Aeromagnetic Surveying in Wisconsin 1997-98: Digital Data Files

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Introduction

Over the past 10 years the U.S. Geological Survey has conducted a series of aeromagnetic surveys in Wisconsin aimed at completing the coverage of high-quality, moderate-resolution aeromagnetic surveying in the State. The data from these surveys have proven to be an effective tool for delineating structures in the Precambrian basement in Wisconsin and have been useful in the study of the mineral resources in the region. Precambrian basement rocks rarely crop out in this region because of glacial deposits and Paleozoic sedimentary cover rocks. Surveys by the U.S. Geological Survey (USGS) in 1988 (Hittleman and others, 1992) and 1996 (Snyder, 1998) had closed gaps in the aeromagnetic coverage of the Midcontinent rift area, adjacent to Minnesota.

The most recent survey flown in 1997-98 is the focus of this report. It extends aeromagnetic coverage southwards to the middle of the state (Daniels and others, 1998). Aeromagnetic contour maps (scales 1:100,000 and 1:50,000) for the 1997-98 survey were recently released as open-file paper maps (U.S. Geological Survey 1998a-i). This report releases the digital data for the same survey. Both digital point and gridded data are included as well as images of the aeromagnetic data for the five areas. Facts about this survey and parameters for the digital files are listed below.

Disclaimer

Survey Facts

The 1997-98 Wisconsin aeromagnetic survey was flown between October 1997 and March 1998 in five separate areas. These blocks are outlined on the index map of Wisconsin and are named: areas1_2, area3E, area3W, areas4_5, and area6 (click on the colored text to see these images or go to the images at the end of this report). The index map shows the distribution of aeromagnetic coverage in Wisconsin prior to the current survey and the 5 areas where new data were collected. The color-shaded-relief images of the aeromagnetic maps for the 5 areas show the magnetic field as if illuminated from the north. South-directed illumination is parallel to the flightline direction, and minimizes enhancement of "flightline noise."

Flightlines were in a North-South direction, spaced ½-mile (805m) apart, draped to topography at 1000 feet (305m) above ground. The survey was flown on contract by Aero Surveys, Inc. of Golden, Colorado. Data processing and production of the contour maps was carried out by Pearson, deRidder, and Johnson of Lakewood, Colorado. The five blocks of the survey required a total of about 21,000 line-miles of flying.

Disc Organization

This CD-ROM disc is structured with 5 directories/folders as follows:

\DATA The basic survey measurements are in five ASCII files (file extension .dat) derived from the original contractor files. Each record of each file contains 15 fields of data per measurement, at a sampling interval of one second. USGS style DOS binary point files (.pos) with 9 fields are also given. See below for the explanation of each of these fields.

\GRIDS The point data have been interpolated into binary raster USGS style grids (file extension .grd) by using a minimum curvature gridding algorithm (program MINC, Phillips, 1997). ASCII versions of the USGS grids are also given (.agd). USGS grids and binary point files can be manipulated using USGS (DOS) software for the PC (Phillips, 1997). This is freeware that is included in a separate directory on this disc, or may be downloaded from ftp://greenwood.cr.usgs.gov/pub/open-file-reports/ofr-97-0725/pfofr.htm. Two alternate ASCII file formats are also included. These ASCII grids permit importation into other software packages. Files with extension .arc can be imported into Arcview 3 - Spatial Analyst, and file extension .gxf can be imported into several programs including ER Mapper and Geosoft Oasis Montaj.

\IMAGES Images of the aeromagnetic data for each of the five areas covered by the survey are included in this directory and are given in 4 graphic formats (file extensions .ps, .pdf, .bmp, .jpg), the latter three derived (using Adobe Illustrator) from an initial Postscript image file. The postscript images were created using GCLR, and associated UNIX programs written by Robert W. Simpson, Jr. of the USGS.

\ACROBAT Adobe Acrobat software for viewing PDF files. The latest version can be downloaded from the web at URL http://www.adobe.com/prodindex/acrobat/readstep.html.

\USGS_PF The USGS potential field software package (Phillips, 1997). Installation is described in the readme files.

