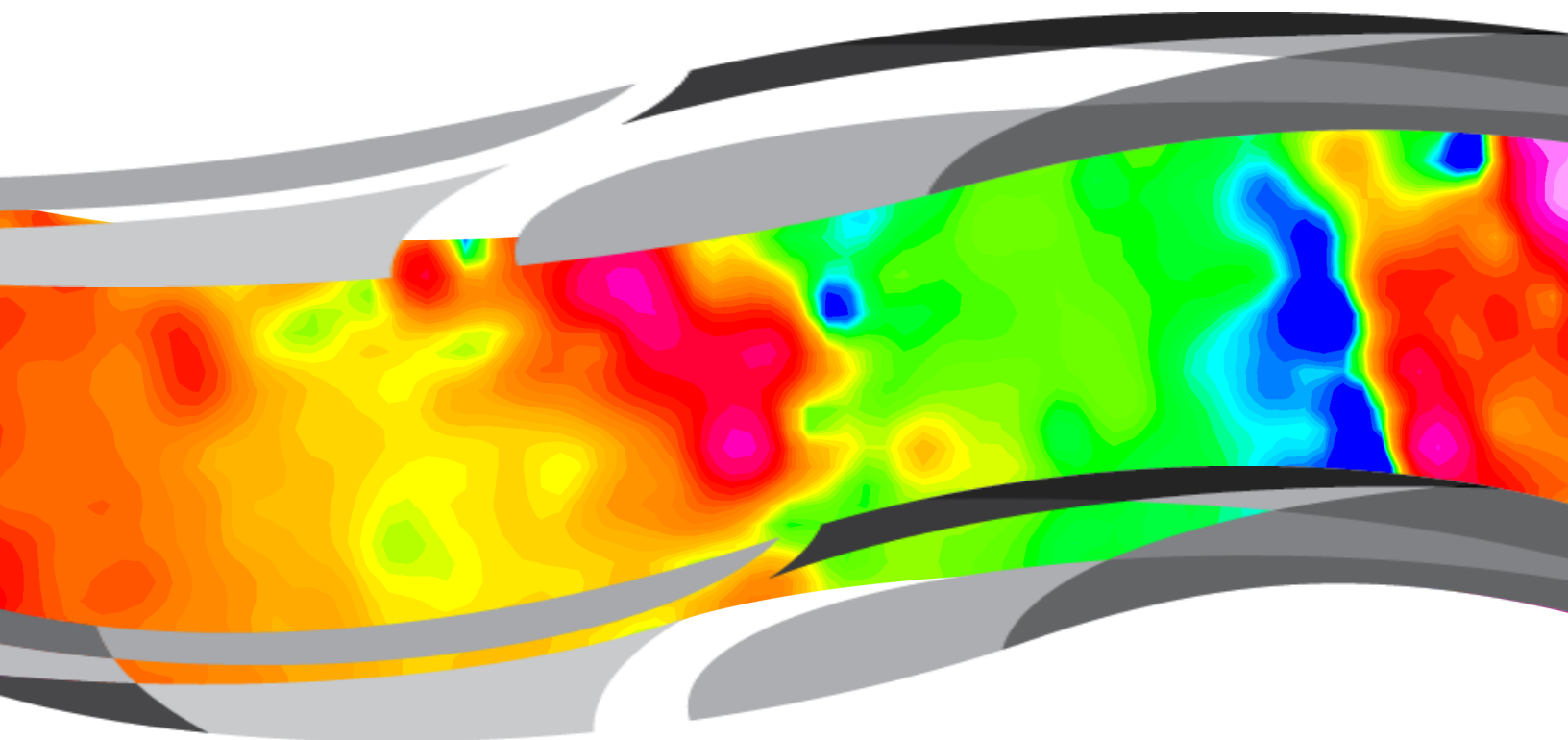




NWT Open Report 2015-17
Enhancements of airborne geophysical data from
assessment report 084582, Starfish Property, Seahorse Lake
area, NWT
A.M. Mirza



Recommended Citation: Mirza, A.M., 2015. Enhancements of airborne geophysical data from assessment report 084582, Starfish Property, Seahorse Lake area, NWT; Northwest Territories Geological Survey, NWT Open Report 2015-017. Digital data.

