and of sufficient magnitude to be conspicuous, should be made the subject of brief comment.

The following synopses will serve to illustrate what are thought to be satisfactory summaries of the meteorological conditions exhibited on two selected weather maps:

Weather map of 8 a. m., November 8, 1905.

Atmospheric conditions between the Mississippi River and the Rocky Mountains and in the extreme Northwest have remained practically inactive during the past 24 hours. A disturbance is developing over northern Mexico which is resulting in cloudy weather in southern California and Texas and rain in the vicinity of Los Angeles, Cal., and in the upper portion of the Rio Grande Valley. Rain has also fallen during the past 24 hours in the Ohio Valley, the Lake region, New York, and the New England States. No important temperature changes have occurred since yesterday. The weather conditions in the Southwest during the next 36 hours will be controlled by the Mexican disturbance, which will cause cloudy and unsettled weather in this vicinity, with probably showers to-night or Thursday. Higher temperature is indicated for to-night.

Weather map of 8 a. m., November 20, 1905.

A storm of marked intensity appears this morning over the middle Plateau regions, with a trough of low barometric pressure extending from the coast of southern California northeastward to Canada. Pressure has increased considerably over the northeast section of the country and has resulted in much colder weather in the Ohio Valley, the Lake regions, and the New England States. It is increasing rapidly over the north Pacific coast, with a steep barometric gradient, thence southeastward to the middle Plateau regions. Cloudy weather prevails this morning in the Southern States, and light rains have fallen during the past 24 hours in Missouri, southern Texas, California, southern Utah, and in portions of Georgia and Tennessee. Snow was falling this morning in Nevada. The Plateau disturbance will move eastward and will cause southerly winds and higher temperatures in this section during the next 36 hours, followed Tuesday by increasing cloudiness. Fair weather and moderate temperature are indicated for to-night.

RESULTS OF THE WORK DONE AT THE AERONAUTICAL OBSERVATORY OF THE ROYAL PRUSSIAN METEOROLOGICAL INSTITUTE, FROM JANUARY 1, 1903, TO DECEMBER 31, 1904.[1]

By STANISLAV HANZLIK, Ph. D. Dated December 2, 1905.

Rapidly following the second volume (see MONTHLY WEATHER REVIEW, December, 1904) appears the third and last publication of this aeronautical observatory as a department of the Royal Meteorological Institute. The observatory has now been separated and transferred as an independent institution, under the title Royal Aeronautical Observatory at Lindenberg, to Lindenberg, 65 kilometers (40.4 miles) southeast of Berlin, in the county of Beeskow-Storkow.

The above-named publication contains, in 188 pages, the results of soundings of the atmosphere during two years, from January 1, 1903, to December 31, 1904. In the first year were made 481, in the second 453 ascents; on every day of this period at least one ascent was made. For economical reasons and on account of the great accumulation of material the results are given in a very condensed form; for the ground, 40 meters (131 feet) above sea level, and 200 meters (656 feet), and 500 meters (1640 feet), and each succeeding 500 meters, and for the greatest height reached. The remarks are very copious. The results are given in extenso only for the days of international ascensions, which are made once a month.

The ascents of elastic rubber balloons were not quite successful in this period, partly because other duties occupied Professor Assmann, who had hitherto personally supervised the work with rubber balloons, and, second, on account of the poor quality of the material used for the rubber balloons. An improvement was made on the rubber balloons by arranging at the bottom of each a trap vent or valve suspended by a line hanging inside of the balloon from the top. When the balloon, filled with hydrogen, ascends and expands, the line stretches more and more till at a certain stage it opens the valve; then the expanded balloon loses enough gas to close the valve and the balloon falls to the ground with moderate velocity. The advantages of this arrangement are, that knowing how the diameter of the balloon increases with diminishing pressure, we can in advance—by the length of the line—fix the height to which the balloon has to ascend, and, second, the balloon comes down to the ground in most cases unharmed and can be used again. Professor Assmann plans to use this scheme every second day, if possible, at the new observatory in Lindenberg.

The table of the average and maximum heights reached in the years 1903 and 1904 shows the following figures:

	Average height.				Maximum height.			
	1903.	1904.	1903.	1904.	1903.	1904.	1903.	1904.
	m.	*m.*	*ft.*	*ft.*	*m.*	*m.*	*ft.*	*ft.*
Kite balloon.....	1,341	1,384	4,400	4,541	2,040	2,157	6,693	7,077
Kites...	2,014	2,433	6,608	7,982	4,598	5,100	15,085	16,732

These figures show a great improvement in the skill of the operators. In 1903 and 1904 the kite balloons had to be used in 30 per cent and 39 per cent, respectively, of the cases of all ascensions, on account of poor wind conditions.