File Facts

Point Files

File Name	Bytes	Records
Areas1_2.dat	37,788,679	271,861
Areas1_2.pos	11,418,164	271,861
Area3E.dat	1,682,873	12,107
Area3E.pos	508,496	12,107
Area3W.dat	2,666,298	19,182
Area3W.pos	805,646	19,182
Areas4_5.dat	27,176,307	195,513
Areas4_5.pos	8,211,548	195,513
Area6.dat	21,605,743	155,437
Area6.pos	6,528,356	155,437

ASCII Point Data File Format:

Each record represents one measurement recorded at one-second flight intervals. The record length is 140 bytes. The "Residual Magnetic Intensity (IGRF removed)" field is the residual total magnetic intensity data with the International Geomagnetic Reference Field (IGRF) removed. The grid files are constructed from this field.

Format	Field	Units
A8	Flight-Line number, Direction	
F11.5	Longitude	Degrees
F11.5	Latitude	Degrees
F13.4	UTM - X	Meters
F14.4	UTM - Y	Meters
F9.1	Fiducial	
I7	Date	YYJDD
I11	Time	HHMMSS
I4	Radar Altimeter	Meters
I5	Barometric Altimeter	Meters

I5	GPS Elevation (WGS 84)	
F10.1	Diurnal Base Magnetic Intensity	Nanoteslas
F10.2	Raw Flight Magnetic Intensity	Nanoteslas
F10.2	Diurnally-Corrected Magnetic intensity	Nanoteslas
F10.2	Residual Magnetic Intensity (IGRF removed)	Nanoteslas

USGS Binary Post File (.POS) Data Fields:

Field	Description	Units
1	Flight-line number, Direction	
2	Longitude	Degrees
3	Latitude	Degrees
4	Residual Magnetic Intensity	Nanoteslas
5	Diurnally-corrected Magnetic Intensity	Nanoteslas
6	Radar Altimeter	Meters
7	Barometric Altimeter	Meters
8	Fiducial	
9	Year-Julian day	YYYY.DDD

Grid Files

Residual Total Magnetic Intensity Binary Grid Files, USGS Grid Format

Grid File	Rows	Columns
Areas1_2.grd	789	925
Area3E.grd	230	85
Area3W.grd	204	203
Areas4_5.grd	615	392
Area6.grd	338	543

Grid Parameters (.grd, .agd, .gxf, .arc)

X, Y units:	Kilometers
Grid node interval:	0.20 kilometers
No-Data Value (.grd, .agd):	10E+38
No-Data Value (.gxf):	10E+30
No-Data Value (.arc):	-99999.99
Spheroid:	Clark 1866
Horizontal Datum:	1927 North American Datum
Projection:	Transverse Mercator
Central Meridian:	90 degrees West
Base Latitude:	0 degrees

References Cited

Daniels, D.L., Snyder, S.L., Nicholson, S.W., and Cannon, W.F., 1998, New aeromagnetic surveys in Wisconsin by the U.S. Geological Survey: Institute on Lake Superior Geology, 44th Annual Meeting, May 6-10, 1998, Minneapolis, Minnesota, pp. 62-63.

Hittleman, A.M., Buhmann, R.W., Racey, S.D., Chandler, V.W., 1992, Aeromagnetics Earth System Data, Minnesota Region: National Geophysical Data Center, CD-ROM, diskettes, and User's Manual.

Phillips, J.D., 1997, Potential-Field Geophysical Software for the PC, version 2.2: US Geological Survey Open-File Report 97-725 34 p.

Snyder, S.L., 1998, Aeromagnetic map of part of northwestern Wisconsin and adjacent areas: U.S. Geological Survey Open-File Report 98-228, Scale 1:125,000, 2 sheets.

U.S. Geological Survey, 1998a, Aeromagnetic survey of parts of the Black River Lake, Eau Claire, Hastings, Stillwater, and Winona 1:100,000 quadrangles in Wisconsin, north-west sheet: U.S. Geological Survey Open-File Report 98-431, scale 1:100,000. [AREAS 1 & 2]

U.S. Geological Survey, 1998b, Aeromagnetic survey of parts of the Black River Lake, Eau Claire, Hastings, Stillwater, and Winona 1:100,000 quadrangles in Wisconsin, north-east sheet: U.S. Geological Survey Open-File Report 98-432, scale 1:100,000. [AREAS 1 & 2]

