

**TERRESTRIAL MAGNETISM.
DISTRIBUTION OF THE MAGNETIC
DECLINATION IN ALASKA AND
ADJACENT REGIONS FOR 1910,
PP. 154-179**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649166299

Terrestrial magnetism. Distribution of the magnetic declination in Alaska and adjacent regions for 1910, pp. 154-179 by R. L. Faris

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Sci 2603.9

DEPARTMENT OF COMMERCE AND LABOR

COAST AND GEODETIC SURVEY

O. H. TITTMANN

SUPERINTENDENT

TERRESTRIAL MAGNETISM

DISTRIBUTION OF THE MAGNETIC DECLINATION IN
ALASKA AND ADJACENT REGIONS FOR 1910

BY

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APPENDIX No. 4—REPORT FOR 1909



WASHINGTON

GOVERNMENT PRINTING OFFICE

1910

available that it is now possible to make use of the graphical method and show some of the irregularities of distribution, at least in southeastern Alaska. The observations reveal the prevalence of local disturbance all along the coast from Cape Muzon to St. Michael. It is especially marked at a number of places in southeastern Alaska, sufficient in amount to affect the compasses of passing steamers. (Coast Pilot of Alaska, Part I, p. 12.) The most remarkable of these areas of local disturbance occurs on Douglas Island, near Juneau, where special observations made in 1904 revealed the presence of a local magnetic pole, at which point the needle lost its directive property and toward which, within a very limited area, the needle pointed from every direction. St. George Island in Bering Sea was also found to be a highly disturbed region, when observations were made there in 1897. These areas of extreme local disturbance are in general too limited in extent to be shown on a map of the scale suitable for an isogonic chart.

The limits adopted for the new isogonic chart of Alaska are somewhat different from those of the earlier ones. It still extends far enough to the east and south to join on to the isogonic chart of the United States, but it has been contracted on the west, because of the lack of reliable data along the coast of Asia. The scale of the present chart has been changed from that of the former ones, so that it is now about four times the size of the previous isogonic charts of Alaska.

SECULAR CHANGE OF DECLINATION.

January 1, 1910, has been adopted as the epoch of the isogonic chart and all results have been reduced to that date. Where the same station has been occupied more than once, only the most recent value has been used, but where several stations in the same locality have been occupied at different times, the different results are given. No attempt has been made to use results of observations made prior to 1870, on account of the uncertainty of the reduction to 1910.

For determining the secular change of declination since 1870 the results tabulated below are available. For earlier observations at Sitka, Port Etches, Kodiak, Unalaska, and Port Clarence, see Appendix 1; Report for 1895. For each station the tabulated values were plotted on cross-section paper and a smooth curve drawn to correspond approximately with the plotted values. The correction to reduce an observation to the year 1910 was then obtained by taking the difference between the ordinate at the date of observation and the 1910 ordinate. For stations where observations were made only at two dates, the annual change was assumed to be uniform during the interval. For convenience a table has been prepared for each "repeat" station giving the reduction to 1910 at five-year intervals. For observations at other than "repeat" stations, the reduction to 1910 was obtained by interpolation between the "repeat" station values. The use of the symbols (a), (b), (c), etc., after the name of the observer in the following tables indicates the organization to which the observer belongs. (See explanations, p. 163).

SITKA.

Most of the magnetic observations in the vicinity of Sitka have been made at three stations: (1) Japonski Island, where the Russians maintained a magnetic observatory from 1842 to 1867; (2) Parade ground in front of the Presbyterian Church; (3) Absolute building of the Coast and Geodetic Survey magnetic observatory. A magnetic survey of Sitka and vicinity in 1901 developed a very uniform distribution of magnetism, the

magnetic declination being 9'.5 greater at the site of the absolute observatory than on Japonski Island, and 3'.7 greater than at the parade ground. These corrections have been applied in the following table. Where a number of observations were made in the same year, only the mean value is given. The values beginning with 1902 are observatory results. In the diagram which follows the table (fig. 1) the tabular values are shown by dots.

Magnetic declination at Sitka.

[Latitude, 57° 02'.9. Longitude, 135° 20'.1 W.]

Date	Declination	Observer	Station
	<i>East</i>		
1867. 6	28 58. 5	A. T. Mosman (a)	Japonski Island
1874. 3	29 03. 2	M. Baker (a)	Parade ground
1880. 4	29 14. 3	M. Baker and W. H. Dall (a)	Japonski Island
1881. 7	29 20. 7	H. E. Nichols (a)	Do.
1892. 6	29 37. 6	F. Morse and J. E. McGrath (a)	Japonski Island and parade ground
1894. 4	29 40. 6	F. Morse (a)	Parade ground
1896. 5	29 43. 1	Do.	Do.
1900. 8	29 47. 4	L. A. Bauer (a)	Parade ground and absolute observatory site
1901. 5	29 50. 5	J. A. Fleming (a)	All three stations
1902. 5	29 51. 1	H. M. W. Edmonds (a)	Absolute observatory
1903. 5	29 53. 9	Do.	Do.
1904. 5	29 55. 8	Do.	Do.
1905. 5	29 59. 6	Do.	Do.
1906. 3	30 03. 1	Do.	Do.
1907. 5	30 06. 8	Do.	Do.
1908. 5	30 10. 4	Do.	Do.

