METEOROLOGICAL CONDITIONS OVER ROYAL CENTER, IND., OCTOBER 5–7, 1927

Time	Altitude	Temperature	Relative humidity	Wind	
				Direction	Velocity
	Meters	° *C.*	*Per cent*		*M. p. s.*
6:37 a. m., 5th	225	10.2	82	SSE	3.6
	500	14.3	50	S	10.3
	750	14.3	37	SSW	10.5
	1,000	16.0	17	SSW	10.1
	1,500	13.3	17	SW	9.3
	2,000	10.2	21	WSW	8.3
	2,500	6.9	26	WSW	8.5
	3,000	3.3	32	WSW	10.3
	3,500	−0.3	38	WSW	12.1
	4,000	−4.2	50	W	14.5
	4,500	−4.7	21	W	16.9
	5,000	−7.0	15	W	20.3
	5,500	−9.3	8	W	23.7
6:39 a. m., 6th	225	14.3	74	S	3.6
	500	19.1	60	SSW	14.6
	750	20.1	58	SW	17.8
	1,000	17.9	68	SW	14.4
	1,500	13.2	78	SW	10.1
	2,000	9.4	83	SW	7.7
	2,500	9.3	39	SW	11.3
	3,000	6.9	39	SW	14.1
	3,500	2.9	59	SW	15.0
	4,000	−1.6	82	SW	14.9
	4,500	−5.7	92	SW	16.3
10:15 a. m., 7th	225	11.9	88	NNW	5.8
	500	9.0	95	N	8.2
	750	7.8	98	N	7.3
	1,000	6.9	99	NNW	5.5
	1,500	5.3	100	NNW	8.2
	2,000	8.3	52	NW	12.3
	2,500	7.6	29	WNW	13.6
	3,000	3.5	30	W	13.0
	3,500	0.9	33	W	16.3
	4,000	−3.7	47	W	20.7
	4,500	−6.4	43	W	21.5

Kite flights were made on the morning of the 1st at Broken Arrow and Groesbeck within a low-pressure area which was central over western Texas. This LOW, which subsequently moved NNE., was attended by heavy precipitation in eastern Texas and Oklahoma the following afternoon and night. (Palestine, 4.22, Taylor, 3.94, Dallas, 3.06, Groesbeck, 8.87, Oklahoma City, 7.08 inches.) Analysis of surface and upper-air observations indicates that these unusual rains were the result of a strong northward acceleration of warm, humid, Gulf air and simultaneous importation of colder air at higher levels while the LOW was occluding. The above phenomena are not sufficient to cause such heavy rains unless they prevail over a comparatively long period. However, in this case the slow west-to-east advance of the trough and the slow rate of occlusion permitted prolonged instability.

The three flights made at Royal Center on the 5th–7th, all of which reached an altitude of at least 4,500 meters are representative of warm and cold front conditions. The ascent of the 5th was made on the rear of a HIGH which covered the eastern portion of the country. The flight of the 6th was made in a trough which extended from northern Quebec to Kansas, and that of the 7th was obtained shortly after the passage of the cold front. It is of interest to see that throughout this series of flights there was only a small change in temperature at 4,500 meters.

In connection with the International Days, 14th–15th, series flights were made covering 36–48 hour periods at all kite stations except Groesbeck, where light winds interfered. Many balloon stations made special observations from 14th–22d which had been designated as International Week.

TABLE 1.—*Free-air temperatures, relative humidities, and vapor pressures during October, 1927*

TEMPERATURE (°C.)

Atlitude, m. s. e. (meters)	Broken Arrow, Okla. (233 meters)		Due West, S. C. (217 meters)		Ellendale, N. Dak. (444 meters)		Groesbeck, Tex. (141 meters)		Royal Center, (225 meters)		Washington, D. C.* (7 meters)	
	Mean	Departure from 10-year mean	Mean	Departure from 7-year mean	Mean	Departure from 10-year mean	Mean	Departure from 10-year mean	Mean	Departure from 10-year mean	Mean	Departure from 3-year mean
Surface	18.7	+1.9	18.2	+1.6	8.0	+0.8	19.6	+0.7	12.8	−0.2	18.2	+4.2
250	18.7	+2.0	18.0	+1.7			19.8	+1.1	12.9	0.0	17.1	+4.0
500	18.3	+2.7	16.9	+2.3	8.4	+1.1	19.7	+1.9	12.8	+1.1	16.2	+3.9
750	17.8	+3.2	15.8	+2.5	9.7	+2.4	18.5	+1.8	12.1	+1.7	14.9	+3.8
1,000	16.8	+3.2	14.5	+2.3	9.5	+1.6	17.2	+1.6	11.2	+2.0	13.5	+3.7
1,250	15.8	+3.1	13.0	+2.0	9.1	+2.0	15.9	+1.2	10.0	+2.0	12.3	+3.8
1,500	14.4	+2.7	11.7	+1.8	8.6	+2.4	14.6	+1.0	8.8	+1.9	10.9	+3.6
2,000	11.5	+2.0	9.5	+1.4	6.2	+2.2	11.5	+0.1	6.5	+2.0	8.5	+3.2
2,500	8.5	+1.5	6.9	+0.7	3.4	+1.9	9.1	0.0	4.0	+1.8	6.0	+2.4
3,000	5.2	+1.0	4.6	+0.7	0.4	+1.6	6.3	−0.5	1.6	+1.8	4.6	+2.9
3,500	2.9	+1.5	1.6	+0.4	−2.8	+1.2	3.1	−1.3	−1.1	+1.6	2.7	+3.3
4,000	−0.4	+0.9	−0.8	+0.8	−5.6	+1.2	0.2	−1.6	−4.2	+1.0	0.9	+3.7
4,500					−8.3	+1.3			−7.3	+0.8		
5,000									−9.9	+0.8		