U.S. Geological Survey, 1998c, Aeromagnetic survey of parts of the Black River Lake, Eau Claire, Hastings, Stillwater, and Winona 1:100,000 quadrangles in Wisconsin, south-east sheet: U.S. Geological Survey Open-File Report 98-433, scale 1:100,000. [AREAS 1 & 2]

U.S. Geological Survey, 1998d, Aeromagnetic survey of parts of the Black River Lake, Eau Claire, Hastings, Stillwater, and Winona 1:100,000 quadrangles in Wisconsin, south-west sheet. U.S. Geological Survey Open-File Report 98-434, scale 1:100,000. [AREAS 1 & 2]

U.S. Geological Survey, 1998e, Aeromagnetic survey of part of the Iron Mountain 1:100,000 quadrangle in Wisconsin: U.S. Geological Survey Open-File Report 98-436, scale 1:50,000. [AREA 3 EAST]

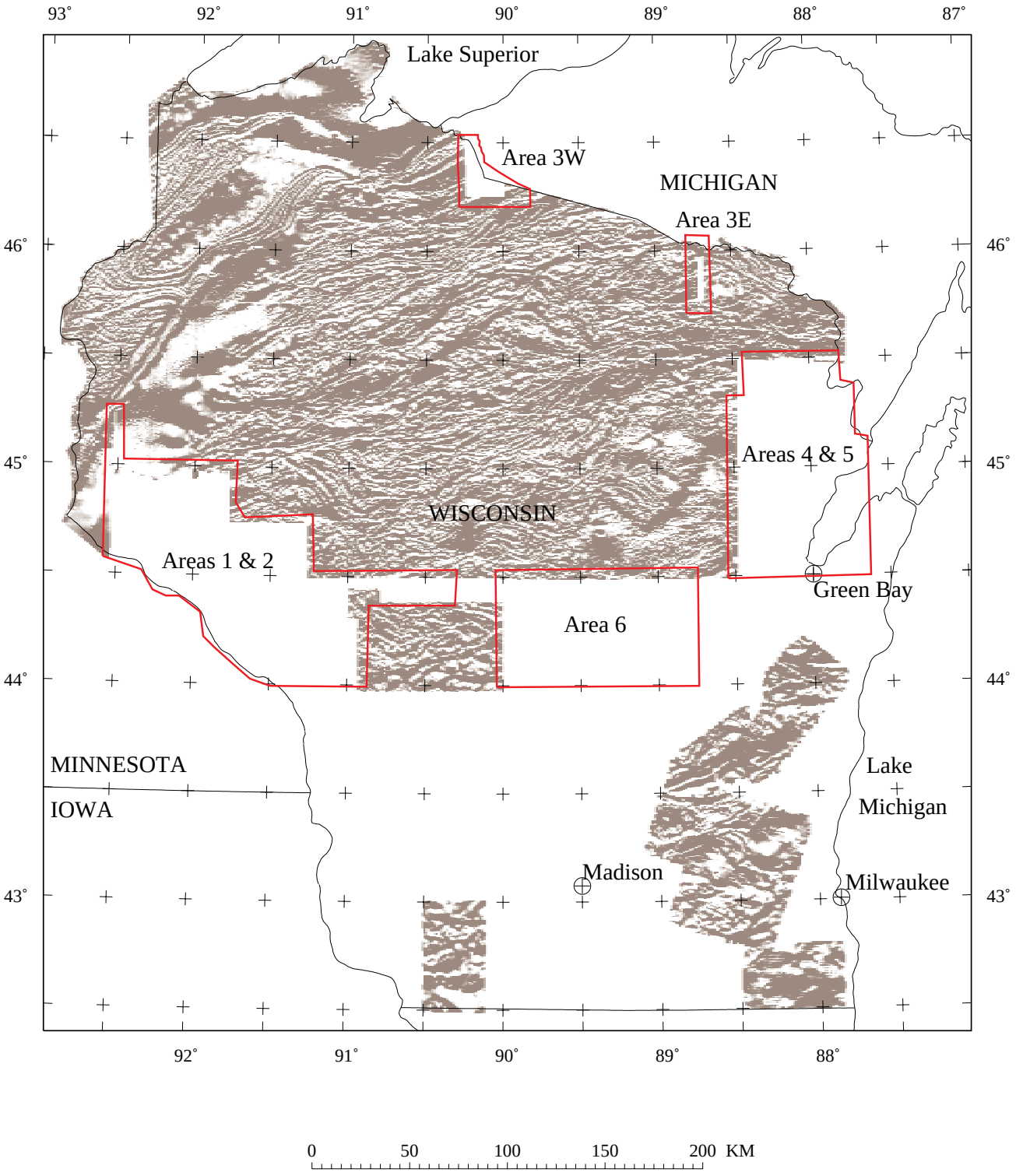
U.S. Geological Survey, 1998f, Aeromagnetic survey of parts of the Ironwood and Wakefield 1:100,000 quadrangles in Wisconsin: U.S. Geological Survey Open-File Report 98-435, scale 1:50,000. [AREA 3 WEST]

