Positions and areas of sun spots—Continued

Date	Eastern standard civil time	Heliographic			Area		Total area for each day
		Diff. long.	Longitude	Latitude	Spot	Group	
	h m	°	°	°			
Apr. 6 (Mount Wilson)	18 15	−60.0	257.2	+16.0		13	
		−53.0	264.2	−7.0		11	
		−29.0	288.2	+9.0	8		
		−7.0	310.2	+13.0		529	
		+69.0	26.2	−5.0	346		907
Apr. 7 (Naval Observatory).	10 41	−49.5	258.6	+15.0		62	
		−41.5	266.6	−7.0		31	
		−19.0	289.1	+8.0	6		
		−0.5	307.6	+13.0		448	
		+80.5	28.6	−5.0	185		732
Apr. 8 (Naval Observatory).	11 38	−61.5	232.9	−7.5		19	
		−37.0	257.4	+15.0		123	
		+13.5	307.9	+12.5		401	543
Apr. 9 (Naval Observatory).	10 53	−62.0	219.6	+14.0		19	
		−47.5	234.1	−8.0		31	
		−41.0	240.6	+12.0	9		
		−20.5	261.1	+15.0	25		
		+29.5	311.1	+12.0	355		439
Apr. 10 (Naval Observatory).	11 7	−49.0	219.3	+14.0		123	
		−35.0	233.3	−7.0		9	
		−8.0	260.3	−11.5	3		
		−6.5	261.8	+15.0	12		
		+23.5	291.8	+8.0	19		
		+42.0	310.3	+12.0	355		521
Apr. 11 (Naval Observatory).	11 2	−38.0	217.2	+13.5		185	
		−20.5	234.7	−7.0		62	
		+6.0	261.2	+15.0	6		
		+55.0	310.2	+12.0	340		593
Apr. 12 (Naval Observatory).	11 27	−25.0	216.7	+14.0		185	
		−7.5	234.2	−7.5		77	
		+17.0	258.7	+15.0		37	
		+67.5	309.2	+12.0	340		639
Apr. 13 (Naval Observatory).	11 6	−51.5	177.2	+15.5	6		
		−11.5	217.2	+14.5		170	
		+4.0	232.7	−8.0		93	
		+32.0	260.7	+14.5	3		
		+81.5	310.2	+12.0	370		642
Apr. 14 (Naval Observatory).	11 15	−38.5	176.9	+15.5		12	
		+1.5	216.9	+15.0		108	
		+18.0	233.4	−7.0		93	
		+69.0	284.4	−11.5	22		235
Apr. 15 (Naval Observatory).	13 10	−25.0	176.2	+15.5	6		
		+17.0	218.2	+14.5		22	
		+30.0	231.2	−10.0		12	40
Apr. 16 (Mount Wilson).	13 15	+30.0	217.9	+15.0		21	
		+42.0	229.9	−13.0		65	
		+55.0	242.9	+12.0	9		95
Apr. 17 (Perkins Observatory).	11 39	−33.7	141.7	−19.4	78		
		−22.4	153.0	−20.0	31		109

