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	
1929	h. m.	°	°	°			
Sept. 7 (Naval Observatory).	10 37	−55.0	167.5	−9.5	46		
		−27.5	195.0	+21.0	40		
		−5.0	217.5	+13.5		3	
		+19.5	242.0	−13.0		6	
		+42.0	264.5	−5.0		201	
		+50.5	273.0	+10.0		46	342
Sept. 8 (Naval Observatory).	10 41	−48.5	160.8	−6.0	6		
		−42.0	167.3	−10.0	34		
		−38.0	171.3	−3.5	3		
		−14.5	194.8	+20.5	40		
		+9.5	218.8	+13.5		25	
		+14.0	223.3	+2.0		6	
		+54.5	263.8	−5.0		170	
		+65.5	274.8	+9.0		28	312
Sept. 9 (Naval Observatory).	12 15	−33.5	161.7	−6.5	6		
		−28.0	167.2	−10.5		40	
		−22.0	173.2	+15.5	6		
		−1.0	194.2	+20.5	46		
		+22.5	217.7	+13.5		15	
		+69.0	264.2	−4.5		154	
		+80.5	275.7	+10.0	15		282
Sept. 10 (Naval Observatory).	11 20	−76.0	106.5	+5.5	62		
		−44.0	138.5	+23.0	6		
		−20.5	162.0	−6.0		12	
		−15.0	167.5	−10.0	12		
		−8.0	174.5	+15.0	6		
		+11.5	194.0	+21.0	31		
		+82.5	265.0	−4.0		139	268
Sept. 11 (Naval Observatory).	11 0	−63.0	106.5	+5.0	31		
		−2.0	167.5	−10.0	15		
		+24.0	193.5	+21.0	25		71
Sept. 12 (Naval Observatory).	10 52	−73.5	82.8	+15.5	15		
		−44.0	112.3	+5.0		62	
		−38.5	117.8	+38.5	3		
		+10.5	166.8	−10.5		9	
		+19.5	175.8	+16.0		18	
		+33.0	189.3	−16.0	3		
		+37.5	193.8	+21.0	18		
		+61.0	217.3	+5.0		6	134
Sept. 13 (Naval Observatory).	10 51	−86.5	56.6	−7.0	123		
		−59.0	84.1	+15.5	6		
		−31.5	111.6	+5.0		46	
		+25.0	168.1	−10.0	6		
		+32.5	175.6	+16.0		31	
		+51.0	194.1	+21.0	15		
		+77.0	220.1	+5.5	15		242
Sept. 14 (Naval Observatory).	10 38	−73.0	57.1	−8.0	62		
		−18.0	112.1	+4.5		9	
		+47.0	177.1	+15.5		9	80
Sept 15 (Naval Observatory).	11 18	−58.5	58.0	−7.5	68		
		−9.0	107.5	+5.5		25	
		+17.0	133.5	+20.0	3		
		+59.5	176.0	+15.5		31	127
Sept. 16 (Naval Observatory).	10 39	−80.0	23.6	−21.0	185		
		−46.0	57.6	−8.0	49		
		+8.5	112.1	+5.0		46	
		+51.5	155.1	+4.0	6		
		+72.5	176.1	+15.5		108	394
Sept. 18 (Naval Observatory).	11 1	−52.5	24.5	−21.0		154	
		−19.0	58.0	−8.0	46		200
Sept. 19 (Naval Observatory).	11 1	−39.5	24.3	−21.0		154	
		−6.0	57.8	−8.0	31		
		+25.0	88.8	+21.0	6		191
Sept. 20 (Naval Observatory).	10 40	−26.0	24.8	−21.0	154		
		+7.0	57.8	−8.0	22		
		+37.0	87.8	+21.0		37	
		+45.5	96.3	−14.0		62	275

