SOLAR RADIATION DATA FOR DECEMBER 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.

TABLE 1.—*Solar radiation intensities during December 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		
December										*mb.*	*mb.*
5	0.95	1.08	1.21	------	------	------	1.21	------	------	3.0	4.0
8	1.01	1.14	1.26	------	------	------	------	------	------	1.6	1.5
12	.86	.95	1.07	------	------	------	------	------	------	1.7	1.7
13	.91	1.07	1.22	------	------	------	------	------	------	1.7	1.7
14	.88	1.10	1.22	------	------	------	------	------	------	1.0	1.4
23	.94	------	------	------	------	------	------	------	------	.8	1.4
24	.62	.91	1.08	------	------	------	------	------	------	.8	2.0
30	.32	.42	.68	------	------	------	------	------	------	4.8	5.8
Means	.81	.95	1.11	------	------	------	1.21	------	------	------	------
Departures	−.08	−.07	−.06	------	------	------	+.02	------	------	------	------
LINCOLN, NEBR.											
	Air mass										
	4.77	3.81	2.86	1.91	*0.95	1.91	2.86	3.81	4.77		
December										*mb.*	*mb.*
6	------	------	------	------	------	------	1.11	0.96	0.83	3.3	4.0
12	0.83	1.00	1.13	------	------	------	1.06	.96	.87	1.2	1.4
15	.74	.85	1.02	------	------	------	1.03	.90	.81	2.2	3.2
22	------	.96	1.13	------	------	------	1.15	1.02	.94	2.0	1.7
27	.87	.98	------	------	------	------	------	------	------	3.0	3.5
Means	.81	.95	1.09	------	------	------	1.09	.96	.86	------	------
Departures	−.13	−.12	−.12	------	------	------	−.10	−.09	−.08	------	------
TABLE MOUNTAIN, CALIF.											
	Air mass										
	3.76	3.01	2.26	1.51	*0.75	1.51	2.26	3.01	3.76		
December										*mb.*	*mb.*
2	------	------	------	1.56	------	------	------	------	------	------	------
4	1.25	1.33	1.43	1.53	------	------	------	------	------	------	------
5	------	------	------	1.52	------	------	------	------	------	------	------
12	------	------	------	1.52	------	------	------	------	------	------	------
13	------	------	------	1.52	------	------	------	------	------	------	------
22	------	------	------	1.52	------	------	------	------	------	------	------
24	------	------	------	1.52	------	------	------	------	------	------	------
26	------	------	------	1.54	------	------	------	------	------	------	------
27	1.22	1.30	1.41	1.54	------	------	------	------	------	------	------
Means	1.24	1.32	1.42	1.53	------	------	------	------	------	------	------
Departures	0	0	−.01	0	------	------	------	------	------	------	------

