

the following night. Brownsville reported a barometer reading of 28.02 inches at 1:30 a.m. of the 5th, and an estimated maximum wind of 80 m.p.h. from the north-west earlier in the night. According to an Associated Press dispatch from Brownsville there were 22 known deaths and property damage running into millions of dollars in the area from Corpus Christi to some distance south of Brownsville in extreme northeastern Mexico. However, no lives were lost in either Brownsville or Corpus Christi. The remarkable escape of Brownsville citizens was attributed to the fact that all had ample warning that the tropical hurricane was approaching the city.

Realizing that the storm was a major hurricane and that the week-end holiday would extend over Labor Day, the district forecaster sent the following warning to all Texas coast stations on the morning of Saturday, September 2:

Uncertain where tropical storm in Gulf will reach coast line, but all persons should be warned to remain away from inaccessible places on Texas coast over week end.

That the warning was heeded was attested by the following excerpt from the report of the official in charge, Corpus Christi, Texas:

\* \* \* Probably never before in the history of Texas hurricanes have such widespread and early warnings been given as were received from Washington in advance of this one. The telegram of Saturday, September 2, warning all persons to avoid

inaccessible places over the week end probably saved thousands of lives. Major Swan, owner of the Don Patricio Causeway, estimated that between 2,500 and 4,000 visitors would have passed over the causeway to Padre Island during Sunday and Monday had it not been for the timely warning sent out from the central office. The same is true of Mustang Island, Bird Island, and the many other places north and south of this city. It is not an exaggerated estimate to state that between 6,000 and 10,000 persons might have been in inaccessible places had it not been for the advance warning to stay away from those places. \* \* \*

At 10 p.m. of September 3, hurricane warnings were ordered displayed from Corpus Christi to Freeport and storm warnings on the remainder of the Texas coast. The storm at this time was central about 300 miles due east of Brownsville and still moving west-northwestward. No reports were received from the vicinity of the storm the morning of the 4th, but when it became apparent during the late afternoon and evening that the storm was moving directly westward and would reach the coast not far north of Brownsville, hurricane warnings were ordered south of Corpus Christi to Brownsville, while the hurricane warnings north of Corpus Christi were changed to storm warnings.

*August 31-September 5.*—On the morning of the 31st, another tropical disturbance was about 225 miles north-northeast of Antigua, West Indies. It subsequently passed over Florida. An account of this disturbance will appear in the September issue of the Monthly Weather Review.

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**SOLAR OBSERVATIONS**

**SOLAR RADIATION MEASUREMENTS DURING AUGUST 1933**

By IRVING F. HAND, Assistant in Solar Radiation Investigations

For a description of instruments employed and their exposures, the reader is referred to the January 1932, REVIEW, page 26.

Table 1 shows that solar radiation intensities averaged above normal for August at all Weather Bureau stations where normal incidence measurements were made.

Table 2 shows an excess in the total radiation received on a horizontal surface at all stations except Pittsburgh and Twin Falls.

Table 3 shows slightly diminished turbidity for the month as a whole.

Polarization measurements obtained at Washington on 4 days give a mean of 57 percent with a maximum of 60 percent on the 5th. At Madison, observations on 11 days give a mean of 63 percent with a maximum of 74 percent on the 4th. The maximum at Madison is considerably above normal; the other values are close to normal.

TABLE 1.—Solar radiation intensities during August 1933

[Gram-calories per minute per square centimeter of normal surface]

**WASHINGTON, D. C.**

| Date       | Sun's zenith distance |          |       |       |                  |      |        |       |       |       | Local mean solar time |       |
|------------|-----------------------|----------|-------|-------|------------------|------|--------|-------|-------|-------|-----------------------|-------|
|            | 8 a.m.                | 78.7°    | 75.7° | 70.7° | 60.0°            | 0.0° | 60.0°  | 70.7° | 75.7° | 78.7° |                       | Noon  |
|            | 75th mer. time        | Air mass |       |       |                  |      |        |       |       |       |                       |       |
|            |                       | A.M.     |       |       |                  |      | P.M.   |       |       |       |                       |       |
| e.         | 5.0                   | 4.0      | 3.0   | 2.0   | 1.0 <sup>1</sup> | 2.0  | 3.0    | 4.0   | 5.0   | e.    |                       |       |
|            | mm                    | cal      | cal   | cal   | cal              | cal  | cal    | cal   | cal   | cal   | mm                    |       |
| Aug. 2     | 20.57                 |          |       |       | 0.78             | 0.98 | 1.30   |       |       |       |                       | 17.96 |
| Aug. 5     | 10.97                 |          | 0.90  | 1.01  | 1.13             | 1.37 |        |       |       |       |                       | 9.14  |
| Aug. 7     | 14.10                 |          |       |       |                  | 1.23 |        |       |       |       |                       | 12.24 |
| Aug. 15    | 12.24                 |          |       |       | .90              |      |        |       |       |       |                       | 9.47  |
| Aug. 25    | 15.65                 | 0.70     | .83   | .91   | 1.10             | 1.41 | 1.10   |       |       |       |                       | 16.20 |
| Aug. 30    | 10.59                 | .65      | .83   | .85   | 1.16             |      |        |       |       |       |                       | 10.59 |
| Means      |                       | (.68)    | .85   | .89   | 1.05             | 1.33 | (1.10) |       |       |       |                       |       |
| Departures |                       | +.05     | +.16  | +.13  | +.12             | +.10 | +.07   |       |       |       |                       |       |

