ATLAS OF TYPHOON TRACKS.

There has recently been issued from the Zi-ka-wei Observatory, by the director, Louis Froc, S. J., a valuable work on typhoon tracks.[1] It appears in the form of an atlas, containing 21 major and 12 minor charts, with a brief introductory and explanatory discussion. The author states that his first purpose was to issue the charts as an appendix to a more general and detailed study on the oceanic storms of the Far East, but that the publication of such an essay ran the risk of considerable delay, and it was decided to publish the charts at once for the benefit of those interested.

The compilation for the atlas covers a period of 26 years, 1893–1918, during which time a total of 620 storms occurred manifesting typhoon characteristics at some period of their existence. Of the 21 principal charts there is one each for January, February, March, April, May, June, and December, which are the less active typhoon months; three each for July, August, September, and October, when the typhoon season is at its height, and two for November, when activity is decreasing. On the 12 lesser charts the data are summarized in condensed form.

In the introduction the author discusses the following subjects: The meaning of "typhoon," disturbed areas, how to read the charts, the classification of typhoons, and rate of progression on the tracks. Three tables are included—mean speed, extreme speed, and points of recurving on the tracks. There is also an explanatory note accompanying each of the major charts.

The author pays a graceful tribute to those who aided him in the preparation of the "Atlas," as follows:

> We beg to present this work to all those who, by their kind and constant cooperation, for many years now, have made possible and easy the study of so numerous storms, and chiefly to the sailors, who very often in the midst of hard struggle with the elements, have found time to collect observations for the sake of those who would run the same risks after them. To establish each track of the maps there have been made use of at least 10, sometimes 20 or more, reports received from stations on land and ships at sea: and we are glad to show our benevolent cooperators, while offering them our hearty thanks, that the task spontaneously undertaken by them has not been without reaching a very important and useful aim.

The charts for January and February are reproduced in the present issue of the REVIEW. See Charts XI and XII.

The revival of shipping since the war, taking many new vessels into the typhoon area, makes the appearance of this work most timely.—*F. G. T.*

[1] Atlas of the Tracks of 620 Typhoons, 1893–1918, by Louis Froc, S. J., director Zi-ka-wei Observatory, Zi-ka-wei—Chang-hai, 1920.

Charles W. Hendel.

Mr. Charles W. Hendel, of La Porte, Plumas County, Calif., for the past 26 years mountain snowfall observer for the Weather Bureau, was found dead in his bed recently. Though his exact age was not known, he was more than 100 years of age at the time of his death.

Mr. Hendel was born near Dresden, Germany, and received his technical education in that country. He migrated to California during the gold rush "in the days of '49," and for the past 67 years has made his home in La Porte, in the Sierra Nevada Mountains, overlooking the scenic Feather River region. He had the C. E. and M. E. degrees, and practiced the profession of civil and mining engineer for over a half century.

Mr. Hendel's vigor and good health remained with him until the very end. La Porte is many miles distant from the nearest railroad station, and in a region of extremely heavy snowfall. Mr. Hendel was as agile on snowshoes as many a man 50 years his junior. His last weather report, that for August, 1920, was received on time at the San Francisco office of the Bureau. He was a careful and conscientious observer, of the type so eagerly sought as special meteorological observers.—*A. H. Palmer, Weather Bureau Office, San Francisco, Calif.*

COLOR OF THE NIGHT SKY.

By LORD RAYLEIGH.

[Excerpt from *Nature* (London), Sept. 2, 1920, p. 8.]

Eye observations on the relative brightness of a yellow and a blue gelatine film afford "definite evidence that the night sky is yellower or less blue than the day sky.

"This conclusion has been confirmed photographically. A yellow and a dense blue filter were selected, and an Ilford panchromatic plate was exposed to the sky under these. It was seen at a glance that the density under the blue filter was the greater for the twilight sky, while for the night sky this relation was reversed.

"The results point to the conclusion that the light of the night sky, whatever the cause of it may be, is not due to the scattering of sunlight by rarefied gas situated beyond the earth's shadow. The comparative absence of polarization, formerly found, points to the same conclusion."

