

a season earlier. (3) There are obscure indications of a tendency to rain at the sun-spot minimum, but the normal minima (he uses 1844-1855-1867-1878-1889-1900) have so frequently coincided with the other cycles that the exact influence of the sun-spot minimum is difficult to trace, and further observations are necessary. (4) Up to the present time the direct influence of Brueckner's 35-year cycle is inappreciable in South African weather.

In conclusion, Hutchins offers a forecast as to the rainfall. In 1888 he published a forecast for the year 1905, namely, that the sun-spot cycle and the Meldrum cycle would coincide, and therefore "most probably general good rains". For 1906 his prediction then was: "Probably good rains, with drought at a few stations". He claims that the forecast for 1905 was well verified, and now, namely, in November, 1905, after studying recent conditions, he offers the following forecast for the next two years:

For South Africa generally, except the southern and southwest coast of Cape Colony [all which is included in his summer rainfall area], the year 1906, coming between two rainfall periods, may have short and local droughts, or the rains may run on to the heavy rainfall period which is ahead of us in 1907, and probably in 1908; the outlook now is for several years of good rainfall ahead.

For the south and southwest coasts of Cape Colony strong "southeasters", really southerly and southwesterly winds, may be expected during the summer; the cyclical indication for next winter's rains (1907) is that they will be moderate.

Long-period forecasts can not have anything like the precision of the short, day-or-two forecasts; * * * they are at best but a calculation of probabilities and an indication of what may be expected to affect the coming season as a whole. * * * For the drier inland districts the rains are too irregular for the cyclical forecast to have any practical value. After 1908 there are six years of drought to be looked forward to, with an irregular mitigation of the drought, most probably about 1911 or 1912.

The more we consider the statements contained in Mr. Hutchins's abstract, the more certain does it seem that he has shown that sun-spot cycles have nothing to do with the variations of rainfall in South Africa. On the other hand, he has shown that there are certain correlations between the rainfall in the east and the west, such that when the one goes up the other goes down. He finds so many exceptions to the chronological regularity of heavy and light rains that the probability is that there is no such regularity at all, so that cycles of 12.5, 11.11, 35, and 9.5 years, all of which he investigates, have no real existence. But, on the other hand, the fact that the area of heavy rain, with its outlying region of lighter rains, moves about, east and west, north and south, becomes clearly evident. When this geographical motion is large one is tempted to hunt for a cycle to correspond, but nothing of the kind appears from his data. On the contrary, by studying the monsoon data of the east coast of Africa it is plain that, as he himself says, "the rains are too irregular for the cyclical forecast to have any value".—C. A.

WILHELM VON BEZOLD.

This eminent meteorologist was born at Munich on the 21st of June, 1837, and died at Charlottenburg, near Berlin, on the 17th of February, 1907. After twenty years of service in the University of Munich, where he organized the Bavarian Meteorological Service, he was called to be Director of the Royal Meteorological Institute at Berlin, in 1885, where he was made professor in the university, a member of the Royal Academy of Sciences, and one of the curators of the Imperial Physico-Technical Institute, and where also he attained the rank of Royal Privy Councillor.

Von Bezold's contributions to the study of the thermodynamics of the atmosphere have been of the highest importance. Fortunately all of these memoirs were revised and edited by himself in a volume of collected memoirs published in 1906. The first three out of the five have also been translated and

published by the Smithsonian Institution, so that they are as well known outside of Germany as inside. His first meteorological memoir was that of 1864 on observations and theory of the twilight, a memoir that became widely known as soon as the red twilights of the Krakatoa eruption revived our interest in the subject. His last meteorological memoir on climatological averages for complete circles in latitude brings us to the summit of our present knowledge of the general relation between the temperature of the earth and the heat that it receives from the sun.

Not only meteorology but equally terrestrial magnetism attracted his attention and became illumined by his thought, and his most eminent pupil in this line of research, Dr. L. A. Bauer, is now carrying out, with the help of the Carnegie Institution of Washington, those broad researches that von Bezold initiated. Von Bezold's principal memoirs on this subject have been published since 1895, but it had been treated of in university lectures for many years before. Many of his devoted students and admirers have lately combined to publish a memorial volume in which they will doubtless work out many of the ideas that he so freely suggested as topics for further research.—C. A.

A WINTER WATERSPOUT.

By DAVID CUTHBERTSON, Local Forecaster. Dated Buffalo, N. Y., February 25, 1907.

