SOLAR RADIATION AND SUNSPOT DATA FOR DECEMBER 1942

[Solar Radiation Investigations 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 January 1942 REVIEW, page 20. A list of the pyrheliometric stations is also included in this month's report.

PYRHELIOMETRIC STATIONS

Station	Under direction of—	N. latitude	W. longitude	Altitude	Instruments		Remarks
					Receiver	Recorder	
		° ′	° ′	Feet			
San Juan [1]	Columbia School of Tropical Medicine.	18 28	66 06	85	Photo-electric cell.	Modified potentiometer.	Good exposure on narrow peninsula, but some interference from salt spray. Cooperation with Columbia University. Ultraviolet measurements only.
New Orleans	Tulane University	29 56	90 07	100	Eppley	L. & N. potentiometer.	Good exposure; considerable cloudiness.
La Jolla	Scripps Institute of Oceanography.	32 50	117 15	85	do	Engelhard	Splendid exposure a few yards inland from Pacific Ocean. Early morning fogs prevail during part of year.
Riverside	University of California	33 58	117 28	1,051	do	do	Excellent exposure in midst of citrus fruit region.
Albuquerque [2] [4]	U. S. Weather Bureau	35 05	106 30	5,314	do	L. & N. potentiometer.	At airport; dust at times. Station has highest elevation of this group.
Nashville	do	36 07	86 41	602	do	do	At airport with good exposure, but records vitiated by soft-coal smoke in winter.
Fresno	do	36 43	119 49	330	do	do	Good exposure at airport northern edge of city. The San Joaquin Valley has an exceedingly high percentage of sunshine.
Davis	University of California	38 32	121 45	106	do	do	Excellent exposure; little atmospheric contamination.
Washington	U. S. Weather Bureau	38 56	77 05	397	do	do	Good exposure on second highest point in District of Columbia. 5½ miles northwest of United States Capitol. Some vitiation from city smoke.
Columbus	Ohio State University	39 58	83 00	810	do	do	Considerable smokiness with light winds.
New York	U. S. Weather Bureau	40 46	73 58	180	do	Engelhard	Fair exposure at Central Park Meteorological Observatory. Values vitiated by large city atmospheric contamination.
State College	State College, Pa	40 48	77 52	1,280	do	L. & N. potentiometer.	Splendid exposure in farming country.
Lincoln [4]	U. S. Weather Bureau	40 50	96 45	1,225	do	do	Results very representative of the Great Plains area. Some dust.
Newport [3]	Eppley Laboratory	41 30	71 19	52	do	do	Excellent location.
Put-in-Bay	Franz Theodore Stone Biological Laboratory.	41 40	82 50	618	do	do	Almost no smoke or dust contamination. On an island 22 miles from the mainland.
East Wareham	U. S. Bureau of Plant Industry in cooperation with Mass. Experiment Station.	41 46	70 40	50	do	do	Low ground; close to cranberry bogs and open water.
Chicago	U. S. Weather Bureau	41 47	87 25	688	do	Engelhard	Good exposure on roof of Rosenwald Hall, University of Chicago. A great deal of smoke.
Blue Hill [4]	Harvard University	42 13	71 07	672	do	Engelhard and L. & N. potentiometer.	Excellent exposure on high ridge 10 miles south of Boston. With northerly component winds, some smoke contamination from Boston.
Cambridge	Massachusetts Institute of Technology.	42 22	71 06	31	do	L. & N. potentiometer.	Data used in studies of direct utilization of solar radiation for house heating under Cabot Fund.
Ithaca	Cornell University	42 27	76 29	953	do	do	Splendid site; data used by School of Agriculture.
Twin Falls	U. S. Bureau of Entomology and Plant Quarantine.	42 29	114 25	4,300	do	Engelhard	Good exposure on high plateau in rich farming country. Greatest elevation of any station here listed; exceeded only by Albuquerque where observations were recently begun.
East Lansing	U. S. Soil Conservation Service in cooperation with Michigan Agricultural Experiment Sta.	42 52	84 28	878	do	L. & N. potentiometer.	Very little atmospheric contamination on low ridge dividing two watersheds.
Madison [4]	U. S. Weather Bureau	43 05	89 23	974	do	do	Excellent exposure, North Hall, University of Wisconsin. Rapid growth of city has added to atmospheric vitiation recently.
Friday Harbor	University of Washington	48 32	123 01	15	do	Engelhard	Good exposure 50 miles northwest of Seattle directly on ocean; considerable fog interference.
Fairbanks	University of Alaska	64 52	147 39	500	do	do	Most northerly station of this kind in the world. Very little contamination.

[1] Measurements from San Juan are of the ultraviolet below 0.3132μ only at present. The pyrheliometer for the measurement of total solar and sky radiation was broken and it is hoped that this type of measurement will be resumed as soon as repairs may be made.

