These results show that the mean temperature of the air on the hill must be lower than the temperature of the free air at the same height because the temperature on the hill never rises appreciably above the temperature of the free air but frequently falls considerably below it.

Since the mean temperature above every peak that has been compared with the temperature of the free air at the same height has been found cooler than the free air, it follows with a high degree of probability that the air above all mountain peaks averages colder than the free air, and as the chief cause is evidently the adiabatic expansion of air driven up the sides of the peak, the difference between the temperature of the peak and the free air probably increases with the height of the peak. From the conditions observed at Blue Hill it is easy to compute that the temperature above the tops of such peaks as Mount Washington, Pikes Peak, the Säntis, and the Sonnblick might be 15° to 20° F. colder than the temperature of the free air at the same height. At Blue Hill, and probably elsewhere, this cooling is greatest in cyclonic conditions when the wind is driven up the sides of the peak with greatest force.

If the air passing over a peak is cooled more than the surrounding air it will sink to a lower level than the top of the peak on the leeward side on account of the greater specific gravity of the cooler air. That this condition exists at Blue Hill is evident on days when clouds are passing somewhat above the summit of the hill. These clouds are seen to sink below the level of the top of the hill on the leeward side and do so for hours in succession.

(5)—ERRORS DUE TO THE OBSERVATIONS BEING LIMITED TO CERTAIN WEATHER CONDITIONS.

It is sometimes supposed that records obtained by means of kites are confined to certain weather conditions. For example, it is supposed that the records are obtained chiefly when the wind is above normal and not at all when the wind is very light. The kite, however, is not necessarily thus limited. The pressure, temperature, and wind velocity on the days of kite flights at Blue Hill do not differ in the average from the mean obtained from all the observations at the observatory taken in all conditions of weather; records have been obtained with the kites in all kinds of winds at the earth's surface, varying from a calm to a gale.

(6)—ERRORS IN DETERMINING THE VERTICAL GRADIENTS DUE TO SIMULTANEOUS CHANGES IN THE WEATHER CONDITIONS AT VARIOUS HEIGHTS WHILE THE INSTRUMENT IS MOVING VERTICALLY FROM POINT TO POINT IN THE ATMOSPHERE.

Since the weather conditions sometimes change rapidly while a kite is moving from point to point in the air, great care is needed in comparing records obtained at different levels; different conditions assumed to be due to differences of level may in reality be due to changes taking place simultaneously at both levels. A temperature gradient derived from the record of a kite meteorograph during the day may sometimes seem to exceed the adiabatic rate when the temperature of a large mass of the atmosphere is falling. For while a kite is rising from one point to another the temperature decrease shown by the meteorograph is the normal decrease with increase of height plus the decrease taking place in the body of the air.

The errors included under (5) and (6) will be considered in greater detail in the discussion of the observations in the Annals of the Astronomical Observatory of Harvard College, for which the above is a preliminary study.

MR. GIDEON S. JONES.

Mr. Gideon S. Jones, Assistant Observer, Weather Bureau, died at Columbus, Ohio, March 9, 1904, after an illness of three weeks, due to typhoid-pneumonia. Mr. Jones was born in Oxford, N. C., January 10, 1868. Most of his boyhood was spent at Madison, Wis. He entered the Weather Bureau in 1892 as an assistant observer. His duties were performed at the following-named points: Norfolk, Galveston, Charleston, Cincinnati, Yankton, Des Moines, and Columbus. He was a kind hearted and genial companion and popular with his associates.

THE TRANSVAAL OBSERVATORY.

By R. T. A. Innes.

This new meteorological institution is built on a range of hills 3 miles northeast of the city of Johannesburg. Its altitude is 5900 feet above sea level. Its latitude is 26° 6′ south. The instruments now being fixed there included a Sprung-Fuess barograph, a Dines-Baxendell anemometer and pressure plate, Callendar platinum resistance thermographs, Callendar sunshine recorder, Hoser lightning recorder of the type sent to the St. Louis Exhibition, Zeiss distance finder for work on clouds, Halliwell rainfall recorder, as well as complete sets of the more usual meteorological instruments. There are 24 outside barometer stations mostly at altitude of 4000 feet or more, and 198 rainfall stations, but the authorities are endeavoring to double this latter number in the coming season.

