Under these conditions, the southeasterly components of the southerly winds in the Marine Tropical masses interact with the northwesterly components of the westerly winds in the Marine Polar masses, to form vortices that necessarily must always have counterclockwise motion, as shown in figure 15A. Another way in which it is thought that tornado vortices may be—and, in the writer's judgment, perhaps usually are—formed is shown in figure 15B. Here, as the winds from the west in the Marine Tropical air mass approach the cold front they are slowed down considerably and deflected to the left, due to frictional drag as they come in contact with the wall of Marine Tropical air that is moving rapidly from a southerly direction. The winds in the Tropical air mass immediately in advance of the cold front usually move with higher speed, due to pre-cold frontal convergence, than do the westerly winds in the Polar mass converging on the front. The Marine Polar air would then flow alongside and adjacent to the edge of the Marine Tropical air mass, and in the same direction as the flow of the Marine Tropical mass, at a speed considerably less than the northward speed of the Tropical air. Swirls would therefore develop at points along the interface between the two air masses, and where these swirls occurred in connection with the rapidly ascending air currents on the edge of the Marine Tropical mass, tornado vortices could easily be set up.

Similarly, the winds in tornadoes that occur in the Southern Hemisphere always have clockwise motion.

7. The violence of the tornado will depend largely upon three factors: (1) The strength of the opposing winds immediately behind and immediately ahead of the front which set up the whirl around the vortex, (2) the area and degree of saturation of the uprushing mass of Marine Tropical air that is disturbed by strong local convection on the cold front aloft, and which is acted on by the opposing frontal winds to induce the spiral, upward counterclockwise motion in the funnel cloud; and (3) the steepness of the cold front aloft.

It is believed that these conclusions provide a sound basis on which the trajectories and speed of movement of tornadoes can be forecast *once they have been formed.* If, for example, a dense network of tornado-reporting stations were organized, by which a large percentage of the tornadoes that occur during daylight hours could be observed and reported immediately by telephone to a forecast district center in the area, it would be possible to forecast the approximate trajectory and speed of movement of a tornado, once it had been observed. Warning could be given of the approach of tornadoes and severe squall line thunderstorms only for periods of 15 or 20 minutes to perhaps 2 or 3 hours in advance; but commercial air-line operators and other interests vitally interested in such storms, and the general public would profit to that extent.

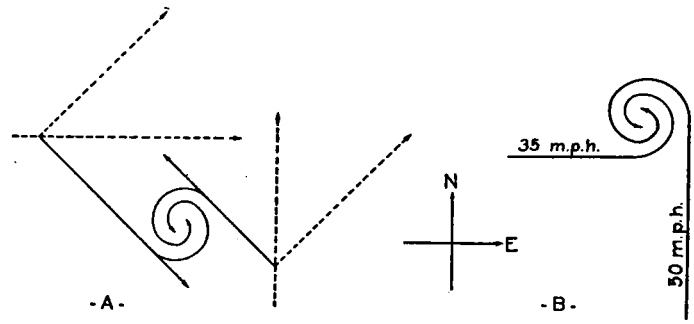

FIGURE 15.—Illustration of theoretical concept of development of tornado vortices.

METEOROLOGICAL AND CLIMATOLOGICAL DATA FOR APRIL 1942

[Climate and Crop Weather Division, J. B. KINCER, in charge]

AEROLOGICAL OBSERVATIONS

TABLE 1.—*Mean free-air barometric pressure in millibars, temperature in degrees centigrade, and relative humidities in percent, obtained by airplanes and radiosondes during April 1942*

Stations with elevations in meters above sea level

Altitude (meters) m. s. l.	Albuquerque, N. Mex. (1,620 m.)				Atlanta, Ga. (300 m.)				Bismarck, N. Dak. (505 m.)				Boise, Idaho. (864 m.)				Brownsville, Tex. (6 m.)				Buffalo, N. Y. (221 m.)				Charleston, S. C. (14 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	30	834	12.9	45	30	984	15.9	57	30	953	7.3	73	30	911	10.9	60	30	1,013	21.8	84	30	991	7.7	72	30	1,018	14.9	84
500	----	----	----	----	30	962	17.6	51	----	----	----	----	----	----	----	----	30	956	19.4	82	30	959	9.8	65	30	962	17.1	60
1,000	----	----	----	----	30	907	14.4	50	30	898	7.3	66	30	897	12.1	56	30	903	18.0	65	30	902	7.5	63	30	907	14.1	55
1,500	----	----	----	----	30	854	11.6	48	30	844	5.3	63	30	844	9.8	54	30	852	16.8	56	30	849	4.8	66	29	854	10.9	52
2,000	30	797	12.0	45	30	804	8.7	48	30	794	3.5	62	30	795	5.8	55	30	802	15.2	46	30	798	2.1	68	29	804	7.7	50
2,500	30	750	8.4	45	30	757	5.8	48	30	746	1.1	62	30	747	1.7	60	30	756	13.0	37	30	750	−0.7	68	29	757	5.4	49
3,000	30	706	4.4	48	30	712	2.7	46	30	701	−1.5	60	30	702	−2.2	64	30	712	10.2	33	30	704	−3.2	66	29	712	2.7	45
4,000	30	623	−3.6	53	30	628	−3.1	40	29	618	−7.6	59	30	618	−9.2	66	30	631	3.7	33	30	620	−8.8	60	28	628	−3.3	41
5,000	28	548	−11.0	57	27	553	−9.5	35	29	543	−14.2	55	29	542	−15.9	64	28	557	−3.8	36	30	544	−15.0	54	28	553	−9.4	41
6,000	28	481	−17.8	54	27	485	−16.6	33	29	474	−21.3	53	29	474	−22.8	60	28	490	−11.2	39	30	476	−21.1	50	28	485	−16.4	39
7,000	27	420	−24.4	50	27	424	−23.7	32	28	413	−28.8	50	29	413	−29.7	59	27	430	−18.1	37	30	415	−28.6	48	28	424	−23.7	38
8,000	27	364	−32.0	48	27	369	−31.1	31	27	359	−36.4	49	29	358	−36.5	58	27	375	−25.0	35	30	360	−35.9	47	27	369	−31.0	37
9,000	26	316	−38.7	----	26	319	−38.6	30	27	310	−43.9	----	29	309	−43.6	----	26	326	−32.0	33	30	311	−43.0	----	27	320	−38.4	35
10,000	26	273	−45.5	----	25	276	−45.5	----	27	266	−51.2	----	29	266	−50.0	----	25	283	−39.2	----	30	267	−49.8	----	27	275	−45.5	----
11,000	24	235	−51.9	----	25	237	−51.4	----	26	228	−56.4	----	28	228	−55.7	----	25	244	−46.8	----	30	229	−55.0	----	27	238	−52.0	----
12,000	23	201	−56.3	----	23	203	−56.8	----	26	195	−59.4	----	28	194	−58.9	----	22	210	−54.1	----	30	196	−58.9	----	26	203	−56.5	----
13,000	20	171	−58.9	----	23	173	−59.7	----	25	166	−60.2	----	28	166	−59.3	----	19	179	−59.9	----	30	167	−60.4	----	26	173	−59.1	----
14,000	19	145	−59.8	----	22	147	−60.3	----	24	141	−57.8	----	26	141	−57.9	----	17	152	−64.1	----	28	142	−58.7	----	25	148	−60.0	----
15,000	19	124	−61.4	----	21	125	−61.6	----	21	120	−57.5	----	26	120	−57.3	----	17	129	−68.7	----	28	121	−58.4	----	23	126	−61.3	----
16,000	18	105	−62.0	----	18	106	−62.7	----	17	102	−57.8	----	23	103	−58.0	----	15	109	−71.4	----	26	103	−58.7	----	22	107	−62.6	----
17,000	15	89	−62.1	----	16	90	−63.2	----	10	87	−58.1	----	20	88	−58.0	----	11	92	−73.3	----	19	88	−58.8	----	16	91	−63.0	----
18,000	12	76	−61.3	----	7	77	−63.6	----	6	74	−58.0	----	10	75	−57.5	----	10	78	−73.1	----	8	75	−59.2	----	14	78	−62.2	----
19,000	10	64	−61.5	----	----	----	----	----	----	----	----	----	----	----	----	----	6	66	−70.1	----	----	----	----	----	6	66	−61.6	----