[2] Measurements of total solar and sky radiation have been discontinued at Albuquerque until such time as a replacement potentiometer may be obtained. Normal incidence readings are made at this station by means of an Eppley normal-incidence pyrheliometer recording on a Leeds and Northrup potentiometer.

[3] Besides the standard Eppley pyrheliometer and Leeds and Northrup potentiometer, the laboratory has precision equipment for the standardization of pyrheliometers.

[4] Station also equipped with normal incidence pyrheliometers recording on Leeds and Northrup potentiometers. At Blue Hill several other types of solar observations also are made.

TABLE 1.—*Solar radiation intensities during January 1943*

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

MADISON, WIS.

Date	Sun's zenith distance										
	7:30 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	1:30 p. m.
	75th mer. time	Air mass									Local mean solar time
		A. M.				P. M.					
	e.	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	e.
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
Jan. 4	1.75	1.01	1.10	1.25	------	1.67	------	1.25	------	------	1.45
5	.64	.74	.86	1.14	------	1.52	------	1.15	------	------	1.30
8	2.16	------	------	------	------	------	------	.94	------	------	2.49
11	2.74	------	------	------	------	------	------	1.28	------	------	3.15
12	1.02	.84	.95	1.15	------	1.67	------	1.16	------	------	1.12
13	.74	.84	1.02	1.14	------	1.49	------	------	------	------	1.17
19	.56	1.11	1.22	1.37	------	1.62	------	1.34	------	------	.53
23	2.36	.76	.88	1.01	------	1.33	------	------	------	------	1.75
25	.69	------	------	1.21	------	1.65	------	1.23	------	------	.48
26	.46	------	1.07	1.22	------	1.58	------	------	------	------	.96
27	.81	.59	.84	1.03	------	1.60	------	1.10	------	------	1.30
28	.86	------	.71	.91	------	1.53	------	------	------	------	2.49
Means	------	.84	.96	1.14	------	1.57	------	1.18	------	------	------
Departures	------	−.09	−.08	−.06	------	−.03	------	+.03	------	------	------

LINCOLN, NEBR.

Jan. 4	1.17	0.83	1.00	------	------	------	------	------	0.89	0.62	2.36
5	1.37	.49	.75	0.96	------	------	------	1.00	.85	------	3.30
7	1.37	------	------	1.07	------	------	------	------	------	------	1.75
9	3.99	------	------	1.07	------	------	------	1.22	1.09	.99	3.63
11	3.02	------	------	1.22	------	------	------	1.20	------	------	3.15
12	2.06	1.00	1.09	1.24	------	------	------	------	------	------	2.26
13	1.52	------	------	1.11	------	------	------	------	------	------	3.86
14	4.57	1.00	1.11	1.20	------	------	------	1.18	1.04	------	4.57

TABLE 1.—*Solar radiation intensities during January 1943*—Con.

LINCOLN, NEBR.—Continued

Date	Sun's zenith distance										
	7:30 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	1:30 p. m.
	75th mer. time	Air mass									Local mean solar time
		A. M.				P. M.					
	e.	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	e.
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
Jan. 19	.36	.94	------	1.18	------	------	------	1.16	1.07	.92	.74
22	2.62	.75	------	------	------	------	------	------	------	------	4.19
25	.56	------	1.04	1.20	1.37	------	1.37	1.20	1.09	1.04	.74
26	.97	.89	1.02	1.18	1.35	------	1.35	1.18	1.05	.92	1.75
27	1.68	.85	.94	1.13	1.31	------	------	------	------	------	2.26
30	2.06	.77	.89	1.04	------	------	------	------	------	------	2.26
Means	------	.84	.98	1.13	1.34	------	(1.36)	1.16	1.01	.90	------
Departures	------	−.08	−.07	−.07	−.05	------	−.05	−.03	−.04	−.03	------

BLUE HILL, MASS.

Jan. 1	3.7	0.79	0.91	1.00	------	------	------	------	------	------	4.4
2	2.0	1.01	1.11	1.23	1.37	------	------	1.30	1.15	------	1.8
3	2.9	1.01	1.10	1.22	1.33	------	------	1.23	1.08	0.99	2.6
6	1.1	1.06	1.17	1.30	1.41	------	------	1.26	1.16	1.06	1.7
7	2.0	.97	1.07	1.17	1.34	------	------	1.21	1.07	.98	2.0
8	1.7	.68	.88	1.12	1.32	------	------	1.19	1.07	.96	1.8
9	1.2	------	------	------	------	------	------	------	.89	.85	2.1
13	1.8	1.00	1.10	1.24	------	------	------	------	------	------	1.9
14	2.0	.83	.92	1.06	------	------	------	------	------	------	2.4
20	1.3	1.06	1.10	1.25	------	------	------	------	------	------	1.7
22	.7	------	------	------	------	------	------	------	1.10	------	1.2
Means	------	.93	1.04	1.18	1.35	------	------	1.24	1.07	.97	------
Departures	------	−.02	.00	+.03	+.03	------	------	+.05	+.03	+.04	------