CLIMATE OF SIBERIA, KOREA, AND MANCHURIA.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

Korea and Manchuria may be compared in area and latitude with the group of Atlantic States of the United States that extends from North Carolina to Massachusetts. The climate of this region differs materially, however, from that of the eastern part of the United States. In eastern Asia the summers are short, with warm days and cool nights, the spring and autumn seasons are transitory, and the winters are long and cold.

Meteorological records at Vladivostok, which has about the same latitude as Boston, fairly represent the climate of northern Korea and adjacent parts of Manchuria. In those regions the monthly mean temperature remains below freezing from October to April, and the surfaces of the rivers serve as highways of travel five and six months in the year. At Vladivostok the annual mean temperature is 40.2°, as compared with 48.6° at Boston. At Boston, however, the monthly mean temperature is below freezing only during December, January, and February, with the lowest mean, 27°, in January, as compared with 7.4° at Vladivostok for the same month.

THE COLD OF SIBERIA.

In Siberia, along the line of the Transsiberian Railway, the climate is very severe. Great mountains shut off this region from the moderating influences of the oceans to the east and south, and from October until late in the spring it is exposed to the sweep of cold winds from the Arctic Ocean.

Lake Baikal, which cuts the line of the railway, and the region thereabouts is subject to heavy falls of snow, and the monthly mean temperature is above freezing only during July, August, and September. During the three winter months the monthly mean temperature at Lake Baikal is below zero, with the lowest mean, 6.8° below zero, in January. As a result of the low temperatures Lake Baikal is usually frozen to a great depth by January and remains in that condition three or four months.

The maximum temperatures of the short summer seasons in Siberia, northern Manchuria, and northern Korea are quite high and frequently range above 90°, even as far north as Verkhoyansk, where the January mean temperature is 56.2° below zero and the lowest absolute minimum temperature noted on the earth's surface, 90.4° below zero, has been recorded. Over a great part of Siberia, in fact, mercury often freezes in November, while in December, January, and February mercury remains frozen for weeks together in southern Siberia.

MANCHURIA AND COREA.

Manchuria, as a whole, possesses many fertile valleys that are watered by the rains of the southwest monsoon. In the plains region of southern Manchuria extremes of heat and cold are marked, although not so great as in the more northern parts of the country. The temperature rises above 90° in summer and falls to 10° or more below zero in winter, and rivers are frozen during the four winter months. After a short spring hot weather begins, which is separated from the severe winter by an autumn of about six weeks duration.

Niuchwang, Manchuria, which has about the same latitude as New York, has an annual mean temperature of 47.2°, as compared with 52.6° at New York. The monthly mean temperature continues below freezing at Niuchwang during December, January, February, and March, but at New York during January and February only. In July and August the mean temperature at Niuchwang, 77.7° and 74.4°, is 4.1° and 4.0° higher, respectively, than the means of the corresponding months for New York.

Korea is a mountainous, well-watered country, with practically no plain regions. Over the northern part of the peninsula winter temperatures fall to 10° to 15° below zero and the rivers are frozen for several months. In southern Korea temperatures fall nearly to zero during the winter months, and snow falls during a considerable part of the winter as far as the southern point of the peninsula.

Wonsan, the main port on the northeastern coast, near the latitude of Washington, D. C., has an annual mean temperature of 50.2°, as compared with 54.9° at Washington, and its July mean is higher than that of Washington. Owing to the proximity of Wonsan to the sea and its sheltered position to the eastward of the principal mountain range of Korea, its temperatures month by month correspond closely with the Washington record; each place presents but two months, January and February, with mean temperatures below freezing; in February the Wonsan temperature averages about 2° higher than that of Washington.

Fusan, in extreme southern Korea, has about the latitude of North Carolina, and its annual mean temperature, 54.5°, is about 5° lower than that of Norfolk, Va. The winter monthly mean temperatures do not fall below freezing at Fusan, the lowest, 33°, being that for January, as compared with 40.4° at Norfolk. The August mean temperature at Fusan, 76.8°, is 0.2° higher than the August mean at Norfolk.

Chemulpo, on the west-central coast of the Korean Peninsula, and Seoul, the capital, have about the same latitude as central Virginia. Seoul has the same annual mean temperature as Washington, with lower winter and higher summer temperatures. In January the monthly mean for Seoul is 24.3° as compared with 31.8° at Washington, and in July the Seoul mean is 81.1°, and the Washington mean 77°. Chemulpo temperatures average several degrees below those of Washington in winter, but correspond very closely with those of the same latitude on our Atlantic coast during the balance of the year.