U.S. Geological Survey, 1998g, Aeromagnetic survey of parts of the Marinette, Shawano, Sturgeon Bay and Wabeno 1:100,000 quadrangles in Wisconsin, north sheet: U.S. Geological Survey Open-File Report 98-437, scale 1:100,000. [AREAS 4 & 5]

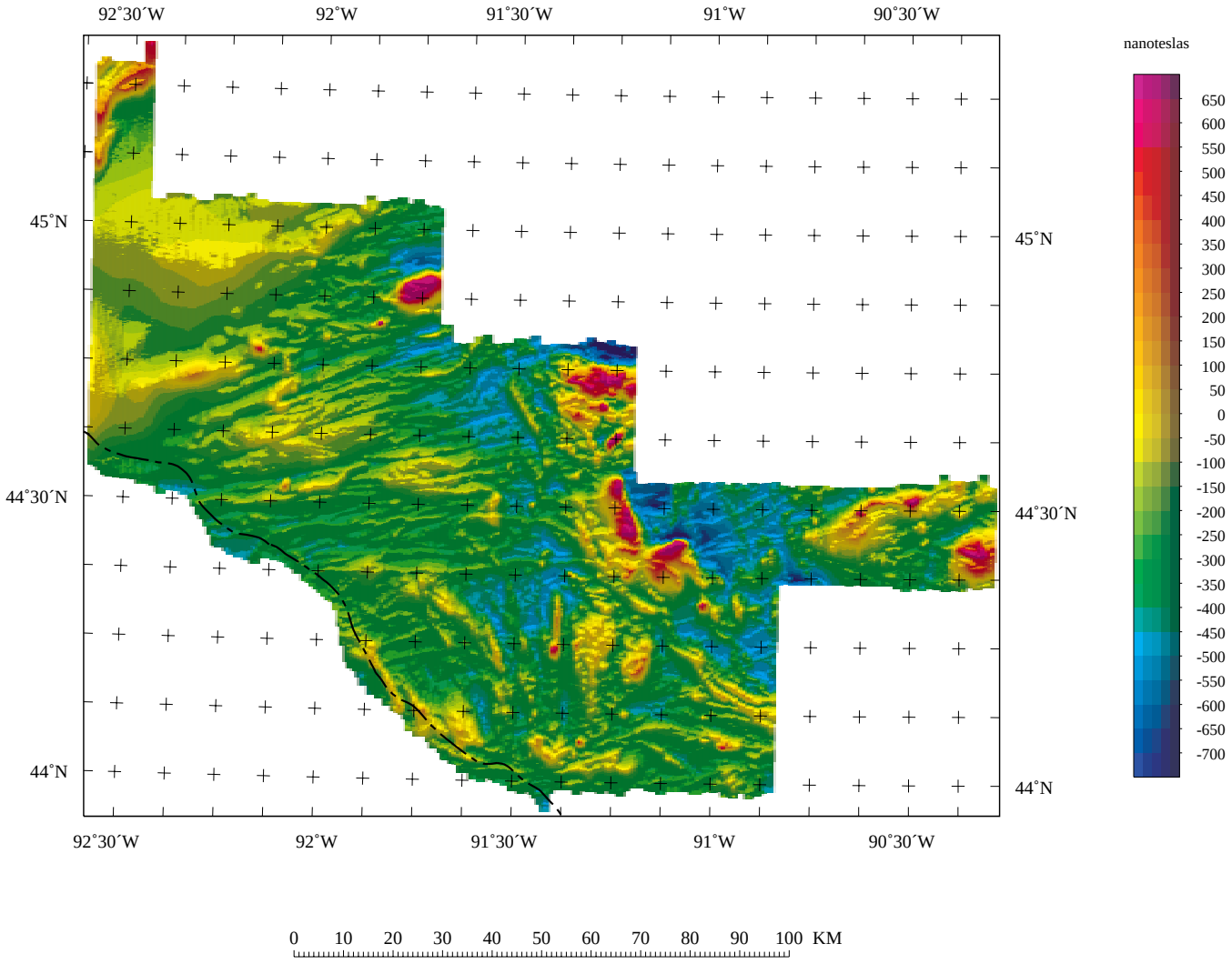
U.S. Geological Survey, 1998h, Aeromagnetic survey of parts of the Marinette, Shawano, Sturgeon Bay and Wabeno 1:100,000 quadrangles in Wisconsin, south sheet: U.S. Geological Survey Open-File Report 98-438, scale 1:100,000. [AREAS 4 & 5]

