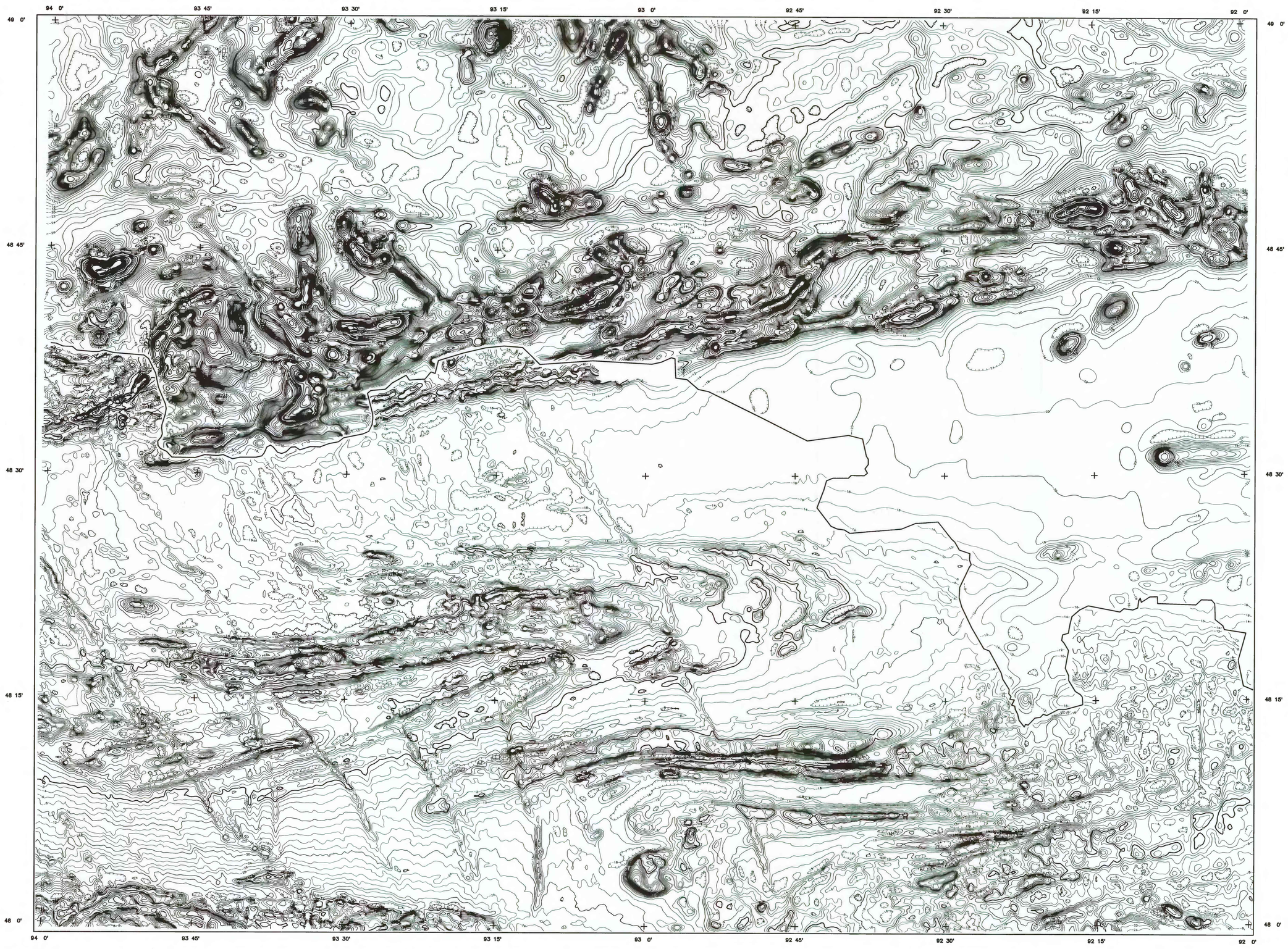
DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH THE MINNESOTA GEOLOGICAL SURVEY AND THE GEOLOGICAL SURVEY OF CANADA

OPEN FILE REPORT NO. 87-620



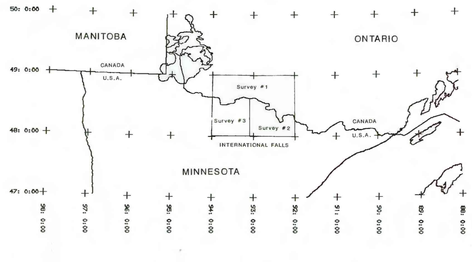


Figure 1. Survey locations.

