SOLAR OBSERVATIONS

SOLAR AND SKY RADIATION MEASUREMENTS DURING APRIL 1934

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For a description of instruments employed and their exposures, the reader is referred to the January 1932 REVIEW, page 26.

Table 1 shows that solar radiation intensities averaged below normal for April at all three Weather Bureau stations. The Lincoln values are in general well below the average for the month owing to the beginning of dust-laden skies which persisted from the 9th through the end of the month. Values of 0.24 gram calorie, as were recorded on the 9th are unusually low and seldom observed except when definite water-vapor clouds are present.

Table 3 shows an excess in the total solar and sky radiation received on a horizontal surface at all stations except Washington, Pittsburgh, and Fairbanks.

Turbidity measurements were obtained on 8 days at Washington and show the usual average variation throughout the month except on the 24th, when the sky was so laden with dust that accurate determinations of the depletion due to dry dust were impossible.

Polarization measurements obtained at Washington on 9 days give a mean of 57 percent with a maximum of 62 percent on the 28th. At Madison measurements on 6 days give a mean of 56 percent with a maximum of 64 percent on the 12th. All the above values are below the April normals.

TABLE 1.—*Solar radiation intensities during April 1934*

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

Washington, D.C.

Date	Sun's zenith distance										
	8 a.m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	Noon
	75th mer. time	Air mass									Local mean solar time
		A.M.					P.M.				
	e	5.0	4.0	3.0	2.0	[1] 1.0	2.0	3.0	4.0	5.0	e
	mm	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm*
Apr. 2	7.57					1.42					6.50
Apr. 10	7.29			0.64	0.85	1.22					7.06
Apr. 12	3.81				1.10	1.30					8.81
Apr. 18	7.04	0.58	0.70		1.00	1.22					6.27
Apr. 21	3.15			.93	1.12	1.42					2.87
Apr. 24	8.48			.47	.66						10.21
Apr. 25	2.74			.96	1.21						3.00
Apr. 26	4.17	.54	.78	.90	1.06						3.81
Apr. 28	2.06	.80	.89	1.02	1.25	1.34					2.36
Means		.64	.79	.82	1.03	1.32					
Departures		−.06	+.01	−.07	−.04	−.04					

Madison, Wis.

Apr. 7	4.37		0.88	1.01	1.19						5.16
Apr. 9	5.36		.76	.87	1.09	1.42					7.87
Apr. 12	1.78			1.19	1.25	1.61					1.88
Apr. 14	4.17					1.58					3.63
Apr. 16	3.15				.82	1.48					3.15
Apr. 18	5.36				1.02						5.56
Apr. 19	3.99			.52							3.30
Apr. 21	3.15			1.12	1.29						2.16
Apr. 25	2.62		.98	1.12	1.30	1.54	1.19				1.96
Apr. 26	4.37				.66	1.49	1.21				2.87
Apr. 27	4.37					1.52	1.37				2.06
Apr. 28	2.36		.55	.73	.93	1.35					3.00
Means			.79	.94	1.06	1.50	1.26				
Departures			−.12	−.08	−.13	+.06	+.06				

Lincoln, Nebr.

Apr. 6	6.02							1.01	0.88	0.79	6.02
Apr. 7	5.16		0.85	1.00	1.20	1.41					4.95
Apr. 9	7.87	0.74	.85	1.02	1.15	1.41	0.85				6.76
Apr. 12	3.63	.99	1.10	1.22	1.33	1.44	.98	.65	.37	.24	2.26
Apr. 13	2.87	.97	1.07	1.20	1.37	1.57	1.29	1.10	.96	.84	2.36
Apr. 14	3.15			.70	1.03						3.30
Apr. 16	3.30			.68	1.04	1.41	1.12	.84	.65	.50	3.15

TABLE 1.—*Solar radiation intensities during April 1934*—Contd.