NORTHWEST TERRITORIES
GEOLOGICAL SURVEY

Government of
Northwest Territories

NWT Open Report 2015-017

Enhancements of airborne geophysical data from assessment report 084582, Starfish property, Seahorse Lake area, NWT

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INTRODUCTION

This publication provides enhancements of airborne geophysical data submitted as part of [assessment report 084582](#), and **is intended to be used in conjunction with that assessment report.**

Assessment reports are submitted to the Government of the Northwest Territories by members of the mineral exploration industry pursuant to the NWT Mining Regulations (and prior to April 2014, to the federal government pursuant to the Canada Mining Regulations). These reports contain the results of exploration work as well as interpretations of those results, and are released to the public after a period of confidentiality. The released reports can be downloaded from the Northwest Territories Geological Survey (NTGS) website at www.nwtgeoscience.ca.

Older assessment reports were submitted as paper reports and maps (which are available online as scanned copies). However, starting in the 1980's, geophysical and geochemical surveys began to appear with assessment report submissions as manipulable digital data. These digital data are available online in their originally submitted form. In addition, NTGS is using those data to create useful products that were not provided in the original assessment report (for example, grids of calculated parameters like analytic signal; databases in GDB format if the originals were in ASCII format; merges of adjacent surveys from different assessment reports), and correcting any errors that are found.

These enhancements are published as NWT Open Reports like this one. Some such publications may contain the enhancements from a number of spatially related assessment reports.

SURVEY INFORMATION*

Name of Survey	Starfish property
Contractor	Fugro Airborne Surveys
NTS Sheets	76D/05 & 06
Dates flown	Nov 2003
Aircraft wing type	Rotary
Nominal bird terrain clearance	25 m
Nominal sample interval	0.1s
Nominal traverse line spacing	50 m
Traverse line direction	Varies by block
Nominal tie line spacing	500 m
Tie line direction	Variable
Datum	NAD27
Projection	UTM ZONE 12N

*Information from assessment report 084582, Starfish_Prop_Expln_Activities.pdf and Appendices.pdf

Figure 1 shows the location of the Starfish Property surveys.