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.	°	°	°			
Sept. 21 (Naval Observatory).	10 26	−27.0	10.8	+3.0		12	
		−26.5	11.3	−25.0		46	
		−13.0	24.8	−21.0	139		
		+3.0	40.8	−22.0	3		
		+20.5	58.3	−8.0	12		
		+50.5	88.3	+21.0		25	
		+59.5	97.3	−14.0		93	330
Sept. 22 (Harvard)	15 25	−9.0	13.0	−27.5	34		
		+6.0	28.0	−20.5	211		
		+75.5	97.5	−14.5		133	378
Sept. 23 (Naval Observatory).	12 10	+14.0	24.4	−21.5		154	
		+23.5	33.9	+9.5	3		
		+32.0	42.4	−12.0	6		163
Sept. 24 (Naval Observatory).	10 52	+17.5	15.4	+5.5	3		
		+26.5	24.4	−21.5		108	
		+46.5	44.4	+17.5	3		114
Sept. 25 (Naval Observatory).	10 33	+38.5	23.4	−22.0		52	52
Sept. 26 (Naval Observatory).	10 40	−68.0	263.6	+14.0	9		
		−57.0	274.6	+9.0		31	
		+53.5	25.1	−22.0	25		65
Sept. 27 (Naval Observatory).	10 33	−56.5	262.0	+12.0	9		
		−42.5	276.0	+9.0		46	
		−18.0	300.5	−9.0	3		58
Sept. 28 (Naval Observatory).	10 48	−86.0	219.2	+11.5	46		
		−41.5	263.7	+12.5	6		
		−29.0	276.2	+9.5		108	160
Sept. 29 (Naval Observatory).	10 38	−75.0	217.1	+11.5		62	
		−27.0	265.1	+12.5		6	
		−14.5	277.6	+10.0		123	191
Sept. 30 (Mount Wilson).	13 30	−60.0	217.3	+12.0		104	
		0.0	277.3	+11.0		254	358
Mean daily area for September							202

PROVISIONAL SUN-SPOT RELATIVE NUMBERS FOR SEPTEMBER, 1929 [1]

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

September, 1929	Relative numbers	September, 1929	Relative numbers	September, 1929	Relative numbers
1	9	11	39	21	55
2	17	12	31	22	[2] 44
3	31	13	53	23	35
4	28	14	25	24	13
5	[3] M 49	15	32	25	10
6	49	16	26	26	[3] E 23
7	[3] M 62	17	[4] 38	27	25
8	54	18	17	28	17
9	58	19	20	29	[4] 43
10	56	20	[3] W 43	30	[2] 40

Mean, 30 days=34.7.

[1] Dependent alone on observations at Zurich and its station at Arosa.
[2] = Passage of an averaged-sized group through the central meridian.
[3] = 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.
[4] = Entrance of a large or average-sized center of activity on the east limb.

AEROLOGICAL OBSERVATIONS

By RICHMOND T. ZOCH

Free-air temperatures were below normal at practically all levels at all of the aerological stations. (See Table 1.)

Free-air relative humidity departures were variable at all stations excepting Due West, where there was a pronounced positive departure. This is significant in that the total precipitation for the month at this station was the greatest ever recorded. Vapor pressure departures were mostly below normal except at Due West.

The resultant winds had a southerly component at all levels over the western and eastern parts of the country. (See Table 3.) Over the northern part of the country and over the Mississippi Valley the resultant winds had a northerly component.

Table 2 gives a summary of observations made at naval air stations. Those made at Washington, D. C., were formerly incorporated in Table 1, but as these data are now being computed by the naval air stations, they have been placed in a separate table. It should be noted there is close agreement between the free-air temperatures and relative humidities computed by the Weather Bureau and those computed by the naval air stations.