Lincoln, Nebr.—Continued

Date	Sun's zenith distance										
	8 a.m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	Noon
	75th mer. time	Air mass									Local mean solar time
		A.M.					P.M.				
	e	5.0	4.0	3.0	2.0	[1] 1.0	2.0	3.0	4.0	5.0	e
	mm	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm*
Apr. 17	4.95						0.98	0.76	0.56	0.43	6.27
Apr. 18	7.87	0.58	0.69	0.88	01.06	01.43					7.87
Apr. 19	2.62		.38	.47							2.87
Apr. 20	2.62	.28	.39	.58	.98	1.44	.80	.62	.51	.43	2.26
Apr. 21	1.96		.47	.66	1.04						2.74
Apr. 24	3.00	.32	.44	.67	.94	1.37	1.15	.97	.80	.69	2.74
Apr. 27	2.62		.53	.66	.92	1.34	1.03	.75	.57	.46	3.00
Apr. 28	2.87		.69	.85	1.07	1.43					3.81
Means		.65	.68	.81	1.09	1.42	1.02	.84	.66	.55	
Departures		−.06	−.13	−.15	−.09	−.02	−.14	−.12	−.16	−.14	

Blue Hill, Mass.

Apr. 2	5.8						1.13	0.69			7.3
Apr. 3	4.8				1.13	1.32	.95	.80			4.4
Apr. 5	1.9				1.14	1.34	1.18	1.14	0.89		2.5
Apr. 8	3.7				1.25	1.53	1.26	1.05	.89		2.5
Apr. 9	5.2				1.15	1.25					4.2
Apr. 10	4.8				1.15	1.40	1.14	.93	.84		5.2
Apr. 11	3.9				1.23	1.44					5.6
Apr. 13	4.2				1.07	1.31					2.8
Apr. 15	5.0				1.02	1.25					5.0
Apr. 16	5.8				.95	1.50					7.6
Apr. 17	8.2					1.45	.98				4.0
Apr. 18	5.4				1.06	1.23					2.9
Apr. 19	7.3				.78	1.38					4.6
Apr. 21	4.6				.98	1.41					4.2
Apr. 22	5.2					1.12	.80				6.2
Apr. 24	9.8					1.30	.70				8.8
Apr. 25	4.4				.99	1.45					3.1
Apr. 26	3.1				1.27	1.50	1.25				2.0
Apr. 28	3.1				1.26	1.45					1.6
Apr. 29	2.4				1.21	1.47	1.00	.86			2.3
Apr. 30	2.7				.90	1.19					4.2
Means					1.09	1.36	1.03	.91	.87		

[1] Extrapolated.

TABLE 2.—*Average daily totals of solar radiation (direct+diffuse) received on a horizontal surface*

Week beginning—	Washington	Madison	Lincoln	Chicago	New York	Fresno	Pittsburgh	Fairbanks	Twin Falls	La Jolla	Miami	New Orleans	Riverside	Blue Hill	Mount Washington
	Gram calories per square centimeter														
1934	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*
Apr. 2	391	305	370	308	314	619	330	318	533	554	486	360	566	426	479
Apr. 9	321	377	480	300	403	640	267	324	541	385	482	280	423	445	488
Apr. 16	373	416	576	368	386	645	263	372	578	369	474	430	521	430	463
Apr. 23	480	526	598	449	509	692	403	330	522	627	463	438	618	538	374
	Departures from weekly normals														
Apr. 2	+4	−66	−53	+3	−19	+89	+43	−15	+111	+131	+14	+14			
Apr. 9	−79	−27	+47	−41	+65	+66	−53	−58	+85	−50	+14	+32			
Apr. 16	−48	+18	+142	+44	+32	+67	−81	−8	+112	−53	±0	+63			
Apr. 23	+40	+84	+139	+102	+118	+73	+40	−34	+40	+175	−15	+72			
	Accumulated departures on Apr. 29														
	−2,037	+840	+1,694	+3,115	+4,081	+2,534	−2,163	−1,085	+3,213	+3,640	+2,310	+4,298			

TABLE 3.—*Total, I_m and screened, I_y, I_r, solar radiation intensity measurements, obtained during April 1934, and determinations of the atmospherec turbidity factor, β, and water-vapor content, w= depth in centimeters, if precipitated*

AMERICAN UNIVERSITY, WASHINGTON, D.C.

