heavy rain. It was subsequently learned that the tornado first made its appearance at a small settlement known as Bloomfield on the west side of Staten Island about 2 miles from the lower end of Newark Bay, where it blew down and unroofed some barns and uprooted several large trees. It then apparently traveled up Newark Bay about 2½ miles and entered Bayonne as above stated. It did not do any extensive damage in Bayonne, but in the southern or Greenville section of Jersey City it destroyed some small frame buildings, severely injured a man and woman who occupied one of them, and totally destroyed a small frame church. The greatest damage done was in a thickly settled residential portion of Jersey City, where many dwellings lost roofs and chimneys. A large church had the greater part of its roof and side wall blown out; another lost its steeple; and the rear wall of a theater was blown out.

The entire path of the storm was narrow, apparently no where exceeding 500 feet in width. It skipped over many places lying in its course, but wherever it descended its action was fierce. The best evidence of its tornadic character was shown at Greenville, above mentioned, where it uprooted and broke off a number of trees within a space about 500 feet in diameter. These were located near the wrecked church referred to, in an apple orchard, and in the cemetery near by. The writer found these trees lying with their tops pointing toward the northeast, north, northwest, southwest and southeast, all in fairly regular order, the whirl of the wind apparently having been in a direction contrary to the motion of the hands of a watch laid on its back. Some of the larger trees were about two feet in diameter.

It has been estimated that the total loss caused by this visitation was in the neighborhood of $150,000.

While small storms of a similar character have occurred in recent years within a few miles of New York City, such as the Cherry Hill disaster in July, 1895, and the wrecking of several buildings in Elizabeth in August, 1899, no storm of equal destructive force and at the same time such narrow limits has ever been known to occur in Hudson County, or at any other place so near New York City, and for that reason it seems to deserve special mention.

RECENT PAPERS BEARING ON METEOROLOGY.

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

The subjoined titles have 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:

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THE SOLAR CONSTANT.

By FRANK W. VERY, dated September 9, 1901.

At the International Congress of Meteorology held at Paris in September, 1900, M. Violle, the Chairman of the Committee on Solar Radiation, expressed the hope that from the special discussion of this topic, now for the first time recognized as of sufficient importance to demand a place in the deliberations of a meteorological congress, a fresh impulse may be given to this study.

It begins to be recognized that the solar constant may, after all, be a variable with a considerable range, and if so, it is of great importance for meteorology, whether studied rationally for the sake of elucidating the causes of the changes of the weather, or as a practical art of weather forecasting, that a knowledge of the changes in this fundamental datum be obtained from day to day. The difficulties which supervene between the recognition of the importance of this knowledge and its attainment are enormous. M. Angot, at the close of the conference just named, expressed the fear that it may never, perhaps, be possible to arrive at an exact determination of this constant, and considered that at the present time effort must be directed toward perfecting actinometers and multiplying measures of the quantity of radiation which reaches the soil of the earth.

Against this rather disheartening conclusion may be placed the experience of Professor Angström, who, as the result of a comparison of his compensating and differential pyrheliometers, says: "The very satisfactory agreement in the values obtained from the two instruments, which are so different in principle and in their manipulation, speaks, as it seems to me, in favor of their accuracy." The problem of the perfecting of the actinometer, as an instrument capable of giving absolute values, seems to be at least approaching solution. It is rather by the devising of new methods of observation, and by new ways of interpreting and supplementing the results of measurements that further progress is to be made.

Crova's registering actinometer, checked by the indications of an absolute instrument, is capable of multiplying observations to any required extent, and Langley's bolographs give us a promising mode of interpreting results—in fact it is not too much to say that when these invaluable spectral records shall have been furnished under a greater variety of local conditions, carefully studied by the aid of meteorographs at high and low altitudes, and with simultaneous actinographs, checked by measures with a rapid absolute actinometer on Angström's or some equally efficacious plan, we shall have made a long step in the direction of an unimpeachable determination of the true intensity of solar radiation, and may possibly be able to decide the question of its variation at first hand.

The simultaneous occurrence of exceptionally hot weather over the North American and European continents in the summer of 1901, has provoked the conjecture that the sun itself is responsible for such wide-spread abnormal conditions; yet even if this were the case, it is certain that actinometers, read at the earth's surface in the heated zones, would not demonstrate such a solar hot wave, without a simultaneous thorough analysis of the condition of the upper air and the application of appropriate corrections. In fact, the first effect of an unusual increase of solar radiation must be to greatly magnify evaporation of moisture, both from the surface of the earth and from cloud layers, thus supplying the upper air with its most efficient absorbent of radiation. After this abundant replenishing with moisture, the incoming rays are employed to an unusual degree in heating the upper air, and increasing the altitude of the high-level isotherms. Surface temperatures rise because of this general lifting of the altitudinal isotherms, rather than by any immediate ac-