

REASONS FOR THE PROSECUTION OF PENDULUM WORK*

"(1) The first scientific object of a geodetic survey is the determination of the earth's figure. It is probable that pendulum experiments afford the best method of determining the amount of oblateness of the spheroid of the earth, for the calculated probable error in the determination of the quantity in question from pendulum observations does not exceed that of the best determination from triangulation and latitude observations. Besides, the measurement of astronomic arcs upon the surface of the earth cover only limited districts, and the oblateness deduced from them is necessarily affected. On the other hand, the pendulum determinations are subject to no great errors which least-squares cannot ascertain; they may be widely scattered over the earth; they may be very numerous, they are combined to obtain the ellipticity by a simple arithmetical process; and the calculated probable error deduced from them is worthy of unusual confidence. It is very significant that while the value derived from pendulum work has remained nearly constant, that derived from measurements of arcs has been continually changing as more data has been secured, and the change has been in the direction to accord with the pendulum method. Also, the expense of the pendulum method is small compared with the geodetic method.

"(2.) Investigation has shown the importance of pendulum experiments to metrology.

"(3.) Geologists affirm that from the values of gravity at different points, useful inference can be drawn in regard to the geological formation of the underlying strata.

"(4.) Gravity is extensively employed as a unit in the measurement of forces. Thus, the pressure of the atmosphere is, in the barometer, balanced against the weight of a measured column of mercury; the mechanical equivalent of heat is measured in foot-pound etc. All such measurements refer to a standard which is different in different localities, and it is therefore very important to determine the amounts of these differences as the exactitude of measurement is improved.

"(5) It is hoped that as the knowledge of the constitution of the earth's crust becomes, by the aid of pendulum experiments, more perfected we shall be able to establish methods by which we can with confidence infer

*United States C. & G. S. report 1882, Appendix, No. 22