Mexican data for January, 1901.

Stations.	Altitude.	Mean barometer.	Temperature.			Relative humidity.	Precipitation.	Prevailing direction.	
			Max.	Min.	Mean.			Wind.	Cloud.
	Feet.	*Inch.*	°*F.*	°*F.*	°*F.*	%	*Inch.*		
Chihuahua	4,633	25.88	64.0	28.2	47.5	60	0.00	w.	w.
Leon (Guanajuato)	5,934	24.34	76.5	37.0	56.8	58	0.03	nnw.	sw.
Linares (Nuevo Leon)	1,188	28.81	86.0	37.4	60.6	76	1.85	s.	s.
Mazatlan	25	29.98	78.3	58.5	70.3	77	0.02	nw.	sw.
Mexico (Obs. Cent.)	7,472	23.09	73.9	36.7	55.6	54	.....	ne.	ne.
Morelia (Seminario)	6,401	.....	.....	.....	.....	.....	.....	.....	.....
Puebla (Col. Cat.)	7,112	23.42	75.2	37.9	57.2	59	.....	e.	ssw.
Saltillo (Col. S. Juan)	5,399	24.83	73.4	32.0	53.8	76	0.87	n.	s.
San Luis Potosi	6,202	.....	.....	.....	.....	.....	.....	.....	.....
Tampico	38	.....	.....	.....	.....	.....	.....	.....	.....
Zapotlan (Seminario)	5,078	.....	.....	.....	.....	.....	.....	.....	.....

RECENT PAPERS BEARING ON METEOROLOGY.

W. F. R. PHILLIPS, in charge of Library, etc.

The subjoined list of titles has been selected from the contents of the periodicals and serials recently received in the library of the Weather Bureau. The titles selected are of papers or other communications bearing on meteorology or cognate branches of science. This is not a complete index of the meteorological contents of all the journals from which it has been compiled; it shows only the articles that appear to the compiler likely to be of particular interest in connection with the work of the Weather Bureau:

Popular Science. New York. Vol 58.
Watts, H. M. The Weather vs. The Newspaper. P. 381.
Scientific American. New York. Vol. 84.
—— A New Flying Machine. [Davidson's.] P. 72.
Nederlandsch Tijdschrift voor Meteorologie, Groningen. 1 *Jahrg.*
Sieberg, A. Over Veranderlijked der Temperatuur en de oorzaken van de grootere schommelingen in de temperatuur te Aken. P. 98.
Proceedings of the Royal Society. London. Vol. 67.
Lockyer, Norman, and Lockyer, W. J. S. Solar Changes of Temperature and Variations in Rainfall in the Region surrounding the Indian Ocean. P. 409.
Astrophysical Journal. Chicago. Vol 13.
Newcomb, Simon. Period of the Solar Spots. P. 1.
Himmel und Erde. Berlin. 13 *Jahrg.*
Neesen, F. Ueber Gewitter und Blitzableiter. P. 145.
Comptes Rendus de l'Académie des Sciences. Paris. Tome 132.
Lannelongue, Achard et Gaillard. De l'influence du climat sur l'évolution de la tuberculose pulmonaire expérimentale. P. 114.
Angot, Alfred. Sur la relation de l'activité solaire avec la variation diurne de la déclinaison magnétique. P. 254.
Journal of School Geography. Lancaster, Pa. Vol. 5.
Jefferson, M. S. W. Weather Map Exercises for High School Pupils. P. 51.
La Nature. Paris. 29*me année.*
Plumandon, P. R. Les orages à neige. P. 171.
Cunha, A. da. L'Observatoire Météorologique de Trappes. Cerfs-volants et Ballons-sondes. P. 179.
Meteorologische Zeitschrift. Band 18. *Wien.*
Billwiller, R. Bildung barometrischer Theilminima durch Föhne. P. 1.
Woeikof, A. Klima und Föhne der Dänemark-Insel, Scoresby-Sund. P. 5.
Valentin, J. Einige Ergebnisse der österreichischen Luftballons bei der internationalen Fahrt am 12 Mai 1900. P. 10.
—— Zur Einführung in die neueren Anschauungen über die Ursachen der Luftelektricität. P. 17.
—— Meteorologische Preisaufgabe. P. 25.
Pernter, J. M. Der zweite internationale Wetterschiess-Kongress in Padua. P. 25.
Hann, J. Teisserenc de Bort über den jährlichen Gang der Temperatur in grossen Höhen der freien Atmosphäre. P. 28.
Sieberg, A. Temperaturumkehrungen mit der Höhe zwischen Aachen und dem Aussichtsthurm im Aachener Walde. P. 33.
Polis, P. Ergebnisse der Luftdruckbeobachtungen zu Aachen 1838–1851 und 1858–1897. P. 34.
Wegrosta, K. Föhnsturm in Spital am Pyhrn. P. 35.
Fruh, J. Föhn in Fort Good Hope 66° 20′ N. am Mackenzie River (Kanada). P. 36.
Scholtz, M. Irrlicht oder elektrische Erscheinung? P. 36.
Less, E. Kugelblitze über Wolken. P. 39.
Pockels, F. Zur Bestimmung der Maximalstromstärke von Blitzen. P. 40.
Wolfer, A. Provisorische Sonnenflecken-Relativzahlen für das IV Quartal 1900. P. 42.
Philosophical Magazine. London. Vol. 1. *6th Series.*
Townsend, J. S. Conductivity produced in Gases by the Motion of negatively charged Ions. P. 198.
Schuster, A. Electric Inertia and the Inertia of Electric Convection. P. 227.
Quarterly Journal of the Royal Meteorological Society. London. Vol. 27.
Ekholm, Nils. On the Variations of the Climate of the Geological and Historical Past and their Causes. P. 1.
Curtis, Richard H. An improved Mounting for the Lens and Bowl of the Campbell-Stokes Sunshine Recorder. P. 63.
Dines, W. H. Weekly Death rate and Temperature Curves 1890 to 1899. P. 69.
Mellish, Henry. Seasonal Rainfall of the British Isles. P. 79.
Nature. London. Vol. 63.
—— Audibility of the Sound of Firing on February 1. P. 372.

LONG RANGE SEASONAL FORECASTS FOR THE PACIFIC COAST STATES.

By ALEXANDER McC. ASHLEY.

While some advances in the art of practical forecasting have been made during the past two decades, the trained meteorologist, whose investigations are conducted along conservative scientific lines, candidly admits, that for the present, at least, weather conditions can not be accurately forecast for any considerable period in advance of their occurrence. The greater portion of his time, therefore, has been devoted to the perfection of a method or system which enables him to give to the public an accurate and practical forecast of the weather conditions which may be expected to prevail over a given area during the following thirty-six hours. Under favorable circumstances these forecasts may be extended to embrace a two-day, or even a slightly longer period; on the other hand, weather conditions may change with such rapidity that to forecast successfully, for even a twenty-four-hour period, is attended with the greatest difficulty.

There are those, however, who have the hardihood to publish long-range forecasts which are couched in such ambiguous terms that they seem to be verified no matter what may actually be the subsequent weather conditions that they purport to foretell, or else upon rigid verification, are proven to be absolute failures. Indeed, the field of long-range forecasting is so overrun by unscrupulous persons of this class that the honest scientific investigator is loath to enter it. Nevertheless, long-range forecasting must be regarded as the ultimate aim of the meteorologist, and there can be no doubt that the persistent efforts of scientific men will at last be rewarded, and a process evolved whereby general conditions may be foretold with reasonable accuracy months in advance. Such forecasts are of two distinct kinds:

(1) Forecasts of the actual meteorological phenomena will occur upon a specified date.

(2) Seasonal forecasts, i. e., forecasts of the variations in average weather conditions during corresponding seasons in successive years.