An unusual phenomenon was observed by the office force at the Buffalo station and a few visitors to the office on the afternoon of Monday, February 11, 1907, when a well-defined funnel-shaped cloud formed over this end of Lake Erie. It was first observed near the extreme western limit of the open water, about a quarter of a mile west of the outer lighthouse. (See fig 1.) This lighthouse is located midway between the American and Canadian shores where the lake begins to narrow into the Niagara River, and on account of the strong current ice seldom forms within one-sixth of a mile of the lighthouse on either side. This open water usually extends from a quarter to a half mile southwestward up the lake, converging to a V-shape at the southwestern end. At about 2:40 p. m. a well-defined tornado-like column formed near the extreme limit of the open water. The column in its early stages seemed to waver with the force of the wind for a few minutes, having all the appearance of the great waves of steam or fog, with a rolling motion against the wind. Suddenly, about 2:45 p. m., the cloud straightened up, the top having an altitude of about 100 feet, and started southwestward across the ice fields toward the south shore. The cloud had all the characteristics of a well-defined tornado funnel, or waterspout, appearing to be from 30 to 50 feet in diameter at the base and spread out to about 100 feet at the top. It retained its funnel shape as it advanced over the ice, licking up the snow as it went, until about a quarter of a mile off the south shore, when it began to waver and slowly vanish, breaking away at the bottom first. The wind at the time was blowing at the rate of 36 miles an hour from the northwest, driving a current of air with a temperature of 2° directly across the open water, whose temperature was about 34°, and into the center of the "V". The violent rotary motion is believed to have been due to this cold current driving against a body of relatively warm air over the open water, which was also forced up into the apex of the "V", and having an expansive upward tendency, mixt with the cold current in such a way as to produce the funnel cloud. From information at hand, a well-marked track over the ice fields was left clear of snow.

Two similar clouds were observed about two and a half miles up the lake at about the same time. These, however, appeared to have only the wave-like motion, and did not form an upright column.

During the afternoon a narrow band of strato-cumulus clouds, about 45° wide, extended from northeast to southwest over this

end of the lake. On the western side of these and near the horizon cirro-stratus and alto-stratus clouds prevailed. These phenomena probably would not have been observed had not the men been admiring a beautiful sundog visible at the time.

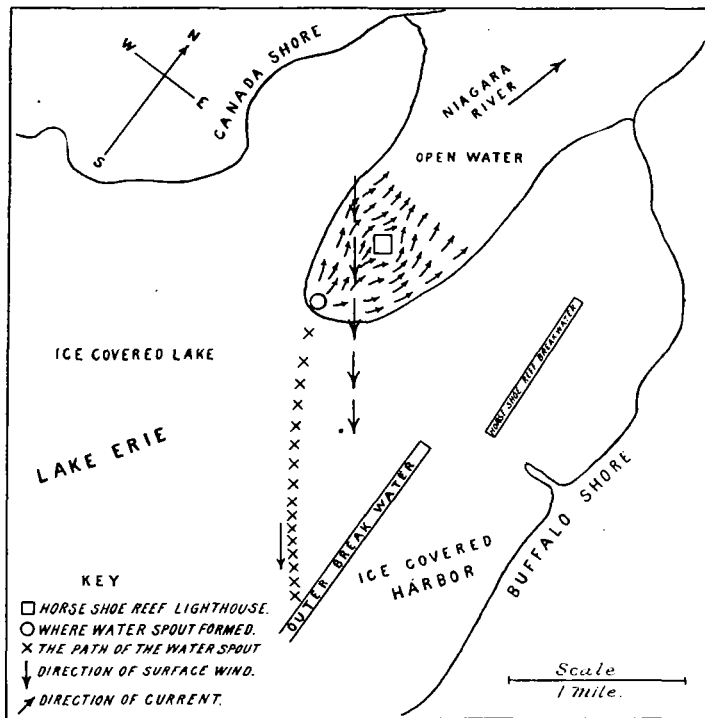


FIG. 1.—Location of waterspout off Buffalo, N. Y., February 11, 1907.

INTERNATIONAL METEOROLOGY.

REPORT ON THE PROCEEDINGS OF THE INNSBRUCK CONFERENCE.