TABLE 1.—*Mean free-air barometric pressure in millibars, temperature in degrees centigrade, and relative humidities in percent, obtained by airplanes and radiosondes during April 1942*—Continued

Stations with elevations in meters above sea level

Altitude (meters) m. s. l.	Denver, Colo. (1,616 m.)				Detroit, Mich. (194 m.)				El Paso, Tex. (1,193 m.)				Ely, Nev. (1,908 m.)				Great Falls, Mont. (1,128 m.)				Huntington, W. Va. (172 m.)				Joliet, Ill. (178 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	30	833	8.8	62	30	994	8.4	75	30	878	16.6	37	30	805	5.1	58	29	882	8.1	51	30	998	11.5	71	30	996	9.6	72
500					30	958	10.6	64													30	960	14.8	59	30	959	12.0	64
1,000					30	902	8.4	61													30	905	12.1	57	30	903	10.3	60
1,500					30	849	6.1	61	30	847	16.6	35					29	843	7.8	49	30	852	8.4	59	30	850	7.7	57
2,000	30	796	9.5	55	30	798	3.8	58	30	798	13.2	34	30	796	6.4	57	29	793	4.4	50	30	802	5.2	59	30	800	5.5	54
2,500	30	749	6.4	54	30	750	1.2	55	30	752	9.1	35	30	749	4.2	53	29	746	0.8	52	30	754	2.5	55	30	752	3.0	52
3,000	30	704	2.9	55	30	705	−1.3	51	30	707	5.4	37	30	704	0.2	54	29	700	−3.0	53	30	708	−0.4	55	30	707	0.6	49
4,000	30	622	−4.5	61	29	621	−7.5	43	30	625	−1.8	40	30	620	−7.4	55	29	616	−10.0	55	30	624	−6.1	52	30	623	−5.0	47
5,000	30	546	−12.0	63	27	546	−14.0	42	30	550	−8.9	41	30	545	−13.9	53	29	541	−16.2	53	30	549	−12.0	49	30	548	−11.8	45
6,000	30	479	−18.7	60	27	478	−20.9	41	30	483	−15.8	38	30	477	−20.5	50	29	473	−22.9	50	30	481	−19.0	46	30	480	−18.3	41
7,000	30	418	−25.9	56	27	416	−28.0	40	30	422	−22.8	36	30	416	−27.5	48	27	412	−30.3	48	30	419	−26.1	43	30	420	−25.3	40
8,000	30	363	−33.5	55	27	361	−35.3	39	30	367	−30.2	34	30	361	−34.4	47	26	356	−37.5	47	30	365	−38.3	42	29	364	−33.8	39
9,000	30	314	−41.5		27	312	−42.4		29	318	−37.6	32	28	312	−41.8		25	308	−44.9		30	315	−40.6		29	315	−40.6	
10,000	30	270	−48.9		27	268	−49.3		29	275	−44.8		28	269	−48.3		25	264	−51.9		30	272	−47.4		29	272	−48.3	
11,000	29	232	−55.1		26	230	−55.1		29	236	−51.5		27	231	−53.8		24	227	−56.5		30	233	−54.2		29	233	−55.4	
12,000	28	198	−59.1		24	197	−59.5		29	202	−56.9		26	197	−57.4		23	194	−58.5		29	199	−60.3		29	199	−61.3	
13,000	28	168	−59.1		23	167	−60.8		29	172	−59.7		26	168	−58.0		21	165	−58.1		29	169	−62.7		29	169	−62.5	
14,000	27	144	−58.5		23	142	−59.9		28	147	−60.7		26	144	−57.3		20	141	−56.9		27	144	−61.9		29	144	−61.4	
15,000	25	122	−58.6		19	121	−59.2		26	125	−62.2		22	122	−57.3		20	120	−56.5		26	122	−61.5		29	123	−60.5	
16,000	22	104	−59.4		15	103	−59.1		24	106	−63.5		20	104	−58.3		18	103	−56.9		25	104	−62.1		27	104	−60.6	
17,000	19	89	−59.0		9	88	−58.7		19	90	−64.3		12	89	−58.4		14	88	−57.7		23	88	−62.8		23	89	−60.8	
18,000	9	76	−58.0						13	76	−64.4						8	75	−57.7		14	75	−62.2		12	76	−59.7	
19,000									8	64	−62.8										8	64	−60.7					

