SOLAR RADIATION AND SUNSPOT DATA FOR NOVEMBER 1946

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, No. 1, January 1944, p. 43. A list of pyrheliometric stations is also given on page 45 of the same issue.

Beginning with this issue, values of total solar and sky radiation received on a horizontal surface at Salt Lake City, Utah, will be included in table 2. These data are furnished through the courtesy of Dr. George R. Hill, Director of the Department of Agricultural Research of the American Smelting & Refining Co., and Dr. M. D. Thomas of the same laboratory. The instrumental equipment consists of an Eppley 10-junction pyrheliometer recording on a Leeds & Northrup Micromax potentiometer. The coordinates of the station are as follows: 40°46′ N. latitude; 111°54′ W. longitude; elevation of pyrheliometer, 4,305 feet. There is considerable atmospheric contamination during the colder months of the year; the station is in a valley ringed by the Wasatch Mountains and other ranges.

In the October 1946 issue of the REVIEW, vol. 74, No. 10, publication began of total solar and sky radiation data from the Central Sierra Snow Laboratory at Soda Springs, Calif. These values will be carried in table 2 henceforth. We are indebted for these data to Dr. Robert W. Gerdel, Technical Supervisor of the Cooperative Snow Investigations. The radiation equipment includes three Eppley 10-junction pyrheliometers recording on Leeds & Northrup Micromax potentiometers; two of the instruments are for special research work. The station is located at 39°20′ N. latitude, 120°22′ W. longitude, at an elevation of 6,903 feet. The skies are absolutely free of any man-made contamination. There is slight shading of the instrument by trees both early and late in the day, but adjustment is made for this in reduction of the records.

TABLE 1.—*Solar radiation intensities during November 1946*

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

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									75th mer. time
		A. M.				*1.0	P. M.				
	e	5.0	4.0	3.0	2.0		2.0	3.0	4.0	5.0	e
LINCOLN, NEBR.											
1946	*mb.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mb.*
Nov. 12	3.7		0.90	1.09	1.24		1.24	1.13		0.77	6.1
Nov. 13	5.3	0.81	.90	1.03	1.20		1.18	1.01	0.81	.68	6.4
Nov. 14	4.4	.70	.83	.96	1.11		1.09	.81	.56	.43	9.8
Nov. 15	7.8							.88	.70		11.0
Nov. 16	5.1	.92	1.01	1.14							4.2
Nov. 18	3.8	.83	.96	1.09				1.07			4.8
Nov. 19	6.1							1.09	.94	.81	6.1
Nov. 20	6.6							1.03	.88	.75	10.2
Nov. 26	3.8	.92	1.03	1.16				1.18	1.01	.89	5.3
Nov. 27	5.6								.92	.79	5.3
Means		.84	.94	1.08	1.18		1.17	1.02	.83	.73	
Departures		−.05	−.16	−.08	−.17		−.16	−.15	−.19	−.18	
BLUE HILL, MASS.											
Nov. 1	6.5	0.95	1.03				1.30	1.12	1.01	0.90	5.8
Nov. 5	3.7	1.08	1.16	1.27	1.40		1.43	1.26	1.15	1.06	2.6
Nov. 6	3.8	1.06	1.13		1.42		1.38	1.19	1.07	.97	3.5
Nov. 9	8.1	.69	.80	.96							9.0
Nov. 10	7.9	.79	.90	1.03							8.9
Nov. 12	10.8	.93	1.02	1.15	1.28		1.27	1.07	1.00	.92	6.5
Nov. 13	4.9	.90	1.01	1.15				1.16	1.09	.99	5.1
Nov. 14	5.0	.64		.93							6.2

See footnote at end of table.