Forecasts of the first class can be made only after the many and complex laws underlying meteorological manifestations have been discovered, but long before this has been accomplished, success in the formulation of seasonal forecasts, for certain sections, at least, will have been realized.

Several years ago an official of the United States Weather Bureau invited attention to some very interesting and instructive data in connection with a severe drought which had been experienced throughout the State of California. The data collected suggested the possibility of a long-range seasonal forecast of average rainfall conditions for the Pacific coast States, more especially for California, and the ingenious and attractive theory advanced created quite a stir and

gained many adherents among the agricultural and industrial interests throughout that section. It will be the purpose of this article to state this theory briefly, after which an effort will be made to determine the truth or falsity of the conclusions reached.

The climate of the Pacific coast, as compared with that elsewhere throughout the United States, is unique, and especially is this true in regard to rainfall. The year may be divided, roughly, into two seasons:

(1) A winter wet season, extending from October to March, the heaviest precipitation occurring in midwinter.

(2) A dry, almost rainless, season during late summer.

Briefly stated, the theory advanced seems to be about as follows:

During the wet season, moisture-laden westerly and southwesterly winds, blowing from the warmer ocean and coming in contact with the cooler air over the land, suffer such a reduction in temperature that a large part of the moisture they contain is condensed and precipitated. During the dry season, on the contrary, westerly winds from the cooler ocean or northerly winds from the dry continent prevail, the capacity of the former for containing moisture being increased after reaching the warmer land, a condition inimical to precipitation. While the prevailing winds account for the occurrence of alternate wet and dry seasons, it is necessary to look still further for the causes which give rise to a variation in the actual amounts of rainfall occurring in different years. When these latter causes are determined a seasonal forecast of the relative amount of rainfall for a certain specified year, as compared with the normal or average amount, becomes possible. An investigation of the surface water temperatures of the neighboring ocean reveals the fact that the water temperatures are higher than the land temperatures during the rainy season, and are correspondingly lower during the dry season; also, as might be supposed, the maximum rainfall occurs during the month in which the water temperature exceeds the land temperature by the greatest amount. Even slight variations in the water temperature during the winter months, therefore, will have their influence upon the rainfall over the contiguous land surface. Under the influence of the sun's rays alone water surfaces are quite uniformly heated, so that were it not for the distributing effect of ocean currents the temperature of the surface water in our oceans would depend almost entirely upon latitude.

Branching northward from the great equatorial current in the region to the north and east of the Philippine group of islands, we find the warm Japan Current (called by the Japanese the Kuroshiwo, or black stream), the Pacific counterpart of the great Gulf Stream of the Atlantic. The Japan Current, flowing in a northeasterly direction from the point where it branches away from the great equatorial current, crosses the northern Pacific in the vicinity of the Aleutian Islands, and finding no egress toward the land-locked north, returns equatorward along the western margin of the North American Continent. It is assumed that this current, in the latter portion of its circuit, plays an important part in determining the temperature of the westerly winds of the Pacific coast, and upon this assumption is based the hypothesis suggested. In its poleward course the Japan Current is constantly giving up a portion of its heat to the overlying air, and, to a limited degree, to the colder containing water walls which define its channel, so that its temperature decreases more or less uniformly until it again reaches tropical latitudes. From this it is inferred that any variations in the path of the current, whereby, perchance, it may penetrate to higher latitudes and traverse a longer circuit than usual, will produce a corresponding decrease in its temperature at any given point, say the California coast, along its southern path. With this lowering of the current temperature, the air above it is cooled, evaporation is checked, less moisture is conveyed inland by the westerly and southwesterly winds, and a diminution in the rainfall over the neighboring coast results. If the temperature of the water is sufficiently lowered, drought conditions should prevail over the land.

