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.	°	°	°			
Aug. 27 (Naval Observatory).	11 3	−13.0	354.5	−7.0		34	
		+64.5	72.0	−5.5		123	
		+66.5	74.0	−19.5		93	250
Aug. 28 (Naval Observatory).	12 15	−24.0	329.7	+4.0		9	
		+1.5	355.2	−7.0		19	
		+79.0	72.7	−5.0		123	
		+82.0	75.7	−19.5		93	244
Aug. 29 (Naval Observatory).	11 31	−13.0	327.9	+4.5	6		
		+15.0	355.9	−7.0		46	52
Aug. 30 (Naval Observatory).	11 30	−26.5	301.2	−13.5	6		
		+29.0	356.7	−7.5		46	52
Aug. 31 (Naval Observatory).	11 20	−17.0	297.5	+2.0	6		
		−5.5	309.0	−37.5	6		
		+14.5	329.0	+4.0	6		
		+43.0	357.5	−7.0		6	24
Mean daily area for August							530

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

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

August, 1929	Relative numbers	August, 1929	Relative numbers	August, 1929	Relative numbers
1	66	11	[2] [3] E 62	21	
2	[2] 70	12	[2] 74	22	[2] 74
3	47	13	[2] [3] M 76	23	[3] M 67
4	[3] E 37	14	[3] M 101	24	54
5	41	15	132	25	54
6	[2] [4] 56	16	[2] [5] 125	26	[3] E 47
7	[4] 61	17	115	27	32
8	48	18	[3] W 107	28	32
9	54	19	43	29	27
10	[3] M 61	20	[3] E	30	28
				31	10

Mean, 29 days=62.1.

[1] Dependent alone on observations at Zurich and its station at Arosa.
[2]=Passage of an average-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.
[5]=Passage of a large group through the central meridian.

AEROLOGICAL OBSERVATIONS

By RICHMOND T. ZOCH

Free-air temperatures were above normal at all levels at Broken Arrow, Ellendale, and Groesbeck and mostly below normal at Due West, Royal Center, and Washington. (See Table 1.)

Free-air relative humidities were below normal and nearly all levels at all stations. Vapor pressures were also mostly below normal, although in a few cases the departures were small. The total precipitation for the month was below normal at all of these stations.

From the 1,000-meter level to the highest levels observed the resultant winds over the northern and eastern part of the country had a northerly component. (See Table 2.) Over the western part of the country the resultant winds were variable to the 2,000-meter level, above which a southerly component prevailed.

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

TEMPERATURE (°C.)

Altitude 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
Meters												
Surface	26.5	−0.2	25.5	−0.4	21.2	+1.0	24.7	−2.1	19.9	−3.6	24.8	+0.3
500	25.5	+0.2	23.3	+0.1	21.2	+1.2	24.4	+0.1	18.3	−2.9	20.8	−1.1
1,000	24.0	+1.1	20.3	+0.2	19.9	+1.8	22.6	+0.4	15.9	−2.1	18.5	−0.9
1,500	20.8	+1.0	17.4	+0.3	18.0	+2.5	20.1	+0.6	13.3	−1.8	15.9	−0.5
2,000	17.5	+1.1	13.8	−0.3	16.1	+3.5	16.9	+0.3	10.9	−1.4	13.2	−0.4
2,500	14.3	+1.3	10.8	−0.3	13.6	+4.0	13.7	0.0	8.3	−1.4	10.4	−0.4
3,000	11.2	+1.4	7.7	−0.7	10.6	+4.0	11.2	+0.2	5.5	−1.4	8.2	+0.1
4,000			−1.0	−3.7	4.0	+3.2	5.9	0.0	0.9	−0.7	3.7	+2.3

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

RELATIVE HUMIDITY (%)

Altitude 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
Meters												
Surface	60	−7	69	0	61	−5	76	+3	70	+3	65	−7
500	57	−7	68	−3	59	−5	66	−8	64	−2	66	−3
1,000	54	−7	69	−3	49	−9	52	−10	61	−6	62	−4
1,500	55	−6	70	−1	46	−11	49	−11	56	−9	63	−5
2,000	54	−9	72	+3	44	−11	54	−5	49	−12	62	−6
2,500	54	−9	60	−7	43	−11	50	−7	52	−3	57	−8
3,000	51	−12	59	−7	42	−12	44	−9	50	−1	52	−8
4,000			66	−4	34	−16	40	+1	55	+9	61	−3

VAPOR PRESSURE (*mb.*)

