

say, of including in the survey the observation of the action of the earth's magnetism in its *entirety*, not simply to observe one angular component, *e. g.*, magnetic declination. Regarded from every possible point of view, from the *practical* as well as from the purely scientific, this course recommends itself.

What would we think of the astronomer who endeavored to adduce celestial laws by observing simply one celestial co-ordinate, *e. g.*, right ascension? By massing such right ascensions together in a statistical fashion he could compile certain statistical laws which would undoubtedly possess some value, but that he could never get at the real physical laws governing the phenomena is too apparent to require further argument. Nay, his statistical deductions might even lead him to adopt totally erroneous physical theories. Or, suppose the meteorologist should attempt to frame laws for weather prediction by observing and massing together simply one meteorological element, such as barometric pressure or temperature? True, this is the very thing that he must largely do in the present stage of meteorology, for the prime reason that he has not yet learned how to reach *all* the factors that control and shape the phenomena of the weather. He fully recognizes this and is making an earnest endeavor to get at the true physical laws by enlarging the scope of his methods of observation. And so the magnetician must be careful to start in the right way at the very beginning.

It is true that the practical needs of the land surveyor are largely satisfied, if not almost entirely, by a magnetic declination survey, such as for example the one so thoroughly carried out by the State Geological Survey of New Jersey, but erroneously designated a "magnetic survey." Declination surveys will supply the necessary data, such as declination, and when repeated, likewise the secular change of declination, but this data will always remain on the empirical plane, so long as simply declination data are at hand. We can never hope to reach the true laws of nature in this way.

The advantage to be derived in the deduction and verification of secular change data by a *combined* treatment whenever possible of *all* the magnetic elements involved, instead of the hitherto *independent*