Date and hour angle	Solar altitude	Air-mass	I_m	I_y	I_r	β_{Im-r}	β_{Iy-r}	β_{mean}	$\frac{I_{w=o}}{1.94}$ (Percentage of solar constant)	$\frac{I_{w=o}-I_m}{1.94}$ (Percentage of solar constant)	W
Apr. 2	° ′	m	gr. cal.	gr. cal.	gr. cal.						cm
2:14 a	40 11	1.55	0.974	0.723	0.585	0.169	0.162	0.166	60.5	10.3	1.1
2:36 a	41 00	1.52	.994	.728	.589	.160	.157	.158	62.1	10.9	1.3
0:44 a	54 31	1.23	1.194	.870	.699	.147	.117	.132	71.0	9.4	.9
0:40 a	54 46	1.22	1.180	.872	.701	.159	.120	.140	69.3	8.4	.5
Apr. 10											
5:00 a	16 36	3.47	.582	.466	.383	.136	.123	.130	44.9	14.9	3.1
4:55 a	17 34	3.28	.607	.474	.389	.131	.145	.138	45.5	13.9	2.2
4:51 a	18 20	3.16	.601	.496	.405	.162	.142	.152	43.5	12.6	1.6
4:44 a	19 43	2.95	.638	.506	.418	.153	.141	.147	46.7	13.9	2.5
4:38 a	20 50	2.80	.650	.522	.436	.175	.154	.164	45.0	11.5	1.1
4:34 a	21 36	2.70	.661	.538	.443	.185	.184	.184	43.2	9.1	.4
4:09 a	26 26	2.25	.812	.592	.495	.136	.175	.156	52.2	10.5	.8
4:04 a	27 23	2.17	.822	.606	.506	.145	.175	.159	52.8	10.4	.8
4:00 a	28 07	2.12	.827	.612	.510	.150	.177	.164	53.0	10.4	.9
3:36 a	32 38	1.86	.858	.640	.528	.170	.180	.175	56.4	12.0	1.8
3:29 a	33 55	1.79	.856	.646	.530	.182	.182	.182	56.5	12.2	1.8
3:25 a	34 39	1.76	.855	.656	.530	.189	.159	.174	56.4	12.2	1.9
3:21 a	35 23	1.73	.859	.660	.532	.194	.156	.175	56.7	12.2	2.0
1:52 a	50 05	1.30	1.089	.754	.616	.147	.195	.171	64.2	8.0	.5
1:48 a	50 39	1.29	1.096	.757	.619	.144	.198	.171	64.4	7.9	.4
0:32 a	58 09	1.18	1.102	.771	.632	.188	.210	.199	63.1	6.3	.3
0:28 a	58 20	1.18	1.097	.772	.634	.172	.216	.194	64.0	7.4	.4
Apr. 12											
3:28 a	34 38	1.26	1.156	.919	.743	.141	.068	.104	65.1	5.0	.2
3:24 a	35 22	1.73	1.156	.921	.745	.148	.068	.108	64.9	4.8	.2
Apr. 18											
5:18 a	14 52	3.85	.710	.569	.458	.085	.069	.077	52.4	15.6	3.5
5:12 a	16 02	3.59	.751	.580	.463	.070	.072	.071	56.3	14.3	3.2
2:23 a	47 33	1.35	1.139	.828	.634	.104	.050	.077	75.7	15.4	4.8
2:17 a	48 30	1.33	1.137	.831	.642	.112	.060	.086	74.0	14.8	4.2
Apr. 21											
4:58 a	19 22	2.99	.933	.748	.609	.090	.064	.077	58.8	10.3	.7
4:52 a	20 23	2.85	.964	.751	.513	.082	.070	.076	59.8	9.7	.5
4:30 a	24 45	2.37	1.025	.821	.659	.100	.060	.080	59.0	5.7	.2
3:25 a	37 12	1.65	1.230	.922	.760	.108	.090	.099	69.2	5.2	.2
3:20 a	38 09	1.62	1.247	.930	.767	.112	.090	.101	68.8	4.0	.1
Apr. 24											
5:00 a	19 37	2.96	.487	.348	.286	.148	.192	.170	43.3	17.7	>5.0
4:52 a	21 10	2.75	.510	.356	.288	.145	.192	.168	44.5	18.0	>5.0
4:00 a	31 14	1.93	.674	.469	.375	.160	.220	.190	52.0	17.0	>5.0
3:56 a	32 00	1.88	.669	.473	.376	.170	.225	.198	51.3	16.7	>5.0
1:48 a	54 34	1.23	.801	.560	.434	.220	.230	.225	60.0	18.7	>5.0
1:44 a	55 09	1.22	.808	.563	.435	.220	.230	.225	60.0	18.0	>5.0
0:50 a	61 38	1.14	.832	.578	.457	.230	.250	.240	57.0	14.2	>5.0
0:46 a	61 59	1.14	.832	.581	.465	.240	.260	.250	57.0	14.2	>5.0
Apr. 25											
5:06 a	17 52	3.24	.856	.708	.578	.105	.067	.086	55.1	10.6	.6
5:00 a	19 02	3.06	.888	.711	.581	.094	.068	.081	57.6	11.1	.7
4:52 a	20 35	2.83	1.005	.773	.636	.075	.069	.072	62.0	9.7	.5
4:48 a	21 22	2.73	1.036	.786	.646	.070	.070	.070	63.0	9.1	.4
4:24 a	26 48	2.21	1.162	.878	.720	.076	.068	.072	67.4	7.6	.3
3:12 a	40 31	1.54	1.231	.954	.754	.088	.060	.074	74.4	10.4	1.0
Apr. 26											
5:28 a	14 34	4.00	.776	.609	.521	.086	.092	.089	48.5	8.1	.3
5:24 a	15 21	3.78	.786	.524	.524	.089	.101	.095	49.3	8.3	.3
5:09 a	18 04	3.19	.876	.679	.568	.094	.104	.099	52.7	6.4	.2
5:04 a	19 13	3.02	.872	.682	.571	.098	.094	.096	54.2	9.0	.4
4:55 a	20 06	2.82	.914	.723	.591	.098	.072	.085	58.8	11.2	1.0
4:49 a	22 10	2.63	.952	.726	.603	.094	.094	.094	58.6	9.1	.4
4:44 a	23 00	2.55	.956	.730	.606	.098	.102	.100	58.2	8.4	.4
4:25 a	26 48	2.21	1.018	.788	.647	.118	.086	.097	62.5	10.3	.6
4:20 a	27 46	2.15	1.045	.791	.650	.104	.090	.097	63.0	9.1	.5

