DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

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Survey specifications and data reduction

The map of the residual magnetic field was compiled from a synthesis of digital data acquired from three aeromagnetic surveys. Flight elevations and line spacings of these surveys were, respectively, as follows: survey I--7500 ft (2286 m) barometric, 1 mi (1.61 km); survey II--500 ft (152 m) above ground, 0.25 mi (0.40 km); survey III--500 ft (152 m) above ground, 0.62 mi (1.0 km). The residual aeromagnetic fields for surveys I and III were obtained by removing the International Geomagnetic Reference Field (1965 and 1975), after updating to the years in which the surveys were flown. An alternative reference field, USPG1266, was employed for survey II.

To merge the various surveys, an elevation of 500 ft (152 m) above terrain was selected as the reduction datum level. Because survey I was flown at a constant barometric altitude above this reduction datum level, the associated data were analytically continued downward and draped to 500 ft (152 m) above terrain, utilizing an unpublished computer program developed by L. Cordell. The three surveys were then merged employing one-dimensional splining techniques described by Bhattacharyya and others (1979). A one kilometer grid of values, using a minimum curvature method (Briggs, 1974), was created and then converted to a Universal Transverse Mecator projection with 105° W longitude as the central meridian.

References

Bhattacharyya, B. K., Sweeney, [illegible], and Codson, K. H., 1979, Integration of aeromagnetic data acquired at different times with varying elevations and line spacings: Geophysics, v. 44, no. 4, p. 742-752.

Briggs, I. C., 1974, Machine contouring using minimum curvature: Geophysics, v. 39, no. 1, p. 39-48.

WYOMING
SOUTH DAKOTA

SOUTH DAKOTA
NEBRASKA

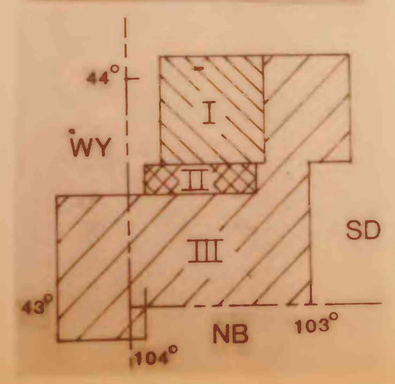
44° 0′
43°40′
43°20′
43° 0′
104°30′
104°10′
103°50′
103°30′
103°10′
102°50′

EXPLANATION

MAGNETIC CONTOURS--Showing total residual magnetic field intensity. Contour interval is 25 gammas. Hachures indicate closed areas of low intensity.

SCALE 1:250 000
5 0 5 10 15 20 25 MILES
5 0 5 10 15 20 25 KILOMETERS

Index map showing extent of coverage of aeromagnetic surveys.



SOURCES OF DATA

I — U.S. Geological Survey, 1969, Aeromagnetic map of the Custer-Rapid City area, southwestern South Dakota: U.S. Geological Survey Geophysical Investigations Map GP-670, scale 1:62,500.

II — Meuschke, J.L., Johnson, R.W., and Kirby, J.R., 1963, Aeromagnetic map of the southwestern part of Custer county, South Dakota: U.S. Geological Survey Geophysical Investigations Map GP-362, scale 1:62,500.

III — Unpublished data from aeromagnetic survey of South Dakota and Wyoming; survey conducted by Geodata International Inc., for the U.S. Geological Survey, 1980.

AEROMAGNETIC MAP OF THE SOUTHERN BLACK HILLS: PARTS OF SOUTHWESTERN SOUTH DAKOTA AND EASTERN WYOMING

by

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1981

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