

menon which no one would have guessed to be connected with terrestrial magnetism, namely, the spots in the Sun. M. Schwabe, of Dessau, had observed the Sun's disk with immense perseverance for 24 years:—often examining it more than 300 days in the year; and had found that the spots had, as to their quantity and frequency, a periodical character. The years of maximum are 1828, 1838, 1848, in which there were respectively 225,⁴ 282, 330 groups of spots. The minimum years, 1833, 1843, had only 33 and 34 such groups. This curious fact⁵ was first made public by M. de Humboldt, in the third volume of his *Kosmos* (1850). The coincidence of the periods and epochs of these two classes of facts was pointed out by General Sabine in a Memoir presented to the Royal Society in March, 1852.

Of course it was natural to suppose, even before this discovery, that the diurnal and annual inequalities of the magnetic element at each place depend upon the action of the sun, in some way or other.

Dr. Faraday had endeavored to point out how the effect of the solar heat upon the atmosphere would, according to the known relations of heat and magnetism, explain many of the phenomena. But this new feature of the phenomena, their quinquennial increase and decrease, makes us doubt whether such an explanation can really be the true one.

Of the *secular* changes in the magnetic elements, not much more is known than was known some years ago. These changes go on, but their laws are imperfectly known, and their causes not even conjectured. M. Hansteen, in a recent memoir,⁶ says that the decrease of the inclination goes on progressively diminishing. With us this rate of decrease appears to be at present nearly uniform. We cannot help conjecturing that the sun, which has so plain a connexion with the diurnal, annual, and occasional movements of the needle, must also have some connexion with its secular movements.

In 1840 the observations made at various places had to a great extent enabled Gauss, in connexion with W. Weber, to apply his Theory to the actual condition of the Earth;⁷ and he calculated the Declination, Inclination, and Intensity at above 100 places, and found

⁴ In 1837 there were 333.

⁵ The observations up to 1844 were published in Poggendorf's *Annalen*.

⁶ See K. Johnstone's *Physical Atlas*.

⁷ *Atlas des Erdmagnetismus nach den Elementen der Theorie Entworfen*. See Preface.