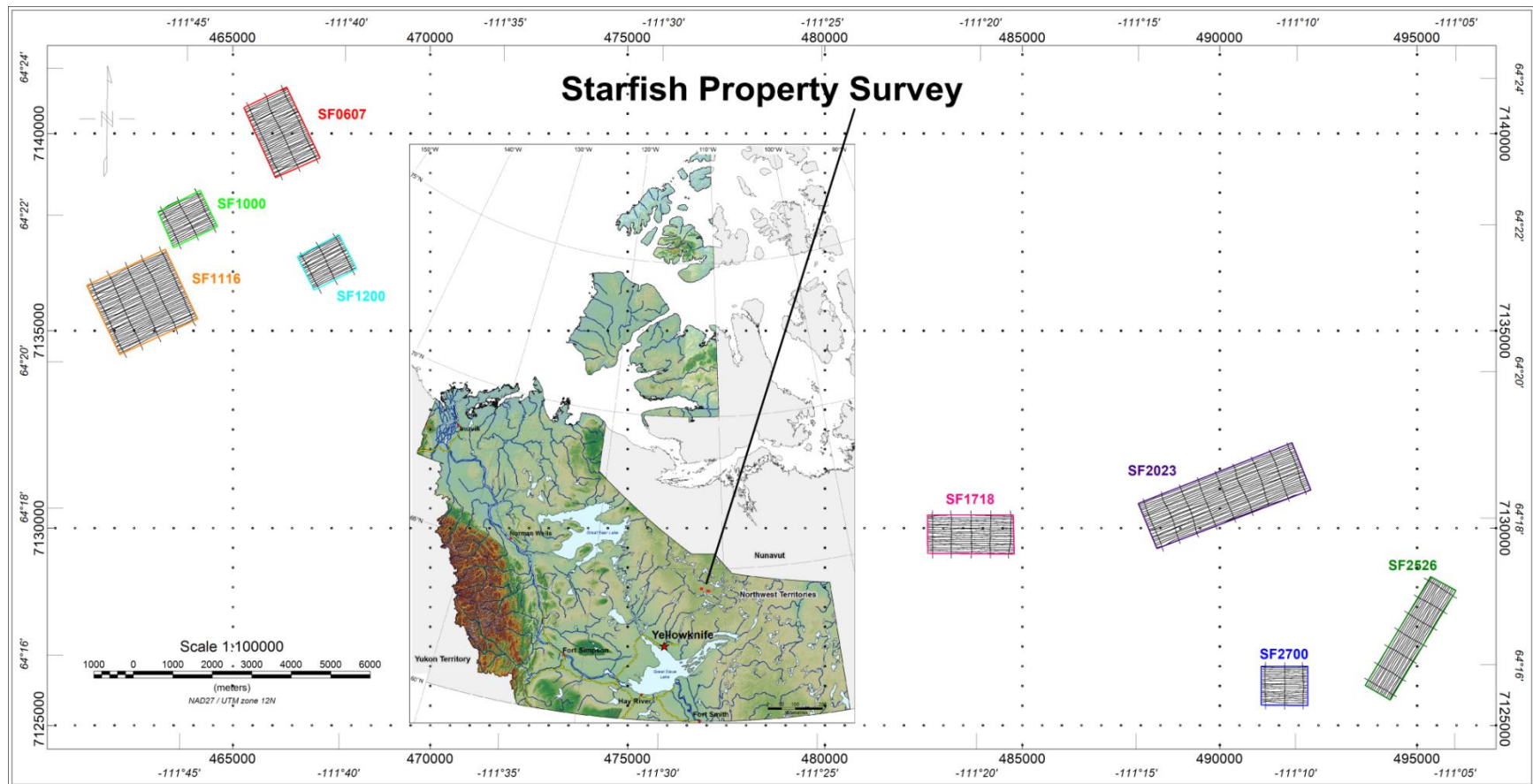


Figure 1. Location map of Starfish Property surveys.

DESCRIPTION OF ENHANCEMENTS

Original data submitted with the assessment report that have been used to generate this publication consist of eight files of line data in geosoft XYZ format and eight corresponding ASCII text-format readme files containing header and other information. In May 2006, NTGS generated databases in geosoft GDB format of seven blocks (SF0607, SF1000, SF1200, SF1718, SF2023, SF2526, and SF2700). Although 9 blocks in total were flown, only 8 were submitted for assessment work, (so there is no file 03012B as part of the submission). Table 1 explains the correspondence of each survey block with each submitted XYZ file.

Table 1. Corresponding survey block, XYZ file and anomalies.

Survey Block and database filename	XYZ filename	Anomalies
SF0607	03012A	SF 06, SF 07
SF1000	03012C	SF 10
SF1116	03012D	SF 11, SF 13 to 16 inclusive
SF1200	03012E	SF 12
SF1718	03012F	SF 17, SF 18
SF2023	03012G	SF 20 to 23 inclusive
SF2526	03012H	SF 25, SF 26, SF 28
SF2700	03012I	SF 27

The enhancements by NTGS provided herein consist of a more recently created database in GDB format of SF1116 block derived from 03012D.XYZ, and for each of the eight blocks, grids of measured and calculated parameters, georeferenced images of the grids, and a boundary polygon file. For all products, left refers to the left magnetic sensor and right refers to the right magnetic sensor. The enhancements consist of:

GDB\

Database in geosoft binary format

SF1116.gdb

-geosoft database of magnetic and electromagnetic data

GRIDS\

Grid in geosoft binary (2-byte) format

084582_SF0607_MagL.GRD

-Calculated Total Magnetic Field grid (left)