TABLE 1.—Solar radiation intensities during August 1933—Con.

[Gram-calories per minute per square centimeter of normal surface]

**MADISON, WIS.**

| Date       | Sun's zenith distance |          |       |       |                  |      |        |       |       |       | Local mean solar time |       |
|------------|-----------------------|----------|-------|-------|------------------|------|--------|-------|-------|-------|-----------------------|-------|
|            | 8 a.m.                | 78.7°    | 75.7° | 70.7° | 60.0°            | 0.0° | 60.0°  | 70.7° | 75.7° | 78.7° |                       | Noon  |
|            | 75th mer. time        | Air mass |       |       |                  |      |        |       |       |       |                       |       |
|            |                       | A.M.     |       |       |                  |      | P.M.   |       |       |       |                       |       |
| e.         | 5.0                   | 4.0      | 3.0   | 2.0   | 1.0 <sup>1</sup> | 2.0  | 3.0    | 4.0   | 5.0   | e.    |                       |       |
|            | mm                    | cal      | cal   | cal   | cal              | cal  | cal    | cal   | cal   | cal   | mm                    |       |
| Aug. 1     | 16.79                 |          |       |       |                  | 1.40 |        |       |       |       |                       | 9.83  |
| Aug. 3     | 12.68                 |          |       |       |                  | 1.47 |        |       |       |       |                       | 7.04  |
| Aug. 4     | 10.59                 | 0.89     | 0.99  | 1.11  | 1.27             | 1.49 | 1.18   |       |       |       |                       | 8.81  |
| Aug. 5     | 9.83                  |          | .88   | 1.01  | 1.18             | 1.41 |        |       |       |       |                       | 7.87  |
| Aug. 8     | 11.81                 |          |       | .78   | .98              | 1.40 |        |       |       |       |                       | 11.79 |
| Aug. 11    | 15.65                 |          |       |       | 1.05             | 1.42 |        |       |       |       |                       | 10.97 |
| Aug. 12    | 13.61                 | .66      | .79   | .97   | 1.08             | 1.28 |        |       |       |       |                       | 12.68 |
| Aug. 14    | 7.57                  | .79      | .89   | 1.06  | 1.20             | 1.44 |        |       |       |       |                       | 7.87  |
| Aug. 15    | 8.48                  | .73      | .86   | 1.03  | 1.23             | 1.43 |        |       |       |       |                       | 9.14  |
| Aug. 17    | 14.10                 |          |       |       | 1.13             | 1.40 |        |       |       |       |                       | 12.24 |
| Aug. 18    | 10.59                 |          | .94   |       |                  |      |        |       |       |       |                       | 7.87  |
| Aug. 19    | 9.14                  | 1.03     | 1.12  | 1.19  | 1.23             | 1.40 |        |       |       |       |                       | 7.29  |
| Aug. 26    | 10.97                 |          |       | .81   | .96              | 1.31 |        |       |       |       |                       | 9.83  |
| Aug. 28    | 10.59                 |          | .86   | .99   | 1.16             | 1.44 |        |       |       |       |                       | 8.18  |
| Aug. 31    | 10.97                 |          |       |       |                  | 1.25 |        |       |       |       |                       | 8.18  |
| Means      |                       | .82      | .92   | .99   | 1.14             | 1.40 | (1.18) |       |       |       |                       |       |
| Departures |                       | +.04     | +.08  | +.05  | +.04             | +.08 | +.10   |       |       |       |                       |       |

