open show the least. Corrections for snowfall and for difference in the exposure of the gauges as regards wind, amount to 5.5 per cent.; the observed difference in catch being 5.2 per cent. It thus appears that, as has previously been the case when the conditions of forest rainfall have been critically examined, the probability of error is about equal to the apparent difference in the amount of precipitation.

The second paper ("Wald und Niederschlag in Westpreussen und Posen und die Beeinflussung der Regen und Schneemessung durch den Wind," ibid., 1906, No. 11) is a critical study of the effect of wind on the catch of precipitation, especially snow, in gauges.

INFLUENCE OF FORESTS UPON WIND VELOCITY

M. I. St. Murat, the new director of the Meteorological Institute of Roumania, has made a study of the retarding effect of forests upon wind velocity (Bucharest, 1907, 4to, pp. 33, pls. 3), which appears in the *Annales* of the Roumanian Academy, Bucharest. The subject is one which has hitherto received practically no attention, at least so far as quantitative measurements are concerned. The results are as follows: The greatest effect which a forest can have upon the wind consists in diminishing the wind velocity to leeward of the forest. At 50 meters (164 feet) this decrease in velocity may amount to 3 to 12 kilometers (4–7½ miles) an hour, which means a reduction of the force of the wind by one degree on the Beaufort scale. This decrease is felt within 100 meters (330 feet) of the forest. After that the velocity increases again with increasing distance, and at about 500 meters (1,640 feet) reaches the force noted before the forest was encountered.

THUNDERSTORMS AND "FALSE CIRRUS"

Dr. C. Kassner has investigated the question of the "false cirrus" and of solar haloes ("Gewitterschirm und Sonnenringe," *Met. Zeitschr.*, July, 1907), with the following result:

1. Solar haloes before and after thunderstorms show that the cirrus veil is an ice cloud.

2. It is therefore wrong and misleading to call these cirrus clouds "false cirrus."

3. The cirrus cloud veil precedes the thunderstorm on the average by as much as four hours, and follows it by about one hour. Hence the average extent is measured by five hours, or, with an average hourly velocity of progression of 25 miles, the distance covered is 125 miles.

CLIMATOLOGY OF SOUTH AFRICA

J. R. Sutton, meteorologist of the De Beers Consolidated Mines, Kimberley, has published three more papers dealing with the climate of his district. These are (1) "A Contribution to the Study of Evaporation from Water-surfaces" (*Sci. Proc. Roy. Dub. Soc.*, XI., N. S., No. 13, 1907, 137–178); (2) "Variability of Temperature in South Africa," and (3) "The Diurnal Variation of Barometric Pressure" (*Rept. So. Afr. A. A. S.*, 1906, 13–48; 135–142). These papers are all worthy of attention on the part of those interested in the general subjects treated, or in the climatology of South Africa in particular.

THE WEATHER BUREAU

An account of the various activities of the Weather Bureau in saving life and property is given in an article by Gilbert H. Grosvenor, entitled "Our Heralds of Storm and Flood," published in the *National Geographic Magazine* for September, 1907. This article, which is fully illustrated, originally appeared in the *Century*.

SALT OF MARINE ORIGIN IN THE ATMOSPHERE

A paper entitled "Quelle est l'Importance du Transport atmosphérique de Sel marin?" by E. Dubois, published in *Ciel et Terre*, July 16, 1907, is worth noting chiefly because of the bibliographical notes which accompany it.

R. DeC. Ward
Harvard University

THE DISTRIBUTION OF RADIUM IN THE ROCKS OF THE SIMPLON TUNNEL[1]

The principal classes of material which enter into the composition of the massif of the

[1] Read before Section C, British Association for the Advancement of Science, Leicester, 1907.

Simplon are: (*a*) The Jura-Trias sediments, lithologically often much alike and much interfolded; (*b*) the Paleozoic crystalline schists; and (*c*) the gneiss of Monte Leone and the Antigorio gneiss, both stated to be of Archæan age. These rocks throughout contain radium, and for the most part in quantities much above what hitherto has been ascribed to sedimentary or igneous rocks.

Some thirty-six typical samples, taken from various points in the tunnel, have been examined. The poorest in radium are certain anhydrite rocks. Certain amphibolite schists go very high. The Antigorio gneiss rises from 10.5×10^{-12} and 8.0×10^{-12} grams radium per gram of rock at the Italian entrance to 23.7×10^{-12} at 4,000 meters inwards. Some of the Archæan gneisses yielded very high results.

Such quantities of radium if generally distributed throughout the rocks of the massif would be sufficient to disturb any forecast of the temperature which under normal conditions would be encountered at the level of the tunnel. It is suggested that the radium was in fact the source of the discrepancy between the predicted and the observed rock temperatures.

As it is improbable that these results are unique and apply only to this particular sedimentary accumulation and locality, they appear to point to hitherto unsuspected quantities of radium (and its parent elements) in the immediate surface materials of the earth. It seems impossible to avoid the conclusion that these elements were precipitated along with the sediments entering into the composition of the massif. The question then arises whether the accumulation of such quantities or radioactive elements may not enter as a factor in the events attending mountain-building. It can be shown that an area of sedimentation whereon has been accumulated some 10,000 meters of sediments, having a richness in radium comparable with the Simplon rocks, must necessarily become an area of greatly lessened crust-rigidity, and would hence become the probable site of crust-flexure under tangential compressive stress.

Further investigation will be required before such views can be generalized and the importance of radium as a source of instability of the earth's crust be determined. Apart from any speculations as to the influence of radium as the cause of an energetic substratum, the shifting of radium and its parent elements by denudation must be regarded as a convection of thermal energy, and this convection, if the quantities involved are sufficient, must, under the conditions referred to above and the unceasing action of denudation, become rhythmic in operation, and at the same time must result in shifting the areas of high temperature and crust-weakness from age to age as the site of sedimentary accumulation changes.

J. JOLY

THE ARC OF PERU

THE Committee of the French Academy of Sciences having scientific control of the French Geodetic operations on the equator has reported the completion of the remeasurement of the historic arc of Peru.[1]

This arc was measured by the French (1736–1743) and used in connection with a similar arc in the Arctic regions, also measured by the French, to decide a question in regard to the form of the earth which had arisen as the result of Cassini's surveys in France.

A discussion of the measurement of the arc can be found in the report of the Superintendent of the Coast and Geodetic Survey for 1889, appendix 7.

In 1889, the question of remeasuring this arc was brought before the International Geodetic Association by the Delegate of the United States, Professor George Davidson, who suggested that France should have the prior right to execute the work.

Circumstances prevented any active work until 1898, when the discussion of the subject was renewed in the same association as the result of a motion offered by the Delegate of the United States, Mr. E. D. Preston. The association voted in favor of the proposition to remeasure the arc and the French delegates undertook to have the work done.

[1] *Comptes Rendus Hebdomadaires des Séances de L'Académie des Sciences*, No. 6, 5 Août, 1907.