TABLE 1.—*Solar radiation intensities during November 1946*—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									75th mer. time
		A. M.				*1.0	P. M.				
	e	5.0	4.0	3.0	2.0		2.0	3.0	4.0	5.0	e
BLUE HILL, MASS.—Continued											
1946	*mb.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mb.*
Nov. 15	4.2							1.09	.99	.93	5.2
Nov. 16	4.0	1.05	1.14	1.24				1.19	1.09	.99	8.3
Nov. 18	3.7								.98	.87	3.3
Nov. 19	4.4	.82	.95	1.09				1.13	1.02	.90	5.9
Nov. 23	3.0	.99	1.10	1.20							2.5
Nov. 27	7.3			1.30	1.43			1.23	1.12	1.01	6.6
Nov. 28	4.0	1.00	1.12								3.8
Means		.91	1.03	1.13	1.38		1.34	1.16	1.05	.95	
Departures		.00	+.02	.00	+.11		+.08	+.06	+.08	+.10	
TABLE MOUNTAIN, CALIF.											
Nov. 1					1.47						
Nov. 2					1.50						
Nov. 3					1.52						
Nov. 4					1.46						
Nov. 5					1.49						
Nov. 9					1.51						
Nov. 10					1.52						
Nov. 15					1.52						
Nov. 16					1.50						
Nov. 17					1.48						
Nov. 24					1.52						
Nov. 25					1.51						
Nov. 26		1.15	1.23	1.34	1.47						
Nov. 27					1.50						
Nov. 28					1.51						
Nov. 29					1.50						
Nov. 30					1.48						
Means		(1.15)	(1.23)	(1.24)	1.50						
CLIMAX, COLO.											
Nov. 1			1.38	1.45	1.57		1.56	1.43	1.31	1.23	
Nov. 5							1.48	1.32	1.18		
Nov. 7		1.23	1.32	1.43							
Nov. 10		1.07	1.21	1.38	1.52		1.40		1.21	1.10	
Nov. 11		1.26	1.36	1.43	1.46		1.53	1.32			
Nov. 12		1.21	1.31	1.42	1.53		1.44	1.34	1.24	1.12	
Nov. 13		1.25	1.34	1.46	1.58		1.56	1.40	1.30	1.20	
Nov. 14		1.22	1.30	1.40	1.50		1.37				
Nov. 16			1.33	1.47	1.57		1.58	1.39			
Nov. 17		1.20	1.32	1.44	1.56		1.54	1.40	1.30	1.21	
Nov. 18		1.24	1.34	1.44			1.54	1.40	1.34	1.17	
Nov. 19		1.04	1.14	1.21	1.48		1.52	1.36	1.28	1.09	
Nov. 20				1.42							
Nov. 22		1.19	1.28	1.38				1.36	1.16	.80	
Nov. 25		1.30	1.41	1.49	1.61			1.41	1.26	1.17	
Nov. 26					1.50			1.30			
Nov. 27		1.20	1.29	1.40	1.50			1.34	1.16		
Nov. 28		1.24	1.33	1.43	1.52			1.40	1.28	1.18	
Nov. 29		1.25	1.37	1.44	1.56			1.44	1.32	1.21	
Nov. 30		1.23	1.32	1.45	1.52			1.34	1.28	1.20	
Means		1.21	1.31	1.42	1.53		1.50	1.37	1.26	1.14	
BOSTON, MASS.											
Nov. 5	4.0			1.16	1.35						3.3
Nov. 6	4.0			1.04	1.29			1.18	1.04	0.92	3.8
Nov. 12	11.8							1.08	.95	.79	7.8
Nov. 13	5.3			1.04	1.11			1.10	.77	.67	5.1
Nov. 14	5.3			1.00							6.9
Nov. 19	3.8	0.50	0.55								6.4
Means		(0.50)	(0.55)	1.06	1.25			1.12	.92	.79	
Departures		−.17	−.19	+.09	+.10			+.12	+.04	+.03	
RATIO, BOSTON/BLUE HILL, ON COMPARABLE DATES											
		(0.61)	(0.58)	0.96	(0.94)			0.98	0.88	0.82	

LATE DATA FOR OCTOBER 1946

MADISON, WIS.