The observatory took part in the international ascensions with kites, sounding balloons, and manned balloons; the greatest height reached in 1903 was 8770 meters (28,773 feet) by Professors Berson and von Schrötter.

In connection with this high ascent some interesting remarks are published about the influence of the rarefied air at this height on both mind and body. The observatory took part in the German educational exhibit at St. Louis, in 1904, where it was awarded a grand prize, as has already been reported in the MONTHLY WEATHER REVIEW.

The introduction to this third volume closes with a short paper by Professor Berson on the average and extreme temperature for each 500 meters and an index to all ascensions.

The new Royal Aeronautical Observatory at Lindenberg was opened on the 16th of October, 1905, in the presence of Emperor William II., and high officials, and scientists; among the foreign scientists, Mr. A. L. Rotch and the Prince of Monaco were present, and the latter was awarded the golden medal for science by the Emperor. The Prince of Monaco, assisted by Professor Hergesell, of Strassburg, has lately contributed much to the exploration of the higher strata of the air above the ocean.

HIGHEST KITE ASCENSION.

By Prof. C. F. MARVIN.

Dated Washington, D. C., December 18, 1905.

From a note in *Das Wetter* for November, 1905, p. 262, we learn that an extreme elevation of 6430 meters, or 21,096 feet; that is, almost exactly four miles, was attained at the German Aeronautical Observatory at Lindenberg, by means of a series of six kites. The record from automatic instruments sent up with the kites showed a drop in temperature from 40.8° F., at the ground to —13° at the highest point. The wind velocity in the lower strata was about 18 miles per hour, and at the highest elevation 56 miles per hour.

The Aeronautical Observatory under Doctor Assmann has been in operation only a few years, and yet has made wonderful progress in the meteorological exploration of the upper air by means of kites and balloons. A few years ago it seemed almost as if elevations of from two to two and a half miles were the limiting elevations for kite ascensions. The present accomplishment under Doctor Assmann is the more noteworthy from the fact that the kites were flown on land, where everything depends upon the natural wind. Hereto-

[1] Ergebnisse der Arbeiten am Aëronautischen Observatorium, 1 Januar, 1903, bis 31 December, 1904. Von R. Assmann und A. Berson.

fore, several incredibly high ascensions have been made at sea from the deck of steam vessels at the command of Teisserenc de Bort. The ability to direct the speed and motion of the vessel to give the best conditions for the flight of the kites constitutes a decided advantage over ascensions made on land from stationary reels, etc.

In the German ascension the note states that six kites were employed having an aggregate area of 323 square feet, and that 47,572 feet of wire (about 9 miles) were suspended in the air.

The size or sizes of the wire employed, the form and structural details of the kites, and their dispositions on the line, together with data in regard to the average tension of the wire, all constitute important details of this distinct engineering achievement that would be highly interesting to aeronautical students. None of these are given in the note referred to, but it is hoped that they will appear in due time in the reports of the observatory.

THE RAINFALL OF CHINA AND KOREA.

By T. OKADA.

[Reprinted from the Journal of the Meteorological Society of Japan, Vol. 24, No. 9, September, 1905.]

[The east coast of Asia must have many climatal analogies with the east coast of North America, but our actual statistical knowledge of the subject has become possible only through the exertions of meteorologists during the past twenty years.

On account of the efforts made by the Department of Agriculture to introduce into the United States many of the important plants of China it becomes doubly necessary that we make a complete study of the climate, especially the rainfall and temperature of these two countries. We therefore have received with great pleasure an important article by T. Okada, published in the Journal of the Meteorological Society of Japan for September, 1905, vol. 24, No. 9, and reprint it herewith, with the addition of an outline map, on which we have entered the annual rainfall figures, but without drawing isohyetal lines, since the figures relate to special groups of years and have not yet been reduced to the fundamental interval, owing to the sparseness of the data. It will, however, be seen that we have here a good general idea of the rainfall along the immediate coast line between latitudes 20° and 40° north.—*C. A.*]

RAINFALL TABLES FOR CHINA AND KOREA.