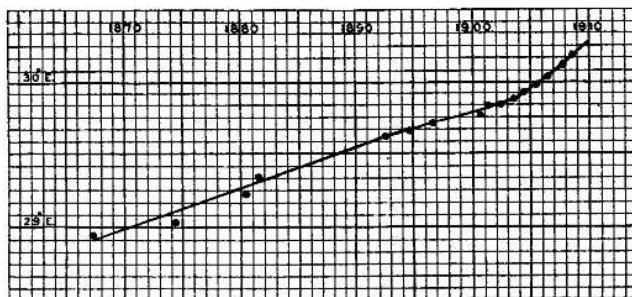


FIG. 1.—Secular change of declination at Sitka.

KODIAK.

Nearly all of the recent observations have been made at the same station, on a bluff on the north side of St. Paul Roadstead, about three-fourths of a mile east of the town.

Magnetic declination at Kodiak.[Latitude, $57^{\circ} 47'.5$. Longitude, $152^{\circ} 23'.8$ W.]

Date	Declination	Observer
	<i>East</i>	
	° ' "	
1867. 7	26 04. 7	A. T. Mosman (a)
1874. 4	25 22. 0	M. Baker (a)
1880. 5	25 09. 2	Do.
1896. 4	24 33. 8	H. P. Ritter (a)
1905. 8	24 13. 3	W. M. Steirnagle and P. C. Whitney (a)
1907. 6	24 06. 9	A. Crowell (a)
1908. 5	24 11. 8	S. W. Tay (a)

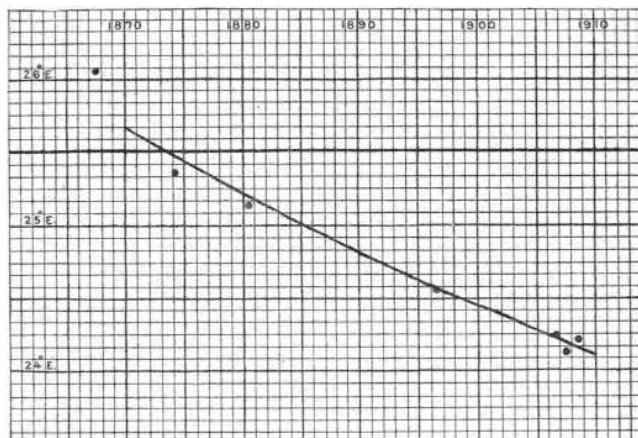


FIG. 2.—Secular change of declination at Kodiak.

DUTCH HARBOR.

Several stations have been occupied in the vicinity of Dutch Harbor at different times.

In 1867 Assistant Mosman observed at the end of the spit at the eastern entrance to Captain's (now Dutch) Harbor, in $\phi = 53^{\circ} 54'.0$ and $\lambda = 166^{\circ} 30'.9$.

In 1871, 1873, 1874, and 1880 Messrs. Dall and Baker observed at the astronomic station on Amaknak Island, just across from Iliuliuk village (now Unalaska) $\phi = 53^{\circ} 52'.9$; $\lambda = 166^{\circ} 32'.3$.

In 1883 R. A. Marr observed at a point about 8 feet south of this astronomic station.

In 1889 J. E. McGrath's station was 267.9 feet northwest of what was supposed to be the location of the old station of Dall and Baker. At the same time J. H. Turner made observations at a point 257.1 feet east of the old station. He reoccupied this station in 1891, as did O. B. French in 1896. In his records of 1891, Mr. Turner says: "Basaltic rock underlying the surface may possibly affect magnetic measures made in this region."

In 1900 Dutch Harbor had become the more convenient anchorage for vessels, and in that year a new station was established near the village of Dutch Harbor, at the "Azimuth Mark" erected in connection with the astronomic observations of 1896 in

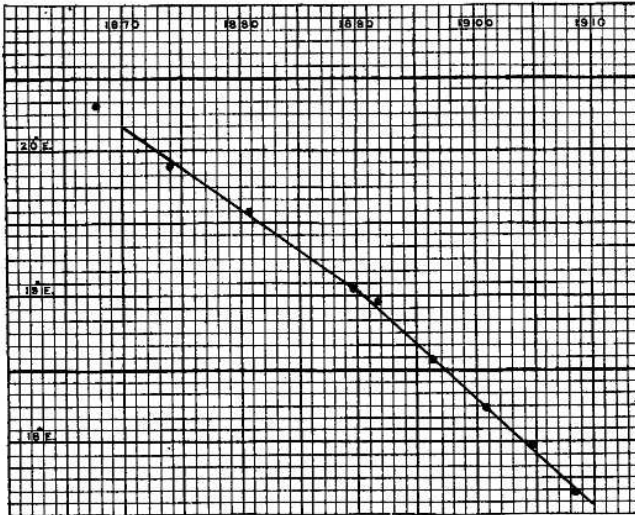


FIG. 3.—Secular change of declination at Dutch Harbor.