Under normal conditions the Japan Current crosses the north Pacific about 400 miles to the south of the Aleutian Archipelago. The air overlying the current becomes heated and rises, causing a surface inflow of air from the north and south. The Aleutian Islands, lying to the north of the current, are chilled by the cold air flowing from the former direction. In the event of a shifting of the current toward the north, the Aleutian group comes directly under the influence of the warm air overlying the current and experiences abnormally high temperatures. Abnormally high Aleutian temperatures should, therefore, presage drought conditions over our Pacific coast, while low Aleutian temperatures should be followed by abundant rainfall.

The only meteorological records originally employed to substantiate the foregoing hypothesis are a four years' record from Unga Island and an old Russian temperature record at Unalaska from 1828 to 1834. The first-named record seems to indicate that high temperatures during the fall and early winter are followed three months later by drought in California; the Russian record shows that abnormally high temperatures prevailed at Unalaska during 1828, while, as far as can be determined, the California wheat crop was almost a complete failure in the spring of 1829. Taken together, the rainfall records for California and the temperature records obtained at Unga Island point toward a three months interval between the occurrence of abnormal heat at Unga and abnormal dryness throughout California. Hydrographic Office charts showing the velocity of the ocean current at various points in its course indicate that about three months are consumed by it in flowing from Unga to the California coast. It is thought, therefore, that if temperature and wind direction records from stations established in the Aleutian Islands could be received in time along the California coast a long-range forecast of temperature and precipitation could be issued for the latter district.

So much for the theory. The question at issue, then, is whether the Japan Current, or more correctly the North Pacific Ocean Current, actually controls the weather of the Pacific coast in the manner stated; i. e., whether drought occurs in California three months after abnormally high Aleutian temperatures.

In the interest of navigation the causes and effects of ocean currents are being constantly studied by the hydrographers of all nations; but as the currents have been plotted almost entirely with a view to determine their influence upon a vessel's course, their direction and rapidity of flow, rather than their temperature, have been considered. However, the latter feature has received some attention. In the case of the Japan Current (and its extensions, so far as it is possible to trace them), it is noted that a steady decrease both in temperature and velocity is manifested as it progresses, so that the ocean drift, when it finally reaches the California coast, is not only colder than the corresponding latitude calls for, but is also extremely indefinite both as to width and direction. This dwindling away of the original Japan Current is certainly inimical to the theory that its sluggish temperature changes primarily influence the rainfall over so extensive an area as the Pacific slope. A similar and erroneous idea that the Gulf Stream determines the climate of all western Europe has at length been abandoned by hydrographers and meteorologists, who now agree that geographical position and the general eastward drift of the atmosphere are the determining influences affecting climate and that the Gulf Stream is not recognizable as such beyond Nova Scotia.

If the temperature of the ocean water controls the rainfall over the California coast, then, inasmuch as the water temperatures off the northern coast of California are nearly the same as those off the southern coast, it must follow that the rainfall along the entire margin of the State should be quite uniform, a conclusion that is negatived by the fact that drought conditions in the south quite often coexist with normal rainfall conditions to the northward. In reality the more abundant rainfall of the north Pacific coast, as contrasted with that of the south Pacific, must be accounted for by the fact that while three influences (a neighboring ocean, proximity to the usual track of cyclonic areas, and mountain barriers extending at right angles to the rain-producing winds) operate in the former locality, a single influence, the neighboring ocean, alone dominates farther south.

TABLE 1.—*Monthly mean temperatures, at Unalaska Island, latitude 54° N; longitude 167 W.*

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
	°	°	°	°	°	°	°	°	°	°	°	°
1883	.....	.....	.....	30.7	38.0	43.5	48.1	47.8	44.5	42.5	36.1	30.4
1884	33.1	36.0	32.5	34.4	36.8	42.7	48.8	48.8	46.1	39.7	36.5	35.1
1885	36.8	27.0	30.5	35.0	39.4	42.9	46.7	48.5	44.1	41.3	35.4	33.8
1886	33.7	27.5	31.6	31.8	40.0	.....	.....	.....	.....	.....	.....	.....
Sums	103.6	90.5	94.6	134.9	154.2	129.1	143.6	145.1	134.7	123.5	108.0	99.3
Means	34.5	30.2	31.5	33.7	38.6	43.0	47.9	48.4	44.9	41.2	36.0	33.1

In order that the theory may be fairly tested a continuous temperature record from some station located on one of the Aleutian Islands is required, and although an effort has been made to collect the reports of all meteorological observations taken throughout this portion of the globe, thus far only fragmentary records have been secured. One of the best of these, a continuous temperature record for Unalaska embracing the unbroken period from April, 1883, to May, 1886, inclusive, has been employed by me. The preceding table shows the monthly average temperatures at Unalaska during this period.