084582_SF0607_MagR.GRD

-Calculated Total Magnetic Field grid (right)

084582_SF0607_1VDL.GRD

-Calculated First Vertical Derivative from Total Magnetic Field grid (left)

084582_SF0607_1VDR.GRD

-Calculated First Vertical Derivative from Total Magnetic Field grid (right)

084582_SF0607_2VDL.GRD

-Calculated Second Vertical Derivative from Total Magnetic Field grid (left)

084582_SF0607_2VDR.GRD

-Calculated Second Vertical Derivative from Total Magnetic Field grid (right)

084582_SF0607_ASL.GRD	-Calculated Analytic Signal from Total Magnetic Field grid (left)
084582_SF0607_ASR.GRD	-Calculated Analytic Signal from Total Magnetic Field grid (right)
084582_SF0607_SuscL.GRD	-Calculated Apparent Susceptibility from Total Magnetic Field grid (left)
084582_SF0607_SuscR.GRD	-Calculated Apparent Susceptibility from Total Magnetic Field grid (right)
084582_SF0607_RES7200Hz.GRD	-Calculated Resistivity (in ohm-metres) for 7200 Hz coplanar coils
084582_SF1000_MagL.GRD	-Calculated Total Magnetic Field grid (left)
084582_SF1000_MagR.GRD	-Calculated Total Magnetic Field grid (right)
084582_SF1000_1VDL.GRD	-Calculated First Vertical Derivative from Total Magnetic Field grid (left)
084582_SF1000_1VDR.GRD	-Calculated First Vertical Derivative from Total Magnetic Field grid (right)
084582_SF1000_2VDL.GRD	-Calculated Second Vertical Derivative from Total Magnetic Field grid (left)
084582_SF1000_2VDR.GRD	-Calculated Second Vertical Derivative from Total Magnetic Field grid (right)
084582_SF1000_ASL.GRD	-Calculated Analytic Signal from Total Magnetic Field grid (left)
084582_SF1000_ASR.GRD	-Calculated Analytic Signal from Total Magnetic Field grid (right)
084582_SF1000_SuscL.GRD	-Calculated Apparent Susceptibility from Total Magnetic Field grid (left)
084582_SF1000_SuscR.GRD	-Calculated Apparent Susceptibility from Total Magnetic Field grid (right)
084582_SF1000_RES7200Hz.GRD	-Calculated Resistivity (in ohm-metres) for 7200 Hz coplanar coils
084582_SF1116_MagL.GRD	-Calculated Total Magnetic Field grid (left)
084582_SF1116_MagR.GRD	-Calculated Total Magnetic Field grid (right)
084582_SF1116_1VDL.GRD	-Calculated First Vertical Derivative from Total Magnetic Field grid (left)
084582_SF1116_1VDR.GRD	-Calculated First Vertical Derivative from Total Magnetic Field grid (right)
084582_SF1116_2VDL.GRD	-Calculated Second Vertical Derivative from Total Magnetic Field grid (left)
084582_SF1116_2VDR.GRD	-Calculated Second Vertical Derivative from Total Magnetic Field grid (right)
084582_SF1116_ASL.GRD	-Calculated Analytic Signal from Total Magnetic Field grid (left)
084582_SF1116_ASR.GRD	-Calculated Analytic Signal from Total Magnetic Field grid (right)
084582_SF1116_SuscL.GRD	-Calculated Apparent Susceptibility from Total Magnetic Field grid (left)
084582_SF1116_SuscR.GRD	-Calculated Apparent Susceptibility from Total Magnetic Field grid (right)