TABLE 1.—*Solar radiation intensities during December 1949—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]
BOSTON, MASS.											
	Air mass										
	4.96	3.96	2.97	1.98	*0.99	1.98	2.97	3.96	4.96		
December										*mb.*	*mb.*
6	------	1.07	1.27	------	------	------	------	------	------	3.1	1.8
8	0.90	1.02	1.24	------	------	------	1.17	1.03	0.90	2.3	2.5
9	.61	.75	1.03	------	------	------	------	------	------	2.2	2.3
15	------	------	.90	------	------	------	1.05	.85	.76	2.4	1.8
16	.82	.86	.99	------	------	------	.96	.81	.62	2.2	2.1
28	.85	.96	------	------	------	------	------	------	------	4.4	3.6
29	------	------	------	------	------	------	1.27	1.10	.99	4.2	2.5
30	------	------	------	------	------	------	1.24	1.16	1.05	.9	1.7
Means	.80	.93	1.09	------	------	------	1.14	.99	.86	------	------
Departures	+.07	+.07	+.08	------	------	------	+.11	+.09	+.06	------	------
BLUE HILL, MASS.											
	Air mass										
	4.86	3.89	2.92	1.94	*0.97	1.94	2.92	3.89	4.86		
December										*mb.*	*mb.*
3	------	------	------	------	------	------	1.01	0.87	0.74	4.4	3.6
5	------	------	------	------	------	------	------	.93	.78	6.0	5.2
6	0.97	1.07	1.28	------	------	------	1.26	1.16	1.09	2.7	1.8
8	1.03	1.14	1.27	------	------	------	------	1.10	.99	2.0	1.7
9	.85	.99	1.12	------	------	------	------	------	------	1.8	2.5
10	1.14	1.20	1.32	------	------	------	1.12	.86	.81	1.7	2.7
15	1.01	1.09	1.19	------	------	------	1.21	1.10	.98	1.8	1.7
16	1.09	1.18	1.26	------	------	------	1.21	1.10	.98	1.7	1.5
24	1.07	1.15	1.24	------	------	------	1.25	1.10	.99	2.9	1.9
25	.91	.98	1.12	------	------	------	1.10	------	------	2.6	3.5
28	.91	.97	------	------	------	------	1.21	1.07	.97	3.9	3.2
29	.59	------	------	------	------	------	1.29	1.20	1.12	3.5	2.0
30	1.16	1.24	1.37	------	------	------	1.32	1.22	1.10	1.0	1.3
31	1.09	1.18	1.27	------	------	------	------	------	------	1.4	2.2
Means	.99	1.11	1.24	------	------	------	1.20	1.06	.96	------	------
Departures	+.08	+.07	+.07	------	------	------	+.04	+.02	0	------	------
RATIO, BOSTON/BLUE HILL ON COMPARABLE DATES											
	0.82	0.87	0.89	------	------	------	0.90	0.87	0.83	------	------

*Extrapolated.
[1] 75th Meridian Time.

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

[Gram-calories per square centimeter]