HOT WINDS AND "NORTHERS" AT TAMPICO, MEXICO

The Tampico Tribune of April 10 and 24, 1920, contains notes by Mr. S. A. Grogan, the meteorological observer for the Mexican Gulf Oil Co. on the "norther" of April 3, 1920, and the hot winds of April 16–18. The first three months of the year had brought to Tampico 12 "northers," but the one of April 3 was decidedly the most severe. The wind, which came suddenly, attained a force of 60 miles per hour, and for two hours averaged 50 miles per hour. This wind was accompanied by a marked rise in the barometer of 0.64 inch in 37 hours. Mr. Grogan has previously discussed these northers.[1]

The hot southwest winds have also been discussed.[2] These are apparently caused by dynamic heating as the dry winds descend from the Mexican plateau. The maximum temperatures on the three days were successively 98.8° F., 103.5° F., and 106.4° F. The relative humidity at times of observation was 20 per cent, 15 per cent, and 12 per cent, respectively, which was sufficient to warp and split woodwork and furniture.—*C. L. M.*

VARIABILITY OF TEMPERATURE AND DEPARTURE FROM THE MONTHLY MEAN.

By H. FICKER-GRAZ.

[Abstracted from *Meteorologische Zeitschrift*, Jan.–Feb., 1920, vol. 37, pp. 42–43.]

The day to day variability of temperature undergoes from year to year such large variations that a considerable number of years' record is necessary in order to

[1] "Northers" on the coast of Mexico, their effects, and forecast by local observations. MO. WEATHER REV., July, 1919, 47:469–471.

[2] Hot winds at Tampico, Mexico, Apr. 6–7, 1919. MO. WEATHER REV., April, 1919, 47:234.

obtain reliable means for each month. The relations, if any exist, between the daily variability of temperature and the mean monthly temperature have not been very thoroughly investigated. For instance, it is possible that in extremely cold months the variability of temperature is greater, and in warm months less, than the average.

Using data compiled by Wahlén from long records of Russian stations, the author has undertaken this investigation. The Russian stations used are Warsaw (101 years), Port Baltic (44 years), Archangel (68 years), Astrakhan (44 years), Katharinenburg (52 years), Barnaul (45 years), and Yakutsk (37 years). In addition, data for Vienna (75 years) and for Pola (40 years) compiled by von Hann, were used.

The results of the investigation were three fold: For Pola, which typifies the climate influenced by the ocean, there was no relation between the variability and the departure from the monthly mean. Vienna, Warsaw, Port Baltic, Archangel, and Astrakhan fall into a second group, in which the following relation seems to hold: In the months colder than normal the variability of daily temperatures is greater than the average; in months warmer than normal, it is less than the average. This region seems to form a transition between oceanic and continental climates. At Barnaul and Katharinenburg in west Siberia, this rule does not hold, and at Yakutsk in east Siberia the relation is reversed; i. e., in winter months colder than normal there is a small variability of temperature, and in those warmer than normal the variability is large.

The proof that these relations are not accidental is to be found in the smooth progression of values from Pola to Yakutsk. The relation is weakest in regions of most intense cold. Great variability of temperature implies cold and warm waves following one another rapidly. But in Yakutsk the lower the monthly mean lies the more uniform the temperature, because of fewer warm waves.[1]—*C. L. M.*

THE LAWS OF APPROACH TO THE GEOSTROPHIC WIND.

By F. J. W. WHIPPLE.

