

ocean throughout its whole course, excepting about one fifth, and consequently be made so much more accessible, owing to the remarkable relations in space between the sea and land, and to the means of which we are now possessed for determining with much exactness both the declination and the inclination at sea.

We have described the distribution of magnetism on the surface of our planet according to the two forms of *declination* and *inclination*; it now, therefore, remains for us to speak of the *intensity of the force* which is graphically expressed by isodynamic curves (or lines of equal intensity). The investigation and measurement of this force by the oscillations of a vertical or horizontal needle have only excited a general and lively interest in its telluric relations since the beginning of the nineteenth century. The application of delicate optical and chronometrical instruments has rendered the measurement of this horizontal power susceptible of a degree of accuracy far surpassing that attained in any other magnetic determinations. The isogonic lines are the more important in their immediate application to navigation, while we find from the most recent views that isodynamic lines, especially those which indicate the horizontal force, are the most valuable elements in the theory of terrestrial magnetism.\* One of the earliest facts yielded by observation is, that the intensity of the total force increases from the equator toward the pole.†

*clination* (On the secular Change in the Magnetic Inclination), in Pogg. *Annal.*, bd. xv., s. 322.

\* Gauss, *Resultate der Beob. des Magn. Vereins*, 1838, § 21; Sabine, *Report on the Variations of the Magnetic Intensity*, p. 63.

† The following is the history of the discovery of the law that the intensity of the force increases (in general) with the magnetic latitude. When I was anxious to attach myself, in 1798, to the expedition of Captain Baudin, who intended to circumnavigate the globe, I was requested by Borda, who took a warm interest in the success of my project, to examine the oscillations of a vertical needle in the magnetic meridian in different latitudes in each hemisphere, in order to determine whether the intensity of the force was the same, or whether it varied in different places. During my travels in the tropical regions of America, I paid much attention to this subject. I observed that the same needle, which in the space of ten minutes made 245 oscillations in Paris, 246 in the Havana, and 242 in Mexico, performed only 216 oscillations during the same period at St. Carlos del Rio Negro ( $1^{\circ} 53'$  north lat. and  $80^{\circ} 40'$  west long. from Paris), on the magnetic equator, i. e., the line in which the inclination  $= 0$ ; in Peru ( $7^{\circ} 1'$  south lat. and  $80^{\circ} 40'$  west long. from Paris) only 211; while at Lima ( $12^{\circ} 2'$  south lat.) the number rose to 219. I found, in the years intervening between 1799 and 1803, that the whole force, if we assume it at 1.0000 on the magnetic equator in the Peruvian Andes, between Micuipampa and Caxamarca,