Atmospheric conditions during solar radiation measurements.

Apr. 2. Temp. 12°–15 C., wind, N-12; vis. 20. St. Cu. early; obs. stopped by Fr. Cu. and Cu.

Apr. 10. Temp. 11°–18° C., wind, SE-15; vis. 20. Cu. from noon on.

Apr. 12. Temp. 9°–10° C., wind, NW-18; vis. 30. A. St. at 10 a.m.

Apr. 18. Temp. 9° 17° C., wind, E-12; vis. 20., Cirri. 11; a.m.

Apr. 21. Temp. 8°–10° C., wind., NW-13; vis. 30 Cirri. noon.

Apr. 24. Temp. 18°–25° C., wind, W-20; vis. 20, Fr. Cu. at noon.

Apr. 25. Temp. 7°–9° C., wind, NW-12; vis. 20., Fr. Cu. at noon.

Apr. 26. Temp. 7°–11° C., wind, NW-14; vis. 20, Fr. Cu. 9 a.m.

TABLE 3.—*Total, I_m and screened, I_y, I_r, solar radiation intensity measurements, obtained during April 1934, and determinations of the atmospheric turbidity factor, β, and water-vapor content, w= depth in centimeters, if precipitated*—Continued

BLUE HILL METEOROLOGICAL OBSERVATORY OF HARVARD UNIVERSITY

Date and hour angle	Solar altitude	Air-mass	I_m	I_y	I_r	β_{Im-r}	β_{Iy-r}	β_{mean}	$\frac{I_{w=o}}{}$ (Percentage solar constant)	$\frac{I_{w=o}-I_m}{}$[1] (Percentage solar constant)	W
Apr. 2	° ′	m	Gr. cal.	Gr. cal.	Gr. cal.						mm
2:57 p	35 51	1.71	1.083	0.794	0.636	0.112	0.101	0.106	67.6	11.8	17.0
Apr. 3											
1:22 a	48 47	1.32	1.239	.868	.711	.125	.149	.137	68.9	5.0	1.8
0:33 a	52 18	1.26	1.299	.932	.744	.091	.077	.084	76.4	9.4	9.0
2:42 p	38 29	1.60	1.125	.803	.633	.091	.081	.086	72.6	14.6	48.0
Apr. 5											
2:41 a	39 14	1.58	1.301	.925	.737	.060	.054	.057	76.8	9.7	8.0
1:02 a	51 36	1.28	1.348	.931	.746	.066	.074	.070	78.0	8.5	5.5
0:52 p	52 00	1.27	1.357	.948	.757	.069	.075	.072	78.0	8.0	4.5
3:15 p	33 31	1.81	1.225	.886	.711	.068	.064	.066	73.0	9.8	7.9
Apr. 8											
2:12 a	44 15	1.43	1.371	.963	.756	.044	.028	.036	82.2	16.5	>50.0
0:38 p	53 31	1.24	1.441	1.012	.805	.051	.040	.046	84.1	9.6	9.3
0:55 p	52 52	1.25	1.414	1.002	.793	.062	.038	.050	81.8	8.7	6.3
4:14 p	24 17	2.42	1.151	.869	.707	.066	.058	.062	67.4	7.9	3.2
Apr. 9											
2:01 a	46 14	1.39	1.133	.815	.659	.142	.138	.140	66.6	8.8	4.3
0:28 a	54 44	1.23	1.196	.818	.670	.114	.176	.145	68.4	6.5	2.8
0:52 p	53 26	1.24	1.220	.826	.677	.115	.175	.145	70.5	7.4	3.8