Surface	20.52	−2.47	22.41	−0.34	14.81	−0.33	23.52	−1.81	16.24	−3.01	20.69	−1.68
500	18.44	−1.99	19.24	−0.78	14.42	−0.34	19.71	−2.49	13.64	−3.16	16.64	−1.94
1,000	15.95	−0.75	16.22	−0.55	11.08	−0.78	14.21	−2.32	11.07	−2.98	13.68	−1.48
1,500	13.46	−0.43	13.85	+0.01	8.96	−0.86	11.38	−2.16	8.52	−2.91	11.87	−1.09
2,000	10.73	−0.87	11.20	+0.06	7.50	−0.39	10.71	−0.48	6.41	−2.48	9.82	−0.96
2,500	8.65	−0.70	7.56	−1.39	6.34	−0.08	8.74	−0.42	5.69	−0.96	7.49	−0.92
3,000	6.81	−0.66	6.02	−1.31	5.25	−0.07	7.44	+0.06	4.71	−0.39	5.78	−0.46
4,000			3.83	−1.54	2.52	−0.96	6.20	+2.01	3.75	+0.51	4.61	+1.24

The total number of observations made during the month (see Table 3) includes 5 captive balloons and 21 limited-height sounding-balloon flights.

TABLE 2.—*Free-air resultant winds (meters per second) based on pilot balloon observations made near 7 a. m. (E. S. T.) during August, 1929*

Altitude m. s. l.	Broken Arrow, Okla. (233 meters)		Brulington, 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 15 E	1.4	S 32 W	1.8	N 79 W	2.2	N 43 E	0.7	N 12 W	1.0	S 17 W	1.6	S 63 W	3.4	S 70 W	0.9	S 59 E	2.2	N 73 W	1.9
500	S 13 W	6.1	S 68 W	3.7	----------	----	N 8 E	1.3	N 46 E	0.7	S 38 W	7.6	----------	----	S 90 W	2.6	S 60 E	5.2	S 74 E	1.2
1,000	S 48 W	7.0	N 82 W	5.2	----------	----	N 12 W	1.9	S 24 W	1.8	S 16 W	4.6	S 37 W	2.0	S 77 W	2.7	S 59 E	4.6	N 7 W	0.6
1,500	S 66 W	4.2	N 82 W	5.2	----------	----	N 54 W	2.7	N 70 W	1.7	S 23 E	2.9	S 73 W	3.4	S 69 W	2.2	S 52 E	4.0	N 80 W	0.7
2,000	N 89 W	2.2	N 75 W	6.3	S 85 W	3.4	N 64 W	3.7	N 71 W	3.1	S 76 E	3.0	S 83 W	4.7	S 66 W	2.2	S 54 E	3.1	S 45 W	2.1
2,500	N 57 W	1.8	N 79 W	6.6	S 75 W	3.2	N 70 W	4.4	N 69 W	5.2	N 86 E	3.0	S 84 W	5.7	S 55 W	2.1	S 51 E	2.6	S 21 W	2.9
3,000	N 18 E	1.5	N 68 W	7.8	S 88 W	3.8	N 72 W	4.3	N 65 W	6.3	N 83 E	3.4	S 82 W	7.2	S 61 W	2.1	S 67 E	2.4	S 4 E	4.2
4,000	N 43 E	2.0	N 69 W	8.8	N 84 W	3.2	N 74 W	5.5	N 50 W	9.4	N 89 E	4.0	S 82 W	9.7	S 38 W	1.6	S 45 E	2.4	S 29 E	4.7
5,000	N 14 E	2.1	----------	----	N 55 W	2.8	N 71 W	5.6	N 47 W	7.6	S 71 E	4.6	S 87 W	12.5	S 45 W	1.4	S 34 E	1.6	S 7 W	1.3