U.S. Geological Survey, 1998i, Aeromagnetic survey of the Wisconsin Rapids and part of the Appleton 1:100,000 quadrangles in Wisconsin: U.S. Geological Survey Open-File Report 98-439, scale 1:100,000. [AREA 6]

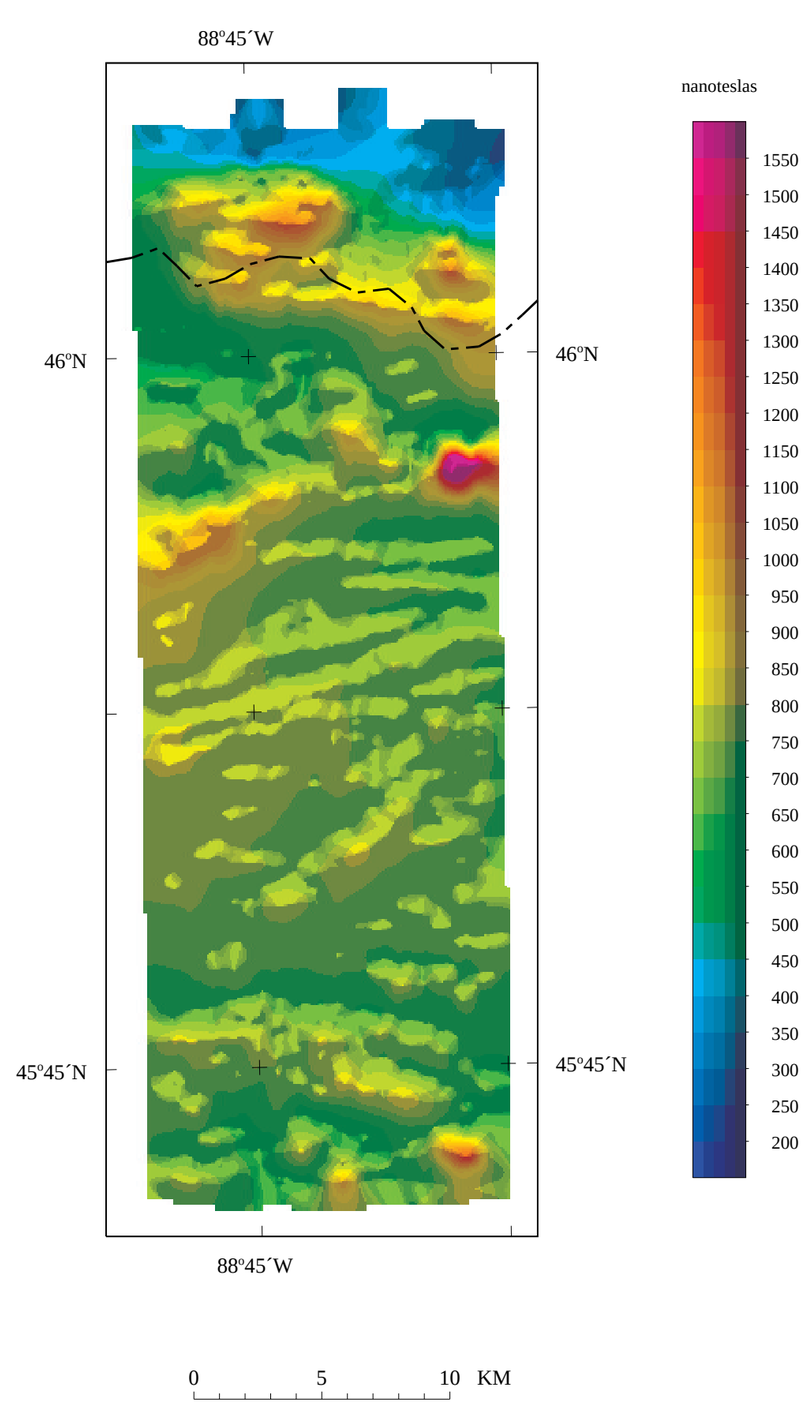
Index Map of Wisconsin Aeromagnetic Data