Stations with elevations in meters above sea level

Altitude (meters) m. s. l.	Lake Charles, La. (6 m.)				Lakehurst, N. J. (1) (39 m.)				Medford, Oreg. (401 m.)				Miami, Fla. (4 m.)				Nashville, Tenn. (180 m.)				Norfolk, Va. (1) (10 m.)				Oakland, Calif. (2 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	30	1016	17.8	90	29	1013	9.9	64	30	965	12.1	56	29	1017	19.6	81	30	997	15.6	64	27	1018	12.6	68	30	1014	13.0	75
500	30	959	16.6	80	29	958	11.0	52	30	954	11.9	55	29	961	18.5	76	30	960	16.5	58	27	960	12.5	57	30	956	10.0	75
1,000	30	904	14.8	68	29	902	8.8	50	30	898	8.9	56	29	906	15.0	75	30	906	13.7	56	27	904	10.2	53	30	900	8.4	70
1,500	29	852	13.3	58	29	849	5.7	53	30	845	5.0	62	29	854	12.6	69	30	853	10.5	57	27	851	7.1	54	30	847	6.6	62
2,000	29	803	11.0	54	29	798	2.7	52	30	794	1.1	69	29	805	10.9	57	30	803	7.6	58	26	800	4.2	54	30	796	4.2	58
2,500	29	756	8.8	50	29	750	−.4	54	30	746	−2.0	69	29	758	8.5	49	30	756	5.1	56	26	752	0.8	53	30	748	1.8	51
3,000	29	711	5.9	45	29	704	−3.5	54	30	700	−5.1	65	29	713	6.2	43	30	710	2.4	54	26	706	−2.3	51	30	703	−0.7	47
4,000	29	629	.7	39	29	620	−8.9	50	29	616	−10.4	53	29	630	1.2	32	30	627	−3.2	52	25	622	−7.9	44	30	620	−6.6	45
5,000	29	554	−5.5	38	29	544	−15.0	48	29	540	−16.7	51	27	556	−4.8	27	29	552	−9.2	46	25	546	−13.9	39	30	544	−13.4	44
6,000	29	487	−12.8	37	29	476	−21.8	51	29	472	−23.5	52	26	489	−11.0	26	29	484	−16.0	44	24	478	−20.7	38	30	477	−19.8	44
7,000	29	426	−20.2	36	29	414	−28.7	54	29	411	−30.5	51	26	429	−17.7	25	29	423	−23.3	42	22	416	−28.0	39	30	416	−27.1	44
8,000	29	372	−27.3	36	29	360	−35.9	54	29	356	−37.6	51	26	374	−24.8	25	29	368	−30.8	42	6	362	−35.6		30	361	−34.5	43
9,000	29	323	−34.7	35	29	311	−42.7		29	307	−44.2		26	325	−31.9	24	29	319	−38.4	41	6	313	−42.9		30	312	−41.5	
10,000	29	279	−41.9		27	267	−48.9		29	264	−50.2		26	282	−39.3	24	29	275	−46.1		5	269	−50.5		28	269	−48.1	
11,000	29	240	−49.1		27	230	−54.1		29	226	−55.3		25	243	−46.1		29	236	−53.1		5	230	−57.3		28	231	−53.6	
12,000	29	206	−55.9		23	196	−57.1		29	194	−58.1		25	209	−52.6		29	202	−58.5						25	197	−57.5	
13,000	28	176	−61.2		22	168	−58.5		29	165	−57.7		24	178	−58.0		29	172	−61.9						24	168	−59.1	
14,000	27	149	−63.6		20	143	−58.0		26	141	−56.8		24	152	−62.3		29	146	−61.7						21	143	−57.5	
15,000	27	126	−65.5		19	122	−57.9		25	120	−57.5		22	129	−65.8		28	124	−61.8						18	122	−57.7	
16,000	23	108	−67.2		18	104	−58.2		20	103	−58.2		21	110	−68.7		28	106	−62.6						16	104	−59.2	
17,000	20	91	−67.9		10	88	−58.5		16	88	−58.8		20	93	−70.6		26	90	−62.8						13	89	−59.8	
18,000	10	77	−66.9						9	75	−57.9		20	78	−70.1		18	76	−62.0						7	75	−59.3	
19,000	5	65	−65.9										12	66	−68.4		12	65	−61.0									
20,000													8	56	−65.8													

TABLE 1.—*Mean free-air barometric pressure in millibars, temperature in degrees centigrade, and relative humidities in percent, obtained by airplanes and radiosondes during April 1942*—Continued