Positions and areas of sun spots—Continued

Date	Eastern standard civil time	Heliographic			Area		Total area for each day
		Diff. long.	Longitude	Latitude	Spot	Group	
	h m	°	°	°			
Apr. 18 (Naval Observatory).	12 1	−66.5	95.7	−11.0	6		
		−48.0	114.2	+27.5		19	
		+56.0	218.2	+15.0	9		
		+70.0	232.2	−11.5	19		53
Apr. 19 (Mount Wilson).	12 0	−55.0	94.0	−13.0		80	
		−40.0	109.0	+28.0	16		
		+30.0	179.0	+14.0		9	105
Apr. 19 (Yerkes Observatory).	11 52	−56.5	92.6	−12.0	21		
		−55.5	93.6	−13.5	26		
		−51.5	97.6	−13.0	64		
		−37.5	111.6	+28.0	20		131
Apr. 20 (Naval Observatory).	10 54	−40.5	95.9	−12.5		22	
		−24.0	112.4	+28.0		77	
		+43.5	179.9	+15.0	9		108
Apr. 21 (Naval Observatory).	10 51	−30.0	93.2	−12.0		19	
		−10.5	112.7	+27.5		31	
		+56.0	179.2	+15.0	9		59
Apr. 22 (Naval Observatory).	11 30	−89.0	20.6	−6.0	170		
		−17.5	92.1	−11.5	12		182
Apr. 23 (Naval Observatory).	11 21	−76.5	20.0	+12.5	9		
		−65.5	31.0	−6.0	185		
		−1.0	95.5	−12.0	6		
		+60.0	156.5	−6.0	6		206
Apr. 24 (Naval Observatory).	11 00	−61.0	22.5	+13.0	15		
		−52.5	31.0	−6.0	201		216
Apr. 25 (Naval Observatory).	10 59	−47.0	23.3	+12.5	9		
		−39.0	31.3	−6.0	216		
		+7.5	77.8	+9.0	3		
		+30.0	100.3	−12.0	2		230
Apr. 26 (Naval Observatory).	10 54	−57.0	0.1	−4.0	3		
		−35.0	22.1	+13.5		46	
		−26.0	31.1	−6.0	201		
		+37.5	94.6	+7.5	6		
		+42.5	99.6	−12.0	6		262
Apr. 27 (Naval Observatory).	10 6	−21.5	22.8	+13.5		62	
		−13.5	30.8	−6.0	216		278
Apr. 28 (Naval Observatory).	11 33	−7.5	22.8	+13.5		77	
		+1.0	31.3	−6.0	231		308
Apr. 29 (Naval Observatory).	10 57	−33.5	343.9	+11.5		53	
		+5.5	22.9	+13.0		170	
		+14.0	31.4	−7.0	185		408
Apr. 30 (Naval Observatory).	10 59	−20.0	344.2	+11.5		154	
		+19.0	23.2	+13.0		170	
		+26.5	30.7	−7.0	185		509
Mean daily area for April							434

AEROLOGICAL OBSERVATIONS

By RICHMOND T. ZOCH

Free-air temperatures were above normal at all the levels at Broken Arrow, Ellendale, and Royal Center and at some of the levels at Due West and Groesbeck. At Ellendale these positive departures were very large.

Free-air relative humidities were below normal at most levels at all of the stations.

Free-air vapor presures were mostly above normal at Broken Arrow, Ellendale, and Royal Center and below normal at Due West and Groesbeck. The vapor pressure departures followed the trend of the temperature departures.

The resultant winds were variable from the surface to the 1,500-meter level. Above this level they were westerly.

Airplane observations made at the naval air station, Seattle, Wash., have been included in Table 2.

TABLE 1.—*Free-air temperatures, relative humidities, and vapor pressures during April, 1930*

TEMPERATURE (° C.)

Altitude meters m. s. l.	Broken Arrow, Okla. (233 meters)		Due West, S. C. (217 meters)		Ellendale, N. Dak. (444 meters)		Groesbeck, Tex. (141 meters)		Royal Center, Ind. (225 meters)	
	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal
Surface	15.8	+0.2	15.2	−1.4	8.8	+3.2	17.6	−0.4	10.7	+0.3
500	15.5	+1.6	14.4	0	8.6	+3.4	17.6	+1.9	9.2	+1.3
1,000	14.4	+2.9	11.9	+0.2	6.3	+3.6	15.7	+1.7	7.2	+1.7
1,500	12.7	+3.3	9.1	+0.2	4.0	+3.5	14.0	+1.2	4.4	+1.1
2,000	9.7	+2.6	6.2	+0.2	1.9	+4.0	11.0	+0.3	2.5	+1.6
2,500	6.4	+2.2	4.0	+0.3	−0.9	+4.0	7.5	−0.6	0.3	+2.0
3,000	2.8	+1.7	0.9	−0.1	−4.0	+3.9	4.1	−1.1	−2.1	+2.2
4,000	−4.2	+0.8	−4.7	−0.5	−9.2	+4.8	−3.4	−2.3	−8.4	+1.1
5,000	−9.8	+0.9	------	------	−16.0	+3.8	------	------	−14.6	+0.7

RELATIVE HUMIDITY (%)

Surface	65	+1	62	0	58	−7	75	+2	67	+2
500	62	−1	56	−6	58	−6	61	−10	65	0
1,000	53	−7	54	−7	56	−4	52	−10	64	+2
1,500	50	−5	53	−7	53	−4	38	−11	65	+6
2,000	48	−2	48	−9	48	−7	37	−6	60	+3
2,500	49	0	45	−7	48	−6	39	−2	54	+2
3,000	55	+7	46	−4	50	−4	37	−3	50	0
4,000	51	+6	46	0	48	−8	40	−3	43	−6
5,000	39	−7	------	------	44	−10	------	------	39	−5

