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	
1930	h m	°	°	°			
May 19 (Perkins Observatory).	16 28	−73.3	36.3	−7.0	109		
		−29.9	79.7	−11.8		232	341
May 20 (Naval Observatory).	10 51	−62.5	37.3	−6.0	77		
		−18.5	81.3	−10.5		216	293
May 21 (Naval Observatory).	10 55	−48.5	38.0	−5.5	46		
		−5.0	81.5	−10.0		247	293
May 22 (Naval Observatory).	10 47	−36.0	37.4	−6.0	62		
		+8.0	81.4	−10.0		231	293
May 23 (Naval Observatory).	11 5	−72.0	348.0	+14.5		108	
		−59.0	1.0	−11.0		15	
		−30.0	30.0	+19.5		9	
		−22.5	37.5	−6.0	34		
		+22.0	82.0	−10.0		185	
		+45.0	105.0	+26.5		43	394
May 24 (Naval Observatory).	11 8	−59.0	347.7	+13.5		77	
		−45.0	1.7	−11.0		12	
		−14.0	32.7	+19.5	3		
		−9.5	37.2	−6.0	34		
		+36.5	83.2	−9.5		93	
		+56.0	102.7	+27.0	6		225
May 25 (Naval Observatory).	11 5	−46.0	347.5	+13.5		46	
		−31.5	2.0	−12.0	6		
		−2.0	31.5	+19.5		46	
		+2.0	35.5	+25.5		9	
		+4.0	37.5	−6.5	28		
		+50.5	84.0	−9.0		108	243
May 26 (Naval Observatory).	10 50	−32.5	347.9	+13.5		46	
		+11.0	31.4	+19.5		71	
		+16.5	36.9	−6.5	25		
		+64.0	84.4	−9.5	93		235
May 27 (Naval Observatory).	10 54	−24.0	343.2	−1.0		6	
		−20.5	346.7	+12.5		6	
		+25.5	32.7	+19.5		108	
		+30.0	37.2	−6.5	9		
		+79.0	86.2	−9.5	77		206
May 28 (Naval Observatory).	13 8	−73.5	279.2	+16.5	139		
		−14.0	338.7	+13.0		77	
		+40.0	32.7	+19.5		68	
		+44.0	36.7	−6.5	6		290
May 29 (Naval Observatory).	11 21	−60.5	280.0	+16.5	139		
		−20.0	320.5	−2.0		6	
		+0.5	341.0	+12.5		62	
		+52.5	33.0	+20.0		123	
		+58.0	38.5	−7.0		15	345

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	
1930	h m	°	°	°			
May 30 (Naval Observatory).	10 46	−48.0	279.5	+16.5	154		
		−6.5	321.0	−2.5		15	
		+15.0	342.5	+12.0	12		
		+66.0	33.5	+20.0		170	
		+70.0	37.5	−6.5	6		357
May 31 (Naval Observatory).	11 6	−34.5	279.6	+17.0	154		
		+6.5	320.6	−2.5	2		
		+29.5	343.6	+12.0	12		
		+85.0	39.1	+20.0		231	399
Mean daily area for May.							327

PROVISIONAL SUN-SPOT RELATIVE NUMBERS FOR MAY, 1930 [1]

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

May, 1930	Relative numbers	May, 1930	Relative numbers	May, 1930	Relative numbers
1	52	11	*Mc* 22	21	31
2	*a* 52	12	25	22	*b* 33
3	50	13		23	*d* 45?
4	41	14		24	67
5	*Ec* 30	15	32	25	46
6	37	16	*d* 41	26	*Mc* 43
7	*b* 25	17	35	27	56
8	26	18	25	28	*d* 38
9	23	19	31	29	*a* 52
10	19	20	39	30	48
				31	35

Mean, 29 days=37.9.

[1] Dependent alone on observations at Zurich and its station at Arosa.
a=Passage of an average-sized group through the central meridian.
b=Passage of a large group through the central meridian.
c=New formation of a large or average-sized center of activity: E, on the eastern part of the sun's disk; W, on the western part; M, in the central zone.
d=Entrance of large or average-sized center of activity on the east limb.

AEROLOGICAL OBSERVATIONS

By RICHMOND T. ZOCH

The free-air temperatures were above normal at Due West and Royal Center and in the upper levels at Ellendale. At Broken Arrow and Groesbeck and in the lower levels at Ellendale they were below normal. In all cases the departures were small.

The free-air relative humidities were above normal in the lower levels at all of the stations and were below normal in the upper levels.