Stations with elevations in meters above sea level

Altitude (meters) m. s. l.	Oklahoma City, Okla. (391 m.)				Omaha, Nebr. (301 m.)				Pensacola, Fla. (1) (24 m.)				Phoenix, Ariz. (339 m.)				Portland, Maine (20 m.)				St. Louis, Mo. (171 m.)				St. Paul, Minn. (225 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	30	967	15.2	78	30	979	12.7	60	29	1,017	17.9	77	29	970	19.0	44	30	1,013	4.5	79	30	997	14.3	65	28	989	11.2	65
500	30	955	15.8	74	30	957	13.4	56	29	962	16.5	54	29	952	21.1	39	30	956	6.4	64	30	959	14.8	60	28	957	11.9	60
1,000	30	901	14.5	65	30	901	11.5	55	29	907	14.5	42	29	899	17.9	36	30	899	4.1	63	30	904	12.4	57	28	902	9.4	55
1,500	30	849	12.0	63	30	848	9.6	51	29	855	12.4	37	29	847	14.1	37	30	845	1.2	64	30	851	10.4	54	28	849	6.3	58
2,000	30	799	9.6	60	30	798	7.4	45	29	805	10.0	34	29	798	9.9	40	30	794	−.8	62	30	801	8.0	53	28	798	4.0	56
2,500	30	752	7.0	57	30	752	5.0	42	29	757	7.1	36	29	751	5.9	42	30	745	−3.3	61	30	754	5.6	51	28	750	2.1	54
3,000	30	708	4.1	53	30	706	2.0	44	29	712	4.4	32	29	706	2.2	43	30	699	−6.0	59	30	709	3.0	50	28	705	−.2	50
4,000	29	626	−2.2	52	30	623	−4.0	45	28	629	−1.8	33	28	623	−3.9	41	30	615	−11.5	53	30	626	−2.8	47	28	622	−5.8	46
5,000	27	551	−8.5	52	29	548	−10.5	43	28	554	−8.5	32	28	548	−10.1	38	30	539	−17.3	50	30	551	−9.3	42	27	546	−12.3	43
6,000	27	484	−15.4	47	29	481	−17.5	38	26	486	−15.5	29	28	481	−17.5	38	28	470	−24.1	48	30	483	−16.2	40	27	479	−19.1	40
7,000	27	423	−22.3	45	29	420	−24.8	36	25	425	−22.6	29	28	420	−24.5	36	27	410	−31.3	49	30	422	−23.4	38	27	418	−26.2	38
8,000	26	367	−29.9	44	28	365	−32.5	35	18	370	−30.2	30	28	365	−31.8	35	27	355	−38.0	49	28	368	−30.9	38	27	362	−34.0	38
9,000	26	318	−37.6	44	27	316	−40.1	----	17	320	−37.5	----	28	316	−39.4	35	27	306	−44.4	----	28	319	−38.3	38	25	313	−41.5	----
10,000	26	275	−45.2	----	25	272	−47.6	----	14	276	−44.6	----	28	273	−45.9	----	27	263	−50.5	----	28	275	−45.9	----	24	270	−48.6	----
11,000	24	236	−52.2	----	25	234	−54.6	----	13	237	−51.5	----	28	234	−52.2	----	24	226	−55.3	----	27	236	−53.5	----	24	231	−55.4	----
12,000	23	202	−58.1	----	25	200	−60.2	----	12	203	−58.3	----	27	201	−56.3	----	24	193	−57.8	----	25	202	−59.9	----	23	197	−61.1	----
13,000	22	172	−60.6	----	25	170	−62.4	----	6	172	−62.0	----	25	171	−58.8	----	21	164	−57.0	----	25	172	−63.3	----	23	167	−62.7	----
14,000	20	146	−60.9	----	22	145	−59.6	----	----	----	----	----	25	146	−59.9	----	20	140	−55.5	----	23	146	−61.7	----	22	142	−60.6	----
15,000	19	124	−60.9	----	18	123	−59.0	----	----	----	----	----	25	124	−60.9	----	16	119	−55.8	----	22	124	−60.8	----	19	121	−59.6	----
16,000	19	106	−61.6	----	14	105	−59.5	----	----	----	----	----	22	106	−62.3	----	13	101	−56.0	----	20	106	−61.0	----	16	103	−59.3	----
17,000	15	90	−62.5	----	9	90	−59.6	----	----	----	----	----	21	90	−62.6	----	7	86	−56.4	----	18	90	−61.1	----	11	87	−58.9	----
18,000	11	76	−61.9	----	----	----	----	----	----	----	----	----	18	76	−61.9	----	----	----	----	----	15	76	−61.2	----	7	74	−58.1	----
19,000	----	----	----	----	----	----	----	----	----	----	----	----	10	65	−61.0	----	----	----	----	----	8	65	−59.9	----	----	----	----	----
20,000	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	6	55	−58.8	----	----	----	----	----

Stations with elevations in meters above sea level

Altitude (meters) m. s. l.	San Antonio, Tex. (175 m.)				San Diego, Calif. (1) (19 m.)				S. S. Marie, Mich. (221 m.)				Seattle, Wash. (1) (27 m.)				Spokane, Wash. (598 m.)				Washington, D. C. (25 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	30	994	19.3	82	26	1,012	15.0	76	30	991	4.6	77	30	1,010	8.3	83	30	940	10.2	62	30	1,016	13.2	60
500	30	957	18.1	82	26	955	12.2	68	30	959	6.7	69	30	954	7.0	77	----	----	----	----	30	960	13.1	54
1,000	30	903	16.1	76	26	900	10.2	60	30	902	6.0	62	30	897	4.4	72	30	896	10.4	56	30	904	10.7	52
1,500	30	851	14.2	74	26	848	8.0	54	30	848	3.5	58	30	844	1.2	71	30	843	6.9	53	30	851	7.5	54
2,000	30	802	12.2	63	26	798	6.6	45	30	797	1.2	58	30	792	−1.7	70	30	793	3.0	54	30	801	4.6	58
2,500	30	755	10.2	55	25	750	4.8	36	30	748	−1.3	57	30	744	−4.7	67	30	745	−0.9	56	30	752	1.4	60
3,000	30	711	7.6	46	25	705	2.5	32	30	703	−3.7	54	30	698	−7.6	63	30	700	−4.5	57	30	707	−1.3	59
4,000	30	629	1.3	40	25	622	−3.4	26	29	618	−9.1	49	29	613	−13.8	59	30	615	−10.8	57	30	623	−7.2	56
5,000	30	555	−5.6	39	25	548	−9.8	30	28	543	−15.6	46	29	537	−19.9	63	30	540	−17.3	55	28	548	−12.9	48
6,000	29	488	−12.7	39	23	480	−16.9	34	25	475	−22.5	44	29	468	−26.4	66	29	472	−24.5	54	27	479	−19.8	45
7,000	29	427	−19.6	39	22	420	−23.9	36	22	413	−29.5	43	29	407	−33.2	69	27	410	−31.3	55	27	418	−27.0	43
8,000	29	372	−26.8	38	9	364	−32.0	----	19	358	−36.6	43	26	352	−40.6	----	27	355	−38.5	55	25	362	−34.4	41
9,000	29	323	−33.5	37	9	315	−39.8	----	18	309	−43.5	----	24	303	−47.4	----	27	306	−45.3	----	23	314	−41.9	----
10,000	29	280	−40.8	----	9	272	−46.3	----	16	266	−50.0	----	22	260	−53.0	----	26	263	−51.5	----	23	270	−49.0	----
11,000	29	241	−48.2	----	6	233	−52.3	----	15	228	−55.5	----	22	223	−56.5	----	26	225	−56.1	----	22	231	−55.7	----
12,000	29	206	−55.0	----	5	198	−55.8	----	13	194	−59.2	----	21	190	−57.7	----	25	193	−58.6	----	22	197	−60.6	----
13,000	28	176	−59.9	----	----	----	----	----	12	165	−61.4	----	19	162	−57.3	----	21	164	−58.1	----	20	168	−63.6	----
14,000	28	150	−62.9	----	----	----	----	----	11	140	−60.6	----	12	138	−56.4	----	20	140	−55.8	----	20	142	−62.5	----
15,000	27	127	−64.5	----	----	----	----	----	10	118	−59.2	----	9	118	−56.4	----	18	120	−55.0	----	16	120	−62.6	----
16,000	25	108	−66.2	----	----	----	----	----	9	100	−58.9	----	7	100	−57.2	----	18	102	−54.8	----	10	103	−63.3	----
17,000	20	92	−68.0	----	----	----	----	----	6	84	−58.3	----	6	85	−56.7	----	16	87	−55.1	----	8	87	−62.9	----
18,000	18	76	−68.4	----	----	----	----	----	----	----	----	----	----	----	----	----	10	74	−54.9	----	7	74	−61.8	----
19,000	12	66	−66.0	----	----	----	----	----	----	----	----	----	----	----	----	----	6	64	−54.5	----	5	63	−60.4	----
20,000	9	56	−63.2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