VAPOR PRESSURE (*mb.*)

Surface	11.66	−0.18	10.85	−1.08	6.45	+0.61	15.11	−0.33	8.92	+0.29
500	10.84	+0.44	9.38	−1.04	6.37	+0.69	11.62	−1.45	7.85	+0.49
1,000	8.67	+0.28	7.74	−0.99	5.43	+0.90	8.75	−1.39	6.87	+0.88
1,500	7.15	+0.48	6.38	−0.71	4.50	+0.80	5.93	−1.22	5.95	+1.01
2,000	5.56	+0.46	4.82	−0.53	3.67	+0.70	4.76	−0.59	4.87	+0.87
2,500	4.46	+0.37	3.80	−0.16	3.00	+0.60	4.23	−0.03	3.79	+0.74
3,000	3.90	+0.63	2.87	−0.16	2.60	+0.67	3.36	−0.07	2.96	+0.55
4,000	1.81	−0.20	2.59	+0.70	1.75	+0.47	1.80	−0.54	1.46	−0.17
5,000	0.53	−0.82	------	------	1.29	+0.51	------	------	0.31	−0.81

TABLE 2.—*Free-air data obtained at Naval Air stations during April, 1930*

Altitude m. s. l. (meters)	Temperature (°C.)				Relative humidity (%)			
	Pensacola, Fla.	San Diego, Calif.	Seattle, Wash.	Washington, D. C.	Pensacola, Fla.	San Diego, Calif.	Seattle, Wash.	Washington, D. C.
Surface	18.0	17.9	12.3	10.5	80	69	70	61
500	17.6	13.9	8.6	8.4	65	81	73	57
1,000	15.9	12.8	5.6	6.0	59	64	71	57
2,000	10.4	9.6	0.0	1.4	50	38	61	57
3,000	5.2	3.5	−5.2	−2.9	36	22	59	47
4,000	------	------	−11.1	------	------	------	54	------
5,000	------	------	−18.1	------	------	------	54	------

TABLE 3.—*Observations by means of kites, captive and limited-height sounding balloons during April, 1930*

	Broken Arrow, Okla.	Due West, S. C.	Ellendale N. Dak.	Groesbeck, Tex.	Royal Center, Ind.
Mean altitudes (meters) m. s. l., reached during month	2,810	2,846	2,987	2,499	2,981
Maximum altitude (meters) m. s. l., reached and date	[1] 6,175	[2] 4,075	[3] 5,429	[4] 4,195	[5] 5,678
Number of flights made	30	33	32	30	32
Number of days on which flights were made	27	28	30	28	30

[1] 14th. [2] 1st. [3] 2d. [4] 29th. [5] 30th.

In addition to the above there were approximately 125 pilot balloon observations made daily at 53 Weather Bureau stations in the United States.

TABLE 4.—*Free-air resultant winds (meters per second) based on pilot balloon observations made near 7 a. m. (E. S. T.) during April, 1930*

