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INTERNATIONAL AEROLOGICAL SOUNDINGS AT ROYAL CENTER, IND., MAY, 1926

PART I. INTRODUCTION

By W. R. GREGG

Meteorologists generally will be glad to learn of the resumption of sounding-balloon observations in the United States. Several series were made prior to 1915, some of these being at St. Louis, Mo., by the Blue Hill Observatory and others at Omaha, Nebr., Huron, S. Dak., Indianapolis, Ind., and Avalon, Calif., by the Weather Bureau. Much valuable information was obtained in these series, but there are still lacking certain data which would be most useful both in theoretical and practical meteorology. For example, the characteristics of the atmosphere at great heights above anticyclones and cyclones in this country are not known in any great detail. There is reason to believe that they differ in important respects from those in Europe, but more data are needed to establish these differences. Other questions concerning which comparatively little is known at these extreme upper levels are the seasonal, latitudinal, and diurnal variations of the different meteorological elements.

The series at Royal Center, Ind., during May, 1926, is the first of what is hoped to be a large number, each one covering a month or more, and some of them consisting of simultaneous soundings from several points, for the purpose of investigating conditions at wide intervals of latitude or in different parts of high and low pressure systems.

In general these series are planned in accordance with the program of the International Commission for the Exploration of the Upper Air, formerly known as the International Commission for Scientific Aeronautics. Prior to 1925 it was the custom of this commission to select certain isolated days, usually one in each month, but in some cases three, and in one month each year a group of six days in succession. At the April, 1925, meeting of the commission the Weather Bureau proposed that all effort be concentrated in one month each year. In this way, at the end of 12 years, there would be as much observational material as under the previous plan, the entire year would be covered (assuming a different month were selected for each of the 12 years) and, most important of all, these data would give information regarding day-to-day changes almost entirely lacking now. This proposal was adopted, not as a substitute but as an addition to the previous program, and May, 1926, was named as the first "international month."

In addition to the work with sounding balloons during this month, the Weather Bureau collected a large amount of observational material regarding upper clouds. A study of these data will be published at a later time.

Moreover, special upper air observations were made at all kite and balloon stations, in order to have as complete information as possible in all parts of the country. Copies of these data and of those procured with sounding balloons have been forwarded to the International Commission for publication with similar data from other countries.

The results of the sounding balloon campaign at Royal Center are given in the two papers following—that by

Mr. Fergusson describing the methods and instrumental apparatus employed, and the one by Mr. Samuels discussing the data themselves.

A series of sounding-balloon observations similar to that at Royal Center in 1926 will be made at Groesbeck, Tex., in October, which has been named the "international month" for 1927.

PART II. INSTRUMENTS AND TECHNIQUE

By S. P. FERGUSSON

The International Series of aerological soundings at Royal Center afforded opportunity for the trial of three new devices for facilitating the exploration of the atmosphere, namely, the light meteorograph and accessories designed in 1919 for use with *ballons-sondes*, the Rossby deflating valve, and an adaptation of the meteorograph to Assmann's method of the free-rising captive balloon.

METEORGRAPHS AND ACCESSORIES

The design of the meteorograph, first described in the MONTHLY WEATHER REVIEW for June, 1920, 48:317-322, was based upon experience derived from the use of earlier apparatus by Assmann, Teisserenc de Bort, and Richard. Distinctive features are simplified construction permitting economical production in quantities, a two-traverse mechanism recording pressure on a scale twice that of earlier instruments and a single time-arc for all elements which simplifies the work of reading records. The temperature-element, of thin thermostatic metal, and the hygrometer, the hairs of which are separated, are more sensitive than similar elements in use previously and permit a very rapid rate of ascent and descent—a feature of great importance at stations near large bodies of water where ascensions must be completed within a short period. The very small weight (only one-third that of the lightest time-recording instrument in use previously) permits the use of molded pilot-balloons having an initial diameter of 30 to 50 centimeters expanded to about 130 centimeters before release.

Standardization of the meteorographs was accomplished easily and rapidly by means of the improved low-pressure-low-temperature apparatus designed by Messrs H. J. E. Reid and Otto E. Kirchner of the Langley Memorial Aeronautical Laboratory who kindly permitted the construction of a duplicate in the instrument laboratory of the Weather Bureau. In this apparatus the conditions of pressure and temperature during a high ascension are duplicated and it is possible to standardize six instruments simultaneously. Evaluations of the scales before and after ascensions were in close agreement and the performance of the Bourdon-tube pressure-elements was particularly good.

The meteorograph is protected from accidental injury by surrounding it with three hoops or buffers 30 centimeters in diameter, of rattan, secured by four threads to the corners of a piece of bright red silk about 1 meter square, which serves as a parachute and also to attract the attention of a possible finder.