

TABLE 2.—Free-air resultant winds (meters per second) based on pilot-balloon observations made near 6 a. m. (E. S. T.) during August 1935
[Wind from N=360°, E=90°, etc.]

Altitude (m) m. s. l.	Albuquerque, N. Mex. (1,554 m)		Atlanta, Ga. (309 m)		Billings, Mont. (1,088 m)		Boston, Mass. (15 m)		Cheyenne, Wyo. (1,873 m)		Chicago, Ill. (192 m)		Cincinnati, Ohio (153 m)		Detroit, Mich. (204 m)		Fargo, N. Dak. (274 m)		Houston, Tex. (21 m)		Key West, Fla. (11 m)		Medford, Oreg. (410 m)		Murfreesboro, Tenn. (180 m)	
	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity
Surface	343	1.7	15	0.6	338	2.6	285	1.3	277	2.6	193	0.9	32	0.6	226	0.6	153	0.9	337	0.7	130	2.3	209	0.6	212	0.5
500			349	0.1			297	4.3			230	3.2	190	1.1	225	1.5	174	1.0	202	4.1	121	4.2	270	1.0	196	1.9
1,000			197	0.7			286	3.4			264	4.1	276	3.3	255	3.1	262	2.7	186	3.5	122	4.6	290	1.8	246	2.3
1,500			254	0.9	93	2.0	280	3.4			280	5.1	267	5.1	264	4.2	276	4.8	163	2.6	126	3.9	46	0.4	265	2.7
2,000	71	0.7	270	1.0	147	0.6	287	3.0	262	3.0	273	6.0	267	5.4	275	6.4	279	6.1	153	2.6	127	3.6	73	0.7	268	2.5
2,500	193	1.8	235	1.1	259	3.2	277	4.0	231	4.6	275	7.0	267	5.3	273	7.1	272	8.0	136	2.2	126	3.7	235	2.7	264	2.4
3,000	212	2.2	216	0.4	260	6.2	283	4.1	242	4.7	288	7.3	264	5.4	273	7.5	271	9.6	118	2.0	111	3.6	225	4.8	254	2.6
4,000	190	1.0	320	1.3	265	11.5	297	2.5	265	4.7	290	7.5	285	8.1	271	8.6	292	10.5	108	2.3	112	2.9	235	6.2	258	2.7
5,000	28	2.2	262	1.3	265	12.7	37	2.3	257	6.3									104	3.1			244	8.0		

Altitude (m) m. s. l.	Newark, N. J. (14 m)		Oakland, Calif. (8 m)		Oklahoma City, Okla. (402 m)		Omaha, Nebr. (306 m)		Pearl Harbor, Territory of Hawaii ¹ (68 m)		Pensacola, Fla. ¹ (24 m)		St. Louis, Mo. (170 m)		Salt Lake City, Utah (1,294 m)		San Diego, Calif. (15 m)		Sault Ste. Marie, Mich. (198 m)		Seattle, Wash. (14 m)		Spokane, Wash. (603 m)		Washington, D. C. (10 m)	
	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity
Surface	353	0.9	331	0.9	174	3.0	153	1.7	48	2.4	353	1.6	187	0.4	155	3.2	290	0.4	134	0.3	104	1.3	105	1.2	5	0.6
500	316	2.8	246	2.2	185	6.5	181	4.9	70	7.1	262	0.4	223	2.8			130	0.5	205	1.4	15	3.3			317	3.5
1,000	298	3.2	294	2.0	206	13.1	215	7.4	72	7.7	257	0.7	265	3.0			84	2.0	248	3.7	14	2.6	263	1.2	303	4.0
1,500	278	4.4	239	0.7	211	9.6	234	6.9	75	6.5	336	0.2	271	3.9	166	5.3	113	2.6	254	3.7	1	1.0	268	2.3	296	4.9
2,000	288	6.0	205	1.7	220	5.8	251	6.2	85	4.4	52	1.1	280	4.2	189	3.9	120	3.8	278	5.8	281	1.2	252	3.2	291	6.6
2,500	291	7.3	169	3.5	220	3.0	269	5.1	49	3.1	68	1.3	239	4.6	216	3.3	116	2.9	283	6.4	241	1.6	258	5.0	285	7.7
3,000	313	8.9	191	3.0	198	2.0	260	4.4	43	2.7	24	1.1	300	4.9	238	3.8	131	4.3	286	7.6	255	2.8	260	7.0	285	7.6
4,000					174	1.2	284	5.7			32	1.6	294	4.3	236	4.3	117	5.0			267	6.5	259	10.6	287	4.4
5,000					28	1.6	314	2.4					304	3.3	247	5.1	111	2.0			281	6.9	274	10.3	273	6.1

¹ Navy stations.