TABLE 1.—*Free-air temperatures, relative humidities, and vapor pressures during September, 1929*

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)		Washington, D. C. (naval air station) (7 meters)	
	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal
Surface	22.4	−0.8	22.0	−1.2	14.5	+0.1	22.1	−2.0	17.2	−3.0		
500	21.0	−0.6	19.4	−1.2	14.1	−0.3	21.8	−0.4	15.4	−2.8		
1,000	18.8	−0.4	16.8	−1.2	10.3	−2.6	19.8	+0.1	12.1	−3.1		
1,500	16.4	−0.1	15.0	−0.6	8.0	−2.9	16.7	−0.7	9.9	−2.4		
2,000	13.3	−0.9	13.0	−0.1	5.3	−3.1	13.6	−1.4	7.6	−2.1		
2,500	9.6	−1.8	10.4	+0.1	2.6	−2.9	10.9	−1.7	5.5	−1.5		
3,000	6.3	−2.2	7.5	−0.1	0.1	−2.4	7.9	−2.2	2.9	−1.7		
4,000					−5.8	−2.8			−3.1	−2.6		

RELATIVE HUMIDITY (%)

Surface	66	−2	76	+8	56	−12	78	+2	67	−1		
500	61	−2	78	+7	56	−10	71	−5	67	0		
1,000	62	−1	80	+9	60	0	65	−6	70	+4		
1,500	61	+1	79	+7	59	+4	61	−1	62	−2		
2,000	64	+9	77	+9	57	+5	63	+3	60	+1		
2,500	66	+15	74	+8	60	+8	60	+6	52	−4		
3,000	91	+43	71	+9	66	+15	57	+7	49	−3		
4,000					52	+6			42	−3		

VAPOR PRESSURE (*mb.*)

Surface	17.65	−1.76	20.45	+1.05	9.35	−2.00	20.80	−2.00	13.47	−2.85		
500	15.85	−1.50	18.12	+0.87	9.18	−1.92	18.36	−1.94	12.25	−2.18		
1,000	13.43	−0.92	15.96	+1.19	7.73	−1.36	14.89	−1.32	10.35	−1.66		
1,500	11.30	−0.34	13.87	+1.05	6.42	−0.86	12.05	−0.63	7.98	−1.75		
2,000	9.83	+0.93	11.79	+1.22	5.11	−0.83	9.33	−0.54	6.73	−0.85		
2,500	8.08	+1.41	9.96	+1.17	4.44	−0.47	7.12	−0.42	4.61	−1.27		
3,000	8.07	+3.06	8.60	+1.16	3.92	−0.20	5.46	−0.43	3.78	−0.67		
4,000					1.98	−0.70			2.79	+0.42		

TABLE 2.—*Free-air data determined at naval air stations during September, 1929*

Altitude meters m. s. l.	Temperature (° C.)			Relative humidity (%)		
	Pensacola, Fla.	San Diego, Calif.	Washington, D. C.	Pensacola, Fla.	San Diego, Calif.	Washington, D. C.
Surface	22.8	21.3	19.7	86	73	72
500	21.9	18.5	17.9	81	80	61
1,000	20.2	20.0	16.2	74	57	56
2,000	15.3	17.5	12.0	63	34	56
3,000	9.9		8.3	50		50
4,000	6.6		7.8	32		33
5,000			4.2			26

TABLE 3.—*Observations by means of kites, captive and limited-height sounding balloons during September, 1929*

	Broken Arrow, Okla.	Due West, S. C.	Ellendale, N. Dak.	Groesbeck, Tex.	Royal Center, Ind.
Mean altitudes (meters) m. s. l. reached during month	2,201	2,060	2,753	2,006	2,640
Maximum altitude (meters) m. s. l. reached and date	[1] 3,274	[2] 3,878	[3] 4,520	[4] 3,815	[4] 4,875
Number of flights made	32	24	25	23	23
Number of days on which flights were made	28	23	23	22	21

[1] 15th. [2] 14th. [3] 10th. [4] 30th.