THE WINTER OF 1903-4.

By W. B. STOCKMAN, District Forecaster, in charge of Division of Meteorological Records.

The winter of 1903-4 was an unusually cold one over the country to the eastward of the Mississippi River. This was not due to the occurrence of very low minimum temperatures, but to the number and succession of days whose mean temperatures continued below the normal. Over the Rocky Mountain slope district and thence westward to the Pacific Ocean, the mean temperature for each district was generally above the normal, and the average departures for the winter ranged from +0.6° to +3.9°. The details as to months and districts are shown in Table 1.

In the upper Mississippi Valley, and in all districts east of the Mississippi River, the mean temperature for each of the months of December, January, and February, except February in the Florida Peninsula, was below the normal, and generally to a marked extent; the departures of the averages of the whole three months ranged from —1.9° in the Florida Peninsula to —7.5° in the Lake region.

From month to month as the winter advanced the minus departures from the normal increased in the New England and middle Atlantic districts; they diminished in the Florida Peninsula, south Atlantic, and east Gulf districts; and varied in the Ohio Valley and Tennessee, Lake region, and upper Mississippi Valley.

TABLE 1.—*Departures from the normal for the several months and for the whole winter.*

Districts.	Departures from normals.			Winter.
	December, 1903.	January, 1904.	February, 1904.	
	°	°	°	°
New England	— 4.0	— 6.0	— 6.5	— 5.5
Middle Atlantic	— 4.8	— 6.1	— 7.4	— 6.1
South Atlantic	— 5.5	— 4.7	— 4.0	— 4.7
Florida Peninsula	— 4.8	— 1.6	+ 0.6	— 1.9
East Gulf	— 5.2	— 3.0	— 0.3	— 2.8
West Gulf	— 2.1	+ 0.5	+ 2.4	+ 0.3
Ohio Valley and Tennessee	— 7.6	— 3.9	— 5.0	— 5.5
Lower Lake	— 6.8	— 6.7	— 9.1	— 7.5
Upper Lake	— 7.0	— 5.3	—10.2	— 7.5
North Dakota	+ 0.2	+ 1.8	— 8.3	— 2.1
Upper Mississippi Valley	— 6.5	— 3.6	— 7.2	— 5.8
Missouri Valley	— 2.8	+ 1.0	— 3.3	— 1.7
Northern slope	+ 4.9	+ 6.5	— 0.1	+ 3.8
Middle slope	+ 1.4	+ 1.9	+ 4.2	+ 2.5
Southern slope	+ 1.8	+ 2.0	+ 7.9	+ 3.9
Southern Plateau	+ 1.0	— 0.1	+ 5.0	+ 2.0
Middle Plateau	+ 1.4	— 0.9	+ 3.7	+ 1.4
Northern Plateau	— 1.1	+ 5.6	+ 5.2	+ 3.2
North Pacific	+ 0.6	+ 2.4	— 0.8	+ 0.7
Middle Pacific	+ 1.4	+ 1.0	— 0.6	+ 0.6
South Pacific	+ 1.5	+ 1.6	+ 0.4	+ 1.2

The mean temperature was above the normal during each of the winter months in the middle and southern slope and south Pacific districts; in December and January in the north and middle Pacific and northern slope districts and North Dakota; in December and February in the northern and middle Plateau districts; and in January and February in the west Gulf districts.

At only two stations having twenty-five years or more of data was the record of lowest temperature broken.

At the following stations the minimum temperatures during January, 1904, were lower than during any preceding January since the establishment of the station:

TABLE 2.

Station.	No. of years of record.	Previous record exceeded by—
		°
Evansville, Ind	8	1
Hannibal, Mo	12	1
Harrisburg, Pa	16	1
Richmond, Va	6	1
Rochester, N. Y	33	2
Detroit, Mich	34	2
Northfield, Vt	18	6
Minneapolis, Minn	14	7
Binghamton, N. Y	8	15

No record of minimum temperatures at a regular Weather Bureau station was broken during the months of December and February.

Unusually high maximum temperatures were reported during December, 1903, from portions of Montana, Wyoming, and interior California; during January, 1904, from the mountains of West Virginia, and portions of the region to the westward of the Mississippi River; and during February, 1904, from portions of the slope, Plateau, and Pacific, and west Gulf districts, and, notwithstanding the marked negative departures from the mean for the month, in portions of Tennessee, Virginia, New York, and Maine. The details of these maximum temperatures are given in Table 3.