084582_SF1116_RES7200Hz.GRD	-Calculated Resistivity (in ohm-metres) for 7200 Hz coplanar coils
084582_SF1200_MagL.GRD	-Calculated Total Magnetic Field grid (left)
084582_SF1200_MagR.GRD	-Calculated Total Magnetic Field grid (right)
084582_SF1200_1VDL.GRD	-Calculated First Vertical Derivative from Total Magnetic Field grid (left)
084582_SF1200_1VDR.GRD	-Calculated First Vertical Derivative from Total Magnetic Field grid (right)
084582_SF1200_2VDL.GRD	-Calculated Second Vertical Derivative from Total Magnetic Field grid (left)
084582_SF1200_2VDR.GRD	-Calculated Second Vertical Derivative from Total Magnetic Field grid (right)
084582_SF1200_AS.L.GRD	-Calculated Analytic Signal from Total Magnetic Field grid (left)
084582_SF1200_AS.R.GRD	-Calculated Analytic Signal from Total Magnetic Field grid (right)
084582_SF1200_SuscL.GRD	-Calculated Apparent Susceptibility from Total Magnetic Field grid (left)
084582_SF1200_SuscR.GRD	-Calculated Apparent Susceptibility from Total Magnetic Field grid (right)
084582_SF1200_RES7200Hz.GRD	-Calculated Resistivity (in ohm-metres) for 7200 Hz coplanar coils
084582_SF1718_MagL.GRD	-Calculated Total Magnetic Field grid (left)
084582_SF1718_MagR.GRD	-Calculated Total Magnetic Field grid (right)
084582_SF1718_1VDL.GRD	-Calculated First Vertical Derivative from Total Magnetic Field grid (left)
084582_SF1718_1VDR.GRD	-Calculated First Vertical Derivative from Total Magnetic Field grid (right)
084582_SF1718_2VDL.GRD	-Calculated Second Vertical Derivative from Total Magnetic Field grid (left)
084582_SF1718_2VDR.GRD	-Calculated Second Vertical Derivative from Total Magnetic Field grid (right)
084582_SF1718_AS.L.GRD	-Calculated Analytic Signal from Total Magnetic Field grid (left)
084582_SF1718_AS.R.GRD	-Calculated Analytic Signal from Total Magnetic Field grid (right)
084582_SF1718_SuscL.GRD	-Calculated Apparent Susceptibility from Total Magnetic Field grid (left)
084582_SF1718_SuscR.GRD	-Calculated Apparent Susceptibility from Total Magnetic Field grid (right)
084582_SF1718_RES7200Hz.GRD	-Calculated Resistivity (in ohm-metres) for 7200 Hz coplanar coils
084582_SF2023_MagL.GRD	-Calculated Total Magnetic Field grid (left)
084582_SF2023_MagR.GRD	-Calculated Total Magnetic Field grid (right)
084582_SF2023_1VDL.GRD	-Calculated First Vertical Derivative from Total Magnetic Field grid (left)
084582_SF2023_1VDR.GRD	-Calculated First Vertical Derivative from Total Magnetic Field grid (right)