Date	Honolulu, T. H.	Pearl Harbor, T. H.	La Jolla, Calif.	Riverside, Calif.	Nashville, Tenn.	Fresno, Calif.	Davis, Calif.	Washington, D. C.	Columbia, Mo.	Soda Springs, Calif.	Seabrook, N. J.	Grand Lake, Colo.	Salt Lake City, Utah	New York, N. Y.	State College, Pa.	Lincoln, Nebr.	Newport, R. I.	Put-in-Bay, Ohio	East Wareham, Mass.	Blue Hill, Mass.	Boston, Mass.	Amherst, Mass.	Lynn, Mass.	Ithaca, N. Y.	Twin Falls, Idaho	Albany, N. Y.	East Lansing, Mich.	Madison, Wis.	Portland, Maine	Toronto, Canada	Caribou, Maine	Summit, Mont.	Fairbanks, Alaska
1949																																	
Dec. 3	374	318	159	270	267	37	234	260	-----	287	242	228	224	-----	259	152	225	228	196	209	181	222	183	-----	203	-----	159	180	186	145	178	110	-----
Dec. 4	503	462	275	281	120	198	122	171	-----	283	227	268	187	-----	71	251	233	67	227	217	157	199	170	-----	124	-----	82	221	194	36	204	135	-----
Dec. 5	516	477	231	264	270	277	244	248	-----	165	194	271	145	-----	148	157	159	232	130	186	147	76	149	-----	81	-----	161	217	148	107	76	16	-----
Dec. 6	455	445	204	266	189	199	131	238	-----	173	195	78	109	-----	223	233	202	117	189	163	147	185	151	-----	139	-----	56	23	206	162	113	112	-----
Dec. 7	360	371	203	150	265	135	59	202	-----	157	158	152	116	-----	95	232	56	77	50	33	16	47	27	-----	89	-----	174	111	30	109	157	140	-----
Dec. 8	216	177	73	54	237	172	259	195	-----	218	221	194	58	-----	143	83	229	118	223	225	212	154	198	-----	184	-----	116	223	163	170	127	150	-----
Dec. 9	264	260	193	278	120	231	175	206	-----	162	225	87	151	-----	177	34	224	193	209	201	175	163	170	-----	30	-----	161	81	181	162	174	30	-----
Means	384	359	191	223	210	178	175	217	-----	192	209	182	141	-----	159	163	190	147	175	176	148	149	149	-----	121	-----	130	151	158	127	147	99	-----
Departures	−24	−15	−44	−1	+66	−2	+4	+56	-----	−14	-----	−8	−15	-----	+28	−8	+50	+28	+36	+39	+45	-----	-----	-----	−1	-----	+38	+33	-----	+39	-----	+11	-----
Dec. 10	450	437	238	271	41	281	283	111	-----	177	128	185	116	-----	126	22	225	22	212	213	172	185	171	-----	65	-----	17	28	203	87	95	73	-----
Dec. 11	365	286	274	191	79	280	289	52	-----	293	70	111	154	-----	18	96	19	47	25	29	20	26	31	-----	181	-----	29	26	107	10	177	75	-----
Dec. 12	456	401	269	197	25	268	232	27	-----	174	38	224	206	-----	24	236	25	171	25	19	22	16	17	-----	87	-----	131	202	25	157	42	51	-----
Dec. 13	400	292	257	245	80	252	234	17	-----	265	19	218	126	-----	114	186	16	184	14	9	5	24	6	-----	112	-----	139	190	20	123	33	68	-----
Dec. 14	443	450	262	240	109	158	121	129	228	181	131	256	222	-----	168	246	93	139	86	121	99	145	114	-----	215	-----	69	212	196	76	176	72	-----
Dec. 15	439	436	153	91	248	92	36	213	247	84	180	245	106	-----	196	227	208	58	196	208	176	207	182	-----	118	-----	61	197	178	134	187	43	-----
Dec. 16	250	189	175	215	271	196	198	211	230	132	218	68	104	-----	209	152	226	195	217	207	183	201	180	-----	84	-----	139	126	199	136	179	47	-----
Means	400	356	233	207	122	218	199	108	-----	186	112	186	148	-----	122	166	116	117	111	115	97	115	101	-----	123	-----	84	140	132	103	127	61	-----
Departures	+1	−9	+1	−5	−1	+48	+34	−31	-----	−4	-----	+5	+13	-----	+9	+5	−30	+12	−35	−24	−21	-----	-----	-----	−5	-----	−9	+21	-----	+8	-----	−8	-----
Dec. 17	244	227	260	112	54	90	98	204	53	50	219	197	66	-----	163	201	203	162	191	186	149	168	134	-----	33	-----	153	160	129	115	65	30	-----
Dec. 18	225	218	146	65	54	116	171	28	75	45	82	177	67	-----	48	228	113	59	94	60	42	47	37	-----	69	-----	19	51	43	10	43	29	-----
Dec. 19	484	461	152	111	106	227	276	84	184	220	88	139	46	-----	57	40	48	42	37	68	65	104	66	-----	126	-----	36	39	138	41	58	131	-----
Dec. 20	474	477	269	292	258	270	262	147	78	220	194	213	219	150	106	71	183	49	158	173	138	148	119	-----	154	-----	15	25	154	87	120	48	-----