While the means shown above can not be considered as representing the actual normal temperature conditions at Unalaska for the several months of the year, for want of more accurate data they will be employed as normals in the comparisons which follow. Table 2 shows the departure from normal for each month of the record.

TABLE 2.—*Departures of monthly mean temperatures from average (normal) monthly temperatures at Unalaska.*

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
	°	°	°	°	°	°	°	°	°	°	°	°
1883	.....	.....	.....	−3.0	−0.6	+0.5	+0.2	−0.6	−0.4	+1.3	+0.1	−2.7
1884	−1.4	+5.8	+1.0	+0.7	−1.8	−0.3	+0.9	+0.4	+1.2	−1.5	+0.5	+2.0
1885	+2.3	−3.2	−1.0	+1.3	+0.8	−0.1	−1.2	+0.1	−0.8	+0.1	−0.6	+0.7
1886	−0.8	−2.7	+0.1	+1.1	+1.4	.....	.....	.....	.....	.....	....	.....

The rainfall records from five stations in California, Red Bluff, Sacramento, San Francisco, Los Angeles, and San Diego, are next considered, these stations are selected because of geographical position and length of record, as affecting accuracy of monthly normals. For each month tabulated averages of the aggregate actual rainfall, and of the aggregate normal rainfall for the five stations are compared for the purpose of deducing an average departure from the average normal rainfall. The result is shown in Table 3.

TABLE 3.—*Combined records of total monthly precipitation at Red Bluff, Sacramento, San Francisco, Los Angeles, and San Diego, Cal.*

	January.	February.	March.	April.	May.	June.
	Inches.	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*
Average normal precipitation	3.64	3.21	2.76	1.71	0.77	0.21
1883 Average actual precipitation	.....	.....	.....	.....	.....	.....
1883 Average departure from normal	.....	.....	.....	.....	.....	.....
1884 Average actual precipitation	3.08	7.15	8.56	4.28	0.61	1.34
1884 Average departure from normal	−0.56	+3.94	+5.80	+2.57	−0.16	+1.13
1885 Average actual precipitation	1.59	0.40	0.38	1.54	0.27	.....
1885 Average departure from normal	−2.05	−2.81	−2.38	−0.17	−0.50	.....
1886 Average actual precipitation	6.99	0.73	2.46	3.75	0.24	0.04
1886 Average departure from normal	+3.35	−2.48	−0.30	+2.04	−0.53	−0.17

	July.	August.	September.	October.	November.	December.
	Inches.	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*
Average normal precipitation	0.02	0.04	0.29	0.92	2.02	4.12
1883 Average actual precipitation	T.	T.	0.47	1.71	0.63	1.26
1883 Average departure from normal	−0.02	−0.04	+0.18	+0.79	−1.39	−2.86
1884 Average actual precipitation	T.	0.01	0.28	1.24	0.30	7.13
1884 Average departure from normal	−0.02	−0.03	−0.01	+0.32	−1.72	+3.01
1885 Average actual precipitation	0.02	0.03	0.63	0.29	9.46	3.39
1885 Average departure from normal	0.00	−0.01	+0.34	−0.63	+7.44	−0.73
1886 Average actual precipitation	0.10	0.04	.....	0.80	0.70	1.71
1886 Average departure from normal	+0.08	0.00	.....	−0.12	−1.32	−2.41

If any intimate relation exists between Aleutian temperatures and California rainfall, it may now be shown by parallel tabulation of the average monthly departures from normal of the California rainfall (Table 3) and the departures of Aleutian monthly mean temperatures from the corresponding monthly normal temperatures (Table 2). In this tabulation (Table 4) the temperature departure for each month is placed alongside of the rainfall departure three months later, the shift being made in accordance with the hypothesis that the relation is manifested after the lapse of a three months' interval of time consumed by the Japan Current in flowing southward from the Aleutian Islands to the California coast. Only the months of the rainy season in the latter locality need be considered.

