SOLAR RADIATION AND SUNSPOT DATA FOR MAY 1947

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

SOLAR RADIATION OBSERVATIONS

Explanations of the tables 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, page 43, January 1944. A list of pyrheliometric stations is given on page 45 of the same REVIEW. An explanation of the formula used in computing the air mass values for each station will be found in vol. 75, No. 3, March 1947, p. 47.

Through the courtesy of Mr. Hugh W. Brodie, Chief of the Climatology Department at the Experiment Station of the Hawaiian Sugar Planters' Association, Honolulu, Hawaii, values of total solar and sky radiation received on a horizontal surface at Makiki and Waipio, Hawaii, will appear regulary in the MONTHLY WEATHER REVIEW in Table 2.

The Makiki Station is on the grounds of the Experiment Station 1.5 miles east of the Federal Building and within the city of Honolulu. The immediate area is almost exclusively residential and there is little atmospheric vitiation from man-made causes. The latitude and longitude of the pyrheliometer installation are 21°18.4′ N., and 157°50.4′ W., respectively, and the elevation is 50 feet. Hills varying in height up to 2,000 feet at a distance of from 3–10 miles prevent an absolutely free horizon in every direction.

The Waipio Station is approximately one-eighth mile from the north shore of the middle Loch of Pearl Harbor. The latitude and longitude are 21°23.5′ N. and 157°59.8′ W., respectively, and the elevation is 60 feet. The true horizon is less obscured than that at Makiki, but distant hills cut off about 5° of the horizon for an arc of approximately 230°. This station is in a cane-growing area, the radiation received being representative of approximately 15,000 acres of cane land.

TABLE 1.—*Solar radiation intensities during May 1947*

[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		
May	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mb.*	*mb.*
3				0.99						9.1	9.8
7	0.76	0.87	1.02	1.19	1.56					5.6	4.8
8	.77	.88	1.03	1.16	1.42					5.1	4.0
9	.64	.76	.94	1.03	1.31					5.1	3.3
10	.60	.73	.87	1.04	1.27					5.1	4.6
13				.80						13.7	16.5
16	.61									9.8	11.4
19			.70							14.2	17.7
20				1.10						10.2	9.4
21		.76	.90	1.04	1.38					9.1	8.7
23		.77								9.4	9.8
26	.71	.84	.98	1.11						7.8	5.8
31	.65	.76	.90	1.04						9.8	12.3
Means	.68	.80	.92	1.05	1.39						
Departures	+.06	+.03	−.03	−.05	+.02						

See footnotes at end of table.

TABLE 1.—*Solar radiation intensities during May 1947*—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]
LINCOLN, NEBR.											
	Air mass										
	4.77	3.81	2.86	1.91	0.95*	1.91	2.86	3.81	4.77		
May	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mb.*	*mb.*
1				0.70	1.32					7.8	10.2
2				1.14	1.41	1.21	1.06	0.94	0.86	6.1	8.1
4					1.25	1.01	.82	.69		8.7	8.1
7					1.32	1.00	.77			5.8	7.8
13					1.36	1.06	.88	.75	.62	10.6	12.7
14					1.29	.99	.82			12.3	17.7
20					1.35	1.06	.82	.67	.58	10.2	12.7
21					1.34					8.1	11.0
26					1.31					9.4	6.6
29					1.43					6.1	6.9
Means				(0.92)	1.34	1.06	.86	.76	.68		
Departures				−.20	−.02	−.07	−.04	−.04	+.01		
BLUE HILL, MASS											
	Air mass										
	4.86	3.89	2.92	1.94	0.97*	1.94	2.92	3.89	4.86		
May	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mb.*	*mb.*
6									0.49	10.6	10.6
8	0.79	0.90	1.03	1.18						5.3	4.3
10	.90	1.00	1.10	1.23	1.49	1.21	1.05	0.88	.77	3.6	2.9
11			.98		1.40		.83			4.2	4.8
14							1.04	.97	.88	8.6	5.3
15	.87	.94	1.10	1.26	1.51	1.31	1.12	1.00	.88	6.5	6.4
16	.86	.94	1.07							8.4	7.7
17	.46	.59	.79	.98						9.3	9.4
21						.93	.75	.55		10.0	11.0
24	.52	.62	.73	.90		.73				16.3	19.3
26							.97	.87		14.1	10.1
27	.49		.71		1.39	1.18	1.00			12.7	6.9
29						1.01	.88	.70		20.1	22.7
30					1.44	1.25	1.07	.92		9.4	8.4
31	.84	.92	1.02	1.11						6.5	7.0
Means	.72	.84	.95	1.11	1.45	1.09	.97	.84	.76		
Departures	+.07	+.05	.00	+.02	+.08	+.02	+.08	+.10	+.12		
CLIMAX, COLO.											
	Air mass										
	3.24	2.59	1.94	1.29	0.65*	1.29	1.94	2.59	3.24		
May	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mb.*	*mb.*
8					1.53	1.22	1.04				
13						1.34	1.22	1.08	0.98		
14				1.31							
19			1.17	1.36	1.51						
20				1.39	1.55	1.36	1.22	1.14	1.04		
21			1.19	1.35	1.56	1.34	1.19	1.09	1.03		
22			1.20	1.37	1.53						
25				1.25	1.50						
26			.99	1.16							
Means			1.14	1.31	1.53	1.32	1.17	1.10	1.02		
TABLE MOUNTAIN, CALIF.											
	Air mass										
	3.76	3.01	2.26	1.51	0.75*	1.51	2.26	3.01	3.76		
May	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mb.*	*mb.*
1				1.36							
2	1.06	1.15	1.26	1.37	1.47						
17				1.38							
18				1.32							
21				1.26							
28				1.38							
Means	(1.06)	(1.15)	(1.26)	1.34	(1.47)						

