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.	°	°	°			
June 24 (Naval Observatory).	10 23	−20.5	336.4	+15.0		37	
		+6.0	2.9	−9.0	6		43
June 25 (Naval Observatory).	10 22	−68.5	275.1	+17.5	12		
		−6.0	337.6	+15.0	9		
June 26 (Naval Observatory).	10 33	−55.5	274.8	+17.5	15		15
June 27 (Naval Observatory).	10 31	−73.5	243.6	+12.5	46		
		−50.0	267.1	+13.0		93	
		−43.5	273.6	+17.5	6		145
June 28 (Naval Observatory).	10 50	−61.5	242.2	+13.0		62	
		−37.5	266.2	+13.0		108	
		−30.0	273.7	+17.5	6		176
June 29 (Naval Observatory).	10 31	−48.5	242.1	+13.5		46	
		−26.0	264.6	+13.0		108	
		−17.5	273.1	+18.0	3		
		+3.0	293.6	+21.0	3		160
June 30 (Naval Observatory).	10 27	−35.0	242.4	+14.0		37	
		−12.5	264.9	+13.0		77	114
Mean daily area for June.							184

PROVISIONAL SUN-SPOT RELATIVE NUMBERS, JUNE, 1930 [1]

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

June, 1930	Relative numbers	June, 1930	Relative numbers	June, 1930	Relative numbers
1	31	11	52	21	8
2	28	12	a 42	22	8
3	a 28	13	37	23	7
4	Mc 34	14	23	24	10
5	27	15	21	25	16
6	Eac 34	16	20	26	14
7	Ec 70	17	16	27	Ec 32
8	a 70	18	15	28	28
9	61	19	9	29	29
10	52	20	14	30	31

Mean (30 days)=28.9.

[1] Dependent alone on observations at Zurich and its station at Arosa.
a=Passage of an average-sized 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.

AEROLOGICAL OBSERVATIONS

By RICHMOND T. ZOCH

Except for a few levels at Ellendale and Royal Center, the free-air temperatures at all the stations were below normal. (See Table 1.) However, in most cases the departures were small.

Free-air relative humidities were mostly below normal at all the stations. Free-air vapor pressures were also below normal at all the stations. The relative-humidity and vapor pressure departures were large.

The negative departures of all three elements are significant in that the precipitation at all the aerological stations except Broken Arrow was considerably below normal.

In the lower levels the resultant winds were southerly all over the country excepting the Allegheny Mountains and the Pacific coast. (See Table 3.) The resultant winds at the 3,000 meter level were northwesterly over the Mississippi Valley and westerly over the remainder of the country. At the 5,000-meter level the resultant winds were southerly over Florida and northwesterly over the remainder of the country.

On the 2d (see Table 4) Royal Center obtained the highest kite flight ever obtained at that station.

TABLE 1.—*Free-air temperatures, relative humidities, and vapor pressures during June, 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	22.5	−2.4	24.0	−1.5	17.4	−1.3	22.7	−3.2	21.8	0.0
500	22.0	−0.9	21.6	−1.0	16.9	−1.4	21.5	−1.4	20.0	+1.1
1,000	20.1	0.0	18.2	−1.1	14.1	−1.2	19.6	−0.7	16.5	+0.9
1,500	17.1	−0.4	14.7	−1.3	11.8	−0.9	17.0	−1.1	12.9	+0.1
2,000	14.7	−0.1	11.3	−1.4	9.2	−0.6	14.8	−1.0	10.1	−0.1
2,500	11.8	−0.2	8.4	−1.2	6.5	−0.4	12.0	−1.2	7.1	−0.4
3,000	8.6	−0.4	5.7	−0.9	3.8	−0.3	9.6	−0.9	4.5	−0.3
4,000	−0.1	−2.9	−0.4	−1.0	−1.5	+0.1			−0.7	−0.5
5,000					−7.2	+0.3			−6.6	+0.1

RELATIVE HUMIDITY (%)