TABLE 4.—*Departures from normal.*

Year.	Month.	Aleutian temperatures.	California rainfall.	Month.	Year.
		° *F.*	*Inches.*		
1883	June	+0.5	+0.18	Sept.	1883
1883	July	+0.2	+0.79	Oct.	1883
1883	Aug.	−0.6	−1.39	Nov.	1883
1883	Sept.	−0.4	−2.86	Dec.	1883
1883	Oct.	+1.3	−0.56	Jan.	1884
1883	Nov.	+0.1	+3.94	Feb.	1884
1883	Dec.	−2.7	+5.80	Mar.	1884
1884	Jan.	−1.4	+2.57	April	1884
1884	Feb.	+5.8	−0.16	May	1884
1884	June	−0.3	−0.01	Sept.	1884
1884	July	+0.9	+0.32	Oct.	1884
1884	Aug.	+0.4	−1.72	Nov.	1884
1884	Sept.	+1.2	+3.01	Dec.	1884
1884	Oct.	−1.5	−2.05	Jan.	1885
1884	Nov.	+0.5	−2.81	Feb.	1885
1884	Dec.	+2.0	−2.38	Mar.	1885
1885	Jan.	+2.3	−0.17	April	1885
1885	Feb.	−3.2	−0.50	May	1885
1885	June	−0.1	+0.34	Sept	1885
1885	July	−1.2	−0.63	Oct.	1885
1885	Aug.	+0.1	+7.44	Nov.	1885
1885	Sept.	−0.8	−0.73	Dec.	1885
1885	Oct.	+0.1	+3.35	Jan.	1886
1885	Nov.	−0.6	−2.48	Feb.	1886
1885	Dec.	+0.7	−0.30	Mar.	1886
1886	Jan.	−0.8	+2.04	April	1886
1886	Feb.	−2.7	−0.53	May	1886

From the foregoing table it will be seen at a glance that the supposed relation between Aleutian temperatures and California rainfall does not exist. If the theory advanced were correct, temperatures above the normal should accompany rainfalls correspondingly below, while temperatures below should indicate rainfall above the normal. Out of the 27 months considered, only 11 show even an approximate agreement with the theory, and in not more than six of these instances can the variation in the temperature be considered as commensurate with that of the rainfall. Furthermore, in the rainy season of 1885–86, it is to be noted that while the Aleutian temperatures remained within a single degree of the normal, the rainfall variation from month to month in California was extreme, ranging from 7.44 inches above to 2.48 inches below the normal. To formulate a long-range seasonal forecast of rainfall over California, based upon variations in Aleutian temperature, would therefore seem to be impossible.

It may be suggested that the evidence of only five rainfall records from California stations is not sufficient in itself to defeat the theory, but it can be shown that the same disagreement between hypothesis and fact exists when all the rainfall records throughout the State are introduced. In Table 5 the Aleutian temperature departures as found in Table 4 are compared with the average rainfall departures from normal for the entire State of California, the latter data being arranged to show the departure from normal in the northern and the southern sections, respectively. In this test the rainfall normals employed are computed only up to the year and month compared; they are those that were used during the respective months by the climate and crop section and were recomputed annually by including the new month of the current year.

Such a striking similarity exists between the rainfall departures in Table 4 and those shown in Table 5 that the conclusions drawn from the former are applicable, with equal force, to the latter. In five months of the record given in Table 5, rainfall above the normal in one-half of the State is coincident with rainfall below the normal in the other, an

additional argument (already touched upon) adverse to the hypothesis.

