I started with the figures 1, 2, 3, 4, 5, but experience has shown that three figures are sufficient. Thus, 3 might mean "almost certain to be verified", 2 would then stand for "normal probability", whatever that is in each state, and 1 for "doubtful".

I hope I have made my meaning clear this time. Instead of involving a great number of extra words, as Professor Garriott has taken it, only three or four extra figures would be required, sometimes only one. This disposes of his remarks (1), (2), and (3). As to (4), when he says "the bewildering complication of uncertainties it involves would confuse even the patient interpolator", it will now be seen that no confusion whatever is introduced, but quite the opposite. If a forecast is to be of any practical value, each item must be considered separately, and all I propose to do is to tell the farmer, etc., by means of a simple figure just what amount of confidence he may place upon the prediction he is considering. In (5) Professor Garriott says: "Our public insist upon having our forecasts expressed concisely and in unequivocal terms". I am glad to hear it. It shows how well the Bureau has educated its public, and I look forward to the time when the Australian public will also thus insist. Meanwhile, I am trying to "express my forecasts concisely and in unequivocal terms", whether the public wants it just yet or not, but quite fail to see how the weighting interferes with this. Indeed I think it assists greatly. In the sister science, astronomy, a weighted observation is regarded as conveying more precise information and being of greater value in combination with other similar observations than one about whose probable error no information is given. I do not propose to interfere in the slightest with the language in which a forecast is expressed, but only to add a figure at the end to signify its weight or degree of probability.

May I request that this principle be considered and criticised? Look for a moment at the results I have obtained. During the year 1905 I attached the figure 5 (maximum weight) to 685 definite predictions, and of these 675 proved to be correct. I issued 970 with the figure 4 (normal probability), of which 910 were correct; and I issued 296 with weight 3 (doubtful), of which 233 were verified.

Now this is the point I wish to make clear. Those forecasts which were marked "doubtful" were the *best I could frame* under the circumstances. I could see no way of improving them at the time, and they would not have been expressed differently whether I weighted them or not. If I make no distinction between these and others, I degrade the whole. But if, on the other hand, I attach a figure which practically says "I'm sorry, but this is the best I can do for you to-day—do not attach too much importance to it", I eliminate beforehand the adverse opinion which a great number of incorrect forecasts must produce, and I raise the bulk of the predictions to their true value. In particular, I create a series, marked with the maximum figure, which the public finds to be almost invariably correct, and thus raise the value of this particular series enormously.

(Signed) W. ERNEST COOKE,
Government Astronomer for Western Australia.
THE OBSERVATORY, PERTH, WESTERN AUSTRALIA, *June 7, 1906.*

MONTHLY REVIEW OF THE PROGRESS OF CLIMATOLOGY THROUGHOUT THE WORLD.

By C. FITZHUGH TALMAN, U. S. Weather Bureau.

CLIMATE OF ALASKA.

This is the subject of a recent monograph by Dr. Cleveland Abbe, jr. (written partly in collaboration with Alfred H. Brooks), which forms a part of Professional Paper No. 45, of the U. S. Geological Survey (Washington, 1906).

Alaska has been the field of energetic exploration by the Geological Survey since 1898; whence our knowledge of its topography and geology has grown at a rapid rate. At the same time there has been a great influx of settlers, attracted by both the agricultural and the mineral resources of the country; and thus the climatological service of the Weather Bureau has been able to recruit observers at many places which, until recently, had no civilized inhabitants. It is mainly the material collected during the last thirty years by the Signal Service and the Weather Bureau that Doctor Abbe summarizes in his paper; which, therefore, supplements the well-known memoir of Doctor Dall,[1] in which were brought together all data available up to 1877.