In addition to the above there are approximately 120 pilot balloon observations made daily at 50 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 September, 1929*

Altitude 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
Meters	°		°		°		°		°		°		°		°		°		°	
Surface	S 11 E	1.2	S 18 W	2.0	N 76 W	2.9	N 44 E	2.3	N 58 W	1.0	N 85 E	0.4	S 88 W	0.7	N 78 E	1.4	S 81 E	1.3	N 88 W	1.2
500	S 4 W	5.6	S 40 W	2.9			N 69 E	4.5	N 61 W	1.3	S 5 E	3.5			S 69 E	4.5	S 58 E	3.1	S 80 E	1.2
1,000	S 29 W	6.5	N 73 W	3.8			N 75 E	3.7	N 26 W	2.6	S 6 E	3.5	N 89 W	3.0	S 48 E	4.7	S 51 E	3.4	S 62 E	1.8
1,500	S 51 W	4.7	N 43 W	3.5			N 51 E	1.3	N 44 W	4.2	S 55 E	3.1	N 61 W	4.2	S 36 E	4.9	S 37 E	3.0	S 75 E	1.7
2,000	S 70 W	4.3	N 61 W	4.8	N 88 W	4.5	N 76 W	1.3	N 60 W	6.1	E	2.8	N 56 W	5.5	S 39 E	4.2	S 39 E	3.7	S 22 E	1.9
2,500	N 83 W	3.8	N 64 W	5.3	S 89 W	5.6	S 71 W	1.9	N 76 W	7.6	N 71 E	2.9	N 60 W	6.1	S 38 E	4.8	S 48 E	3.2	S 7 W	2.1
3,000	N 49 W	2.7	S 88 W	7.5	N 81 W	6.6	S 61 W	2.8	N 84 W	10.0	N 82 E	2.4	N 66 W	7.1	S 18 E	2.9	S 49 E	2.0	S 32 W	2.6
4,000	N 5 W	2.4			N 81 W	6.6	S 68 W	3.4	N 86 W	12.4			N 69 W	9.7	S 13 E	2.7	S 79 E	1.6	S 6 W	2.4
5,000	N 14 W	4.1			S 75 W	6.4	S 58 W	3.8					N 61 W	9.5	S 9 E	1.4	S 63 E	1.4		

Altitude 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. (67 meters)		Washington, D. C. (34 meters)	
	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity
Meters	°		°		°		°		°		°		°		°		°		°	
Surface	S 26 E	1.6	N 83 E	1.9	N 46 E	1.6	S 51 E	1.1	S 60 E	1.0	S 25 E	2.8	N 52 W	0.3	S 64 E	0.5	S 84 E	1.0	N 21 E	0.7
500	S 34 E	1.1	S 53 E	3.3	S 87 E	4.8	S 7 E	3.1	S 55 E	2.5			S 67 W	1.6	S 45 W	2.1	N 1 W	0.5	N 14 E	2.4
1,000	N 4 E	0.1	N 45 W	0.1	S 84 E	3.7	S 33 W	6.9	S 55 W	2.8			N 61 W	3.6	S 82 W	5.3	N 12 E	2.3	N 20 W	2.1
1,500	S 85 E	1.6	N 51 W	1.0	S 86 E	3.3	S 55 W	6.0	S 62 W	4.0	S 19 E	4.4	N 75 W	2.0	S 85 W	5.7	N 27 E	3.8	N 48 W	2.1
2,000	N 71 E	1.4	N 45 W	1.6	N 76 E	2.8	S 77 W	6.3	S 63 W	4.4	S 2 E	4.9	S 61 W	1.0	S 79 W	6.8	N 61 E	4.0	N 87 W	1.5
2,500	N 39 W	1.2	N 13 E	0.8	N 65 E	3.3	S 71 W	6.7	S 80 W	5.5	S 19 W	4.0	S 21 W	0.9	S 72 W	8.5			S 82 W	2.6
3,000	N 61 W	2.4	N 9 W	4.0	N 60 E	3.3	S 77 W	6.7	S 78 W	5.8	S 58 W	4.3	N 57 W	3.4	S 72 W	8.2			S 66 W	2.0
4,000	N 47 W	3.6			N 30 E	2.4	S 79 W	9.5	S 84 W	7.9	S 73 W	6.5			S 79 W	8.7				
5,000	N 33 W	6.2			N 13 E	3.2			S 61 W	5.7	S 70 W	9.8			N 74 W	10.6				