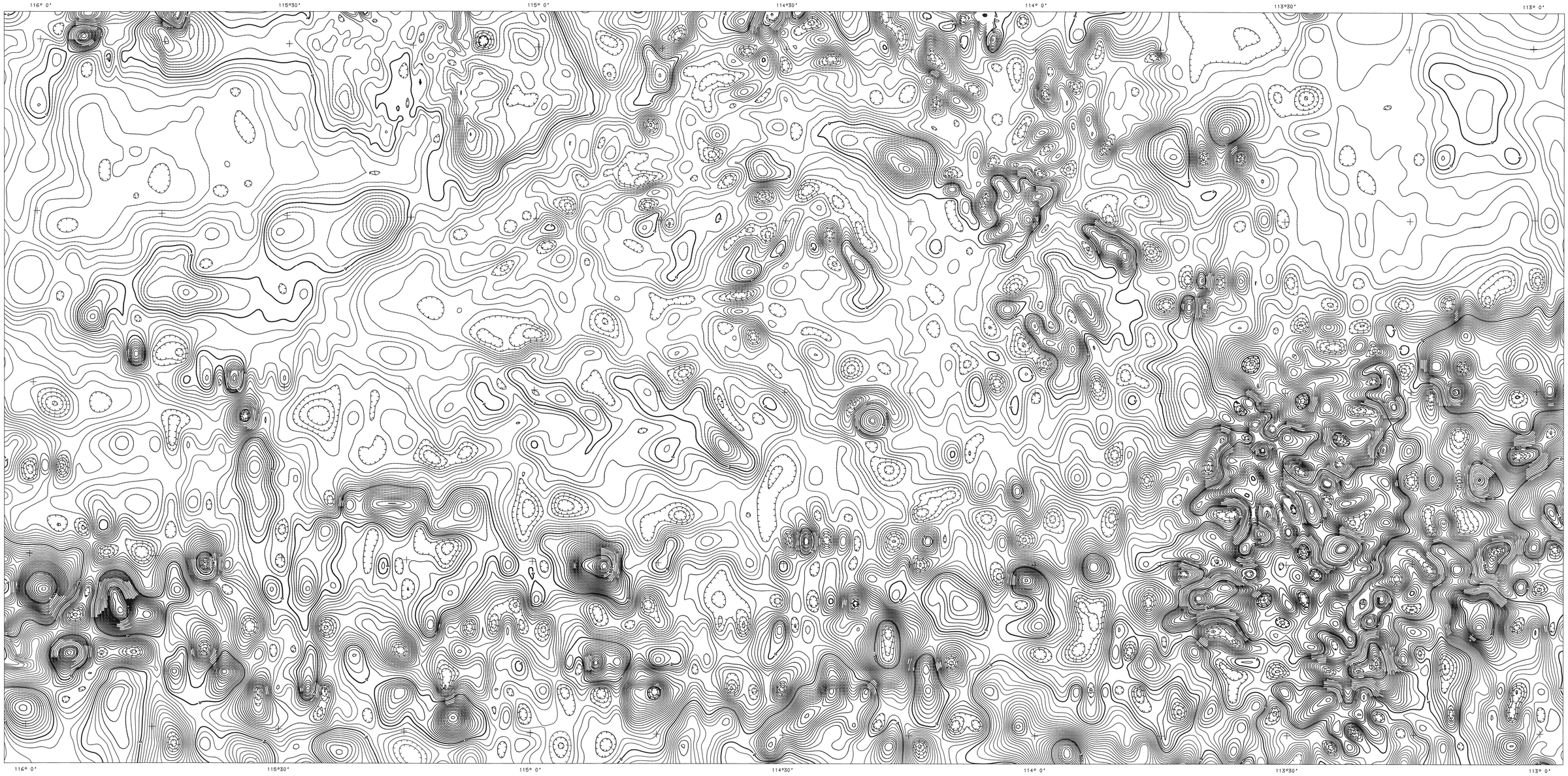
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF-2160-A



SCALE 1:250 000

5 0 5 10 15 20 25 MILES

5 0 5 10 15 20 25 KILOMETERS

Manuscript approved for publication May 3, 1991

Aeromagnetic contour—Contour interval 25 nanoteslas. Hachures show areas of closed magnetic lows

INTRODUCTION

The aeromagnetic-anomaly map in this report was produced as part of the Hailey CUSMAP (Conterminous U.S. Mineral Assessment Program) in order to facilitate studies of the mineral resources and tectonic setting of the region. The compilation of various magnetic surveys into one composite data set provides a framework for geologic and geophysical interpretations at both local and regional scales. The map presented herein is part of a cooperative effort that used geophysical, geological, and geochemical techniques to assess the mineral-resource potential of the Hailey and western half of the Idaho Falls 1° x 2° quadrangles, which cover a region between latitudes 43° N. and 44° N. and longitudes 113° W. and 116° W. These data enhance preliminary compilations shown in an earlier interpretative report by Kleinkopf and others (1989).

AEROMAGNETIC ANOMALY MAP

The aeromagnetic map was compiled from a synthesis of digital data acquired from eight separate aeromagnetic surveys flown at different times with varied flight elevations, flight-line spacings, and data-reduction procedures. The eight surveys were analytically merged together to produce one composite data set. Figure 1 and table 1 give a brief description of the surveys used in the map compilation. Flight elevations ranged from 120 m to 3,650 m (400-12,000 ft) above terrain; flight-line spacings ranged from 0.8 km to 4.8 km (0.5-3 mi). The data were projected onto a cartesian coordinate system using a Lambert projection with standard parallels of 33° N. and 45° N., a central meridian of 114° W., and a base latitude of 0° N.