**LINCOLN, NEBR.**

| Date       | Sun's zenith distance |          |       |       |                  |      |       |       |       |       | Local mean solar time |       |
|------------|-----------------------|----------|-------|-------|------------------|------|-------|-------|-------|-------|-----------------------|-------|
|            | 8 a.m.                | 78.7°    | 75.7° | 70.7° | 60.0°            | 0.0° | 60.0° | 70.7° | 75.7° | 78.7° |                       | Noon  |
|            | 75th mer. time        | Air mass |       |       |                  |      |       |       |       |       |                       |       |
|            |                       | A.M.     |       |       |                  |      | P.M.  |       |       |       |                       |       |
| e.         | 5.0                   | 4.0      | 3.0   | 2.0   | 1.0 <sup>1</sup> | 2.0  | 3.0   | 4.0   | 5.0   | e.    |                       |       |
|            | mm                    | cal      | cal   | cal   | cal              | cal  | cal   | cal   | cal   | cal   | mm                    |       |
| Aug. 10    | 17.37                 |          |       |       |                  |      |       |       | 0.79  | 0.68  |                       | 19.23 |
| Aug. 11    | 12.24                 |          |       |       |                  | 1.16 | 1.46  | 1.14  | 0.95  |       |                       | 10.97 |
| Aug. 14    | 10.21                 |          | 0.90  | 1.00  |                  |      | 1.36  | 1.16  | .91   | .82   | .66                   | 14.10 |
| Aug. 17    | 11.81                 |          | .88   | 1.02  |                  |      |       |       | .90   | .86   | .75                   | 10.21 |
| Aug. 18    | 7.87                  |          | .83   |       |                  |      |       |       |       |       |                       | 11.81 |
| Aug. 24    | 15.65                 |          | .78   | .91   |                  |      |       |       |       |       |                       | 13.13 |
| Aug. 25    | 11.81                 |          | .96   | 1.08  | 1.24             | 1.45 |       |       |       |       |                       | 11.38 |
| Aug. 30    | 10.97                 |          |       | .94   | 1.12             | 1.31 | 1.14  |       | .95   | .78   | .68                   | 9.83  |
| Aug. 31    | 10.97                 |          |       |       | 1.09             | 1.27 | 1.10  |       | .90   | .72   | .60                   | 12.24 |
| Means      |                       | .87      | .99   | 1.15  | 1.37             | 1.16 | .93   | .79   | .67   |       |                       |       |
| Departures |                       | +.09     | +.08  | +.06  | +.06             | +.08 | +.05  | +.03  | -.02  |       |                       |       |

**BLUE HILL, MASS.**

| Date    | Sun's zenith distance |          |       |       |                  |      |       |       |       |       | Local mean solar time |      |
|---------|-----------------------|----------|-------|-------|------------------|------|-------|-------|-------|-------|-----------------------|------|
|         | 8 a.m.                | 78.7°    | 75.7° | 70.7° | 60.0°            | 0.0° | 60.0° | 70.7° | 75.7° | 78.7° |                       | Noon |
|         | 75th mer. time        | Air mass |       |       |                  |      |       |       |       |       |                       |      |
|         |                       | A.M.     |       |       |                  |      | P.M.  |       |       |       |                       |      |
| e.      | 5.0                   | 4.0      | 3.0   | 2.0   | 1.0 <sup>1</sup> | 2.0  | 3.0   | 4.0   | 5.0   | e.    |                       |      |
|         | mm                    | cal      | cal   | cal   | cal              | cal  | cal   | cal   | cal   | cal   | mm                    |      |
| Aug. 2  | 19.9                  |          |       |       |                  |      |       |       | 0.98  |       |                       | 19.2 |
| Aug. 6  | 9.1                   |          |       |       |                  |      |       | 1.18  | 0.95  |       |                       | 7.9  |
| Aug. 9  | 11.4                  |          |       |       |                  |      |       | 1.02  | .98   | 0.86  |                       | 11.4 |
| Aug. 15 | 11.4                  |          |       |       |                  |      |       | 1.08  | .91   |       |                       | 11.4 |
| Aug. 26 | 13.6                  |          |       |       | 1.08             | 1.20 | 1.46  | 1.16  | .97   | .87   | .69                   | 14.1 |
| Aug. 27 | 16.8                  |          |       |       |                  |      |       | 1.05  | .82   | .58   | .48                   | 15.1 |
| Aug. 30 | 10.2                  |          |       |       |                  | 1.32 | 1.47  | 1.22  | 1.09  | .87   | .79                   | 9.5  |
| Means   |                       |          |       |       | (1.08)           | 1.26 | 1.46  | 1.10  | .95   | .80   | .65                   |      |

<sup>1</sup> Extrapolated.