

INITIAL STUDIES IN ATMOSPHERIC ELECTRICITY AT THE MANILA OBSERVATORY, OCTOBER 1927-DECEMBER 1928

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I. GENERAL

A. THE INSTRUMENTS

During the months, October 1927 to April 1928 (inclusive); the instrument used for the measure of potential gradient was a Wulf electrometer, intended for visual reading but adapted for registration, rather crudely but quite effectively, as follows: The eye-piece of the reading microscope was removed, and a lens of longer focus substituted in its place, in such wise that when an electric lamp was placed near the rear opening of the instrument, the shadow of the quartz fibres on a bright background was projected on the slit of an old-type Mascart recording cabinet. The record shows a double white curve on a black background, the scale being 1 cm. per hour.

The record is clear-cut, the insulation and the sensitivity of the Wulf electrometer excellent, but yet for routine work this instrument was abandoned in favor of a remodeled Mascart quadrant electrometer for the following reasons: (a) With the fibres at the tension demanded by actual conditions, the Wulf calibration curve was not linear in form for the smaller potentials, but parabolic, making the scale in this region quite close, with consequent difficulty in reading, especially for low night values. (b) Unless additional potential were put on the inner case, negative values could not readily be distinguished from positive in the Wulf electrometer. As thunderstorms at or near Manila are very frequent during many months of the year, with consequent large negative values, considerable additional potential would have to be used, with resultant lessening of the openness of the scale. (c) It was desired to leave the electrometer working in all sorts of weather. This is rather risky with the Wulf as the high potentials of a thunderstorm could easily strain the delicate quartz fibres.

These difficulties mostly disappear with the quadrant electrometer used. The scale of calibration was found to be practically linear throughout, giving easy reading of low night values; plus and minus values are seen at a glance; and the highest occurring potentials of thunderstorms simply have the effect of making the light trace leave the paper, with no perceptible shift of the zero afterwards. After remodeling to overcome insulation troubles, the Mascart electrometer has been continued in use for the daily registration of potential gradient. The Wulf has been adapted for portable registration by substituting a small drum rotated by clockwork for the unwieldy falling frame of the Mascart recorder, and by enclosing the light path. The light is furnished by a small lamp lit by a 6-volt storage battery. (It is hoped to use this for comparison records at various places from time to time, and also at the coming total eclipse of the sun on May 9, 1929.)

B. LOCATION OF POST INSULATOR

The usual type of post insulator furnished by the Bureau of Terrestrial Magnetism, Washington, is used, with the slight modifications mentioned later. It is placed on a lawn in front of the Observatory, the collectors being 1.9 meters above the ground. The