[Abstracted from *Quar. Jour. Roy. Met'l Soc.*, 46, 39-53, Jan., 1920.[2]]

In the steady state, the forces at each level in the atmosphere due to rotation, gradient, and internal friction (eddy viscosity) must balance; in the layer next the surface, the additional drag due to friction is practically equal and opposite to the drag due to the eddies, since it may be shown that the combined effect of pressure and rotation is only one-thirtieth that of one of the other two forces, and hence may be ignored. The actual wind at any level is considered as the vector sum of the gradient wind and a fictitious "relative wind." In the case of straight, parallel, motionless isobars, with uniform distribution of density, gradient, and eddy motion throughout the height considered, the above conditions lead to three laws: I. The relative wind falls off with increase of height according to the exponential law $R = R_0 e^{-(Bz-z_0)}$, where R is the relative wind at the height z, and R_0 that at height z_0; B is a constant, $B^2 = \omega \sin \lambda \, (\rho/\mu)$. II. The direction of the relative wind turns uniformly with increase of height, the circular measure of its azimuth being given by $\phi - \phi_0 = B\,(z - z_0)$. III. The angle between the actual wind near the surface and the relative wind there is 135°. The velocity curve traced out by the lines, drawn from a fixed origin, representing the relative winds at all heights, is the equiangular spiral of Ekman, the constant angle between the radius vector and the tangent (the latter representing transfer of momentum by the eddies) being 45°. The Law of Dynamic Similarity then leads to Taylor's relation, $V_0 = G\,(\cos \alpha - \sin \alpha)$.

The first two laws also hold when G changes with height: $G = G_0 + Az$; then $e^{-3i\pi/4}\,R_0 = a(V_0 - U)$, where $U = A/aB\sqrt{2}$, and $a = K\rho V_0/\mu B\sqrt{2}$, a generalization of Law III. With V_0, and U known, G_0 may be computed; and with the law of change of G with height known, V at any level may be computed. The theory is applied to the case where observation shows east winds at the surface to be replaced by west winds at 2,000 meters, so that the change of gradient wind with increasing height is equivalent to the addition of a westerly component; then for surface winds of equal strength, it is found that the backing of the surface wind is least for south winds, greatest for north winds; the ratio of surface wind to gradient wind is least for southeast gradient wind and greatest for northwest. This shows the tendency for the surface wind to be governed by the geostrophic wind aloft rather than the geostrophic wind at the surface.

The theory is applied in detail to Dobson's Salisbury Plain observations, and again the fact is theoretically confirmed that the gradient speed is attained at about 300 meters, while the gradient direction is not attained until a much greater height. Comparisons of theory with observation are rendered difficult because of the influence of the anemometer exposures, but such comparisons as have been made, especially with the data of T. Koraen, tend to confirm the theory—south winds being much lighter in comparison with gradient winds than those from northwest.

Cf. MONTHLY WEATHER REVIEW: July, 1915, **43**: 315–316; Sept., 1917, **45**: 455; Jan., 1918, **46**: 22; May, 1918, **46**: 211; Oct., 1919, **47**: 703–707.—*E. W. W.*

TECTONIC EARTHQUAKES AND VARIATIONS OF LATITUDE.

By G. ZEIL.

[Abstracted from *Comptes Rendus*, Paris Academy of Sciences, t. 171, pp. 311-313, Aug. 2, 1920.]

Omori, Milne, and Cancani found that destructive earthquakes took place at or near times of maximum or minimum variation of latitude. Brillouin concluded that variations of latitude were caused by sudden internal movements, of seismic origin; Montessus de Ballore's former doubts about this would not now hold, since he has come to believe that earthquakes and epeirogenic movements are one and the same. (*C. R.*, 158, 1833, 1914.)

The present author states that on a parallel of latitude, the various molecules of the lithosphere are in equilibrium two by two, at the opposite extremities of diameters of the circle; if one of these molecules is displaced along the diameter, a seesaw movement of the diameter will take place such that the displaced extremity will be above the normal level of rotation if it approaches the center, and below if it recedes from the center. On the basis of his former studies (see MONTHLY WEATHER REVIEW, 48, 356, June, 1920), Zeil then

[1] The colder the air, the stronger the disturbance necessary to blow it away. But in the coldest weather in continental interiors, such as central Siberia, the winds are usually weak. The warm winds of winter may glide over the cold surface layers for many hours and may not reach the surface at all before they cease to blow.—EDITOR.

[2] Cf. *Science Abstracts*, Apr. 30, 1920, p. 518.