Surface	72	0	67	+2	68	−2	80	+5	61	−5
500	66	−6	66	−1	68	−1	73	−5	61	−7
1,000	60	−11	62	−6	65	−2	56	−16	61	−8
1,500	61	−6	63	−7	61	−3	48	−14	61	−6
2,000	56	−5	64	−6	56	−6	38	−16	57	−5
2,500	55	+1	61	−9	51	−10	36	−13	53	−3
3,000	55	+5	54	−13	47	−10	31	−15	50	−2
4,000	81	+32	61	+6	42	−8			45	+4
5,000					37	−13			39	−12

TABLE 1.—*Free-air temperatures, relative humidities, and vapor pressures during June, 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	19.77	−2.85	19.35	−1.39	13.50	−1.79	22.00	−2.61	15.68	−1.64
500	17.51	−2.58	16.44	−1.74	13.20	−1.62	18.45	−3.26	14.12	−0.76
1,000	14.02	−2.52	12.64	−2.49	10.70	−1.03	12.39	−4.65	11.56	−0.93
1,500	11.80	−1.32	10.35	−2.30	8.68	−0.75	9.08	−3.69	9.28	−0.99
2,000	9.13	−0.88	8.37	−1.89	6.88	−0.72	6.45	−3.17	6.77	−1.13
2,500	7.17	−0.20	6.38	−1.95	5.26	−1.00	5.11	−2.39	4.92	−0.84
3,000	5.96	+0.38	4.65	−1.87	4.13	−0.70	3.97	−1.96	3.73	−0.56
4,000	6.37	+2.70	3.31	−0.08	2.46	−0.65			2.44	+0.26
5,000					2.03	−0.33			1.57	−0.16

TABLE 2.—*Free-air data obtained at naval air stations during June, 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. D.
Surface	24.4	23.8	20.4	17.5	24.9	75	83	69	63	62
500	21.8	22.8	16.6	13.0	21.9	69	74	81	69	60
1,000	18.8	20.3	18.4	9.7	19.0	65	68	54	71	58
2,000	12.9	14.2	18.5	4.4	13.3	56	65	17	69	55
3,000	7.1	9.1	12.1	−0.4	7.3	46	45	6	55	51
4,000				−4.6					46	
5,000				−9.6					32	

TABLE 3.—*Free-air resultant winds (meters per second) based on pilot-balloon observations made near 7 a. m. (E. S. T.) during June, 1930*

Altitude (meters) m. s. l.	Broken Arrow, Okla. (233 meters)		Burlington, Vt. (132 meters)		Cheyenne, Wyo. (1,873 meters)		Due West, S. C. (217 meters)		Ellendale, N. Dak. (444 meters)	
	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity
	°		°		°		°		°	
Surface	S 12 E	2.9	S 7 W	3.7	S 89 W	2.8	N 17 E	1.0	S 82 W	1.4
500	S 8 W	8.8	S 23 W	7.4			N 10 E	2.1	S 69 W	1.9
1,000	S 31 W	9.9	S 64 W	5.7			N 1 W	1.8	S 54 W	4.8
1,500	S 46 W	8.3	S 83 W	6.8			N 40 W	1.4	S 59 W	4.5
2,000	S 68 W	7.0	S 87 W	8.6	S 75 W	4.3	N 48 W	1.9	S 65 W	5.0
2,500	S 83 W	5.9	S 77 W	9.1	S 79 W	5.0	N 56 W	2.0	N 88 W	5.8
3,000	N 59 W	6.4	S 88 W	9.5	N 85 W	8.0	N 79 W	3.7	N 81 W	5.9
4,000	N 45 W	6.6	N 78 W	9.5	N 83 W	10.7	N 80 W	5.5	N 89 W	7.0
5,000	N 52 W	6.1			N 74 W	10.5	N 84 W	3.9	N 65 W	8.0