Oct. 1	5.8	0.83	0.98	1.11	1.25	1.48					6.9
Oct. 2	7.4	.61	.75	.92	1.13	1.54					8.7
Oct. 4	9.8	.58	.70	.84	1.07	1.35					13.2
Oct. 15	8.1	.76	.81	.99	1.16	1.33					12.5
Oct. 21	8.1	.76	.84	.98	1.15	1.30					9.4
Oct. 22	9.8			.66	.84						13.7
Oct. 23	7.4	.49	.71*	.90							12.7
Oct. 25	7.8	.90	.98	1.11	1.31	1.51					8.1
Means		.70	.82	.94	1.13	1.42					
Departures		−.04	−.06	−.08	−.06	−.01					

*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.	Columbia, Mo.	Boston, Mass.	Nashville, Tenn.	Twin Falls, Idaho	La Jolla, Calif.	Riverside, Calif.	Blue Hill, Mass.	Newport, R. I.	State College, Pa.	Put-in-Bay, Ohio	Salt Lake City, Utah	Davis, Calif.	Tooele, Utah	Toronto, Canada	Ithaca, N. Y.	Boulder, Colo.	Soda Springs, Calif.
1946	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*
Oct. 29	296	156	222	49	166	389	273	112	297	277	363	303	153	126	185	182	189	372	256	82	-----	321	366
Oct. 30	290	200	349	88	193	381	36	116	282	109	359	401	181	218	278	265	458	352	278	194	-----	337	226
Oct. 31	336	209	251	64	202	368	57	164	255	303	352	396	231	246	110	58	420	362	378	82	-----	271	389
Nov. 1	151	25	192	26	251	361	53	235	251	134	340	377	304	283	104	46	102	373	198	107	-----	364	387
Nov. 2	188	47	64	91	56	364	23	26	248	310	335	333	64	63	155	42	439	355	393	24	-----	18	----
Nov. 3	96	48	174	17	64	374	42	29	250	281	355	419	76	88	188	174	456	356	375	30	-----	125	376
Nov. 4	214	267	214	176	82	364	228	123	95	289	351	381	165	193	123	140	391	324	360	223	-----	158	365
Means	225	136	210	73	145	372	102	115	240	243	351	373	168	174	163	130	351	356	320	106	-----	228	352
Departures	−20	−48	−23	−69	−63	+46	−120	−40	+7	+33	+7	+60	−46	−48	−27	−69	------	+63	+49	−38	-----	−42	----
Nov. 5	337	262	127	238	294	340	175	253	263	278	352	370	313	295	343	296	397	283	374	240	-----	328	319
Nov. 6	314	172	32	224	280	262	36	239	103	212	325	350	296	304	294	235	372	136	327	241	-----	270	173
Nov. 7	106	87	60	27	99	186	60	203	110	52	212	304	272	238	71	22	57	282	110	42	56	266	51
Nov. 8	251	59	208	10	129	312	122	8	300	130	266	343	45	46	100	22	61	330	43	53	154	69	344
Nov. 9	201	79	11	56	142	320	48	91	305	260	296	362	131	189	30	51	229	305	212	80	39	133	344
Nov. 10	271	54	154	25	134	315	139	160	14	102	318	355	208	210	104	41	398	325	363	33	49	375	306
Nov. 11	67	33	305	26	67	127	124	13	58	204	212	167	40	94	62	34	316	314	283	27	11	317	269
Means	221	107	128	86	164	266	100	138	165	177	283	322	186	197	143	100	262	282	244	102	62	251	258
Departures	0	−53	−94	−26	−18	−24	−81	+3	−10	−27	−26	+24	+2	−2	+5	−26	------	+27	+8	−14	−74	−8	----
Nov. 12	228	240	299	186	239	233	337	196	188	236	97	54	248	243	88	239	311	284	220	183	61	316	169
Nov. 13	273	244	287	174	253	82	292	202	246	104	59	50	270	280	204	246	84	82	95	90	73	309	173
Nov. 14	276	244	265	206	147	307	322	104	246	31	242	246	175	201	100	238	274	161	116	145	59	295	100