Before each survey was merged to an adjacent survey, each data set was interpolated to a square grid using a minimum-curvature algorithm (Webring, 1981); grid spacing was typically one-fourth to one-third the original flight-line spacing. The magnetic-anomaly grid [total field intensity minus the DGRF (Definitive International Geomagnetic Reference Field)] was calculated (Sweeney, 1990) for the appropriate time of year and elevation of the original survey. If an obsolete regional field other than the DGRF had been removed, as was the case with much of the digitized data, the outdated geomagnetic reference field was added back and the DGRF was subtracted from the grid.

An elevation of 305 m (1,000 ft) above terrain was selected as the reduction datum level. Surveys flown in draped mode (constant elevation above terrain) above or below this datum level were analytically continued upward or downward (Hildenbrand, 1983) so that the data would be consistent with that of adjacent surveys. For surveys flown at a constant barometric elevation, the related data were analytically continued to the draped surface of 305 m above ground using the method of Cordell (1985). If the survey's data had to be continued more than two grid intervals downward, the data were regridded to a coarser interval prior to continuation to minimize short-wavelength noise enhanced by the method. After reducing the data to a common level, each survey was regridded to a 0.5-km (0.3-mi) interval and merged to adjoining surveys using a cubic-spline method (U.S. Geological Survey, 1989).

Every attempt was made to acquire the data in digital form. Most of the available digital data were obtained from aeromagnetic surveys flown by the USGS (U.S. Geological Survey), or flown on contract for the USGS, or were obtained from other federal agencies. Much of the pre-1975 data are available only on hand-contoured maps and had to be digitized. These maps were digitized along flight-line/contour-line intersections. Table 1 specifies availability of digital data.

The entire study area is also covered by aeromagnetic data collected as part of the NURE (National Uranium Resource Evaluation) program of the U.S. Department of Energy. These data are available in digital form and provided the framework for the map compilation. However, since magnetic surveying was not the primary objective in the design of the NURE surveys, these data are subject to certain limitations. Although the NURE surveys were flown at elevations close to the reduction datum level, the spacing between flight lines is 4.8 km (3 mi). This condition causes anomalies with short spatial wavelengths to be elongated between flight lines, producing lineations perpendicular to the flight-line direction. This problem was especially severe over the Snake River Plain basalt fields. Consequently, data from surveys other than NURE were incorporated into the NURE framework wherever possible.

The aeromagnetic map shows changes in the Earth's magnetic field as a result of variations in the magnetic-mineral content of near-surface rocks. In general, sedimentary rocks are nonmagnetic. Therefore, the anomaly map reflects lithologic and structural changes related to magnetic properties associated with crystalline basement rocks and volcanic rocks that are likely to contain enough magnetic minerals to produce anomalies.

AKNOWLEDGMENTS

The authors wish to thank Pat Hill for indispensable organizational help in the early part of this project, and Esther Castellanos for digitizing and computer support.

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Table 1. *Aeromagnetic survey specifications for this study*

Survey[1]	Line direction	Flight altitude[2] (in m)	Line spacing (in km)	Data type[3]	Source
A	N-S	305 AG	0.8	D	U.S. Geological Survey (1981).
B	N-S	3,350 B	1.6	D	Killsgaard and others (1970).
C	N-S	3,660 B	1.6	A	Mabey and Tschanz (1986).
D	E-W	120 AG	4.8	D	EG&G geoMetrics Inc. (1980).
E	N-S	3,650 B	1.6	A	U.S. Geological Survey (unpub. data, 1970).
F	N-S	3,650 B	1.6	A	U.S. Geological Survey (1979b).
G	E-W	2,740 B	1.6	D	U.S. Geological Survey (1979a).
H	N-S	2,440 B	3.2	A	U.S. Geological Survey (1974).

[1]Areas of surveys shown in figure 1.
[2]AG, survey originally flown "above ground" in draped mode at a constant elevation above terrain; B, survey originally flown at constant "barometric" elevation.
[3]A, data exist in "analog" form only--subsequently, maps were digitized from published versions; D, data exist as original "digital" flight-line data.

INDEX MAP SHOWING LOCATION OF STUDY AREA

SOURCES CITED IN TABLE 1

EG&G geoMetrics, Inc., 1980, Aerial gamma-ray and magnetic survey, Idaho project, Hailey, Idaho Falls, and Elk City quadrangles of Idaho and Montana and Boise quadrangle, Oregon and Idaho: U.S. Department of Energy Report GJBX 010-80, scale 1:250,000.

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_____1981, Aeromagnetic map of the Ten Mile West area, Idaho: U.S. Geological Survey Open-File Report 81-930, scale 1:62,500.

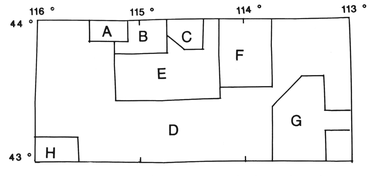

Figure 1. Map showing locations of magnetic surveys used in the compilation of magnetic data for this study. Survey specifications are summarized in table 1.

AEROMAGNETIC MAP OF THE HAILEY AND WESTERN PART OF THE IDAHO FALLS 1° X 2° QUADRANGLES, IDAHO

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1991

INTERIOR--GEOLOGICAL SURVEY, RESTON, VIRGINIA--1991

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