RIVERS AND FLOODS

[River and Flood Division, MONTROSE W. HAYES, in charge]

By RICHMOND T. ZOCH

Unusually heavy rains occurred over the Muskingum River Basin in Ohio on August 6 and 7. The resulting floods caused considerable damage and the loss of five lives. A detailed report on this flood will appear in a later issue of the REVIEW.

There were a number of floods in the small streams of Arizona, the most important being those of the 22d, near Wickenburg, which made 35 persons homeless; and on the 28th, near Dragoon, which overturned a transcontinental bus and drowned 5 persons.

The other floods of August were not of great importance.

HEAVY RAIN IN TEXAS, MAY 31

A very heavy rain and resulting flood occurred on May 31 near D'Hanis, Tex., in the Nueces River Basin; a report recently prepared by the official in charge, Weather Bureau Office, San Antonio, Tex., is of unusual interest and is printed in full below:

An excessive rainfall of great intensity occurred in Medina County, Tex., on May 31, 1935. Saco Creek flooded the town of D'Hanis, washed away 17 small houses, a mile or more of the Southern Pacific tracks, and a section of the highway. Five persons were drowned.

The Saco Creek Basin is approximately 50 miles west of San Antonio, and the watershed has an area of about 80 square miles. This section was visited by Mr. Dalrymple, an engineer from the United States Geological Survey, Austin, Tex., and J. H. Jarboe, United States Weather Bureau, San Antonio, Tex. An effort was made to determine amounts of rainfall and estimate the discharge. All available rainfall measurements were checked and crest stages at ranch houses examined. A rock house on the Lutz ranch, built in 1851, was flooded for the first time, and the highest water stages known occurred at all ranches.

The number of rainfall measurements is too small to support a definite statement of amounts. A circular water tank at the Woodward ranch, cleaned and dry before the rain as affirmed by all, is the best measurement obtained. This tank holds 21.84 inches, and ran over in less than 3 hours. A carbide can that holds 11.5 inches ran over at the Lutz ranch, as did a dip can hanging from a branch of a tree at another ranch. The last measured 13 inches. All ranchmen state that the rain fell in less than 3 hours. Using the

high crest stages reached at the different ranches as part evidence, the following conclusions have been reached:

That apparently 20 inches or more rainfall occurred over a small area on Saco Creek, approximately 12 miles above D'Hanis, and that 12 inches or more occurred at other points, with an average amount exceeding 9 inches over the entire watershed of approximately 80 square miles, and that the time required for this rain was less than 3 hours.

It seems almost impossible for water to fall at so rapid a rate, but slope measurements made by the United States Geological Survey engineers indicate a discharge of 265,000 second-feet from an area of about 80 square miles. So far as known, this much exceeds any rate of flow from an area of this size.

In connection with the above report it is of interest that the cooperative observer at Sabinal, Tex., a short distance west of D'Hanis, reported 7.70 inches of rain, which fell between 5 a. m. and 11 a. m.; and the cooperative observer at Hondo, Tex., a short distance to the east of D'Hanis, reported 9.15 inches in the same period. Both Sabinal and Hondo lie outside of the Saco Creek Basin.

The discharge of 265,000 second-feet from 80 square miles is 3,312½ second-feet per square mile. Since a rate of rainfall of 1 inch per hour is equal to a discharge of 645½ second-feet per square mile there must have been a rate of rainfall of 5.13 inches per hour from the entire drainage area in order to produce the discharge calculated from the slope measurements. This is assuming that the soil became completely soaked and a steady state had been reached. Even at this very high rate of rainfall it is very doubtful if a steady state had been reached in the short time of 3 hours. Therefore, if the discharge calculated from the slope measurements is correct, a rate of rainfall considerably in excess of 5 inches per hour must have occurred.

