
APPENDIX No. 2.

REPORT OF THE DIRECTOR OF THE MAGNETIC OBSERVATORY, TORONTO, FOR THE CALENDAR YEAR ENDED 31st DECEMBER 1877.

MAGNETIC OBSERVATORY,
TORONTO, January, 1878.

SIR,—In my Report for 1874, the first Report which I had the honour to make after the Observatory was placed in connection with the Marine Department, I gave a brief outline of the origin and objects of this, and of the other Colonial Observatories set in operation by the Imperial Government in 1839. In the same Report I enumerated the various instruments and their uses, and also gave a short summary of some of the facts connected with the science of magnetism which have been brought to light by the labours of this and of other Magnetic Observatories.

As sundry additions to the instrumental appliances of the establishment have been made since the publication of the Report of 1874, I have thought it desirable to again state the instruments used at the present time in the various branches of our work.

MAGNETIC OBSERVATIONS.

The *direction* of the magnetic force is defined by two angles, namely, the *declination* (called by sailors the variation of the compass), which is the angle between the plane of the astronomical meridian and the vertical plane in which the axis of the magnet lies, and the *dip* or *inclination*, which is the angle made by the axis of the needle with the horizontal plane. The numbers which express the *intensity* of the force, and the *declination* and *dip* which define its *direction*, are called the “magnetic elements,” a term used to denote the horizontal and vertical components of the force, named for brevity the “horizontal” and “vertical forces,” while the force, to distinguish it from its components, is usually called the “total force.”

For determining the values of the elements above named, the apparatus employed is as follows:—

- (1.) Declinometer and azimuth circle, for the declination.
- (2.) Dip circle and needles, for the dip or inclination.
- (3.) Vibration and deflection instruments, for the horizontal force.

The total force is commonly computed from the dip and horizontal force, but it may be found also by an independent instrument.

As the observations taken with the above named instruments occupy a considerable time, they are not adapted for the detection of changes which occupy a short time.

To observe the more minute and rapid changes, differential magnetometers are employed, viz.:—

- (1.) Differential declinometer, which shews the change that the declination has undergone between the times of readings.
- (2.) The bifilar, for measuring changes in the horizontal force.
- (3.) The balance magnetometer, for measuring changes in the vertical force.