The elaborate report on the proceedings of the International Meteorological Conference of Directors, held at Innsbruck in September, 1905, has been published by the Centralanstalt at Vienna, as an appendix to its annual for 1905. The report consists of three parts—the provisional program, the daily proceedings, and the reports of subcommittees—and an appendix of 90 pages containing articles contributed by over thirty meteorologists. The entire volume is one of the most important of the international meteorological publications. On page 44 the subcommittee on the international meteorological codex reported that this important work was practically finished, and expressed the hope that it would be published in English, German, and French.

The same committee also reported that the international comparison of normal barometers, namely one or two for each national service, is still in the most unsatisfactory condition, and should be undertaken at once; and in accordance with information received by the committee it recommended that the central offices at Berlin, London, Paris, St. Petersburg, and Vienna should prosecute the work. Since the meeting of this committee at Innsbruck Professor Sundell has published the results of his elaborate and successful personal work on this subject since 1885, and has shown that the international comparisons are now practicable at less expense and with greater accuracy than at any time previously. The extensive work done by Dr. Frank Waldo, who at that time compared Washington, Cambridge, Toronto, Kew, Hamburg, St. Petersburg, Berlin, and Paris, can now be repeated with greater advantage. This is, in fact, a work that can no longer be delayed if we would secure for barometry the international accuracy demanded by the progress of meteorology.

The subcommittee on clouds presented a series of revised definitions of cloud names, (*stratus*, *lenticularis*, etc.), and recom-

mended the publication of additional charts in the new edition of the international cloud atlas.

The conference resolved that hereafter the international committee should consist only of the directors of services. Accordingly its present membership is as follows: Chaves, Davis, Eliot, Hellmann, Hepites, Hildebrandsson, Lancaster, Mascart, Mohn, Moore, Nakamura, Palazzo, Paulsen, Pernter, Russel, Rykatchew, and Shaw. At the first session of the new committee, held on September 14, Mascart was chosen president, and Hildebrandsson secretary.

INTERNATIONAL METEOROLOGICAL CODEX.

This publication, referred to above as having been presented to the Innsbruck meeting, has been published in German by the Meteorological Office at Berlin. It contains viii + 81 pages, and a chart showing the international form for monthly and annual results for stations of the second order. Its contents may be divided into: (1) historical, followed by (2) the resolutions that are now in force or important relative to the general conduct of meteorological observations, computations, and publications; these are a codification of the results of all the international conferences, from that at Leipzig, 1872, to that at Innsbruck, 1905, and the English edition will be as desirable as the German; (3) the twenty pages of index constitute virtually an index to the contents of all the appendices of all the successive international reports. We undoubtedly owe this to Dr. G. Hellmann, whose high appreciation of the importance of bibliography is shown by the resolution offered by him at the conference at Rome, urging the need of a catalog of published observations and a catalog of published memoirs bearing on meteorology. In response to this international wish the German bibliography by Hellmann has already been published, but the general bibliography undertaken by the Weather Bureau is still unpublished. The international meteorological tables were published in Paris in 1890.

This codex will save a great deal of labor and uncertainty in hunting thru the seventeen or eighteen volumes of international reports, and it is to be hoped that the English, French, and Spanish editions will be able to reproduce exactly some of the more difficult passages in the authoritative German, especially the definitions of phenomena, such as halos, *rauhfrost*, and *glatteis*, about which there seems to have been much confusion in the past.—C. A.

RAINFALL AND OUTFLOW ABOVE BOHIO, IN THE VALLEY OF THE CHAGRES.

By Gen. HENRY L. ABBOT, U. S. A., retired. Dated Washington, D. C., April 9, 1907.

The exceptional uniformity both as to temperature and rainfall existing in this tropical valley, and the entire absence of frost and snow, render a study of the ratio between downfall and drainage much more simple than in the Temperate Zone. The subject has an important bearing upon certain engineering problems of the Canal, and received early attention from the New Panama Canal Company. The preliminary results appeared in the MONTHLY WEATHER REVIEW for June, 1900,¹ and in the number for February, 1904,¹ a full summary of six years' observations was given. The records have been continued since the work passed under the control of the United States—that is to say, to the beginning of the current year, thus adding three more years to the accumulated data. The important bearing of the subject upon many economical questions now receiving attention in this country, such as irrigation, the water supply of cities, generation of power, etc., may render a brief summary of the results of these nine years' investigations interesting to hydraulic engineers. The methods employed were identical throughout, and were so fully explained in the paper in the MONTHLY WEATHER REVIEW for February, 1904, that a tabular statement will suffice to bring the matter up to date (see Table 1).

¹ Vol. XXVIII, p. 243, and Vol. XXXII, p. 57.