TABLE 5.—*Departure from normal.*

Year.	Month.	Aleutian temperatures.	California rainfall.		Month.	Year.
			Northern.	Southern.		
		° *F.*	*Inches.*	*Inches.*		
1883	June	+0.5	+ 0.27	+0.01	Sept.	1883
1883	July	+0.2	+ 0.60	+0.83	Oct.	1883
1883	Aug.	−0.6	− 1.37	−1.03	Nov.	1883
1883	Sept.	−0.4	− 2.53	−0.35	Dec	1883
1883	Oct.	+1.3	− 1.58	−0.74	Jan.	1884
1883	Nov.	+0.1	+ 0.31	+5.42	Feb.	1884
1883	Dec	−2.7	+ 5.08	+5.85	Mar.	1884
1884	Jan.	−1.4	+ 2.19	+1.12	April	1884
1884	Feb.	+5.8	− 0.83	+0.71	May	1884
1884	June	−0.3	+ 0.12	−0.08	Sept.	1884
1884	July.	+0.9	+ 0.64	−0.21	Oct.	1884
1884	Aug.	+0.4	− 2.08	−0.17	Nov.	1884
1884	Sept.	+1.2	+ 4.35	+1.80	Dec.	1884
1884	Oct.	−1.5	− 2.84	−1.00	Jan.	1885
1884	Nov.	+0.5	− 3.49	−2.44	Feb.	1885
1884	Dec.	+2.0	− 3.18	−1.42	Mar.	1885
1885	Jan.	+2.3	− 1.51	+0.11	April	1885
1885	Feb.	−3.2	− 0.60	−0.13	May	1885
1885	June	−0.1	+ 0.73	0.00	Sept.	1885
1885	July	−1.2	− 0.62	−0.20	Oct.	1885
1885	Aug.	+0.1	+10.06	+2.39	Nov.	1885
1885	Sept.	−0.8	+ 0.09	−1.37	Dec.	1885
1885	Oct.	+0.1	+ 2.17	+3.20	Jan.	1886
1885	Nov.	−0.6	− 2.83	−1.26	Feb.	1886
1885	Dec.	+0.7	− 0.82	+0.67	Mar	1886
1886	Jan.	−0.8	+ 1.70	+0.87	April	1886
1886	Feb.	−2.7	− 0.43	−0.31	May	1886

Regarded as a whole, the Japan Current theory is open to the objection that the generalization is out of all proportion to the premises. The conclusion arrived at is far too weighty to be suspended upon so slender a thread of evidence as that presented by the Unga Island records. A coincidence has been discovered, not a law. Variations in the path of the Japan Current have little, if any, effect upon the rainfall either in California or elsewhere along our Pacific coast. The distribution of atmospheric pressure is undoubtedly the determining factor, for, upon investigation, it is found that if, from any cause, the mean storm track shifts to the southward along the western margin of the United States, such shifting is accompanied by heavy precipitation in regions where, under ordinary conditions, the rainfall is but scanty in amount. Such a condition prevailed in December, 1889, when the storm track shifted southward from the extreme northwestern border to central California. During this month the rainfall over the California coast was heavier than that over any other portion of the Pacific slope. Such shifts of storms and winds are the ultimate causes of changes in the ocean currents or drift and in the weather or climate; the Japan Current and ocean drift have no effective influence on California weather.

Inasmuch as storm areas must appear upon the weather map before their probable courses can be determined, and since individual storms cross the field of observation and disappear within a few days, we must consider long-range forecasting for any section of the country as impossible until our present knowledge of meteorology has been materially increased; until, in fact, the general circulation of the atmosphere is thoroughly understood.

SOME FEATURES OF THE CLIMATE OF IDAHO.[1]

By S. M. BLANDFORD, Section Director, dated Boise, Idaho, August 9, 1899.