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	1.2	S 67 E	1.1	N 11 W	0.5	S 59 E	1.0	S 36 E	0.7	S 27 E	3.3	S 58 W	2.2	N 45 E	0.2	S 62 E	1.6	N 26 W	0.7
500	S 30 E	0.9	S 76 W	0.1	N 46 W	2.5	S 13 E	3.8	S 26 W	1.9	----------	----	S 45 W	3.5	S 73 W	1.9	S 28 E	1.5	N 23 W	2.8
1,000	N 78 W	0.4	N 55 W	2.3	N 45 W	0.6	S 37 W	4.7	N 72 W	1.9	----------	----	S 82 W	4.6	N 74 W	4.3	S 61 E	0.4	N 35 W	2.9
1,500	S 84 E	0.9	N 59 W	3.7	S 68 E	1.0	S 87 W	4.1	N 53 W	4.4	S 25 E	5.8	S 38 W	4.0	N 61 W	5.2	N 67 W	0.6	N 60 W	4.5
2,000	S 3 W	2.4	N 34 W	2.9	S 82 E	1.4	N 74 W	3.9	N 53 W	6.1	S 7 E	4.8	S 41 W	4.5	N 61 W	5.9	N 83 W	3.1	N 61 W	5.4
2,500	S 18 W	6.3	N 9 W	3.6	S 80 E	1.6	N 70 W	4.5	N 50 W	7.0	S	3.0	S 25 W	5.6	N 46 W	8.2	N 86 W	4.2	N 53 W	5.9
3,000	S 20 W	8.3	N	3.5	N 61 E	1.8	N 62 W	5.8	N 48 W	7.2	S 11 W	3.3	S 29 W	4.5	N 37 W	7.8	S 78 W	4.3	N 49 W	5.4
4,000	S 25 W	10.9	N 22 W	2.9	N 55 E	2.1	N 68 W	6.8	N 54 W	7.0	S 36 W	4.6	----------	----	N 20 W	8.3	----------	----	N 9 W	8.5
5,000	----------	----	N 46 W	3.1	N 60 E	2.2	N 59 W	7.6	N 39 W	6.3	S 54 W	5.6	----------	----	----------	----	----------	----	----------	----

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

	Broken Arrow, Okla.	Due West, S. C.	Ellendale, N. Dak.	Groesbeck, Tex.	Royal Center, Ind.	Naval Air Station, D. C.
Mean altitudes (meters), m. s. l., reached during month	2,404	2,118	2,809	1,854	2,659	3,323
Maximum altitude (meters), m. s. l., reached and date	[1] 3,705	[2] 4,120	[3] 4,824	[4] 4,699	[5] 4,693	[6] 4,002
Number of flights made	29	24	30	27	20	17
Number of days on which flights were made	29	23	26	27	20	17

[1] 14th. [2] 4th. [3] 31st. [4] 21st. [5] 15th. [6] 6th.

In addition to the above there are approximately 100 pilot-balloon observations made daily at 45 Weather Bureau stations in the United States.

551.506 (73)

WEATHER IN THE UNITED STATES

THE WEATHER ELEMENTS

By P. C. Day

GENERAL SUMMARY

August, 1929, was notable mainly for the wide extent and persistence of the drought conditions that prevailed in practically all parts of the country, save in a few States embracing the territory from the southern Rocky Mountains westward to the Pacific coast.

In many sections where drought existed during August there had been little precipitation during the latter part of the previous July, and the absence of any extensive precipitation during August resulted in drought conditions of unusual severity, causing marked deterioration in crop growth over considerable areas.

Other weather conditions were not abnormal to any important extent, and the month, as a whole, was comparatively cool in many sections and favorable for outdoor activities in practically all parts of the country.

PRESSURE AND WINDS

The pressure distribution during the month was unfavorable for the development of active cyclones, and, as in July, these storms were infrequent and maintained their identity as such for only short periods.

The month opened with a slight barometric depression passing into the lower St. Lawrence Valley attended by light precipitation in the Canadian Maritime Provinces and the northern portions of New York and New England, and showers, some comparatively heavy, had fallen during the previous 24 hours locally in the Gulf States and the southern drainage area of the Ohio. The following day falling pressure overspread the central Great Plains and local showers occurred over portions of the Dakotas and southeastward to southern Lake Michigan, and widely scattered light rains continued in the Gulf States and occurred at points along the Atlantic coast. The depression over the central Plains moved eastward to the lower Lake region by the morning of the 3d, attended by general rains from the upper Mississippi Valley eastward to and including much of the Ohio Valley. This storm moved to northward of the lower St. Lawrence Valley by the morning of the 4th, and rain occurred from the lower Lakes and Ohio Valley northeastward to the Atlantic coast and the adjoining Canadian Provinces.

Another low-pressure area (cyclonic storm) had formed over the lower Missouri Valley by the morning of the 5th, attended by showers at points near the center, and had moved southeasterly by the morning of the 6th, but precipitation was still limited to small areas near and to northward of the center, the largest recorded fall (nearly 3 inches) occurring at St. Louis. This storm appears to have lost energy quickly and by the morning of the 7th had largely dissipated.