TABLE 1.—*Mean free-air barometric pressure in millibars, temperature in degrees centigrade, and relative humidities in percent, obtained by airplanes and radiosondes during April 1942*—Continued

Altitude (meters) m. s. l.	Stations with elevations in meters above sea level																							
	Anchorage, Alaska (42 m.)				Barrow, Alaska (6 m.)				Bethel, Alaska (7 m.)				Fairbanks, Alaska (156 m.)				Juneau, Alaska (49 m.)				Ketchikan, Alaska (26 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	30	998	6.3	61	30	1,014	−15.0	93	30	1,000	3.5	69	30	986	6.0	46	30	1,001	7.0	63	29	1,005	7.9	69
500	30	944	3.2	61	30	951	−12.1	90	30	940	−0.1	70	30	945	3.1	48	30	947	3.9	66	29	949	4.9	75
1,000	30	887	−0.5	63	30	891	−10.2	81	30	883	−3.8	72	30	888	−1.2	51	30	891	0.0	71	29	893	1.0	79
1,500	30	833	−4.3	66	30	835	−11.1	75	30	829	−7.0	74	30	834	−5.0	55	29	836	−3.4	76	28	838	−2.9	83
2,000	30	781	−8.0	70	30	782	−12.9	69	30	777	−10.3	73	30	782	−8.6	58	29	785	−6.7	78	28	787	−6.0	82
2,500	30	732	−11.4	72	29	732	−15.4	66	30	728	−13.3	71	30	733	−12.1	60	29	736	−9.9	79	28	738	−9.0	80
3,000	30	686	−14.8	73	29	685	−18.2	64	30	681	−16.4	69	30	686	−15.5	61	27	689	−13.2	77	27	691	−11.7	78
4,000	30	600	−21.5	72	29	598	−24.1	60	29	595	−22.4	66	30	600	−22.0	63	27	603	−19.7	73	27	606	−18.3	75
5,000	30	523	−27.9	70	29	521	−30.0	59	29	519	−28.8	62	30	523	−28.0	63	23	526	−26.5	70	26	529	−24.8	73
6,000	30	455	−34.3	68	29	452	−36.7	59	29	450	−35.7	58	30	455	−34.7	61	18	458	−33.1	67	26	460	−31.2	71
7,000	30	393	−41.5	----	28	390	−43.6	----	28	388	−42.2	----	29	393	−41.8	----	16	395	−40.2	----	23	398	−37.7	69
8,000	29	338	−48.2	----	28	335	−50.0	----	28	334	−48.4	----	28	338	−48.4	----	16	341	−46.2	----	23	344	−43.7	----
9,000	29	290	−52.9	----	28	287	−53.4	----	28	287	−51.3	----	28	290	−53.7	----	16	292	−51.1	----	23	296	−49.2	----
10,000	29	248	−53.1	----	28	246	−52.7	----	27	246	−50.9	----	27	248	−54.9	----	16	250	−54.8	----	23	254	−52.8	----
11,000	29	213	−51.5	----	26	211	−50.3	----	25	211	−49.7	----	25	213	−51.9	----	15	214	−54.5	----	22	217	−54.2	----
12,000	28	183	−49.7	----	26	181	−48.8	----	24	181	−48.7	----	25	182	−50.1	----	15	183	−53.5	----	19	186	−54.3	----
13,000	27	157	−49.5	----	26	155	−48.7	----	21	155	−48.5	----	25	156	−49.6	----	13	156	−53.1	----	16	159	−53.4	----
14,000	26	135	−49.7	----	23	134	−48.7	----	21	133	−48.8	----	24	134	−49.5	----	12	134	−52.8	----	15	136	−52.9	----
15,000	22	166	−50.6	----	17	114	−49.3	----	18	114	−49.3	----	24	115	−50.0	----	8	114	−52.6	----	13	116	−53.2	----
16,000	19	99	−51.0	----	10	98	−49.7	----	16	98	−50.0	----	22	99	−50.6	----	6	97	−52.7	----	8	99	−53.4	----
17,000	16	85	−51.4	----	5	85	−50.0	----	10	84	−50.6	----	21	85	−51.0	----	5	84	−52.6	----	----	----	----	----
18,000	9	73	−51.8	----	----	----	----	----	6	71	−51.0	----	14	72	−51.3	----	----	----	----	----	----	----	----	----
19,000	----	----	----	----	----	----	----	----	----	----	----	----	9	62	−51.7	----	----	----	----	----	----	----	----	----

Altitude (meters) m. s. l.	Stations with elevations in meters above sea level											
	McGrath, Alaska (103 m.)				Nome, Alaksa (14 m.)				San Juan, P. R. (15 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	17	989	5.2	51	30	1,000	−1.2	79	30	1,013	24.4	81
500	17	942	2.3	53	30	941	−3.1	79	30	959	22.0	85
1,000	17	885	−1.9	55	30	883	−5.1	78	30	905	18.7	86
1,500	17	830	−5.9	58	30	828	−7.9	78	30	855	15.8	85
2,000	17	778	−9.5	60	30	776	−10.8	77	30	806	13.1	82
2,500	17	729	−13.1	61	30	727	−13.8	75	30	759	11.5	75
3,000	17	682	−16.7	63	30	680	−17.0	74	30	715	9.5	67
4,000	17	596	−23.2	66	30	594	−23.3	71	29	633	4.9	52
5,000	17	519	−29.4	65	29	518	−29.4	69	28	560	−0.1	42
6,000	17	451	−35.8	64	29	450	−36.1	67	27	494	−6.1	35
7,000	17	390	−42.6	----	26	388	−42.9	----	25	434	−12.0	31
8,000	17	335	−49.4	----	26	334	−48.9	----	23	380	−18.9	30

Altitude (meters) m. s. l.	Stations with elevations in meters above sea level											
	McGrath, Alaska (103 m.)				Nome, Alaska (14 m.)				San Juan, P. R. (15 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
9,000	16	287	−53.7	----	26	286	−52.6	----	22	331	−26.0	30
10,000	16	246	−53.7	----	24	245	−51.8	----	22	288	−33.5	29
11,000	15	211	−50.7	----	23	210	−49.5	----	20	250	−40.9	----
12,000	15	181	−49.4	----	21	180	−48.2	----	19	216	−48.4	----
13,000	15	155	−48.9	----	20	155	−48.0	----	19	184	−56.0	----
14,000	15	133	−49.2	----	18	133	−47.9	----	17	157	−63.8	----
15,000	15	114	−49.9	----	15	114	−48.7	----	17	133	−70.3	----
16,000	13	98	−50.6	----	14	98	−49.3	----	17	112	−76.3	----
17,000	11	84	−51.2	----	13	84	−49.7	----	14	94	−79.9	----
18,000	9	72	−51.4	----	9	72	−50.0	----	11	79	−81.0	----
19,000	----	----	----	----	7	62	−50.2	----	9	66	−77.7	----

NOTE.—All observations taken at 11 p. m., 75th meridian time, except at Norfolk, Va., where, between April 1 and 14, inclusive, observations were made near 4 a. m., 75th meridian time, and from the 15th through the 30th, at 11 p. m. and at Seattle, Wash., where they were taken about 5 a. m., 75th meridian time.