I. *Introductory.*—Since the publication of Dr. Fritsche's admirable treatise on the climate of eastern Asia, contributions to the knowledge of the climate of China, especially in connection with the rainfall, have been made by several authorities, as Thirrling, Hann, Supan, and Doberck. Among others Professor Supan collected the results of pluviometric observations made at Chinese light-houses and custom-houses, together with those taken at the Peking, Zikawei, and Hongkong meteorological observatories, and published the result of his elaborate discussion in the well known Petermann's Geographische Mitteilungen. This monograph by the German geographer is indeed the most complete of all the similar works that we have at present. But since the publication of that memoir several years have elapsed, and we can now obtain a several years longer mean of rainfall at some forty stations in eastern China and the Korean Empire, instead of the six years' mean at a smaller number of stations from which Professor Supan has drawn his conclusions on the pluviometric conditions of the vast celestial empire. It may not, therefore, be needless duplication to publish here a collection of the more recent observations for the ten years from 1892 to 1901.

The materials used are the rainfall tables given in the successive volumes of the excellent bulletins of the Observatoire Magnétique et Météorologique de Zikawei for the years from 1892 to 1901. These tables contain only daily sums of precipitation at some thirty stations on the coasts of China and Korea, which include custom-houses, light-houses, and meteorological observatories. We have, therefore, enumerated the number of days with rain, and extracted the greatest daily rainfall for each month from the tables. The data for Tintau, Wei-hai-wei, and Foochow are taken from other sources. Rainfall tables for China, published by Doctor Doberck in the early numbers of the Quarterly Journal of the Meteorological Society, and reports of Hongkong Observatory were also consulted.

2. *Annual rainfall.*—We give in Table 1 the mean annual rainfall at thirty-seven stations in China and three stations in Korea. Most of these stations are situated on the coasts or on the neighboring islands, and only a few stations have continental situation, so that our data are professedly insufficient for the study of geographical distribution of rainfall throughout the empire. The mean annual rainfalls here given are mostly deduced from the ten years' observations, and only a few of them refer to measurements of shorter duratation. But we have abstained from reducing the latter to the corresponding 10-year mean as is usual in pluviometric investigations, simply because we have not sufficient data to do so.

TABLE 1.—*Annual rainfall.*

Stations.	Latitude.	Longitude.	Annual rainfall.
	° ′	° ′	*mm.*
Peking	39 57	116 28	675.9
Wonsan	39 9	127 33	1138.1
Houki	38 4	120 39	423.2
Chefoo	37 34	121 32	582.6
Chemulpo	37 29	126 37	905.2
Shangtung Cape, NE.	37 24	122 42	536.1
Shangtung Cape, SE.	37 24	122 42	671.9
Wei-Hai-Wei	37 10	122 10	535.5
Tintau	36 4	120 18	682.6
Fusan	35 5	129 6	1136.3
Chinkiang	32 12	119 30	1041.8
Shaweishan	31 25	122 15	934.5
Wuhu	31 22	118 22	1017.9
Zikawei	31 12	121 21	1009.7
North Saddle	30 52	122 40	746.7
Gutzluff	30 50	122 10	823.8
Hankau	30 33	114 20	1276.1
Ichang	30 12	111 19	1059.3
Steep Island	30 12	122 36	848.6
Ningpo	29 58	121 44	1375.3
Kiukiang	29 44	113 48	1326.4
Chunking	29 31	104 11	979.5
Wenchow	28 0	120 35	1501.1
Pagoda	26 8	119 38	1208.6
Middledog	25 58	120 2	1114.9
Tournabout	25 26	119 56	1001.5
Ockseu	24 59	119 28	886.9
Amoy	24 27	118 4	1073.0
Chapel Island	24 10	118 13	813.0
Wuchow	23 29	111 20	1111.5
Swatow	23 20	116 43	1460.6
Lamocks	23 15	117 18	1001.0
Canton	23 7	113 17	1292.5
Breakerpoint	22 56	116 28	1549.6
Longchow	22 22	106 45	1010.1
Hongkong	22 18	114 10	2005.0
Macao	22 11	113 33	1615.5
Waglan	22 10	113 30	1209.9
Pakhoi	21 29	109 6	1979.9
Kiungchow	20 3	110 20	1288.1

In northern China the amount of rainfall is generally below 100 centimeters, as in our Hokkaido (Japan). The provinces of Shangtung are peculiarly liable to drought, with consequent severe famine. But the valley of the Yangtsekiang and southern China are wet and fertile. In general, the annual rainfall decreases from the south to the north; thus Pakhoi, in the Gulf of Tonking, has 188 centimeters of rainfall; Foochow, 121 centimeters; Zikawei, 101 centimeters; Shangtung promontory, 91 centimeters; and Peking, 68 centimeters. The annual rainfall also decreases from the coast toward the interior of the empire. This can be clearly seen from the observations made at the rain gage stations in the valley of the Yangtsekiang. Thus Chinkiang has 104 centimeters of yearly rainfall, Wuhu,