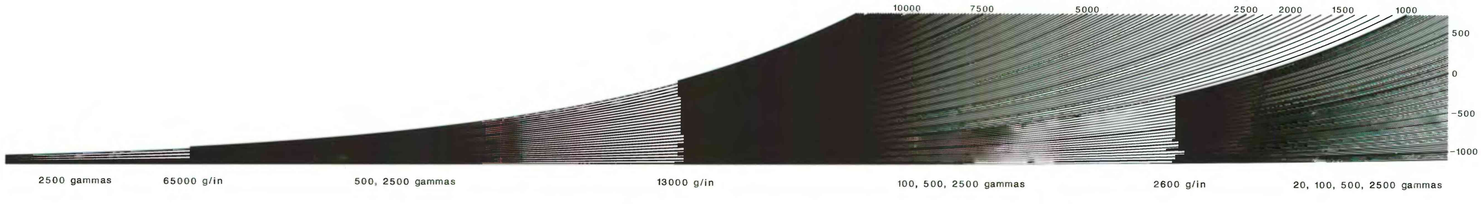


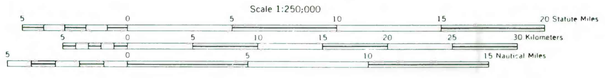
Figure 2. Contour intervals and pinch out gradients.

Aeromagnetic map of the International Falls 1° X 2° Quadrangle, Minnesota and Ontario

Compiled by

R. E. Bracken and R. H. Godson

This map is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.



EXPLANATION

Aeromagnetic contours show the residual magnetic intensity of the earth in gammas relative to an arbitrary datum. Contour intervals are: 20, 100, 500, and 2500 gammas, with special primaries at -1000 and +1000 gammas. High gradient areas display only the larger contour intervals (see fig. 2). Actual contour values are equal to ten times the values of the contour labels. Hachures indicate closed areas of lower magnetic intensity. No attempt has been made to remove anomalies due to culture.

The aeromagnetic map was made by merging data from 3 different surveys (see fig. 1). The data from survey #1 were furnished by the Geological Survey of Canada. The survey was flown by Spartan Air Services, Ltd., during May to October, 1961. The altitude was 1,000 feet (305 meters) above ground level and the flight lines were north-south with a spacing of about 680 meters.

The data from survey #2 were furnished by the Minnesota Geological Survey. The survey was flown by geoMetrics, Inc. during 1979 and 1980. The altitude was radar-controlled at 492 feet (150 meters) above ground level and the flight lines were north-south with a spacing of 400 meters. A geoMetrics model G-803 proton precession magnetometer was used. West of 92° 20', the sensitivity was .25 gammas and the sampling interval was 75 meters. East of 92° 20' the sensitivity was .5 gammas and the sampling interval was 50 meters.

The data from survey #3 were acquired by the U.S. Geological Survey. The survey was flown by D. H. Rohret, R. W. Krizman, C. R. Thompson, R. A. Sneddon, R. J. Horton, and H. A. Pierce of the U.S. Geological Survey and J. N. Mangin of Diversified Technical Services, Inc., during August to November, 1984 and June to November, 1985. The altitude was radar controlled at 300 feet (91 meters) above ground level and the flight lines were north-south with a spacing of about 380 meters. A geoMetrics model G-813 proton precession magnetometer was used on the right wing tip with a sensitivity of 0.5 gammas and a cycle time of 0.5 seconds. The sampling interval was 0.4 seconds and the average aircraft speed was 90 nautical miles per hour (46 meters per second).

Survey #1 was gridded at an interval of 0.42672 kilometers using a minimum curvature program (Webring, 1981) and then regridded, using cubic spline interpolation (unpublished program) to an interval of 0.21336 kilometers. Survey #2 and survey #3 were gridded at 0.21336 kilometers using a minimum curvature program. (Webring, 1981)

The reference fields removed from each of the 3 surveys were as follows: survey #1 I.G.R.F., 1961 Julian day 180 (Peddie, 1982); survey #2 A.W.C. model 1975, updated to 1980, (Peddie and Fabiano, 1976); survey #3 I.G.R.F., 1985 Julian day 180 (Peddie, 1982).

Due to differences in flight conditions, reduction techniques, and reference fields among the 3 surveys a level adjustment was made in survey #1 and survey #2 in order to cause a match between values at survey boundaries. A constant of 80 gammas was subtracted from survey #1 and 388 gammas was added to survey #2. Survey #2 was merged with survey #3 using cubic spline interpolation and then they were mosaiced along the Canada/United States border with survey #1.

References

Peddie, N. W., 1982, International Geomagnetic Reference Field: The third generation: J. Geomag. Geoelectr., v. 34, p. 309-326.

Peddie, Norman W. and Fabiano, Eugene B., 1976, Model of the Geomagnetic Field for 1975: J. G. R., v. 81, p. 2539-2542.

Bhattacharyya, B. K., Sweeney, R. E., and Godson, R. H., 1979, Integration of aeromagnetic data acquired at different times with varying elevations and line spacing: Geophysics, v. 44, no. 4, p. 742-752.

Webring, M. W., 1981, MINC--A gridding program based on minimum curvature: U.S. Geological Survey Open-File Report 81-1224, 41 p.