Comparing Doctor Abbe's paper with the earlier literature of the subject, we find a new subdivision of the territory into eight climatic provinces, each susceptible of very satisfactory generalized description. Regarding each of these regions much fresh information is afforded, some of which corrects impressions heretofore prevailing regarding extreme conditions of temperature and rainfall. Thus, the maximum temperature recorded by properly sheltered instruments has not risen above 90° in the great Yukon basin, while the temperature of 94° at Copper Center, on the Copper River plateau, is the highest that has been reported from any of the voluntary observing stations of the Weather Bureau in Alaska. Earlier writers have spoken of temperatures as high as 112°, or even 120°. The lowest recorded temperature is —80° at Fort Reliance, in January. The heaviest annual precipitation, 190.09 inches, occurs at Nuchek (Fort Constantine). The greatest rainfall in twenty-four hours was 7.41 inches, at Orca, on Prince William Sound, a record which has been exceeded at many stations in other portions of the United States. The greatest number of rainy days (i. e., days with .01 inch, or more, of precipitation) is 250.8 at Unalaska, while Sitka, which was formerly considered the rainiest point in the United States, has but 207.9.

Of great practical interest to intending settlers in Alaska are the statistics given in this paper regarding the length of the growing season at the various stations, and the dates of the opening and closing of rivers and harbors.

"SCHEITELWERTE."

One feature of Doctor Abbe's memoir above cited deserving of special mention is the introduction of tables exhibiting the "Scheitelwerte", or most frequently recurring values of certain climatic elements, at stations for which long records are available. The fact that the "Scheitelwerte" often depart widely from the arithmetical means of a series of meteorological measurements, or values, was first brought into prominence by Dr. Hugo Meyer, in his "Anleitung zur Bearbeitung meteorologischer Beobachtungen für die Klimatologie" (Berlin, 1891), though the idea had previously been applied, in climatic tables, to the discussion of wind direction—the prevailing, or most frequent direction, having been given an even more prominent place than the resultant or mean direction—and had occasionally been applied to the other elements. The question of introducing frequency values into climatic tables was discussed at the Munich Conference, but no very definite conclusion was reached as to the extent to which this should be done.

There can be no doubt that, for many parts of the world, "Scheitelwerte" of the temperature, precipitation, etc., give a truer picture of the climate than the mean, or so-called normal values, though the latter can by no means be dispensed with. "Scheitelwerte" represent the values we are most likely to encounter; but the arithmetical means are a factor of the sum total of the element for the whole period of observation, and for many scientific purposes this is the more important datum.

As the literature of "Scheitelwerte" is nearly all in German

[1] United States. Coast and Geodetic Survey. Pacific coast pilot. Coasts and islands of Alaska. Washington, 1879. Appendix 1. Meteorology. W. H. Dall.

(references will be found in Hann's "Lehrbuch der Meteorologie", 1st edition, pp. 113–115), students who do not read that language would do well to examine the "frequency" tables given in Doctor Abbe's memoir, pp. 177–188, and to read the explanatory text which accompanies them.

NEW METEOROLOGICAL STATIONS IN GUAM AND YAP.

The latest annual report of the Philippine Weather Bureau[2] contains interesting particulars regarding the stations recently opened by that Bureau in the islands of Guam and Yap. Both of these islands are now connected by cable with Manila; and the erection of the new stations greatly increases the efficiency of the Philippine Weather Bureau as an outpost to guard the whole of the Far East against surprises in the line of typhoons.

The meteorological station in Guam is located at the cable office on a cliff of Orote promontory, near the village of Sumay, and about seven and one-half miles from Agaña, the capital of the island. The observer in charge is the superintendent of the cable office. In Yap, which is the seat of German administration in the Western Carolines, the station is situated at the Capuchin Mission, and is operated by the missionaries. Both stations went into commission July 1, 1905.

A small amount of meteorological work had previously been done in both these islands. In Guam observations have been made by the United States naval authorities since November 1, 1901, the data for 1902 having been fully discussed by Dr. C. Abbe, jr.[3] The Germans have been making observations in Yap for the past seven years.

RAINFALL OF KUSAIE, CAROLINE ISLANDS.

