## PROVISIONAL SUNSPOT RELATIVE NUMBERS FOR NOVEMBER 1938

(Dependent alone on observations at Zurich and its station at Arosa)

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

| November 1938 | Relative Numbers | November 1938 | Relative Numbers | November 1938 | Relative Numbers |
|---|---|---|---|---|---|
| 1 | *a* 146 | 11 | *a* 125 | 21 | 78 |
| 2 | | 12 | *EEccd* 134 | 22 | 56 |
| 3 | *a* 162 | 13 | *Macd* 152 | 23 | *d* 61 |
| 4 | *aad* 128 | 14 | 152 | 24 | *Mc* 79 |
| 5 | 112 | 15 | *a* 161 | 25 | *Ec* 94 |
| 6 | *Mcd* 167 | 16 | *Eac* 157 | 26 | *a* 85 |
| 7 | *d* 176 | 17 | | 27 | 110 |
| 8 | 159 | 18 | *aa* 115 | 28 | *ab* 107 |
| 9 | 138 | 19 | *a* 106 | 29 | |
| 10 | *b* 131 | 20 | 97 | 30 | 95 |

Mean: 27 days=121.6

| | | h m | h m |
|---|---|---|---|
| Nov. 10. | Middle large, bright chromospheric eruption | 13 35– | 13 50, M. |
| 13. | Middle large, bright chromospheric eruption | 13 38– | 14 40, W. |
| 20. | Middle large, bright chromospheric eruption | 13 45– | 14 00, W. |
| 25. | Middle large, bright chromospheric eruption | 8 50– | 9 00, & |
| | | 13 55– | 14 50, E. |
| 27. | Middle large, bright chromospheric eruption | 9 40– | 10. 05. |
| 28. | Middle large, bright chromospheric eruption | 13 30– | 14 30. |

*a*=Passage of an average-sized group through the central meridian.
*b*=Passage of a large group or spot through the central meridian.
*c*=New formation of a group developing into a middle-sized or large center of activity: E, on the eastern part of the sun's disk; W, on the western part; M, in the central circle zone.
*d*=Entrance of a large or average-sized center of activity on the east limb.

# AEROLOGICAL OBSERVATIONS

[Aerological Division, D. M. LITTLE in charge]

By B. FRANCIS DASHIELL

During November 1938 a total of 474 airplane and radiosonde observations were made in the United States, and the mean free-air data based on these observations, shown in tables 1 and 1a, includes pressure, temperature, and relative humidity recorded at certain geometric heights. Of all radiosonde ascensions launched at stations making such observations, about 30 percent reached a height of 19 kilometers.

The "means" are omitted from the tables whenever less than 15 observations are made at the surface and less than 5 at a standard height, but 15 observations are required for those levels which fall within the limits of the monthly vertical range of the tropopause. A description of the methods used for computing these means will be found in the January 1938 MONTHLY WEATHER REVIEW.

Chart I, published elsewhere in this REVIEW, shows the departures of the mean *surface* temperature (° F.) from normal. The month of November was warm over the entire country east of the Mississippi River valley. In that area positive departures ranged from 2° F. to 6° F. over the Great Lakes region and the Middle Atlantic coast. The weather was cool over the western half of the United States, except along the southern California coast. There the mean temperature remained close to normal. Subnormal temperatures with deficiencies ranging from 3° F. to 6° F. occurred over portions of the central Rocky Mountain States.

Mean free-air temperatures (° C.) *above* the surface (tables 1 and 1a) were rather evenly distributed in all levels below 5 kilometers. During November, however, the coldest weather was centered over the north-central States. In this area, upward from 0.5 to 11 kilometers, Fargo, N. Dak., reported the lowest temperatures recorded at each level. However, radiosonde observations made farther south, at Omaha, Nebr., and Oklahoma City, Okla., above 11 kilometers, indicated decidedly lower temperatures than those reported at Fargo, N. Dak. This fact was particularly noticeable at 17 kilometers, where the mean temperature was 13.0° C. lower over Oklahoma City, Okla., than that which was recorded over Fargo, N. Dak.

The lowest mean free-air temperature recorded in the high altitudes by means of radiosonde was −72.2° C. over Washington, D. C., at 17 kilometers. But, in the lower levels below 5 kilometers, where observations are made by both radiosonde and airplane, the lowest mean temperatures for the country during the current month were recorded over Fargo, N. Dak. These temperatures, for each level from 0.5 to 5 kilometers, respectively, were −4.7° C., −5.3° C., −5.7° C., −6.9° C., −9.1° C., −11.7° C., −17.0° C., and −22.8° C. The highest mean temperatures recorded in each level for the month were: 13.9° C., 13.2° C., 11.4° C., 9.6° C., 7.7° C., and 5.5° C., over San Diego, Calif., and 0.1° C., and −5.7° C., over Pensacola, Fla.; all recorded at 0.5, 1, 1.5, 2, 2.5, 3, 4, and 5 kilometers, respectively. Below-zero mean temperatures were reported from all stations at 5 kilometers and higher, and at Fargo, N. Dak., and Sault Ste. Marie, Mich., at all levels beginning with that at 0.5 kilometer.

During November the mean temperatures observed at all stations were lower than in the preceding month of October. Such seasonal changes were decidedly outstanding at Fargo, N. Dak., Sault Ste. Marie, Mich., Salt Lake City, Utah, Billings, Mont., Omaha, Nebr., and Oklahoma City, Okla. But, on the other hand, at Lakehurst, N. J., San Diego, Calif., Norfolk, Va., and Oakland, Calif., the November mean temperatures were very little lower than in October. At Fargo, N. Dak., the mean temperatures for November were lower than in October by 15.1° C., 15.8° C., 14.5° C., 13.9° C., 13.7° C., 13.4° C., 12.4° C., and 11.4° C.; but over San Diego, Calif., they differed only by 1.3° C., 2.1° C., 2.7° C., 1.1° C., 1.3° C., 0.0° C., 0.2° C., and 1.0° C.; at 0.5, 1, 1.5, 2, 2.5, 3, 4, and 5 kilometers, respectively.

The distribution of atmospheric pressure during the month of November was remarkably uniform. Isobaric charts, which were prepared from the mean pressure data given in tables 1 and 1a, showed that a well-defined area of low pressure existed over the north-central States at all levels up to 5 kilometers. Its statistical center was over Fargo, N. Dak., reaching as high as 16 kilometers. Above this altitude the center spread out to include Sault Ste. Marie, Mich., and Omaha, Nebr. Higher pressures prevailed over the South, and particularly so at Pensacola, Fla., up to 5 kilometers. Then, above that level, the highest pressures were found over Nashville, Tenn., where radiosonde observations are made. They continued upward to the maximum altitude reached during the month—20 kilometers.

The differences in pressure existing between the centers of low and high pressure at each level over Fargo, N. Dak.,