

91°30'

91°15'

91° 0'

46°45'

46°45'

46°30'

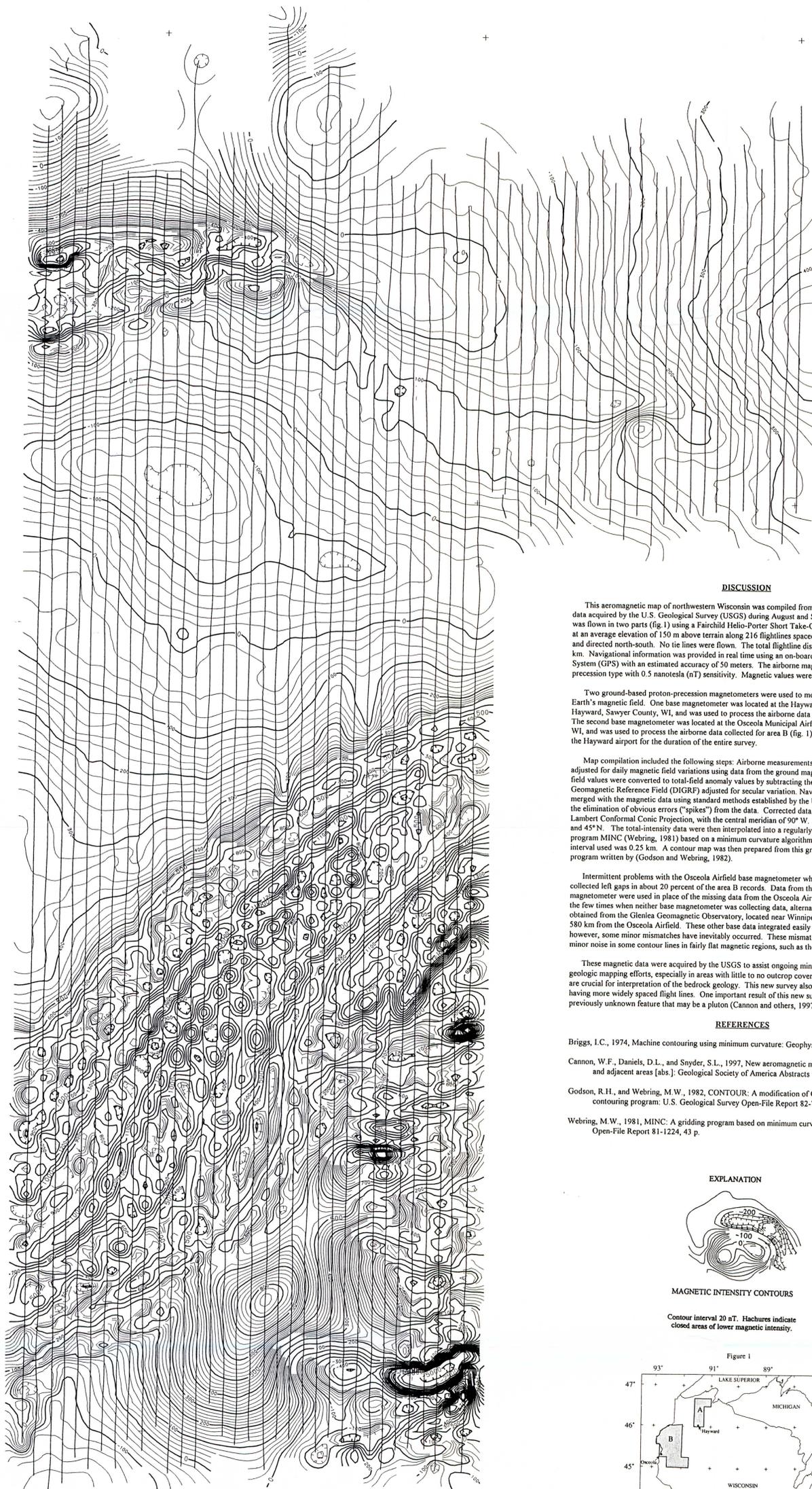
46°30'

46°15'

46°15'

46° 0'

46° 0'



DISCUSSION

This aeromagnetic map of northwestern Wisconsin was compiled from digitally recorded aeromagnetic data acquired by the U.S. Geological Survey (USGS) during August and September 1996. The survey was flown in two parts (fig. 1) using a Fairchild Heli-Porter Short Take-Off and Landing (STOL) aircraft at an average elevation of 150 m above terrain along 216 flightlines spaced approximately 0.8 km apart and directed north-south. No tie lines were flown. The total flightline distance was approximately 10,780 km. Navigational information was provided in real time using an on-board Standard Global Positioning System (GPS) with an estimated accuracy of 50 meters. The airborne magnetometer was a proton-precession type with 0.5 nanotesla (nT) sensitivity. Magnetic values were recorded every 0.5 second.