None of the means included in this table are based on less than 15 surface or 5 standard level observations.

Number of observations refers to pressure only, as temperature and humidity data are missing for some observations at certain levels, also, the humidity data are not used in daily observations when the temperature is below −40° C.

Stations marked with the figure one (1) are Navy stations.

LATE REPORT FOR JANUARY, FEBRUARY, AND MARCH

Stations with elevations in meters above sea level

Altitude (meters) M. S. L.	JANUARY 1942				FEBRUARY 1942				MARCH 1942							
	Pearl Harbor, T. H. (1) (7 m.)				Swan Island, W. I. (10 m.)				Brownsville, Tex. (6 m.)				Swan Island, W. I. (10 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	31	1,014	22.4	74	28	1,012	24.5	81	31	1,014	16.9	79	31	1,012	25.6	79
500	31	958	18.3	71	28	957	21.8	83	31	957	15.5	73	31	958	22.4	84
1,000	31	904	15.0	69	28	904	18.8	79	31	902	14.2	57	31	904	19.3	78
1,500	31	852	13.8	50	28	852	16.4	73	31	850	13.4	44	31	853	17.1	68
2,000	31	803	12.3	33	28	803	14.4	60	31	800	11.8	42	31	804	15.1	57
2,500	31	756	10.4	19	28	757	12.4	51	31	754	9.4	44	31	758	12.9	50
3,000	31	712	8.2	18	28	713	10.4	46	31	710	7.2	42	31	714	10.5	44
4,000	31	630	2.8	18	28	632	5.6	37	30	628	1.3	36	29	632	6.2	36
5,000	31	556	−2.9	22	28	559	0.2	28	30	553	−5.6	37	29	559	1.0	31
6,000	31	489	−9.5		28	493	−5.9	24	30	487	−12.5	38	29	493	−5.3	28
7,000	29	429	−16.7		27	433	−12.7	22	30	426	−19.4	38	29	434	−12.0	27
8,000					26	379	−19.8	21	30	372	−26.1	37	29	380	−19.4	26
9,000					26	330	−27.5	20	29	323	−33.3	37	27	331	−26.6	25
10,000					25	287	−35.5	20	29	280	−40.6		26	288	−33.8	25
11,000					25	248	−42.8		27	241	−47.5		26	249	−41.4	
12,000					25	214	−49.4		26	207	−53.4		26	214	−49.0	
13,000					25	183	−56.7		25	177	−58.8		26	184	−57.2	
14,000					23	156	−64.8		25	150	−63.5		26	156	−66.2	
15,000					22	132	−73.8		25	127	−68.4		25	132	−75.8	
16,000					22	111	−82.4		21	108	−72.3		24	111	−84.2	
17,000					21	92	−88.2		19	91	−74.8		22	92	−90.4	
18,000					16	76	−92.8		15	76	−76.4		14	76	−91.5	
19,000					11	63	−91.4		6	64	−77.0		8	63	−88.2	

TABLE 2.—*Free-air resultant winds based on pilot balloon observations made near 5 p. m. (75th meridian time) during April 1942. Directions given in degrees from North (N=360°, E=90°, S=180°, W=270°)—Velocities in meters per second*

Altitude (meters) m. s. l.	Abilene, Tex. (537 m.)			Albuquerque, N. Mex. (1,630 m.)			Atlanta, Ga. (299 m.)			Billings, Mont. (1,095 m.)			Bismarck, N. Dak. (512 m.)			Boise, Idaho (866 m.)			Brownsville, Tex. (7 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	29	187	4.5	30	209	3.1	30	252	1.7	30	312	2.0	29	207	1.0	30	341	1.0	29	128	6.1
500							30	242	2.3										28	136	7.4
1,000	29	188	6.1				30	256	2.3				28	200	2.4	30	345	0.7	18	156	4.5
1,500	26	207	6.7				30	266	2.5	30	294	2.0	28	216	3.4	30	248	1.0	17	186	4.4
2,000	24	216	7.1	30	211	4.0	30	294	3.9	29	283	1.8	24	233	5.2	30	218	2.1	14	209	5.0
2,500	20	222	8.0	30	219	3.6	27	301	4.4	27	268	3.3	21	244	6.6	28	237	3.2	12	230	4.8
3,000	20	238	7.9	30	231	4.0	26	298	5.0	26	257	4.1	19	263	7.8	27	243	3.8	11	244	5.8
4,000	19	260	9.5	25	246	8.6	25	300	6.4	19	254	8.2	16	275	11.7	25	246	5.7	11	250	10.6
5,000	18	257	11.2	22	247	13.2	22	303	8.7	16	243	11.7	15	278	11.8	19	251	7.0	10	257	15.0
6,000	16	264	11.5	19	254	15.4	20	299	8.4	10	246	9.2	15	276	13.7	17	258	8.2			
8,000	14	255	15.4	17	254	16.1	14	306	13.1				12	264	17.1	10	262	7.3			
10,000	11	271	18.4	14	270	20.2	12	300	19.8												
12,000	11	269	29.1																		
14,000																					