Altitude (meters) m. s. l.	Broken Arrow, Okla. (233 meters)		Burlington, Vt. (132 meters)		Cheyenne, Wyo. (1,868 meters)		Due West, S. C. (217 meters)		Ellendale, N. Dak. (444 meters)		Groesbeck, Tex. (141 meters)		Havre, Mont. (762 meters)		Jacksonville, Fla. (65 meters)		Key West, Fla. (11 meters)		Los Angeles, Calif. (40 meters)	
	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity
	°		°		°		°		°		°		°		°		°		°	
Surface	S 23 E	1.7	S 33 W	1.7	N 88 W	3.5	N 73 E	0.3	N 36 W	0.9	S 5 E	2.1	S 52 W	0.7	N 32 W	0.4	N 85 E	2.4	N 60 W	1.5
500	S 3 W	5.4	S 64 W	3.8	------	----	N 49 W	1.3	N 12 E	0.7	S 12 W	8.3	------	----	N 76 E	1.0	S 81 E	5.3	N 87 E	0.9
1,000	S 32 W	7.7	N 85 W	5.2	------	----	N 70 W	1.8	N 50 E	1.3	S 17 W	6.7	S 50 W	2.4	N 72 E	1.0	S 61 E	3.7	N 10 E	0.8
1,500	S 55 W	6.9	N 54 W	7.3	------	----	N 55 W	3.2	N 36 W	2.5	S 29 W	4.3	S 87 W	4.5	N 2 E	0.9	S 16 E	1.0	N 62 W	1.9
2,000	S 81 W	6.7	N 56 W	9.2	N 81 W	5.6	N 67 W	5.4	N 37 W	6.1	S 35 W	2.2	N 87 W	5.4	N 84 W	2.0	S 40 W	2.2	S 83 W	2.6
2,500	S 85 W	8.3	N 64 W	12.5	N 69 W	6.6	N 66 W	6.5	N 42 W	7.0	N 72 W	2.3	S 86 W	7.3	N 51 W	1.9	S 49 W	1.9	S 66 W	1.9
3,000	S 74 W	8.1	N 63 W	15.3	N 68 W	6.6	N 72 W	8.4	N 51 W	8.1	N 71 W	4.0	S 88 W	8.6	N 57 W	2.1	N 87 W	2.0	S 67 W	3.2
4,000	N 63 W	9.5	N 69 W	13.9	N 73 W	6.6	N 69 W	8.9	N 54 W	13.2	N 45 W	5.5	S 89 W	9.3	N 63 W	5.9	N 79 W	5.7	S 47 W	4.1
5,000	------	----	------	----	S 63 W	6.5	N 74 W	8.5	N 60 W	11.1	------	----	N 84 W	12.5	S 78 W	3.8	N 69 W	8.8	------	----

Altitude (meters) m. s. l.	Medford, Oreg. (446 meters)		Memphis, Tenn. (145 meters)		New Orleans, La. (25 meters)		Omaha, Nebr. (313 meters)		Royal Center, Ind. (225 meters)		Salt Lake City, Utah (1,280 meters)		San Francisco, Calif. (60 meters)		Sault Ste. Marie, Mich. (198 meters)		Seattle, Wash. (14 meters)		Washington, D. C. (5 meters)	
	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity
	°		°		°		°		°		°		°		°		°		°	
Surface	N 53 W	0.2	S 4 E	1.3	N 58 E	0.6	N 83 E	0.8	S 27 E	0.6	S 17 E	2.7	S 32 W	0.6	N 20 W	0.6	S 34 E	0.7	N 58 W	0.5
500	N 54 W	0.3	S 49 W	2.9	S 67 E	2.8	S 36 E	2.3	S 50 W	2.8	------	----	S 82 W	2.6	S 4 E	0.2	S 13 W	2.5	N 73 W	5.1
1,000	S 13 W	0.9	S 89 W	4.5	S 27 W	2.8	S 84 W	2.6	S 84 W	5.7	------	----	S 89 W	3.7	N 46 W	3.2	S 7 W	3.6	N 68 W	7.2
1,500	S 4 E	2.6	N 86 W	5.7	S 8 E	0.1	N 64 W	4.6	N 77 W	6.8	S 17 E	5.0	S 65 W	3.5	N 47 W	4.2	S 25 W	3.8	N 60 W	10.1
2,000	S 22 W	5.3	N 88 W	6.1	N 44 W	1.7	N 46 W	9.0	N 80 W	8.4	S 84 W	4.4	S 51 W	3.8	N 46 W	5.9	S 35 W	4.5	N 72 W	8.6
2,500	S 26 W	7.5	N 77 W	6.9	N 50 W	2.3	N 46 W	9.9	N 72 W	9.1	S 36 W	4.6	S 24 W	2.7	N 58 W	8.1	S 58 W	4.9	W	9.9
3,000	S 31 W	8.4	N 79 W	6.5	N 36 W	2.1	N 52 W	10.3	N 58 W	10.5	S 60 W	5.4	S 5 W	2.1	N 56 W	6.6	S 50 W	6.2	N 86 W	10.8
4,000	S 49 W	10.0	N 87 W	5.2	N 61 W	4.0	N 80 W	7.9	N 49 W	14.8	S 56 W	6.8	------	----	N 61 W	8.6	------	----	------	----
5,000	------	----	------	----	N 75 W	4.4	------	----	N 66 W	13.7	S 65 W	5.2	------	----	N 66 W	8.9	------	----	------	----