Apr. 10											
3:05 a	36 54	1.66	1.212	.861	.690	.072	.078	.075	72.7	10.0	8.8
1:41 a	49 05	1.32	1.283	.872	.710	.077	.102	.090	74.4	8.0	4.4
0:39 a	54 34	1.23	1.310	.911	.719	.074	.071	.072	75.4	7.6	4.7
4:00 p	27 19	2.17	1.099	.822	.658	.077	.061	.069	67.4	10.5	9.6
Apr. 13											
2:43 a	46 01	1.39	1.173	.850	.685	.124	.112	.118	70.5	9.7	8.7
Apr. 15											
2:54 a	40 00	1.55	1.189	.818	.676	.086	.150	.118	72.1	10.4	10.1
Apr. 18											
2:36 a	43 41	1.45	1.157	.804	.653	.094	.140	.117	69.5	8.8	5.9
2:09 a	47 47	1.35	1.199	.831	.674	.100	.140	.120	70.5	8.2	4.6
0:50 a	56 49	1.19	1.217	.830	.653	.087	.105	.096	76.0	13.0	39.0
1:09 p	55 06	1.22	1.196	.845	.669	.107	.102	.104	74.7	12.5	33.0
3:53 p	30 33	1.96	.945	.721	.568	.121	.092	.106	64.2	15.1	50.0
Apr. 19											
2:23 a	45 51	1.39	1.235	.851	.683	.079	.106	.092	73.6	12.5	28.0
2:09 a	48.02	1.34	1.242	.860	.683	.079	.092	.086	75.1	10.5	13.3
Apr. 21											
2:12 a	48 11	1.34	1.234	.860	.691	.090	.109	.100	73.2	9.0	6.7
Apr. 22											
3:47 p	32 12	1.87	1.193	.866	.695	.070	.062	.066	72.2	10.1	6.1
5:05 p	18 15	3.18	.833	.649	.562	.116	.133	.124	48.7	5.3	1.2
Apr. 25											
2:06 a	50 08	1.30	1.364	.938	.738	.043	.048	.046	82.1	10.9	13.3
0:19 p	60 33	1.14	1.384	.932	.717	.044	.025	.034	85.4	13.2	43.0
Apr. 26											
2:14 a	49 11	1.32	1.276	.883	.699	.071	.079	.075	77.1	10.5	13.3
0:33 a	60 25	1.15	1.371	.974	.765	.041	.050	.046	83.5	11.9	30.0
0:59 p	58 34	1.17	1.444	.974	.770	.028	.048	.038	84.3	8.9	7.7
Apr. 28											
1:17 p	57 25	1.19	1.389	.941	.751	.045	.054	.050	81.3	9.7	10.0
Apr. 29											
3:17 a	37 40	1.63	1.332	.922	.731	.038	.045	.042	79.2	10.1	9.2
1:20 a	57 16	1.19	1.390	.950	.748	.049	.050	.050	82.4	9.7	10.0
0:24 p	61 43	1.13	1.455	1.001	.788	.037	.031	.034	85.5	9.4	9.7
2:28 p	47 44	1.35	1.365	.934	.748	.045	.072	.058	79.4	8.1	4.5
3:27 p	37 40	1.63	1.272	.878	.710	.055	.084	.070	74.0	7.5	3.4
Apr. 30											
4:10 a	30 29	1.96	.900	.653	.547	.143	.186	.164	55.4	8.3	3.9
2:50 a	45 01	1.41	1.080	.759	.637	.150	.215	.182	63.3	6.8	2.9
0:55 a	60 12	1.15	1.190	.811	.671	.150	.218	.184	66.9	4.4	1.4
1:11 p	58 30	1.17	1.149	.801	.670	.164	.233	.198	64.7	4.6	1.6

