288	297	447	465	320	338	371	323	241	342	286	176	432	336	587	555	177	313	528
Departure	−37	+21	+58	−80	+39	+14	−8	−17	−23	+5	+70	−51	−57	−41	0	−70	−48	+8	−113	−14	+7	-----	-----	-----	−93	-----
Mar. 25	561	433	357	498	637	311	406	482	466	531	444	558	559	158	528	510	493	498	375	516	544	454	452	288	476	498
Mar. 26	350	251	46	257	571	237	522	401	74	546	599	456	392	558	150	291	569	272	193	502	378	402	412	292	624	241
Mar. 27	230	457	349	80	618	97	70	50	233	533	616	34	38	557	91	298	573	64	120	500	55	456	412	279	642	588
Mar. 28	348	553	591	272	350	155	588	131	477	100	223	183	198	472	605	465	124	572	125	505	289	312	319	197	396	590
Mar. 29	580	277	518	452	493	328	581	452	551	129	201	575	589	216	365	529	420	375	388	574	516	522	520	182	343	365
Mar. 30	517	492	278	396	635	280	145	434	306	107	202	490	494	156	439	361	568	468	285	551	500	658	651	328	384	348
Mar. 31	223	81	421	417	605	331	80	448	359	499	605	509	535	566	209	205	595	179	248	624	509	616	595	100	671	581
Mean	402	363	366	339	558	248	342	343	352	391	413	401	401	383	341	380	478	347	248	539	399	489	480	238	505	459
Departure	+43	+4	−18	+7	+86	−37	−52	−33	−4	−83	−1	+6	−10	−23	−10	+4	+8	+50	−49	+67	+12	-----	-----	-----	+111	-----
ACCUMULATED DEPARTURES ON MARCH 31, 1948																										
	−826	+1190	+252	−938	+4711	−154	+602	−1477	−1085	−1547	+3044	−1624	−945	−1414	+2254	+679	+847	+1512	−2562	−970	−1155	-----	-----	-----	−525	-----

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 March 1948*

Date	[1] 26	27	28	29	[2] 1	2	3	Mean	4	5	6	7	8	9	10	Mean	11	12	13	14
Gm. cal/cm²	52	365	26	110	624	68	157	200	82	657	608	52	277	440	40	307	103	566	587	465

Date	15	16	17	Mean	18	19	20	21	22	23	24	Mean	25	26	27	28	29	30	31	Mean
Gm. cal/cm²	292	74	177	323	466	196	468	205	202	39	320	271	470	368	10	105	454	390	395	313

[1] February.
[2] March.