$\phi = 53^{\circ} 53'.4$ and $\lambda = 166^{\circ} 32'.1$. This station has been in use up to 1908. In that year observations were also made at a number of places about the bay, one of which, South Base, is only a short distance from Mr. Mosman's station of 1867.

The observations of Dall and Baker show an annual decrease in declination of $2'.8$ from 1873 to 1880. Observations at Turner's station give an annual decrease of $4'.5$ from 1889 to 1896. Observations at the Dutch Harbor station give an annual decrease of $4'.7$ from 1900 to 1908. Assuming station South Base of 1908 to be comparable with Mosman's station of 1867, the average annual decrease for that interval is $3'.9$, which is very nearly the average of the values for the shorter periods.

Assuming an annual decrease of 4'.5 from 1896 to 1900, observations at Turner's station (1889-1896) require a correction of +50'.5 to reduce to the Dutch Harbor station. Assuming an annual decrease of 3'.5 from 1880 to 1889, observations at the old astronomic station (1871-1880) must be increased by 6'.5 to reduce to Turner's station and hence require a correction of +57'.0 to reduce to the Dutch Harbor station. From observations in 1908, results at South Base must be increased by 31'.0 to reduce to Dutch Harbor station. This correction will be used for the 1867 value. The reduced values are given in the following table:

Magnetic declination at Dutch Harbor.

[Latitude, 51° 55'.4. Longitude, 166° 22'.1 W.]

Date	Declination	Observer	Station
	<i>East</i>		
	°		
1867. 7	20 18. 4	A. T. Mosman (a)	At end of spit
1873. 4	20 04. 2	W. H. Dall (a)	Astronomic station
1873. 7	19 56. 3	M. Baker (a)	Do.
1874. 7	19 39. 8	Dall and Baker (a)	Do.
1880. 6	19 35. 0	Do.	Do.
1889. 5	19 02. 9	J. H. Turner (a)	Turner's station
1891. 6	18 57. 4	Do.	Do.
1896. 3	18 34. 1	O. H. French (a)	Do.
1900. 3	18 14. 0	J. F. Pratt (a)	Dutch Harbor
1904. 5	17 57. 3	H. L. Beck (a)	Do.
1908. 3	17 38. 4	H. A. Seran (a)	Do.

KISKA, KISKA ISLAND.

[Latitude, 51° 59'.1. Longitude, 162° 21'.6 W.]

Date	Declination	Observer	Station
	<i>East</i>		
	°		
1873. 6	11 06. 4	W. H. Dall (a)	Astro Post Barrel
1904. 6	8 18. 2	H. L. Beck (a)	
1904. 6	8 14. 3	Do.	
1904. 7	8 04. 5	H. C. Denson (a)	
Average annual change, -5'.6			

ST. PAUL ISLAND, PRIBILOF ISLANDS

[Latitude, 57° 07'.2. Longitude, 170° 16'.4 W.]

Date	Declination	Observer
	<i>East</i>	
	°	
1874. 6	17 24. 0	W. H. Dall (a)
1880. 6	17 39. 2	Dall and Baker (a)
1897. 5	16 42. 0	G. R. Putnam (a)
Average annual change, -3'.4		

ST. MICHAEL.

Observations have been made at a number of stations at St. Michael, and they indicate the presence of much local disturbance. There is not sufficient data, however, to reduce all the observations to the same station, and only an approximate determination of the secular change is possible.

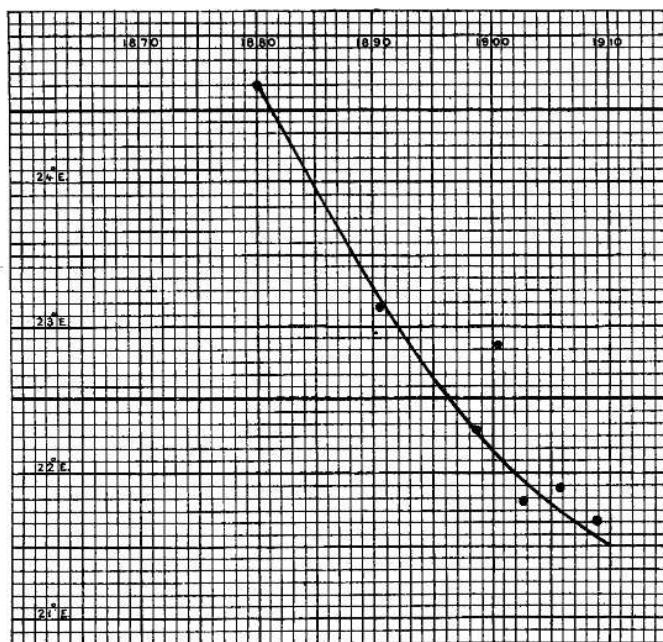


FIG. 4.—Secular change of declination at St. Michael.