Altitude (meters) m. s. l.	Buffalo, N. Y. (220 m.)			Burlington, Vt. (132 m.)			Charleston, S. C. (17 m.)			Chicago, Ill. (192 m.)			Cincinnati, Ohio (152 m.)			Denver, Colo. (1,627 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	28	260	4.3	27	316	1.8	30	183	2.2				29	267	1.5	26	155	2.1
500	28	262	6.0	27	308	3.1	30	206	2.6				29	238	3.1			
1,000	28	270	6.7	26	310	4.0	30	246	2.7				28	241	4.3			
1,500	25	268	6.5	22	294	6.3	29	275	3.4				26	240	4.3			
2,000	19	270	8.0	19	313	8.2	29	280	4.5				23	255	5.3	26	161	1.8
2,500	15	298	7.3	12	306	9.4	28	288	6.6				19	281	4.3	24	174	1.7
3,000	14	296	9.3	10	323	7.9	27	307	6.7				18	280	5.3	23	212	2.7
4,000	12	306	8.9				24	284	8.7				14	309	5.2	19	244	7.4
5,000	11	308	10.2				22	286	10.6							18	247	12.2
6,000	10	322	10.3				20	285	13.7							17	247	13.6
8,000							10	309	10.2							12	248	15.4
10,000																10	256	18.4
12,000																		
14,000																		

Altitude (meters) m. s. l.	El Paso, Tex. (1,196 m.)			Ely, Nev. (1,910 m.)			Grand Junction, Colo. (1,413 m.)			Greensboro, N. C. (271 m.)			Havre, Mont. (767 m.)			Jacksonville, Fla. (16 m.)			Las Vegas, Nev. (570 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	30	235	3.2	30	234	1.4	30	300	1.5	29	248	1.4	30	283	1.7	30	83	3.8	30	218	2.8
500										29	239	2.4				30	95	2.0			
1,000										29	258	3.2	30	279	2.4	29	331	0.3	30	217	3.6
1,500	30	227	3.8							29	274	3.4	30	283	3.1	29	279	1.8	30	220	3.5
2,000	30	223	4.1	30	217	2.3	30	249	1.4	29	289	4.3	29	269	4.2	29	293	3.2	30	209	4.7
2,500	30	232	4.8	30	211	2.9	29	234	1.9	29	299	5.3	25	263	5.7	27	285	3.4	30	227	4.7
3,000	30	247	6.3	26	202	3.2	29	239	3.3	28	297	7.2	24	256	6.3	26	288	4.2	29	234	4.1
4,000	21	251	9.8	18	197	2.7	22	218	7.0	24	298	10.6	17	261	10.0	21	292	7.3	22	243	2.8
5,000	19	254	11.0	15	246	4.4	15	239	8.7	21	296	13.4	12	262	12.0	18	295	8.7	19	263	7.7
6,000	16	266	13.9	11	288	8.6				21	297	15.8	10	263	12.7	16	297	11.4	17	277	7.5
8,000	13	263	20.8	10	299	13.0				17	297	17.9							14	287	14.3
10,000	11	264	23.8							14	297	18.3							10	282	17.3
12,000																					
14,000																					

Altitude (meters) m. s. l.	Little Rock, Ark. (88 m.)			Medford, Oreg. (410 m.)			Miami, Fla. (10 m.)			Minneapolis, Minn. (265 m.)			Mobile, Ala. (66 m.)			Nashville, Tenn. (194 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	28	159	3.2	28	346	1.2	30	77	4.1	30	183	2.5	29	158	2.9	30	226	0.9
500	28	162	4.9	28	335	0.9	30	84	4.7	30	190	3.5	29	162	2.9	30	222	1.8
1,000	26	179	6.1	28	209	0.9	29	78	3.9	29	196	4.6	26	171	2.2	29	224	2.4
1,500	25	193	5.8	28	198	2.8	27	35	2.5	28	209	5.4	25	193	2.2	28	222	3.4
2,000	25	208	6.8	25	209	4.0	25	17	1.9	27	240	5.9	23	182	1.5	26	237	3.1
2,500	21	205	4.7	24	217	5.1	24	348	2.6	26	254	7.7	23	214	1.7	25	246	4.4
3,000	18	241	3.1	22	222	5.5	22	319	3.0	24	260	9.4	22	237	2.1	20	266	4.0
4,000	10	292	3.6	17	225	8.0	17	293	4.3	21	265	10.4	20	279	4.8	15	271	4.3
5,000				16	226	10.6	16	283	7.2	19	279	10.1	14	289	8.1	11	293	3.8
6,000							13	292	10.8	16	293	12.2	11	289	11.0			
8,000										12	309	14.5						
10,000																		
12,000																		
14,000																		

TABLE 2.—*Free-air resultant winds based on pilot balloon observations made near 5 p. m. (75th meridian time) during April 1942. Directions given in degrees from North (N=360°, E=90°, S=180°, W=270°)—Velocities in meters per second*—Continued

Altitude (meters) m. s. l.	New York, N. Y. (15 m.)			Oakland, Calif. (8 m.)			Oklahoma City, Okla. (402 m.)			Omaha, Nebr. (306 m.)			Phoenix, Ariz. (338 m.)			Rapid City, S. Dak. (982 m.)			St. Louis, Mo. (181 m.)			San Antonio, Tex. (180 m.)			San Diego, Calif. (15 m.)			Sault St. Marie, Mich. (230 m.)			Seattle, Wash. (12 m.)			Spokane, Wash. (603 m.)			Washington, D. C. (24 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	28	241	2.1	28	250	4.2	24	178	8.4	30	170	3.2	30	246	1.5	26	210	1.3	28	164	3.7	29	133	3.6	23	264	3.9	29	278	2.5	30	257	2.4	27	215	2.0	29	303	1.6
500	28	273	4.6	28	242	3.2	24	182	9.9	30	169	3.8	30	247	2.4	...	...	...	28	168	4.1	29	130	5.0	23	274	4.0	29	270	3.6	30	209	2.5	...	...	...	29	286	3.3
1,000	26	292	6.0	23	247	2.3	23	183	9.2	30	174	4.3	30	242	3.0	26	213	1.3	27	190	5.1	28	145	5.0	20	258	2.4	29	273	4.3	29	192	3.9	27	223	4.6	27	282	4.9
1,500	25	305	8.6	21	223	2.2	22	193	8.8	27	188	5.0	30	233	3.8	26	216	2.0	27	221	6.2	26	165	4.5	18	284	1.5	29	307	3.5	28	189	5.6	27	221	3.5	27	294	6.0
2,000	17	322	9.5	17	292	2.9	20	207	10.3	25	208	4.6	30	227	4.8	24	234	4.1	26	236	6.1	22	209	3.3	14	254	2.2	29	306	4.6	24	191	7.1	26	226	5.1	23	299	7.2
2,500	15	326	10.8	15	306	4.0	16	229	9.8	22	238	5.1	30	234	5.6	19	237	6.2	25	250	7.5	15	251	3.2	14	266	3.2	25	302	6.6	21	205	6.4	26	223	5.6	19	301	7.3
3,000	13	336	12.0	13	337	7.6	15	226	8.3	21	247	5.9	30	245	6.6	17	243	7.1	24	266	7.8	13	253	4.9	13	303	6.1	21	312	7.8	19	216	8.2	23	228	6.2	18	311	8.7
4,000	...	...	...	13	309	9.2	13	250	9.8	16	256	5.0	29	250	8.9	16	259	8.1	21	271	7.3	12	268	9.8	...	...	...	17	301	10.3	13	214	8.8	18	239	7.4	14	320	10.4
5,000	...	...	...	11	326	12.4	11	265	11.7	14	254	5.4	23	262	11.2	14	243	11.2	16	293	7.1	...	...	...	...	...	...	10	295	12.3	...	...	...	13	246	7.4	12	312	12.2
6,000	...	...	...	10	317	16.3	11	265	13.4	13	267	5.2	21	265	12.8	12	253	10.8	14	300	8.8	...	...	...	...	...	...	...	...	...	...	...	...	11	251	8.3	11	321	14.1
8,000	...	...	...	...	...	...	10	267	15.2	10	297	9.6	20	274	16.4	11	248	16.8	12	306	9.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10,000	...	...	...	...	...	...	...	...	...	...	...	...	14	274	19.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12,000	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14,000	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