[1] 75th meridian time. * Extrapolated.

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.	East Lansing, Mich.	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.	New Orleans, La.	Toronto, Canada	Ithaca, N. Y.	Boulder, Colo.	Soda Springs, Calif.	East Wareham, Mass.	Honolulu, Hawaii	Pearl Harbor, Hawaii
1947	*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. 30	447	531	459	273	360	699	277	707	364	276	618	621	647	356	365	696	288	696	224	247	86	674	731	206	716	664
May 1	576	347	610	163	261	686	505	455	30	364	620	468	675	83	54	682	440	676	520	127	242	690	735	83	380	439
May 2	454	79	705	206	54	665	274	106	92	304	617	639	662	126	101	679	275	704	614	215	82	702	729	136	486	428
May 3	372	350	524	380	63	680	610	674	41	173	618	604	671	98	176	719	216	741	610	514	342	498	750	102	425	333
May 4	456	443	665	246	130	619	151	688	146	544	574	495	629	156	64	676	335	649	581	368	263	667	735	177	730	684
May 5	383	485	265	162	86	684	438	633	319	650	606	355	570	368	361	528	230	705	591	60	48	534	748	339	507	556
May 6	564	204	551	390	414	718	420	587	170	543	447	589	642	298	344	623	195	710	584	176	42	261	770	317	651	513
Means	465	348	540	260	195	679	382	550	166	408	586	539	642	212	209	658	283	697	532	248	158	576	743	194	557	516
Departures	−6	−93	+91	−87	−237	+54	−43	+102	−197	−36	+45	−19	+102	−239	−253	----	−154	+51	+91	−143	−240	+72	----	−228	----	----
May 7	500	646	710	251	222	717	538	762	97	607	629	566	683	182	221	705	177	682	----	180	30	530	532	279	647	668
May 8	672	653	523	262	503	638	534	712	443	627	639	608	644	472	318	724	425	570	----	298	252	309	400	450	471	398
May 9	596	666	512	663	408	685	462	770	386	687	273	599	666	410	442	529	299	735	----	711	275	410	715	498	497	451
May 10	756	657	536	630	696	692	163	760	678	700	228	450	544	744	742	327	726	746	----	674	509	204	785	708	546	504
May 11	746	666	392	623	656	738	339	614	640	646	164	504	531	696	698	229	703	710	----	629	492	459	520	682	636	673
May 12	720	413	346	513	591	585	277	362	527	600	385	652	707	594	586	287	624	642	----	488	443	560	622	569	509	578
May 13	650	334	646	371	506	693	478	739	376	342	387	498	685	400	556	436	385	712	----	212	202	690	781	488	616	613
Means	663	576	524	473	512	678	399	674	450	601	386	554	637	500	509	462	477	697	----	456	315	452	622	525	560	555
Departures	+186	+119	+75	+65	+70	+38	−50	+194	+56	+128	−167	−8	+102	+31	+37	----	+34	+32	----	+45	−112	−20	----	+54	----	----
May 14	516	543	695	461	41	731	396	731	266	446	640	341	150	230	82	536	238	719	----	632	45	459	----	129	706	685
May 15	238	292	328	461	411	715	546	444	711	500	688	486	519	759	761	728	157	724	----	334	157	81	762	740	454	410
May 16	217	660	311	461	511	715	441	320	558	631	678	302	555	649	317	734	204	729	----	451	148	375	741	477	663	584
May 17	501	75	195	461	491	732	452	453	608	456	638	332	628	661	677	705	90	753	----	302	219	622	762	671	709	617
May 18	405	661	709	461	146	707	628	761	62	405	628	280	660	84	98	618	441	710	----	272	156	384	743	92	703	467
