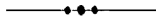


T H E

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[T H I R D S E R I E S.]



ART. XXII.—*On a Chart of the Magnetic Declination in the United States, constructed, by J. E. HILGARD, Assistant U. S. Coast and Geodetic Survey. With Plate V.*

[From the United States Coast Survey Report for 1876.]

SIR: I submit to you herewith, for publication in the Coast Survey Report for 1876, a chart of the magnetic variation in the United States. This chart, which shows the lines of equal magnetic declination (so-called Isogonic lines) for the year 1875, is mainly based upon the observations made during the progress of the coast survey up to 1877, together with those made under my personal direction during the period 1872-'77, at the charge of the fund bequeathed for scientific research by the late Professor Alexander Dallas Bache, held in trust by the National Academy of Sciences.

When the income of this fund became available for its objects, I proposed, in 1871, to the board of direction, then consisting of Professors Joseph Henry, Louis Agassiz, and Benjamin Peirce, that a portion of it should be devoted to the investigation of terrestrial magnetism in the United States, that subject being one in which Professor Bache had taken much interest, and in the investigation of which he had been personally engaged. Moreover, while this was a subject of general importance, there was not at that time any provision made for its prosecution on the part of the government. The board of direction having approved of my proposition, an allotment was made for several years in succession, and the observations were prosecuted under my immediate direction by observers whom

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I personally instructed in the work. In this way observations of the magnetic declination were made at about 200 stations, distributed over a large area of the interior country, at 150 of which stations the dip and horizontal intensity were also observed. These observations will be published in detail under the auspices of the National Academy of Sciences.

Subsequently, when on the extension of the scope of the Coast Survey so as to embrace the interior country, you proposed to undertake the requisite magnetic observations, the board of direction of the Bache fund deemed it best to close the work that I had been carrying on, and to publish the results obtained in the most available form, beside printing the observations themselves as a matter of record. Such publication can best be effected by combining them with all similar data available, and giving a graphic representation of the general result.

In the accompanying map this has been done for the declination (or variation of the compass) which is the element of the most practical utility. Since the data obtained by the Coast Survey form a very large part of the material used, an early publication in the Coast Survey Report is thought to be the most advantageous mode of giving the results to the country.

The incessant demands made upon the office of the Coast and Geodetic Survey for information relative to the variation of the compass in different parts of the United States bear evidence of the appreciation in which is held the similar map given in the Coast Survey Report for 1865 and published in 1867. The present map cannot fail to meet acceptably the constantly-increasing demand, as it is not only brought up to a more recent date, but is based upon a very much greater number of exact observations in the interior.

In its construction I have made use of all available data up to 1877, including, notably, beside the two principal sources already mentioned, the magnetic observations made in connection with the surveys of the Great Lakes and those of the Northern and of the Northwestern Boundaries by the United States Engineers, and those made under the direction of the General Land Office in tracing some of the principal meridians and base-lines for the surveys of the public lands and the boundaries of some of the Territories. Moreover, some very valuable observations have been furnished by private observers, which will be specified in another place.

I am indebted to Mr. A. Lindenkohl, chief draughtsman in the Coast and Geodetic Survey Office, for his valuable aid in the graphic construction of the Isogonic lines.

It was fortunate that, for the construction of this chart, the researches of my colleague, Assistant Charles A. Schott, on the

secular variation of the magnetic declination in the United States were available, without which it would have been difficult to reduce the observations to a common date, with some approach to accuracy. His latest paper on this subject, printed recently, will be found very useful for reference.

For a separate publication, it will probably be convenient to print Mr. Schott's map, illustrating the annual change, on the obverse side of the chart of magnetic declination, in order to make the sheet available for use without the aid of an explanatory text.

J. E. HILGARD,

Assistant Coast and Geodetic Survey.

TO CARLILE P. PATTERSON, *Superintendent.*

U. S. Coast and Geodetic Survey Office, Washington, D. C., July 1, 1879.

ADDENDUM.—The approximate annual change of the declination for the epoch 1880 in different parts of the country is given below, as deduced from the map accompanying the valuable research on the secular variation of the magnetic declination in the United States, etc., by C. A. Schott. Appendix No. 8 to Coast Survey Report for 1874, third edition, 1879.

The observed amount of change is by no means the same even in places not far remote from each other, as New York and Philadelphia. In grouping together a table of the present rate of change much allowance must therefore be made for possible local peculiarities that have not been ascertained. For the interior States the information is very scanty, or altogether wanting.

The annual change is expressed in minutes of arc, a + sign indicating increase of westerly or decrease of easterly declination.

Locality.	Annual change.	Locality.	Annual change.
Maine, coast of	+ 2'	West Virginia	+ 3½
Maine, interior	+ 3	N. Carolina, S. Carolina, Georgia	+ 3½
New Hampshire	+ 3½	Florida, northern part	+ 3½
Vermont	+ 5½	Florida, southern part	+ 3½
Massachusetts, eastern part ..	+ 2½	Alabama, Mississ., Gulf coast of ..	+ 3½
Massachusetts, western part ..	+ 3 to 4	Louisiana, eastern part	+ 3
Rhode Island and Connecticut ..	+ 3½	Louisiana, western coast	+ 2
New York, Long Island,	+ 2½	Texas, coast of	+ 2
N. Y., northern and west'n part ..	+ 4½	Texas, southwestern part	0
New Jersey	+ 3	Colorado	+ 2½
Pennsylvania	+ 3½	Utah	+ ½
Ohio	+ 2½	New Mexico and Arizona	0
Tennessee, eastern part	+ 2½	California, coast of	— 1½
Tennessee, western part	+ 2	Oregon, coast of	— 2 to 2½
Missouri	+ 2	Washington Territory, coast of ..	— 2½ to 3
Delaware, Maryl'd. and Virginia ..	+ 3		

The negative sign indicates an increase of easterly declination.

J. E. H.