The free-air vapor pressures were below normal at Broken Arrow but were mostly above normal at the other aerological stations.

In the lower levels the resultant winds were northwesterly on the Pacific coast and southerly in the eastern part of the country. The resultant winds changed to westerly at the 2,000-meter level and remained westerly above this level.

Airplane observations made at Hampton Roads, Va., have been included in Table 2.

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

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
TEMPERATURE (° C.)										
Surface	18.6	−1.1	21.6	+1.1	11.6	−1.5	20.4	−2.1	16.5	+0.4
500	17.6	−0.2	19.2	+1.3	11.1	−1.6	19.1	−0.7	14.6	+1.2
1,000	15.1	−0.5	16.4	+1.5	8.0	−1.5	16.5	−0.9	11.6	+1.4
1,500	12.5	−0.9	13.4	+1.5	6.2	−0.4	14.8	−0.8	8.6	+1.2
2,000	10.3	−0.5	9.9	+0.9	4.5	+0.9	12.5	−0.9	5.7	+0.7
2,500	7.9	−0.1	6.7	+0.5	2.2	+1.5	9.5	−1.2	3.0	+0.4
3,000	5.4	+0.5	3.7	+0.5	−0.7	+1.4	5.7	−2.0	0.7	+0.9
4,000	−1.8	−0.5	−2.5	+0.5	−7.5	+0.5			−5.0	+1.3
5,000			−8.4	+1.4	−13.5	+0.6			−11.8	+0.3
RELATIVE HUMIDITY (%)										
Surface	76	+6	66	+2	66	+6	86	+14	70	+6
500	70	+1	66	+1	66	+6	78	+5	69	+5
1,000	68	+1	65	0	66	+7	76	+7	69	+6
1,500	60	−2	63	−2	62	+2	65	+7	68	+7
2,000	47	−12	62	−1	55	−5	52	+3	63	+6
2,500	41	−15	59	−1	55	−4	44	−1	56	+5
3,000	36	−18	55	−2	55	−2	50	+5	49	+2
4,000	26	−29	51	−3	52	−1			44	−2
5,000			49	−3	46	−5			44	−2

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

VAPOR PRESSURE (*mb*)

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	16.42	−0.01	16.98	+1.48	9.06	−0.02	20.89	+1.23	13.46	+1.58
500	14.33	−0.05	14.71	+1.21	8.84	+0.01	17.20	+0.09	11.99	+1.88
1,000	11.85	+0.02	12.44	+1.19	7.09	+0.04	14.23	+0.47	9.95	+1.74
1,500	8.91	−0.41	9.74	+0.47	5.92	+0.03	10.86	+0.76	7.89	+1.31
2,000	5.95	−1.46	7.69	+0.33	4.80	+0.03	7.46	+0.14	5.90	+0.79
2,500	4.30	−1.47	5.80	+0.01	4.19	+0.44	5.23	−0.49	4.11	+0.35
3,000	3.29	−1.29	4.53	+0.04	3.57	+0.66	5.16	+0.43	2.88	+0.18
4,000	1.07	−2.00	3.45	+0.45	2.20	+0.55	------	------	1.71	+0.19
5,000	------	------	3.19	+1.16	1.56	+0.63	------	------	1.06	+0.28

TABLE 2.—*Free-air data obtained at naval air stations during May, 1930*

Altitude (meters) m. s. l.	Temperature (° C.)					Relative Humidity (%)				
	Hampton Roads, Va.	Pensacola, Fla.	San Diego, Calif.	Seattle, Wash.	Washington, D. C.	Hampton Roads, Va.	Pensacola, Fla.	San Diego, Calif.	Seattle, Wash.	Washington, D. C.
Surface	20.1	22.4	18.8	13.3	20.3	64	86	65	68	59
500	18.0	21.2	14.7	9.6	17.5	56	74	72	73	55
1,000	15.4	18.9	13.6	6.4	14.9	53	66	62	71	54
2,000	9.1	13.3	10.3	1.1	9.0	54	58	39	68	56
3,000	2.5	8.3	4.9	−4.6	3.4	58	38	33	54	49
4,000	−3.2	------	------	−11.1	0.9	59	------	------	62	34
5,000	------	------	------	−17.1	------	------	------	------	56	------