The recently published results of five years' observations by an American missionary, Dr. C. F. Rife, on the island of Kusaie, Eastern Carolines,[4] give for this station the remarkable annual rainfall of 6472 mm. (254.8 inches, or over 21 feet). This record is exceeded at only some half-dozen stations on the globe (Cherra Punji, India, 11,628 mm.; Debundja, Kamerun, 10,454 mm.; Málcolmpeth, India, 6795 mm.; Lalakhal, India, 6727 mm.; Greytown, Nicaragua, 6583 mm.; Tami, German New Guinea, 6550 mm.).

For the following interesting particulars regarding the location of this station,[5] I am indebted to Rev. Irving Channon, a former missionary in Kusaie, who writes from Oberlin, Ohio:

> The station is located on the lee side of the island, on the lower slope of a range of mountains running from north-northeast to south-southwest, so that our exposure is to the west by north or west-northwest. The range is 2000 feet high at the highest point, but just back of the mission is about 1500 feet. Doctor Rife's house, where the measurements of rainfall have been taken, is about sixty-five feet above the sea. The northeast trade winds blow from December to April 1, but are not so strong, of course, in our latitude as farther north. Southeast trades are slight, and westerly winds are also slight and uncertain, as we are just at the eastern limit of the westerly monsoons. Some years we have several weeks of light westerly winds, but often scarcely any.

At Lelahafen, on the same island, observations taken by the German officials indicate a considerably smaller rainfall—probably because of some difference in the exposure. The records of both stations, however, show that this is one of the rainiest regions of the world. The number of rainy days at the American mission is 280. In other words, it rains five days in the week, on an average; and this average holds good, approximately, throughout the year, all the months being exceedingly rainy.

[2] Sixth annual report of the Philippine Commission, 1905. Washington, 1906. Part 2. Appendix L. Pp. 391–416.

[3] Report of the Eighth International Geographic Congress, 1904. Washington, 1905. Pp. 246–265. Abstract in Meteorologische Zeitschrift, March, 1906. P. 141.

[4] Mitteilungen von Forschungsreisenden und Gelehrten aus den Deutschen Schutzgebieten, 1905. 18 Bd. 4 Hft. P. 375. Also Meteorologische Zeitschrift, June, 1906. P. 268.

[5] Approximate latitude 5° 20′ N., longitude 163° 5′ E. of Greenwich.

NEW STATIONS IN THE CANAL ZONE.

The newly organized Division of Meteorology and River Hydraulics under the Isthmian Canal Commission has put into operation fully equipped meteorological stations at Naos (an island in the Bay of Panama) and Ancon, at which observations of all the elements are made twice daily, at 8 a. m. and 8 p. m., seventy-fifth meridian time. These stations are supplied with thermograph, barograph, sunshine recorder, and self-recording rain gage, and are manned by former observers of the United States Weather Bureau. Rainfall stations are in operation at Cristobal (a suburb of Colon), Gatun, Bohio, Empire, Culebra, Rio Grande, La Boca, Alhajuela, and Gamboa.

THE TORNADO OF APRIL 12, 1906, AT STAFFORD, KANS.[1]

By W. E. SERIGHT, Stafford, Kans. Dated May 21, 1906.

This particular [tornado?] cloud, of which a photograph is sent, was the last of about six or seven that appeared in and around Stafford on the afternoon of April 12, 1906. It formed about 5:30 p. m., and was probably five or six minutes in passing. Its path was very narrow, not over 100 or 150 feet in width, but it seemed to be of terrific force wherever it struck.

FIG. 1.—Showing funnel-shaped cloud at Stafford, Kans.

In securing this negative the camera was pointing east of northeast; the large building facing the camera is about 100 feet wide, and about 300 feet from where the camera was; the small frame building is about 15 feet wide and about 200 feet from the site of the camera; the distance between the two buildings is about 100 feet; the small house at the left of the center of the picture is about 100 feet from the camera, while the tornado itself was about three-fourths of a mile distant.

[1] Through the kindness of Mr. W. E. Seright, photographer, Stafford, Kans., Mr. Richard H. Sullivan, Observer, Weather Bureau, Wichita, Kans., was able to secure for the Bureau the print from which the accompanying half tone has been prepared.—ED.