TABLE 3.—*Maximum free-air wind velocities (m. p. s.), for different sections of the United States, based on pilot-balloon observations during April 1942*

Section	Surface to 2,500 meters (m. s. l.)					Between 2,500 and 5,000 meters (m. s. o.)					Above 5,000 meters (m. s. l.)				
	Maximum velocity	Direction	Altitude (m.) m. s. l.	Date	Station	Maximum velocity	Direction	Altitude (m.) m. s. l.	Date	Station	Maximum velocity	Direction	Altitude (m.) m. s. l.	Date	Station
Northeast [1]	35.6	WSW	1,000	2	Boston, Mass	42.4	W	3,350	6	Caribou, Maine	61.6	NNW	6,730	8	Portland, Maine.
East-Central [2]	36.5	SW	2,500	9	Knoxville, Tenn	53.0	WNW	4,400	11	Greensboro, N. C	61.2	WNW	6,030	11	Greensboro. N. C.
Southeast [3]	30.7	S	1,370	7	Birmingham, Ala	34.8	NW	3,740	11	Atlanta, Ga	61.0	W	12,780	11	Miami, Fla.
North-Central [4]	45.1	W	1,610	28	Duluth, Minn	51.4	W	3,950	28	Duluth, Minn	74.0	WSW	10,210	9	Marquette, Mich.
Central [5]	42.4	SSW	1,650	27	Des Moines, Iowa	52.5	WNW	4,600	10	Moline, Ill	54.0	WNW	12,070	11	St. Louis, Mo.
South-Central [6]	45.3	WSW	2,310	30	Big Spring, Tex	44.8	WSW	3,930	24	Big Spring, Tex	60.0	W	12,870	11	Abilene, Tex.
Northwest [7]	28.1	WSW	2,440	14	Billings, Mont	39.3	N	5,000	23	Medford, Oreg	58.5	NNW	7,350	23	Spokane, Wash.
West-Central [8]	43.8	SW	2,500	27	Reno, Nev	50.6	NW	5,000	22	Redding, Calif	70.0	NW	8,130 / 8,950	22	Redding, Calif.
Southwest [9]	40.0	SW	2,280	18	Roswell, N. Mex	56.4	SSE	3,810	20	Sanberg, Calif	60.2	W	10,240	30	Albuquerque, N. Mex.

[1] Maine, Vermont, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania and Northern Ohio.
[2] Delaware, Maryland, Virginia, West Virginia, Southern Ohio, Kentucky, Eastern Tennessee and North Carolina.
[3] South Carolina, Georgia, Florida and Alabama.
[4] Michigan, Wisconsin, Minnesota, North Dakota and South Dakota.
[5] Indiana, Illinois, Iowa, Nebraska, Kansas and Missouri. (Chicago, Ill., not received).
[6] Mississippi, Arkansas, Louisiana, Oklahoma, Texas (except El Paso), and Western Tennessee.
[7] Montana, Idaho, Washington and Oregon.
[8] Wyoming, Colorado, Utah, Northern Nevada and Northern California.
[9] Southern California, Southern Nevada, Arizona, New Mexico, and extreme West Texas.

RIVER STAGES AND FLOODS

By BENNETT SWENSON

There was a marked deficiency of precipitation during April in the Atlantic area from Georgia northward with the driest area centered in Virginia. In contrast there was an abundance of precipitation and accompanying damaging floods in a large area comprising the six States, Colorado, New Mexico, Kansas, Oklahoma, Arkansas, and Texas.

St. Lawrence drainage.—Light flooding occurred again during April in the Maumee River system. The stages had fallen to fairly low stages following the overflows in March but with moderately heavy rains from April 6 to 10, the stages rose to slightly above flood stage. The Sandusky River also overflowed, reaching a stage of 13.6 feet at Upper Sandusky, Ohio, on April 11.

Atlantic Slope drainage.—River stages were moderately high in New England, stages slightly above flood stage being recorded in the Connecticut River; in South Carolina and Georgia, the stages were generally above flood from March. Otherwise, stages were generally low.

A snow survey made on April 3–6 at 23 stations in the Merrimack Basin above Franklin, N. H., showed an average snow depth of 16.8 inches, with an average water content of 5.79 inches compared with a value of 4.45 inches of water obtained from a survey of February 10–16. A survey of 8 selected stations in the Pemigewasset River Basin on April 14 gave an average water content of 6.06 inches, or a decrease of 1.08 inches for that basin since the April 3–6 survey.

The entire Merrimack Basin, except the upper reaches of the Contoocook River, was clear of snow cover before April 1. All river ice had disappeared from the reaches below Franklin by March 18, which is unusually early.

A moderate rise occurred in the main river on April 8–10 but did not reach bankfull. It was produced by rainfall on the 7th, averaging one-half inch over the basin. The estimated run-off from snow was 1 inch. Lesser peak stages occurred later, with flows continuing moderately high into the first week of May.

Moderate rains on the 7th and 8th and run-off from melting snow in the Upper Connecticut River resulted in high water generally and a stage of 17.2 feet at Hartford, Conn., on April 10. Unseasonably high temperatures during the remainder of the month accelerated snow melt and caused a general rise in most upper river tributaries, cresting at South Newbury, Vt., on April 28 at a stage of