[1] Reduced to value at mean solar distance.

Notes on sky conditions at Blue Hill

Date and time from apparent noon	Wind	Visibility	Sky blueness	Clouds, etc., and remarks
April 1934				
2, 2:57 p	SW&W		3	Few Ci.; moderate haze.
3, 1:01 p	NNW 4-5		3	Few Ci.; mod. hz. & smk.
3, 2:42 p	NNW 5	8	4	Smoke in valley.
5, 2:20 a	N 3-4	8-9	3	City smk. in NW & SW.
5, 0:47 p	NE&N 2	8	4	0 clds.; mod. hz. in SW & W.
5, 3:13 p	NE&N 1-2		4	Smk. & hz. in SW & W.
5, 3:29 p	ENE 1		3	Mod. hz.
8, 2:05 a	N&NW 5-6			Mod. hz.; 2 Cu Stcu. & Frcu. interfered.
8, 0:54 p	NW 5		4	3 Cu., Frcu. (not near sun).
8, 2:50 p	NW 3	10	4	Few Ci., Cu., Frcu.; very clear.
9, 1:42 a	WNW 6		4	0 clds.; mod. hz.; harbor invisible.
9, 0:47 p	W 7	7	4	Few Ci., Cu. (possibly Ci. over sun).
9, 2:56 p	W 7		4	Few Ci., Cu.; thin Ci. over sun.
10, 1:31 a	ESE 3		4	Few Ci.; mod. hz.
10, 0:53 p	ENE 4	8	4	Few Cist.; in W & N visibility 7.
10, 3:52 p	NE 5	8	4	Few Cist.; (hz. & smk.; reduced vis. in W.)
11, 2:03 a	NE 4		4	Ci. coming on rapidly; hz. over Boston.
15, 2:26 a	NW&N 1-2		3	Cu. & Frcu. forming rapidly.
18, 2:19 a	NW&W 2		3	Lt. hz.; excellent sky.
18, 0:58 p	E 1			No clds.
18, 3:49 p	W 3		3	Few Cist.; some smk. in W & SW.
19, 2:16 a	SSE 4		3	Few Acu.
21, 2:27 a	NW&N 2		3	Few Frcu. & Cu. near sun.
22, 3:53 p	NW 6	8	3	Few Frcu. & Cu. in E.
24, 0:46 p	SSW 9		6	Few Cu., Frcu.
24, 3:58 p	S 9		4	Few Ci., Acu., Cu.; poor conditions.
25, 2:10 a	W 4-5	8	4	0 clouds.
25, 0:42 p	NW&W 4		4	Few Ci., Cist. (clouds stopped obs'ns.).
26, 1:55 a	SW 3-4	8	4	Cist. in N; conditions good.
29, 3:01 a	NW 2	9	4	0 clouds.
29, 0:23 p	SW&W 2		4	0 clouds; conditions good.
29, 3:22 p	SE&S 2		6	Do.
30, 3:00 a	SW&S 4-5		4	0 clouds; conditions excellent.
30, 1:05 p	SW&S 5-6	8	4	Ci. low in S & SW; lt. hz.