RELATIVE HUMIDITY (%)

Surface	63	−3	62	−1	71	+2	74	+1	72	+3	61	−11
250	62	−4	62	−1			68	−3	71	+2	59	−9
500	55	−7	57	−5	68	+1	58	−10	63	−3	57	−8
750	50	−10	56	−6	59	−3	56	−11	58	−7	57	−8
1,000	48	−10	57	−5	55	−5	56	−9	53	−10	56	−10
1,250	45	−11	57	−4	50	−8	53	−9	51	−10	54	−13
1,500	44	−10	53	−5	48	−7	49	−11	47	−11	52	−15
2,000	41	−8	46	−5	51	−1	50	−5	40	−13	46	−18
2,500	40	−5	44	−1	52	+2	38	−11	37	−12	42	−15
3,000	39	−3	42	−1	51	+3	29	−14	33	−14	36	−14
3,500	43	+3	61	+19	52	+4	35	−6	38	−8	32	−15
4,000	37	+2			38	−9	34	−6	43	−1	28	−15
4,500					30	−16			42	−1		
5,000									33	−1		

VAPOR PRESSURE (mb.)

Surface	13.63	+0.64	13.33	+0.90	7.30	+0.28	16.99	+0.43	10.56	0.00	12.82	+0.80
250	13.49	+0.60	13.13	+0.89			15.96	+0.06	10.46	+0.02	11.68	+0.85
500	11.96	+0.38	11.41	+0.46	7.22	+0.31	13.63	−0.71	9.33	+0.10	10.62	+0.74
750	10.42	−0.09	10.30	+0.28	6.69	+0.28	12.37	−0.85	8.09	−0.18	9.68	+0.46
1,000	9.33	−0.29	9.71	+0.43	6.04	+0.18	11.26	−0.74	6.98	−0.46	8.76	+0.17
1,250	8.15	−0.56	8.97	+0.56	5.37	+0.06	9.74	−0.96	6.21	−0.42	7.70	−0.23
1,500	7.27	−0.59	7.66	+0.28	4.89	+0.11	8.26	−1.30	5.30	−0.52	6.76	−0.46
2,000	5.62	−0.43	5.59	+0.01	4.46	+0.51	6.44	−0.79	4.02	−0.53	5.18	−0.58
2,500	4.29	−0.35	4.56	+0.20	3.82	+0.58	3.73	−1.77	2.99	−0.58	4.15	−0.37
3,000	3.53	−0.02	3.61	+0.08	3.10	+0.49	2.11	−1.97	2.26	−0.65	3.53	+0.13
3,500	3.37	+0.63	4.14	+1.25	2.47	+0.32	1.94	−1.28	2.17	−0.27	3.05	+0.52
4,000	2.25	+0.34			1.69	−0.03	1.16	−1.48	1.68	−0.19	2.75	+0.99
4,500					1.35	0.00			1.07	−0.31		
5,000									0.57	−0.31		

*Naval Air Station, District of Columbia.