Altitude (meters) m. s. l.	Groesbeck, Tex. (139 meters)		Havre, Mont. (762 meters)		Jacksonville, Fla. (65 meters)		Key West, Fla. (11 meters)		Los Angeles, Calif. (145 meters)	
	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity
	°		°		°		°		°	
Surface	S 9 E	1.7	S 59 W	1.3	S 7 W	0.9	S 1 E	1.9	N 52 W	1.7
500	S 10 W	7.7			S 45 W	2.3	S 10 E	4.3	S 70 E	1.3
1,000	S 8 W	7.8	S 84 W	3.8	S 65 W	1.1	S 1 W	5.0	N 7 W	1.3
1,500	S 1 E	6.1	N 62 W	6.1	S 29 E	1.0	S 9 W	5.2	N 35 W	3.1
2,000	S	7.0	N 68 W	5.4	S 56 W	0.7	S 3 W	4.5	N 59 W	2.7
2,500	S 8 W	3.3	N 85 W	6.0	S 8 E	0.3	S 15 W	4.4	N 75 W	2.2
3,000	S 16 W	2.1	N 83 W	7.4	S 2 W	1.7	S 12 W	5.7	N 37 W	1.7
4,000	S 14 E	1.2	S 87 W	9.7	N 22 W	1.7	S 46 W	4.6	N 83 W	3.3
5,000	N 84 W	0.5	S 89 W	8.8	S 53 W	3.1	S 34 W	3.0		

Altitude (meters) m. s. l.	Medford, Oreg. (410 meters)		Memphis, Tenn. (145 meters)		New Orleans, La. (25 meters)		Omaha, Nebr. (321 meters)		Royal Center, Ind. (225 meters)	
	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity
	°		°		°		°		°	
Surface	N 27 W	0.3	S 13 W	0.9	N 11 E	0.8	S 2 W	1.5	S 26 W	1.1
500	N 43 W	0.9	S 40 W	2.5	N 45 E	1.6	S 15 W	3.5	S 64 W	5.4
1,000	N 58 W	1.4	S 64 W	4.3	S 80 E	2.4	S 57 W	4.8	S 75 W	7.6
1,500	S 28 W	0.1	S 72 W	4.5	S 74 E	1.8	S 84 W	3.6	S 77 W	8.1
2,000	N 73 W	1.1	S 77 W	4.6	S 61 E	1.4	S 81 W	4.9	S 86 W	7.6
2,500	S 79 W	3.9	S 77 W	3.6	N 62 E	0.9	N 66 W	5.5	N 86 W	7.5
3,000	S 74 W	5.5	N 83 W	3.1	N 18 E	1.9	N 58 W	7.4	N 74 W	7.4
4,000	S 78 W	8.4	N 59 W	6.3	N 7 E	2.7	N 49 W	9.4	N 65 W	9.3
5,000			N 28 W	5.8	N 14 E	4.1	N 52 W	8.8	N 63 W	10.6

Altitude (meters) m. s. l.	Salt Lake City, Utah (1,294 meters)		San Francisco, Calif. (8 meters)		Sault Ste. Marie, Mich. (198 meters)		Seattle, Wash. (14 meters)		Washington, D. C. (10 meters)	
	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity
	°		°		°		°		°	
Surface	S 30 E	2.8	S 45 E	0.8	N 34 W	0.6	S 36 E	1.1	S 15 W	1.3
500			N 70 W	1.7	N 66 W	2.0	S 10 W	2.6	S 68 W	3.4
1,000			N 10 W	3.6	N 68 W	4.6	S 36 W	3.2	S 79 W	5.5
1,500	S 16 E	2.0	N 27 W	3.3	N 53 W	5.5	S 23 W	3.2	S 88 W	5.9
2,000	S 30 W	1.7	N 47 W	4.0	N 54 W	7.6	S 4 E	2.9	S 85 W	6.7
2,500	S 59 W	2.1	N 47 W	3.8	N 60 W	5.9	S 11 W	4.0	S 78 W	7.6
3,000	S 80 W	3.3	N 77 W	4.1	N 44 W	6.6	S 28 W	2.6	S 86 W	6.9
4,000	N 80 W	6.1							W	5.8
5,000										

TABLE 4.—*Observations by means of kites, captive and limited-height sounding balloons during June, 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	2,834	2,734	3,205	2,258	3,602
Maximum altitude (meters), m. s. l., reached and date	[1] 4,418	[2] 4,231	[3] 5,025	[4] 3,693	[5] 6,363
Number of flights made	29	20	33	28	29
Number of days on which flights were made	29	20	29	28	28

[1] 26th. [2] 2d. [3] 6th. [4] 19th. [5] 22d.

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