MONTHLY WEATHER REVIEW.

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The MONTHLY WEATHER REVIEW is based on data from about 3500 land stations and many ocean reports from vessels taking the international simultaneous observation at Greenwich noon.

Special acknowledgment is made of the data furnished by the kindness of cooperative observers, and by Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Camilo A. Gonzales, Director-General of Mexican Telegraphs; Capt I. S. Kimball, General Superintendent of the United States Life-Saving Service; Commandant Francisco S. Chaves, Director of the Meteorological Service of the Azores, Ponta Delgada, St. Michaels, Azores; W. N. Shaw, Esq., Secretary, Meteorological Office, London; H. H. Cousins, Chemist, in charge of the Jamaica Weather Office; Señor Anastasio Alfaro, Director of the National Observatory, San José, Costa Rica; Rev. L. Gangoiti, Director of the Meteorological Observatory of Belen College, Havana, Cuba.

As far as practicable the time of the seventy-fifth meridian, which is exactly five hours behind Greenwich time, is used in the text of the MONTHLY WEATHER REVIEW.

Barometric pressures, both at land stations and on ocean vessels, whether station pressures or sea-level pressures, are reduced, or assumed to be reduced, to standard gravity, as well as corrected for all instrumental peculiarities, so that they express pressure in the standard international system of measures, namely, by the height of an equivalent column of mercury at 32° Fahrenheit, under the standard force, i. e. apparent gravity at sea-level and latitude 45°.

SPECIAL ARTICLES, NOTES, AND EXTRACTS.

THE RELATION BETWEEN STORM MOVEMENT AND PRESSURE DISTRIBUTION.

By EDWARD H. BOWIE, Local Forecaster. Dated St. Louis, Mo., November 30, 1905.

The influence exerted by the pressure of contiguous regions of high pressure, or the flow of air therefrom, to modify the rate and the direction of progression of a storm center, is a principle recognized by practically all writers on the subject of weather forecasting. The first mention of such an influence is nearly coincident with the earliest use of synoptic charts in weather predicting. It is a matter of common observation that in the middle latitudes, where storms move in an easterly direction, a storm center lying near and south of an area of high pressure pursues a course that deviates to the right of the track that storms of that particular locality normally travel, and the converse is true when a storm is charted north or northwest of an area of high pressure; again, when an area of high pressure covers the region toward which the storm would move under normal conditions, then its progressive motion is retarded, but when an area of high pressure develops in the rear of a storm its movement is accelerated.

In view of the foregoing, it is seen that the influence of the pressure distribution adjacent to a storm center in causing a storm to depart from a normal course should be considered in forecasting; and it follows that the explanation of an abnormal storm movement is often to be found in the unequal pressure distribution surrounding the storm center. Assuming anomalous storm movements to be mainly due to anomalous pressure distribution, it is obvious that the direction and velocity of storm movement could be predetermined were it possible to obtain correct values of (1) the displacement of the storm center arising from the unequal pressure distribution, and (2) the value of the drift of the upper air currents that appear to carry the storm with them. In order to represent quantitatively the displacement or movement of the storm center due to unequal pressure, each tenth of an inch increase in barometric pressure, measured outwardly from the storm center along lines radiating to the north, northeast, east, etc., has after many trials been considered as equivalent to a movement of the storm center by 62.99 miles, or to a vector of 0.40 inch, or one centimeter, in length, on a map the scale of which is about 160 miles to the inch.[1] The pressure is considered along the lines radiating northward, northeastward, etc., from the center of the storm outward to the points where the general trend of the isobars is no longer approximately perpendicular to these radii.

The general resultant of these eight vectors represents the total influence of the pressure [or some equivalent flow of air.—*C. A.*] toward the storm center from the surrounding regions of high pressure, and is assumed to show both the direction and the extent of the 24-hour displacement of the storm center so far as it is due to the unequal distribution of pressure. If the pressure of the air from all directions toward the storm center be a factor in determining the direction and the velocity of the movement of the center, it is apparent that this "general pressure resultant" summarizes one of the forces that determine the storm's path.

By considering the above resultant pressure effect as one of two component forces that cause the storm center to move along its path, it is possible to find the other component, or the so-called "eastward drift," by resolving an observed 24-hour movement into its two corresponding components by the parallelogram of forces.

It may be expected that the second component, or drift, should have approximately the same direction and value for two or more storms in the same locality for any given month of the year, and in fact the values when charted for each locality show an agreement that can not be wholly the result of accident.

[1] This is very nearly the scale of the Washington morning weather map (Form C), or the outline forecast map (Form A), or the Form A-C, which was prepared some years ago for special study by adding the contour lines for each 1000 feet for Canada, United States, and Mexico. The engraving from which these maps are printed represents a polyconic projection in which the linear dimensions are 1/10000000 of corresponding distances on the earth's surface. That is to say, the distance from the pole to the equator is represented by one meter, and the length of a degree of a great circle by 11.111 millimeters, or 0.44 inch. Adopting the dimensions of the Clarke spheroid of 1866, as in the Smithsonian Geographical Tables, we have for the radius of the sphere having the same surface as that spheroid 3958.8 miles; its circumference is 24873.8 miles, and its surface 196,940,400 square miles. A degree of a great circle is, therefore, 69.094 miles, which, on the scale of 1/10000000, becomes 0.4378 inch on the morning weather map, or at the rate of 157.8 miles to the inch; nine-tenths of a degree is 62.18 miles; 0.91 degree is 62.99 miles.