TABLE 2.—*Free-air resultant winds (m. p. s.) during October, 1927*

Altitude, m. s. l. (meters)	Broken Arrow, Okla. (233 meters)				Due West, S. C. (217 meters)				Ellendale, N. Dak. (444 meters)			
	Mean		10-year mean		Mean		7-year mean		Mean		10-year mean	
	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.
Surface	S. 34°W.	3.0	S. 3°W.	2.2	N. 24°E.	1.4	N. 43°E.	1.6	N. 70°W.	2.0	N. 71°W.	1.9
250	S. 33°W.	3.2	S. 2°W.	2.4	N. 27°E.	1.3	N. 43°E.	1.8				
500	S. 36°W.	4.9	S. 10°W.	3.6	N. 27°E.	1.5	N. 47°E.	2.2	N. 79°W.	2.2	N. 78°W.	2.0
750	S. 40°W.	5.4	S. 18°W.	4.2	N. 16°E.	1.0	N. 47°E.	1.8	N. 78°W.	2.5	N. 86°W.	2.9
1,000	S. 42°W.	6.2	S. 26°W.	4.3	N. 14°E.	1.3	N. 29°E.	1.0	N. 82°W.	3.7	N. 85°W.	3.6
1,250	S. 43°W.	6.2	S. 39°W.	4.5	N. 6°W.	1.1	N. 36°W.	0.9	N. 76°W.	4.5	N. 82°W.	4.3
1,500	S. 55°W.	6.1	S. 48°W.	4.7	N. 28°W.	1.9	N. 72°W.	1.6	N. 82°W.	4.9	N. 83°W.	5.0
2,000	S. 66°W.	6.0	S. 57°W.	5.1	N. 38°W.	2.2	N. 78°W.	2.4	N. 79°W.	7.2	N. 81°W.	6.7
2,500	S. 67°W.	6.9	S. 70°W.	5.8	N. 50°W.	2.2	N. 80°W.	4.3	N. 68°W.	9.6	N. 77°W.	8.2
3,000	S. 60°W.	8.4	S. 68°W.	6.8	N. 30°W.	3.0	N. 84°W.	5.1	N. 64°W.	12.2	N. 78°W.	9.5
3,500	S. 54°W.	9.7	S. 74°W.	7.9	S. 53°E.	4.5	S. 89°W.	6.2	N. 66°W.	12.9	N. 82°W.	11.2
4,000	S. 56°W.	12.8	S. 67°W.	8.9	S. 07°E.	13.0	S. 81°W.	5.8	N. 68°W.	15.6	N. 86°W.	12.0
4,500									W.	14.0	S. 84°W.	13.4
5,000									W.	15.0	N. 86°W.	14.6

Altitude, m. s. l. (meters)	Groesbeck, Tex. (141 meters)				Royal Center, Ind. (225 meters)				Washington, D. C. (34 meters)			
	Mean		10-year mean		Mean		10-year mean		Mean		7-year mean	
	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.
Surface	S. 6°E.	1.5	S. 50°E.	0.8	S. 57°W.	1.7	S. 50°W.	2.2	N. 46°W.	0.5	N. 51°W.	1.0
250	S. 17°E.	1.8	S. 39°E.	1.4	S. 55°W.	1.9	S. 48°W.	2.4	N. 69°W.	1.9	N. 48°W.	2.3
500	S.	3.0	S. 20°E.	2.6	S. 63°W.	4.7	S. 57°W.	4.8	N. 80°W.	2.7	N. 55°W.	3.0
750	S. 6°W.	2.9	S. 12°E.	2.9	S. 72°W.	5.4	S. 66°W.	5.9	N. 83°W.	3.8	N. 62°W.	3.9
1,000	S. 10°W.	2.8	S.	2.8	S. 84°W.	5.8	S. 72°W.	6.4	N. 69°W.	4.2	N. 60°W.	4.8
1,250	S. 15°W.	2.7	S. 12°W.	3.0	S. 87°W.	5.9	S. 76°W.	7.4				
1,500	S. 6°W.	3.1	S. 22°W.	2.9	N. 84°W.	6.4	S. 81°W.	7.9	N. 60°W.	5.5	N. 59°W.	6.3
2,000	S. 10°W.	4.7	S. 41°W.	3.1	N. 81°W.	7.5	S. 84°W.	9.3	N. 54°W.	7.1	N. 63°W.	6.9
2,500	S. 4°W.	6.0	S. 48°W.	3.5	N. 84°W.	8.7	S. 89°W.	10.2	N. 58°W.	8.4	N. 66°W.	7.8
3,000	S. 18°W.	4.6	S. 58°W.	3.8	N. 85°W.	8.8	N. 89°W.	11.0	N. 59°W.	8.5	N. 70°W.	8.2
3,500	S. 41°W.	2.9	S. 58°W.	3.9	N. 68°W.	11.0	N. 87°W.	12.8	N. 61°W.	8.9	N. 72°W.	9.2
4,000	S. 30°W.	5.2	S. 48°W.	4.0	S. 87°W.	17.0	N. 89°W.	14.4	N. 71°W.	7.9	N. 77°W.	9.8
4,500					S. 83°W.	18.1	S. 84°W.	17.6	S. 84°W.	7.7	N. 80°W.	9.3
5,000					N. 76°W.	17.4	N. 88°W.	17.9	S. 89°W.	8.5	N. 76°W.	9.6