TABLE 3.—*Free-air resultant winds (meters per second) based on pilot balloon observations made near 7 a. m. (E. S. T.) during May, 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 19 E	2.1	S 21 W	1.8	N 88 W	2.2	N 9 E	0.3	N 43 W	1.5	S 35 E	1.6	N 84 E	0.3	------	------	S 63 E	2.3	N 63 W	1.1
500	S 2 W	5.6	S 68 W	3.2	------	------	S 78 W	2.0	N 60 W	1.8	S 16 E	4.8	------	------	------	------	S 55 E	5.2	S 75 E	1.7
1,000	S 27 W	7.0	N 76 W	6.0	------	------	N 82 W	3.3	S 82 W	3.7	S 1 W	5.0	S 65 W	1.3	------	------	S 42 E	4.4	S 71 E	0.9
1,500	S 59 W	5.1	N 59 W	9.8	------	------	S 88 W	3.3	S 73 W	4.0	S 5 W	1.1	S 77 W	4.1	------	------	S 45 E	2.5	N 59 W	1.7
2,000	S 63 W	7.1	N 59 W	10.7	S 89 W	3.6	S 83 W	4.2	S 81 W	5.4	N 72 W	1.5	N 75 W	5.1	------	------	S 24 E	1.4	N 70 W	2.5
2,500	S 80 W	6.0	N 55 W	10.8	N 88 W	6.6	N 85 W	4.6	S 80 W	5.3	N 66 W	3.6	N 61 W	5.2	------	------	S 53 E	1.2	N 89 W	2.9
3,000	S 80 W	5.5	N 38 W	12.8	S 84 W	7.7	N 86 W	5.6	S 87 W	5.6	N 19 E	1.1	N 80 W	5.9	------	------	S 61 E	1.1	N 89 W	3.8
4,000	N 62 W	6.4	------	------	S 82 W	8.7	N 79 W	7.5	N 83 W	7.7	S 83 E	0.8	S 86 W	8.7	------	------	N 53 W	1.1	S 88 W	6.8
5,000	N 68 W	6.5	------	------	S 78 W	7.2	N 75 W	8.1	N 84 W	8.9	S 29 E	0.5	N 61 W	8.6	------	------	N 70 W	3.1	------	------

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 72 W	0.5	S 56 E	1.1	N 75 W	1.1	S 55 E	1.0	S 7 W	1.6	S 30 E	3.2	S 80 W	2.7	S 85 E	0.3	S 41 E	0.7	N 68 W	1.1
500	N 84 W	1.1	S 50 W	2.5	S 58 E	4.1	S 21 W	2.3	S 51 W	5.9	------	------	N 74 W	3.5	S 5 E	1.2	S 9 W	2.6	N 53 W	5.5
1,000	N 53 W	1.8	S 64 W	4.6	S 37 E	4.7	S 50 W	4.8	S 70 W	7.9	------	------	N 45 W	5.9	S 87 W	3.5	S 20 W	2.9	N 57 W	5.6
1,500	N 46 W	0.5	S 72 W	5.5	S 20 E	4.4	S 71 W	4.6	S 71 W	8.4	S 15 E	5.4	N 32 W	5.9	N 74 W	5.4	N 44 W	0.5	N 56 W	7.4
2,000	S 51 W	1.1	S 83 W	5.4	S 10 W	4.0	N 85 W	6.3	S 72 W	8.2	S 1 W	4.1	N 52 W	5.0	N 70 W	5.5	N 2 W	1.4	N 69 W	8.1
2,500	S 43 W	3.3	S 64 W	5.1	S 54 W	2.3	N 84 W	7.8	S 88 W	9.3	S 19 W	4.2	N 58 W	7.2	N 70 W	6.5	N 51 W	2.3	N 81 W	9.3
3,000	S 67 W	2.7	W	5.4	S 74 W	3.5	N 86 W	9.8	N 85 W	10.3	S 32 W	4.6	------	------	N 59 W	6.0	S 13 W	4.4	N 86 W	11.3
4,000	N 32 W	4.5	S 63 W	4.6	N 84 W	5.9	N 83 W	10.3	N 69 W	10.7	S 67 W	5.1	------	------	N 53 W	9.0	------	------	------	------
5,000	------	------	------	------	N 81 W	5.9	N 61 W	9.3	N 53 W	10.1	S 78 W	4.5	------	------	------	------	------	------	------	------

TABLE 4.—*Observations by means of kites, captive and limited—height sounding balloons, during May, 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	2,518	3,304	3,181	2,096	3,388
Maximum altitude (meters), m. s. l., reached and date	[1] 4,126	[2] 5,789	[3] 6,044	[4] 3,378	[5] 5,778
Number of flights made	31	28	35	30	31
Number of days on which flights were made	30	28	30	28	31

[1] 3d. [2] 31st. [3] 19th. [4] 9th. [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.