May 19	-------	310	396	461	552	705	608	560	287	209	696	323	453	514	504	749	454	736	----	565	191	472	694	479	562	644
May 20	-------	518	417	538	421	717	549	106	293	386	703	528	605	361	428	714	557	721	----	493	384	770	753	339	340	373
Means	375	437	436	472	368	717	517	482	398	434	667	370	510	465	410	683	306	728	----	436	186	452	743	418	591	540
Departures	−97	−31	−70	+143	−86	+64	+58	−1	−9	−15	+68	−174	−21	−22	−84	----	−114	+76	----	+30	−238	+11	----	−41	----	----
May 21	515	705	639	343	171	722	551	765	140	173	700	398	510	176	121	738	254	723	----	153	254	724	756	155	310	363
May 22	399	242	349	623	136	736	638	565	125	665	693	151	251	106	188	740	705	735	----	653	442	76	762	229	645	652
May 23	655	510	636	204	635	746	452	191	253	627	688	429	583	270	464	727	627	706	----	398	435	160	750	317	726	707
May 24	623	219	480	285	420	733	364	442	512	184	686	516	-------	622	597	731	506	695	----	367	259	658	673	613	661	684
May 25	253	591	656	218	187	732	411	784	327	171	400	433	-------	396	263	654	348	704	----	109	172	609	776	314	501	488
May 26	722	735	743	529	532	451	358	505	608	638	557	186	254	682	617	601	718	322	----	252	434	207	313	608	700	546
May 27	659	280	252	281	680	553	513	364	658	647	231	481	-------	721	657	278	700	385	----	539	427	273	143	653	585	416
Means	547	469	536	355	394	668	469	517	375	444	565	371	400	425	415	638	551	610	----	353	346	387	596	413	590	551
Departures	+50	−22	−2	−7	−66	+10	+23	-----	−54	−54	−33	−126	−136	−36	−32	----	+88	−23	----	−46	−120	−60	----	−69	----	----
May 28	704	83	52	78	543	721	653	646	439	599	657	608	-------	568	531	421	579	691	----	191	289	173	369	519	445	395
May 29	634	547	798	175	573	711	641	803	555	185	692	410	679	628	426	518	500	655	----	274	254	736	633	423	659	680
May 30	704	663	762	433	668	243	730	760	423	732	302	583	366	484	374	378	734	373	----	460	425	575	163	297	722	640
May 31	759	634	182	592	676	585	745	577	619	702	441	618	606	649	608	243	633	310	----	570	393	381	118	622	666	572
June 1	722	77	142	92	630	752	633	-----	568	497	493	561	629	652	638	313	573	642	----	115	190	621	354	624	630	593
June 2	509	693	594	197	390	598	446	-----	374	339	372	442	364	453	501	361	340	630	----	54	96	573	327	503	509	600
June 3	552	686	362	681	242	747	714	-----	114	253	439	646	683	136	154	156	499	736	----	736	352	380	642	125	593	598
Means	655	483	413	321	532	622	652	-----	442	472	485	553	554	510	461	341	551	580	----	343	285	491	372	445	603	582
Departures	+138	−8	−108	−60	+38	−46	+160	-----	−14	−30	−90	+7	+15	−15	−67	----	+79	+7	----	−84	−187	+16	----	−53	----	----

ACCUMULATED DEPARTURES ON JUNE 3, 1947

	+5,824	−1,617	−3,710	−154	−2,464	+2,814	-----	-----	−2,100	−1,309	+1,288	−4,130	+3,199	−1,799	−4,046	----	−399	+329	----	−2,590	−8,932	+406	----	-----	----	----

ADDITIONAL DATA FOR FAIRBANKS, ALASKA, MARCH 1947

Week beginning—	Means	Departures
Feb. 26	118	−8
Mar. 5	120	−23
Mar. 12	173	−23
Mar. 19	229	+8
Mar. 26	330	+40

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