084582_SF2023_2VDL.GRD	-Calculated Second Vertical Derivative from Total Magnetic Field grid (left)
084582_SF2023_2VDR.GRD	-Calculated Second Vertical Derivative from Total Magnetic Field grid (right)
084582_SF2023_AS.L.GRD	-Calculated Analytic Signal from Total Magnetic Field grid (left)
084582_SF2023_ASR.GRD	-Calculated Analytic Signal from Total Magnetic Field grid (right)
084582_SF2023_SuscL.GRD	-Calculated Apparent Susceptibility from Total Magnetic Field grid (left)
084582_SF2023_SuscR.GRD	-Calculated Apparent Susceptibility from Total Magnetic Field grid (right)
084582_SF2023_RES7200Hz.GRD	-Calculated Resistivity (in ohm-metres) for 7200 Hz coplanar coils
084582_SF2526_MagL.GRD	-Calculated Total Magnetic Field grid (left)
084582_SF2526_MagR.GRD	-Calculated Total Magnetic Field grid (right)
084582_SF2526_1VDL.GRD	-Calculated First Vertical Derivative from Total Magnetic Field grid (left)
084582_SF2526_1VDR.GRD	-Calculated First Vertical Derivative from Total Magnetic Field grid (right)
084582_SF2526_2VDL.GRD	-Calculated Second Vertical Derivative from Total Magnetic Field grid (left)
084582_SF2526_2VDR.GRD	-Calculated Second Vertical Derivative from Total Magnetic Field grid (right)
084582_SF2526_AS.L.GRD	-Calculated Analytic Signal from Total Magnetic Field grid (left)
084582_SF2526_ASR.GRD	-Calculated Analytic Signal from Total Magnetic Field grid (right)
084582_SF2526_SuscL.GRD	-Calculated Apparent Susceptibility from Total Magnetic Field grid (left)
084582_SF2526_SuscR.GRD	-Calculated Apparent Susceptibility from Total Magnetic Field grid (right)
084582_SF2526_RES7200Hz.GRD	-Calculated Resistivity (in ohm-metres) for 7200 Hz coplanar coils
084582_SF2700_MagL.GRD	-Calculated Total Magnetic Field grid (left)
084582_SF2700_MagR.GRD	-Calculated Total Magnetic Field grid (right)
084582_SF2700_1VDL.GRD	-Calculated First Vertical Derivative from Total Magnetic Field grid (left)
084582_SF2700_1VDR.GRD	-Calculated First Vertical Derivative from Total Magnetic Field grid (right)
084582_SF2700_2VDL.GRD	-Calculated Second Vertical Derivative from Total Magnetic Field grid (left)
084582_SF2700_2VDR.GRD	-Calculated Second Vertical Derivative from Total Magnetic Field grid (right)
084582_SF2700_AS.L.GRD	-Calculated Analytic Signal from Total Magnetic Field grid (left)
084582_SF2700_ASR.GRD	-Calculated Analytic Signal from Total Magnetic Field grid (right)

084582_SF2700_SuscL.GRD	-Calculated Apparent Susceptibility from Total Magnetic Field grid (left)
084582_SF2700_SuscR.GRD	-Calculated Apparent Susceptibility from Total Magnetic Field grid (right)
084582_SF2700_RES7200Hz.GRD	-Calculated Resistivity (in ohm-metres) for 7200 Hz coplanar coils

Additional files with filename extensions of *.gi contain projection information for each grid.

TIFF\

Georeferenced image in Tagged Image File Format

084582_SF0607_MagL.tif	-Total Magnetic Field (left)
084582_SF0607_MagR.tif	-Total Magnetic Field (right)
084582_SF0607_1VDL.tif	-Calculated First Vertical Derivative from Total Magnetic Field (left)
084582_SF0607_1VDR.tif	-Calculated First Vertical Derivative from Total Magnetic Field (right)
084582_SF0607_2VDL.tif	-Calculated Second Vertical Derivative from Total Magnetic Field (left)
084582_SF0607_2VDR.tif	-Calculated Second Vertical Derivative from Total Magnetic Field (right)
084582_SF0607_ASJ.tif	-Calculated Analytic Signal from Total Magnetic Field (left)
084582_SF0607_ASR.tif	-Calculated Analytic Signal from Total Magnetic Field (right)
084582_SF0607_SuscL.tif	-Calculated Apparent Susceptibility from Total Magnetic Field (left)
084582_SF0607_SuscR.tif	-Calculated Apparent Susceptibility from Total Magnetic Field (right)
084582_SF0607_RES7200Hz.tif	-Calculated Resistivity (in ohm-metres) for 7200 Hz coplanar coils
084582_SF1000_MagL.tif	-Total Magnetic Field (left)
084582_SF1000_MagR.tif	-Total Magnetic Field (right)
084582_SF1000_1VDL.tif	-Calculated First Vertical Derivative from Total Magnetic Field (left)
084582_SF1000_1VDR.tif	-Calculated First Vertical Derivative from Total Magnetic Field (right)
084582_SF1000_2VDL.tif	-Calculated Second Vertical Derivative from Total Magnetic Field (left)
084582_SF1000_2VDR.tif	-Calculated Second Vertical Derivative from Total Magnetic Field (right)
084582_SF1000_ASJ.tif	-Calculated Analytic Signal from Total Magnetic Field (left)
084582_SF1000_ASR.tif	-Calculated Analytic Signal from Total Magnetic Field (right)
084582_SF1000_SuscL.tif	-Calculated Apparent Susceptibility from Total Magnetic Field (left)

