HARMONIC ANALYSIS OF THE MAGNETIC VARIATIONS.¹

In this paper the author describes the method which he, and a number of other magneticians, have decided to employ for the harmonic analysis of magnetic variations.

The daily variations of total intensity, T , of declination, δ , and of inclination, i , are to be represented by periodic formulæ. The variations of the rectangular components (north, east, nadir), X , Y , Z , are therefore studied. Only such published values of the variations are to be used, which are the mean results of hourly observation throughout the month. The monthly means of the variations from the daily mean, if not already given in the publications, is found for every hour, for every month throughout the year. The annual period is easily eliminated by a linear interpolation formula (Lamont's). The mean variations for the entire year are also formed, and more especially for the polar day and polar night. The author hopes thus to be able to separate the direct from the indirect influences (temperature, etc.) of the relative position of earth and sun. If observations of many years are to be had, eleven-year means are also formed in order to eliminate the eleven-year period.

The form adopted for the periodic formulæ is—

$$f(x) = u_0 + \sum_{m=1}^{\frac{n}{2}} u_m + \sin (U_m + mx),$$

and a simple method is described for performing the numerical part of the process.

From the results, as Schuster has first shown, may be answered the question whether the causes for the daily variation are above or below the earth's surface. The direct and indirect influences of the earth's position in space may thus be separated. Also the geographical distribution of the values of the coefficients may give rise to important discoveries, as, for instance, an increase or decrease with the latitude.

The author hopes that all magneticians, interested in this work will enter into correspondence with him. He has asked the reviewer to publicly express his appreciation to those that are already his collaborators, as well as to those who may yet wish to assist in this important work.

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¹A. NIPPOLDT, JR. Ein Verfahren zur harmonischen Analyse erdmagnetischer Beobachtungen nach einheitlichem Plane. *Annalen der Hydrographie*. Februar, 1899. Pp. 57-64.