Dec. 21	485	451	245	238	181	249	255	116	15	(280)	126	175	78	93	110	38	170	41	148	67	52	69	40	-----	117	-----	10	27	58	10	19	56	-----
Dec. 22	476	430	258	269	31	251	249	108	103	280	116	109	73	89	184	246	48	53	67	117	130	123	121	-----	58	-----	14	82	145	22	31	33	-----
Dec. 23	487	467	245	270	173	244	242	37	257	276	20	188	170	26	21	214	58	43	50	49	47	19	57	-----	128	-----	88	180	47	82	9	51	-----
Means	411	390	225	194	122	207	222	103	109	196	121	171	103	89	98	148	118	64	108	103	89	97	82	-----	98	-----	48	81	102	52	49	54	-----
Departures	+3	+13	+3	−17	−27	+62	+94	−45	−55	−15	-----	−11	−35	−23	−27	−20	−21	−46	−44	−34	−18	-----	-----	-----	−18	-----	−47	−41	-----	−35	-----	+1	-----
Dec. 24	486	458	-----	252	283	119	202	233	256	279	204	74	135	201	200	212	217	148	223	217	184	120	187	-----	135	-----	150	218	190	105	165	33	-----
Dec. 25	503	471	-----	260	87	222	265	204	26	261	170	200	239	141	210	129	209	187	192	197	165	207	172	-----	102	-----	72	61	162	127	207	22	-----
Dec. 26	426	401	-----	272	51	216	246	68	77	254	166	139	-----	55	10	218	73	24	63	58	44	20	52	-----	148	-----	24	206	82	6	95	40	-----
Dec. 27	256	222	-----	282	87	227	239	94	256	272	73	209	166	53	41	233	47	142	39	34	23	35	-----	-----	114	-----	22	142	67	26	37	18	-----
Dec. 28	293	269	-----	269	281	237	227	235	256	268	224	260	210	223	135	225	217	214	213	201	169	163	163	-----	202	-----	155	165	184	162	106	26	-----
Dec. 29	455	405	-----	245	267	265	163	151	236	240	160	270	190	220	206	218	185	78	197	198	166	200	175	-----	200	-----	153	88	192	176	136	131	-----
Dec. 30	438	328	-----	270	259	59	244	238	208	260	223	187	236	229	236	57	239	212	229	232	204	206	198	-----	183	-----	122	132	196	126	154	39	-----
Dec. 31	433	425	-----	150	84	69	198	210	43	279	214	269	225	169	204	50	222	230	209	190	151	206	184	-----	114	-----	34	20	190	104	187	18	-----
Means	411	372	-----	250	175	177	223	179	170	264	179	201	200	162	155	168	176	154	170	166	138	145	162	-----	150	-----	91	129	158	104	136	41	-----
Departures	+1	−7	-----	+39	+72	+35	+89	+34	+36	+23	-----	+15	+43	+39	+49	+8	+40	+55	+32	+38	+33	-----	-----	-----	+19	-----	+13	+12	-----	+20	-----	−16	-----
ACCUMULATED DEPARTURES ON DECEMBER 31, 1949																																	
	+196	+238	+12,390	-----	+9,261	+11,949	-----	−2,016	-----	+1,323	-----	-----	−854	-----	+8,449	−2,121	+6,076	+11,242	+3,532	+6,818	+12,404	-----	-----	-----	+5,306	-----	−3,241	+9,863	-----	+588	-----	+308	-----
PERCENTAGE DEPARTURES FOR THE YEAR 1949																																	
	+0.1	+0.1	−8.2	-----	+7.5	+7.2	-----	−1.6	-----	+0.8	-----	-----	−0.6	-----	+7.3	−1.6	+4.8	+9.2	+2.9	+5.5	+11.6	-----	-----	-----	+3.8	-----	−3.2	+8.2	-----	+0.5	-----	+0.3	-----

NOTE.—Values 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 December 1949*

Date	3	4	5	6	7	8	9	Mean	10	11	12	13	14	15	16	Mean	17	18	19	20	21	22	23	Mean
Gm cal cm^{-2}	456	473	355	359	26	530	452	379	508	16	12	6	158	511	524	248	381	36	62	351	48	178	59	159
Date	24	25	26	27	28	29	30	31	Mean	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Gm cal cm^{-2}	536	457	34	17	476	452	582	453	376	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

TABLE 4.—*Daily totals and weekly means of solar and sky radiation, plus the radiation reflected from the ground, as received on a vertical surface facing north at Blue Hill, Mass., during December 1949*

Date	3	4	5	6	7	8	9	Mean	10	11	12	13	14	15	16	Mean	17	18	19	20	21	22	23	Mean
Gm cal cm^{-2}	48	54	44	47	19	48	43	43	44	12	7	3	31	29	30	22	40	23	25	34	26	30	14	28
Date	24	25	26	27	28	29	30	31	Mean	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Gm cal cm^{-2}	32	30	21	15	33	33	35	27	28	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----