

DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Aeromagnetic flight-line data and gridded data from a survey
flown over Antelope Island, Utah

by

Viki Bankey¹, and Robert E. Bracken¹

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This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards. Trade names are used for descriptive purposes only and do not constitute endorsement by the U.S. Government.

¹Denver, CO

INTRODUCTION

In 1987, the state of Utah began a study of the geology of Antelope Island prior to making the island a state park. In support of the study, the USGS flew an aeromagnetic survey over the island. The survey was flown 500 ft (150 m) above ground with twenty north-south flight lines spaced approximately 0.4 mi (0.6 km) apart and with 3 east-west tie lines.

DATA COLLECTION

The aeromagnetic survey was flown Sept. 2, 1987, by the USGS using a fixed-wing aircraft. The survey altitude was radar controlled at a constant height of 500 ft (150 m) above ground and position recovery was accomplished using Loran-C navigation. A GeoMetrics model G-813 proton precession magnetometer was used to measure the magnetic total field. It was mounted in the aircraft tail stinger and had a sensitivity of 0.5 nanoTeslas (nT) and a magnetometer cycle time of 0.5 seconds. The data-sampling interval was 0.2 seconds (however, the magnetometer sampling interval had 0.5 sec accuracy caused by the slower cycle time) and average aircraft speed was 90 nautical mi/hour (46 m/sec).

The navigational data were reduced to a TM coordinate grid having a central meridian of $112^{\circ} 13'$ W long. and a base latitude of $40^{\circ} 50'$. The data were gridded at a 0.15-km spacing, using a computer program written by Webring (1981) based on a minimum curvature algorithm (Briggs, 1974).

The magnetometer readings were corrected for time-dependant changes in the magnetic field as measured by a base station magnetometer located near the survey area. The definitive International Geomagnetic Reference Field (DGRF) updated to Sept., 1987, was calculated for the appropriate latitude, longitude, and average survey elevation, and was removed from the grid using a program written by Sweeney (1990).

ACKNOWLEDGEMENTS

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DESCRIPTION OF DISKETTES

Five 5-1/4 in, high density (1.6 megabyte) diskettes in IBM-AT format contain the following data files in ASCII (text readable).

- Disk 1:** ANTGRD.ASC -- gridded aeromagnetic data (format described below)
BL.ASC -- flight line data from 3 east-west tie lines (format on page 3)
TITLE.ASC -- title page of this report

GRIDDED DATA FORMAT: The gridded data file begins with an 8-line header entry:

- Line 1: Type of file stored on diskette, creation date
Line 2: Name of file
Line 3: Description of the file
Line 4: FORTRAN format for each data record.
Line 5: Numbers written per record, numbers making up one grid row, and records required to contain the values in one grid row
Line 6: Explanation of 0 values used
Line 7: Grid identification string, base latitude, central meridian (decimal degrees), projection.
Line 8: Number of columns, number of rows, position of first column in km left relative to the central meridian, the distance between columns (km), position of the first row in km north of the base latitude, and the distance between rows (km).

A row is defined as a series of data positions that extend from west to east along a common north coordinate. The first value in each row contains a "0" to indicate that the grid is evenly spaced. The first row is the southernmost.

These are the first 11 lines of the grid file:

FILETYPE = GRID, CREATION DATE: 24-MAR-1992 10:00

Filename = ANTGRD.ASC

Antelope Island, UTAH, aeromagnetic grid, IGRF removed

Format of grid values: (5E16.8)

5 numbers written per line; 85 numbers = 1 grid row; 17 records = 1 grid row

Each grid row begins with "0"; every 17th record is padded with three 0's to fill out row.

Therefore, each new row begins with a "0" at every 18th record

Antelope Island Aeromagnetic Map baslat = 40.8333 cm = 113.2166 TM

ncol = 81 nrow = 183 x0: -7.0261 dx = 0.15 y0: 0.3696 dy = 0.15

0.00000000E+00 0.38669141E+03 0.38842969E+03 0.39016016E+03 0.39173438E+03
0.39295313E+03 0.39360156E+03 0.39343750E+03 0.39221484E+03 0.39040234E+03
0.38848438E+03 0.38732422E+03 0.38671094E+03 0.38665234E+03 0.38721875E+03

DISK 2: p3001.asc -- flight lines 14 - 18
DISK 3: p3002.asc -- flight lines 19, 20, 13, 12, 11
DISK 4: p3003.asc -- flight lines 10, 9, 8, 7, 6
DISK 5: p3004.asc -- flight lines 5, 4, 3, 2, 1

FLIGHT LINE FORMAT: Each record contains 9 fields which are:

<u>Field</u>	<u>Format</u>	<u>Contents</u>
LINE	1X,A4	Flight line number
TAPE	1X,A4	Flight line direction, tape no.
LONG	F11.5	Longitude, decimal degrees
LAT	F11.5	Latitude, decimal degrees
TIME	F8.1	Time from local midnight, seconds
RADAR	F8.1	Measured radar altitude, feet above ground level (AGL)
MSL	F8.1	Calculated true altitude, feet mean sea level (MSL)
RAWMAG	F9.1	Flight-recorded magnetics , nT
TOTMAG	F9.1	Base-magnetometer corrected mag, nT

These are the first 5 lines of p3001.asc:

014	s370 -112.24781	41.07964	31710.0	516.0	4400.0	54605.5	54586.9
014	s370 -112.24780	41.07957	31710.2	520.0	4390.0	54605.6	54587.0
014	s370 -112.24779	41.07951	31710.4	517.5	4390.0	54605.2	54586.6
014	s370 -112.24778	41.07945	31710.6	520.0	4390.0	54605.2	54586.6
014	s370 -112.24777	41.07939	31710.8	517.5	4396.0	54605.5	54586.8

REFERENCES CITED

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

Sweeney, R.E., 1990, IGRFGRID--A program for creation of a total magnetic field (International Geomagnetic Reference Field) grid representing the earth's main magnetic field: U.S. Geological Survey Open-File Report 90-45A-B, 39 p.

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