An interesting study from a meteorological standpoint is found in the investigation of the physical laws which operate to give the isotherms of Idaho their north and south trend for a distance of 400 miles. A glance at the monthly isotherm chart, assisted by the knowledge that there are only slight variations from the general direction from month to month, suffices to show that the subject is worthy of investigation.

Few States in the Union possess more interesting features meteorologically and topographically than Idaho. Since these considerations become a part of each deduction which a forecaster is required to make in diagnosing the weather symptoms of any locality, it will be interesting to note to what extent they are intertwined in Idaho.

Preliminary to the discussion of the cause of the peculiar trend of the isotherms, it will be interesting to note the varying elevations over an undulating surface, such as the State presents, from its 485 miles of western boundary, eastward to its natural boundary, the Bitter Root Range and Rocky Mountains, i. e., from a point where the normal actual barometric pressure is 29 inches, corresponding to 1,000 feet elevation, to 22 inches pressure (8,000 feet) at its eastern boundary, the Rocky Mountains.

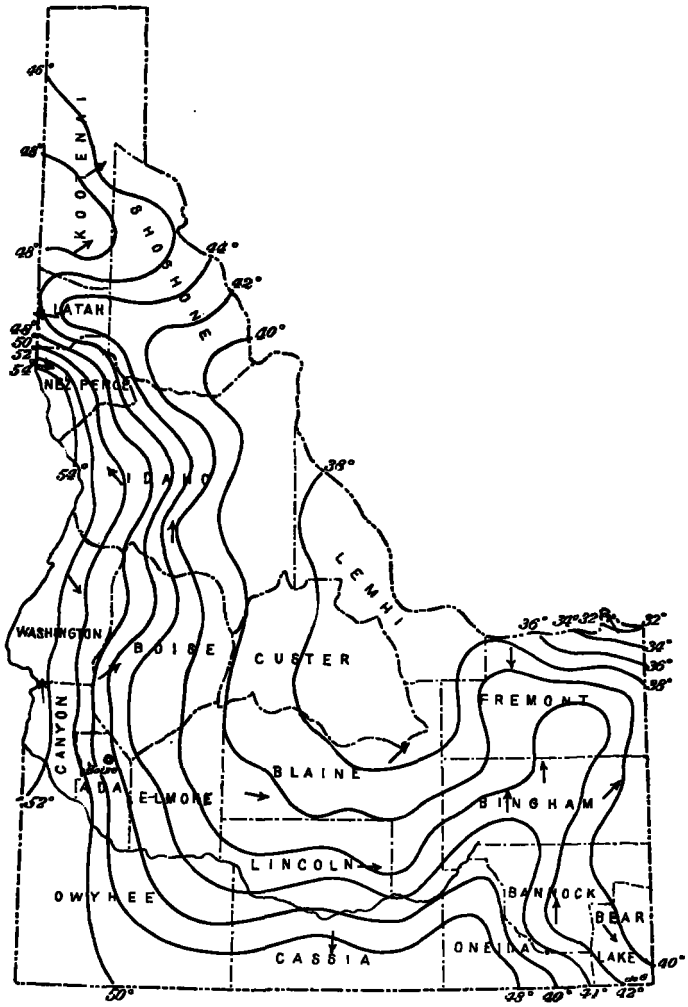

FIG. 2.—Mean annual isotherms and prevailing winds in Idaho, 1898.

An 8,000-foot barrier, trending southeastward from the winter storm track and penetrating the numerous cyclonic disturbances to a vertical height of a mile and a half, necessarily has an influence sufficient to cause the forecaster serious reflection in determining to what extent the storms are deflected by it from their natural course.

Not the least consideration is the valley of the Snake River,

[1] In reply to a general circular letter of September 14, 1898, Mr. S. M. Blandford, Section Director at Boise, Idaho, prepared a report on some features of the climate of Idaho that has not, so far as we know, as yet been published and which we take pleasure in laying before our readers. In connection with this article, a previous one on weather types, published at Portland, Oreg., in pamphlet form, August 15, 1897, should be studied.—ED.