Two ground-based proton-precession magnetometers were used to monitor the daily variations of the Earth's magnetic field. One base magnetometer was located at the Hayward Municipal Airport in Hayward, Sawyer County, WI, and was used to process the airborne data collected for area A (fig. 1). The second base magnetometer was located at the Osceola Municipal Airfield in Osceola, Polk County, WI, and was used to process the airborne data collected for area B (fig. 1). The aircraft operated out of the Hayward airport for the duration of the entire survey.

Map compilation included the following steps: Airborne measurements of total magnetic field were adjusted for daily magnetic field variations using data from the ground magnetometer(s). Adjusted total-field values were converted to total-field anomaly values by subtracting the Definitive International Geomagnetic Reference Field (DIGRF) adjusted for secular variation. Navigational information was merged with the magnetic data using standard methods established by the USGS. This procedure included the elimination of obvious errors ("spikes") from the data. Corrected data were then projected using the Lambert Conformal Conic Projection, with the central meridian of 90° W. and standard parallels of 33° and 45° N. The total-intensity data were then interpolated into a regularly spaced grid using computer program MINC (Webring, 1981) based on a minimum curvature algorithm (Briggs, 1974). The grid interval used was 0.25 km. A contour map was then prepared from this grid by using the computer program written by (Godson and Webring, 1982).

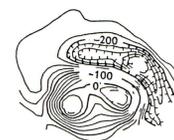
Intermittent problems with the Osceola Airfield base magnetometer while data for area B were collected left gaps in about 20 percent of the area B records. Data from the Hayward Airport base magnetometer were used in place of the missing data from the Osceola Airfield base magnetometer. For the few times when neither base magnetometer was collecting data, alternate magnetic base data were obtained from the Glenlea Geomagnetic Observatory, located near Winnipeg, Manitoba, Canada, about 580 km from the Osceola Airfield. These other base data integrated easily into the airborne data; however, some minor mismatches have inevitably occurred. These mismatches are only noticeable as minor noise in some contour lines in fairly flat magnetic regions, such as the southeastern part of map B.

These magnetic data were acquired by the USGS to assist ongoing mineral resource studies and geologic mapping efforts, especially in areas with little to no outcrop coverage, where aeromagnetic data are crucial for interpretation of the bedrock geology. This new survey also replaces much older surveys having more widely spaced flight lines. One important result of this new survey was the recognition of a previously unknown feature that may be a pluton (Cannon and others, 1997).

REFERENCES

- Briggs, I.C., 1974, Machine contouring using minimum curvature: *Geophysics*, v. 39, p. 39-48.
- Cannon, W.F., Daniels, D.L., and Snyder, S.L., 1997, New aeromagnetic map of northwestern Wisconsin and adjacent areas [abs.]: *Geological Society of America Abstracts with Program*, v.29, no. 4, p. 9.
- Godson, R.H., and Webring, M.W., 1982, CONTOUR: A modification of G.I. Evenden's general purpose contouring program: U.S. Geological Survey Open-File Report 82-797, 73 p.
- Webring, M.W., 1981, MINC: A gridding program based on minimum curvature: U.S. Geological Survey Open-File Report 81-1224, 43 p.

EXPLANATION



MAGNETIC INTENSITY CONTOURS

Contour interval 20 nT. Hachures indicate closed areas of lower magnetic intensity.

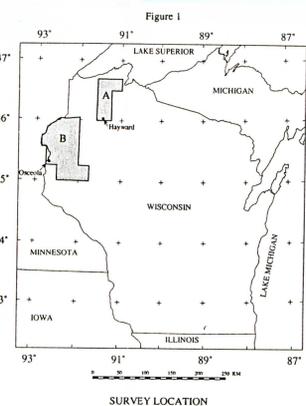
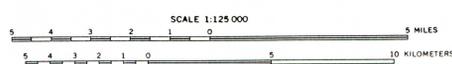


FIGURE 1

SURVEY LOCATION



This map is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards. Any use of trade, firm or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

AEROMAGNETIC MAP OF PART OF NORTHWESTERN WISCONSIN AND ADJACENT AREAS - AREA A

by

Stephen L. Snyder

1998