POSITIONS AND AREAS OF SUN SPOTS

[Communicated by Capt. J. F. Hellweg, U.S. Navy, Superiptendent U.S. Naval Observatory. Data furnished by the U. S. Naval Observatory in cooperation with Harvard and Mount Wilson Observatories. The difference in longitude is measured from the central meridian, positive west. The north latitude is positive. Areas are corrected for foreshortening and are expressed in millionths of the sun's visible hemisphere. The total area for each day includes spots and groups]

Date	Eastern standard time		Heliographic			Area		Total area for each day	Observatory
			Diff. in longitude	Longitude	Latitude	Spot	Group		
1934	h.	m.	°	°	°				
Apr. 1	11	58	No spots						U.S. Naval.
Apr. 2	11	7	No spots						U.S. Naval.
Apr. 3	11	20	+30.0	187.1	+29.0		46	46	U.S. Naval.
Apr. 4			No spots						Harvard.
Apr. 5	11	34	No spots						U.S. Naval.
Apr. 6	11	14	No spots						U.S. Naval.
Apr. 7	14	1	No spots						U.S. Naval.
Apr. 8	11	10	No spots						U.S. Naval.
Apr. 9			No spots						Harvard.
Apr. 10	11	12	No spots						U.S. Naval.
Apr. 11	9	45	No spots						Mount Wilson.

POSITIONS AND AREAS OF SUN SPOTS—Continued

Date	Eastern standard time		Heliographic			Area		Total area for each day	Observatory
			Diff. in longitude	Longitude	Latitude	Spot	Group		
1934	h.	m.	°	°	°				
Apr. 12	9	30	No spots						Mount Wilson.
Apr. 13	9	50	No spots						Mount Wilson.
Apr. 14	11	31	No spots						U.S. Naval.
Apr. 15	11	5	−80.0	278.9	−28.5		185	185	U.S. Naval.
Apr. 16	14	3	−67.0	277.0	−28.5		309	309	U.S. Naval.
Apr. 17	12	40	−53.0	278.7	−29.8		1320	1320	Harvard.
Apr. 18	11	6	−42.0	277.3	−29.0		710	710	U.S. Naval.
Apr. 19	12	40	−26.8	278.5	−30.0		950	950	Harvard.
Apr. 20	10	13	−16.0	277.3	−29.0		617	617	U.S. Naval.
Apr. 21	11	2	−10.5	269.2	−29.5		93		U.S. Naval.
			−0.5	279.2	−28.0	432		525	U.S. Naval.
Apr. 22	11	0	+1.5	268.0	−29.5		93		U.S. Naval.
			+12.5	279.0	−29.0	432		525	U.S. Naval.
Apr. 23	11	1	+12.5	265.8	−29.5		31		U.S. Naval.
			+25.5	278.8	−29.0	432		463	U.S. Naval.
Apr. 24	11	5	+39.0	279.0	−29.0	340		340	U.S. Naval.
Apr. 25	11	8	+51.0	277.8	−29.0	340		340	U.S. Naval.
Apr. 26	13	11	+64.5	276.9	−29.0	309		309	U.S. Naval.
Apr. 27	9	50	+26.0	227.0	+27.0		12		Mount Wilson
			+76.0	277.0	−29.0	590		602	Mount Wilson.
Apr. 28	11	1	No spots						U.S. Naval.
Apr. 29	12	58	No spots						U.S. Naval.
Apr. 30	10	44	No spots						U.S. Naval.
Mean daily area for 30 days								241	

NOTE.—Harvard Observatory reported that there were no spots on Feb. 19, 1934.

PROVISIONAL SUN-SPOT RELATIVE NUMBERS FOR APRIL 1933

(Dependent alone on observations at Zurich and its station at Arosa)

[Data furnished through the courtesy of Prof. W. Brunner, Eidgenössische Sternwarte, Zurich, Switzerland]

April 1934	Relative numbers	April 1934	Relative numbers	April 1934	Relative numbers
1	0	11	0	21	22
2	11	12	0	22	*b* 18
3	12	13	0	23	16
4	9	14	*d* 7	24	19
5	8	15	21	25	11
6	0	16	33	26	10
7	0	17	32	27	16
8	0	18	29	28	14
9		19	22	29	7
10	0	20	21	30	0

Mean: 29 days=11.7.

b=Passage of a large group or spot through the central meridian.
d=Entrance of a large or average-sized center of activity on the east limb.

AEROLOGICAL OBSERVATIONS

[Aerological Division, D. M. Little, in Charge]

By L. T. SAMUELS

Free-air temperatures during April averaged above normal in practically all cases except at Pembina and Washington, where appreciable negative departures prevailed (table 1). Relative humidity departures for the month were small except at Norfolk, where large positive values obtained in the higher levels.

Resultant free-air wind directions for the month were close to normal in practically all cases. Resultant free-air velocities were mostly above normal except in the west where they were generally less than normal.