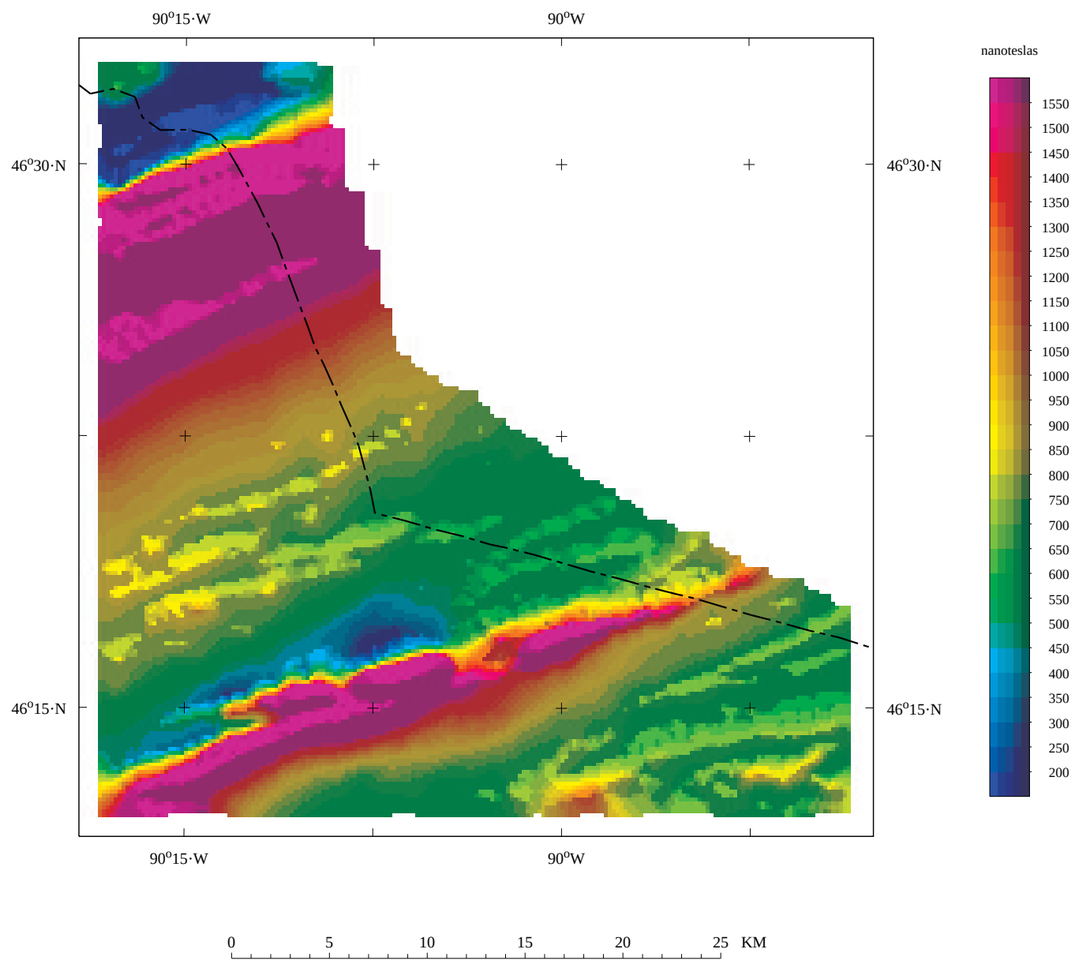
USGS - Residual Aeromagnetic Map - Areas 1 & 2