*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	Madison	Lincoln	New York	East Lansing	Cambridge	Fairbanks	Nashville	Twin Falls	New Orleans	Riverside	Blue Hill	Ithaca	Newport	State College	Put-in-Bay	East Wareham	Davis, Calif
1943	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*		
Jan. 1	62	104	125	44	67	91	------	205	68	------	271	110	25	83	17	43	112	50
2	204	72	10	141	56	179	------	162	156	------	273	169	93	175	40	26	182	213
3	59	35	211	153	33	211	------	133	187	------	293	170	112	230	28	12	235	241
4	100	225	223	89	181	18	------	141	190	------	261	30	71	24	102	200	24	152
5	234	202	219	188	158	204	------	227	91	380	284	167	111	216	107	119	216	254
6	176	66	15	150	87	219	------	87	149	204	310	191	226	235	192	108	248	265
7	114	114	182	189	92	212	------	24	113	32	314	188	164	229	53	53	243	251
Mean	**136**	**117**	**141**	**136**	**96**	**162**	**0**	**140**	**136**	------	**286**	**172**	**115**	**170**	**77**	**80**	**180**	**204**
Departure	−31	−12	−29	+18	------	+11	−7	0	−13	------	+39	+29	+14	+21	−25	------	------	------
8	33	170	186	124	180	213	------	52	40	51	306	188	245	213	80	234	238	234
9	171	61	162	225	66	198	------	190	52	262	288	167	278	196	200	66	224	147
10	46	171	226	176	81	150	------	44	52	------	275	156	135	199	53	74	208	180
11	199	212	237	65	42	153	------	259	38	------	287	139	66	194	114	56	225	270
12	261	224	235	149	186	124	------	194	32	111	289	103	116	154	162	120	137	264
13	249	210	226	241	185	216	------	164	74	158	302	190	189	244	166	171	240	245
14	195	143	241	159	46	191	------	67	167	393	293	170	109	206	123	33	230	255
Mean	**165**	**170**	**216**	**163**	**112**	**178**	**0**	**139**	**65**	**195**	**292**	**197**	**162**	**201**	**128**	**108**	**215**	**228**
Departure	+12	+36	+36	+41	------	+24	−10	0	−88	−23	+45	+37	+55	+31	−5	------	------	------
15	229	114	196	147	152	192	------	242	181	359	286	145	116	204	129	169	205	250
16	187	124	44	96	85	40	------	199	180	272	97	42	163	90	66	90	83	299
17	------	177	160	32	150	26	------	162	200	140	186	16	50	20	13	68	18	302
18	57	135	99	16	115	16	------	40	236	218	305	13	25	14	58	38	21	308
19	157	269	276	35	243	------	------	287	87	418	328	27	105	34	87	152	35	137
20	252	192	230	262	268	------	------	292	60	374	187	183	263	267	253	259	265	37
21	196	157	189	98	63	------	------	238	162	364	47	168	145	145	65	65	198	41
Mean	**180**	**167**	**171**	**98**	**154**	**68**	**0**	**209**	**158**	**306**	**205**	**105**	**124**	**111**	**96**	**120**	**118**	**196**
Departure	+22	+14	−16	−25	------	−58	−14	−3	−14	+66	−79	−53	+8	−65	−22	------	------	------
22	202	215	204	182	203	170	------	160	200	287	23	136	233	251	184	163	140	105
23	154	227	141	40	111	138	------	186	140	302	------	142	58	184	40	56	194	243
24	189	35	134	142	66	202	------	284	238	------	206	162	109	219	163	108	229	212
25	172	255	257	106	113	38	------	50	213	248	163	45	61	64	94	34	60	60
26	30	252	263	27	248	29	------	30	155	44	123	20	113	30	67	110	23	80
27	70	246	243	138	295	114	------	204	92	130	338	85	127	97	216	290	84	283
28	44	262	226	27	294	34	------	82	196	50	236	31	59	35	63	219	38	244
Mean	**123**	**213**	**210**	**94**	**190**	**104**	**5**	**142**	**176**	**177**	**181**	**110**	**108**	**126**	**118**	**140**	**110**	**175**
Departure	−50	+31	−12	−64	------	−44	−19	−32	−5	−43	−66	−68	−33	−48	−6	------	------	------

ACCUMULATED DEPARTURES ON JANUARY 28, 1943

	−329	+483	−147	−210	------	−469	−350	−245	−840	0	−427	−385	+308	−427	−406	------	------	------