Table of flood stages in August 1935

[All dates are in August unless otherwise specified]

River and station	Flood stage	Above flood stages— dates		Crest	
		From—	To—	Stage	Date
ATLANTIC SLOPE DRAINAGE					
Saluda:	<i>Feet</i>			<i>Feet</i>	
Pelzer, S. C.	6	20	20	7.1	20
Chappells, S. C.	13	21	22	14.8	22
Santee: Rimini, S. C.	12	25	27	17.2	26
Savannah: Ellenton, S. C.	14	22	24	13.0	24
			26	16.2	24
MISSISSIPPI SYSTEM					
<i>Missouri Basin</i>					
Solomon: Beloit, Kans.	18	30	30	19.4	30
<i>Ohio Basin</i>					
Tygart: Elkins, W. Va.	14	8	8	14.6	8
Walhonding: Walhonding, Ohio.	8	7	8	16.9	7
Tuscarawas:					
Newcomerstown, Ohio.	16	7	11	21.2	9
Coshocton, Ohio.	11	7	13	24.6	8
Muskingum:					
Lock No. 10, Zanesville, Ohio.	25	8	12	33.6	9
Lock No. 7, McConnellsville, Ohio.	22	8	13	32.8	9
Lock No. 3, Lowell, Ohio.	25	9	12	30.3	10
Little Kanawha:					
Glenville, W. Va.	23	7	8	28.2	8
Creston, W. Va.	20	8	9	21.0	8
Gauley: Summersville, W. Va.	10	8	8	12.1	8
<i>Arkansas basin</i>					
Purgatoire: Higbee, Colo.	4	18	18	4.2	18
		29	29	5.0	29
Canadian: Union, Okla.	6	8	8	6.0	8
		31	31	7.0	31
WEST GULF OF MEXICO DRAINAGE					
Nueces: Cotulla, Tex.	15	July 29	1	18.6	July 30

WEATHER OF THE ATLANTIC AND PACIFIC OCEANS

[The Marine Division, W. F. McDONALD, in Charge]

NORTH ATLANTIC OCEAN

By H. C. HUNTER

Atmospheric pressure.—The pressure averaged moderately above normal near the British Isles; and, apart from waters near Iceland and east Greenland, was mainly a little above normal over the middle and eastern portions of the North Atlantic; also near the North American coast from Labrador to Virginia, save near Nova Scotia and southern Newfoundland where it was below normal. From Nova Scotia to the Bermuda region and thence southwestward to the Greater Antilles the pressure averaged below normal, while it was slightly below over the Gulf of Mexico and the east Florida coast.

The highest pressure thus far reported was 30.53 inches, by the American steamship *Exochorda*, about 10 p. m., the 25th, a short distance north of Horta. The lowest reading was in a hurricane area, about 27° N., 68° W., at 5 a. m., the 21st when the American steamship *Angelina* noted 28.20 inches. Apart from hurricane areas the lowest is 28.74 inches, by the Swedish motorship *Blankholm*, at 3 a. m., the 21st, near 53° N., 38° W.

TABLE 1.—Averages, departures, and extremes of atmospheric pressure (sea level) at selected stations for the North Atlantic Ocean and its shores, August 1935

Station	Average pressure	Departure	Highest	Date	Lowest	Date
	<i>Inches</i>	<i>Inch</i>	<i>Inches</i>		<i>Inches</i>	
Julianehaab, Greenland.	29.75		30.22	29	29.31	4
Reykjavik, Iceland.	29.69	-0.12	30.06	30	29.28	8, 20
Lerwick, Shetland Islands.	29.89	+ .09	30.26	6	29.25	27
Valencia, Ireland.	30.04	+ .12	30.43	6	29.62	28
Lisbon, Portugal.	30.01	- .01	30.17	2	29.77	29
Madeira.	30.05	+ .02	30.12	25	29.94	24
Horta, Azores.	30.25	+ .05	30.45	25	29.86	20
Belle Isle, Newfoundland.	29.91	+ .02	30.20	18, 19 21, 23	29.28	3
Halifax, Nova Scotia.	29.98	- .03	30.30	18	29.62	2, 25
Nantucket.	30.02	+ .03	30.31	19	29.65	1
Hatteras.	30.00	.00	30.16	18	29.82	7
Bermuda.	30.05	- .09	30.14	1, 18	29.68	23
Turks Island.	29.97	- .07	30.07	2, 12	29.89	20
Key West.	29.97	- .01	30.15	3	29.87	31
New Orleans.	29.95	- .03	30.17	3	29.80	23

NOTE.—All data based on a. m. observations only, with departures compiled from best available normals related to time of observations, except Hatteras, Key West, Nantucket, and New Orleans, which are 24-hour corrected means.

Cyclones and gales.—A low near Virginia on the 7th advanced over the ocean, first eastward, then toward