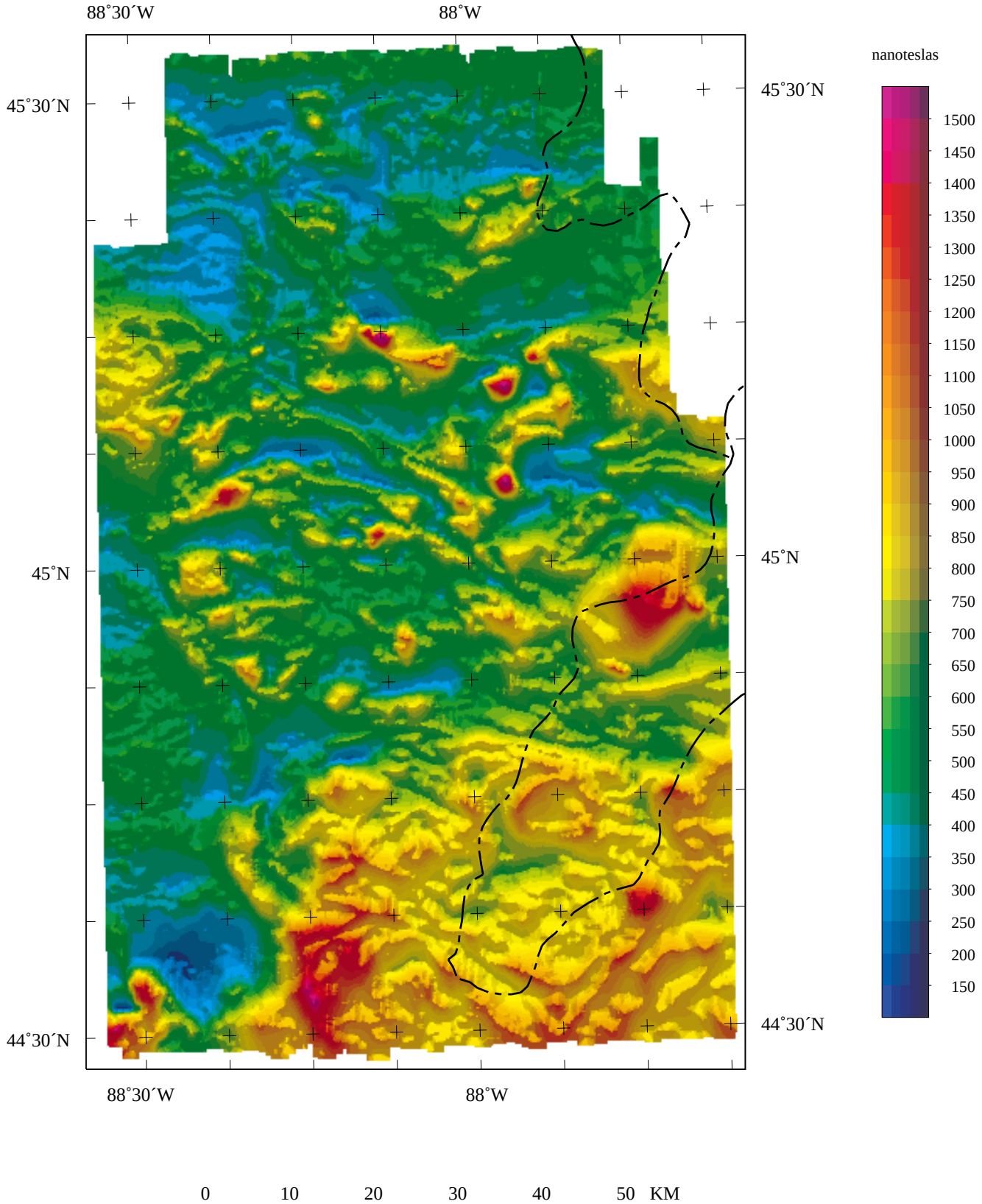
USGS - Residual Aeromagnetic Map - Area 3e



USGS - Residual Aeromagnetic Map - Area 3W



USGS - Residual Aeromagnetic Map - Areas 4 & 5



USGS - Residual Aeromagnetic Map - Area 6