Nov. 15	315	167	123	194	259	261	137	180	276	252	313	358	219	259	278	249	112	243	302	210	253	134	316
Nov. 16	245	21	284	22	201	258	50	170	36	223	319	344	270	263	182	60	311	105	293	69	176	194	220
Nov. 17	49	249	291	224	20	98	353	35	61	144	327	352	63	95	27	274	314	218	304	228	44	304	207
Nov. 18	309	200	284	188	222	140	315	153	296	35	320	322	202	128	286	227	254	32	245	192	220	329	42
Means	242	195	262	171	192	197	258	149	193	146	244	246	207	209	166	219	237	161	225	160	127	269	175
Departures	+40	+41	+51	+64	+41	−48	+74	+30	−18	−17	−44	−28	+47	+26	0	+65	------	−32	+5	+56	+13	+23	----
Nov. 19	286	228	266	197	139	11	298	150	264	118	239	290	250	237	280	241	61	33	66	135	192	254	----
Nov. 20	261	89	249	41	132	148	288	154	92	122	74	58	220	211	206	227	69	216	111	154	196	242	----
Nov. 21	258	24	270	142	164	229	74	85	76	182	298	319	156	210	197	225	160	88	200	59	207	291	153
Nov. 22	162	223	227	69	19	92	270	4	290	70	79	270	24	46	213	131	235	55	201	51	133	294	----
Nov. 23	264	114	176	153	120	171	229	132	255	66	74	54	186	215	194	190	15	280	36	89	174	253	----
Nov. 24	262	21	82	25	154	286	42	109	257	144	298	344	172	179	197	112	106	288	214	109	89	41	298
Nov. 25	207	88	222	26	108	280	21	74	181	140	320	331	102	96	42	20	338	224	285	10	50	280	169
Means	243	112	213	93	119	174	175	101	202	120	198	237	159	170	190	164	140	169	159	87	149	236	----
Departures	+57	−18	+17	−9	−22	−58	+8	−5	+21	−37	−90	−40	+9	+9	+53	+40	------	−43	−46	−2	+27	+18	----
Nov. 26	154	222	261	117	39	280	287	70	30	56	294	310	98	47	47	23	108	231	237	29	20	201	244
Nov. 27	192	227	254	138	187	282	286	166	196	111	292	311	218	216	228	104	223	241	203	59	149	230	266
Nov. 28	280	180	235	88	219	235	272	112	288	102	275	303	176	193	213	71	234	251	232	35	150	229	276
Nov. 29	249	67	160	160	128	48	259	94	255	93	247	308	150	146	171	230	264	232	282	178	102	174	275
Nov. 30	191	120	145	76	117	113	253	54	250	181	113	280	112	100	181	146	287	48	86	77	109	154	273
Dec. 1	111	198	149	59	58	106	------	39	80	87	68	------	81	69	45	32	147	103	168	89	21	230	----
Dec. 2	281	167	189	187	236	51	------	83	293	170	162	------	128	202	253	229	251	162	158	182	103	200	----
Means	208	169	199	118	141	159	------	88	199	114	207	------	138	139	163	119	216	181	195	93	93	202	----
Departures	+41	+45	+20	+29	+13	−44	------	−10	+50	−30	−58	------	−11	−16	+37	+18	------	+12	−6	+9	+3	+1	----

ACCUMULATED DEPARTURES ON DEC. 2, 1946

+5,264	+4,417	−2,891	+3,080	−10,101	+4,830	------	+609	+1,778	−5,838	------	------	−2,212	−2,835	+6,069	------	------	+11,858	−1,491	------	------	+1,554	----

ADDITIONAL DATA FOR MADISON, WIS., FOR OCTOBER 1946

Week beginning	Means	Departures
Oct. 1	392	+109
Oct. 8	226	−29
Oct. 15	234	+3
Oct. 22	203	−10

Accumulated departures on Oct. 28, 1946, +4648