084582_SF1000_SuscR.tif	-Calculated Apparent Susceptibility from Total Magnetic Field (right)
084582_SF1000_RES7200Hz.tif	-Calculated Resistivity (in ohm-metres) for 7200 Hz coplanar coils
084582_SF1116_MagL.tif	-Total Magnetic Field (left)
084582_SF1116_MagR.tif	-Total Magnetic Field (right)
084582_SF1116_1VDL.tif	-Calculated First Vertical Derivative from Total Magnetic Field (left)
084582_SF1116_1VDR.tif	-Calculated First Vertical Derivative from Total Magnetic Field (right)
084582_SF1116_2VDL.tif	-Calculated Second Vertical Derivative from Total Magnetic Field (left)
084582_SF1116_2VDR.tif	-Calculated Second Vertical Derivative from Total Magnetic Field (right)
084582_SF1116_AS_L.tif	-Calculated Analytic Signal from Total Magnetic Field (left)
084582_SF1116_AS_R.tif	-Calculated Analytic Signal from Total Magnetic Field (right)
084582_SF1116_SuscL.tif	-Calculated Apparent Susceptibility from Total Magnetic Field (left)
084582_SF1116_SuscR.tif	-Calculated Apparent Susceptibility from Total Magnetic Field (right)
084582_SF1116_RES7200Hz.tif	-Calculated Resistivity (in ohm-metres) for 7200 Hz coplanar coils
084582_SF1200_MagL.tif	-Total Magnetic Field (left)
084582_SF1200_MagR.tif	-Total Magnetic Field (right)
084582_SF1200_1VDL.tif	-Calculated First Vertical Derivative from Total Magnetic Field (left)
084582_SF1200_1VDR.tif	-Calculated First Vertical Derivative from Total Magnetic Field (right)
084582_SF1200_2VDL.tif	-Calculated Second Vertical Derivative from Total Magnetic Field (left)
084582_SF1200_2VDR.tif	-Calculated Second Vertical Derivative from Total Magnetic Field (right)
084582_SF1200_AS_L.tif	-Calculated Analytic Signal from Total Magnetic Field (left)
084582_SF1200_AS_R.tif	-Calculated Analytic Signal from Total Magnetic Field (right)
084582_SF1200_SuscL.tif	-Calculated Apparent Susceptibility from Total Magnetic Field (left)
084582_SF1200_SuscR.tif	-Calculated Apparent Susceptibility from Total Magnetic Field (right)
084582_SF1200_RES7200Hz.tif	-Calculated Resistivity (in ohm-metres) for 7200 Hz coplanar coils
084582_SF1718_MagL.tif	-Total Magnetic Field (left)
084582_SF1718_MagR.tif	-Total Magnetic Field (right)
084582_SF1718_1VDL.tif	-Calculated First Vertical Derivative from Total Magnetic Field (left)

084582_SF1718_1VDR.tif	-Calculated First Vertical Derivative from Total Magnetic Field (right)
084582_SF1718_2VDL.tif	-Calculated Second Vertical Derivative from Total Magnetic Field (left)
084582_SF1718_2VDR.tif	-Calculated Second Vertical Derivative from Total Magnetic Field (right)
084582_SF1718_AS�.tif	-Calculated Analytic Signal from Total Magnetic Field (left)
084582_SF1718_ASR.tif	-Calculated Analytic Signal from Total Magnetic Field (right)
084582_SF1718_SuscL.tif	-Calculated Apparent Susceptibility from Total Magnetic Field (left)
084582_SF1718_SuscR.tif	-Calculated Apparent Susceptibility from Total Magnetic Field (right)
084582_SF1718_RES7200Hz.tif	-Calculated Resistivity (in ohm-metres) for 7200 Hz coplanar coils
084582_SF2023_MagL.tif	-Total Magnetic Field (left)
084582_SF2023_MagR.tif	-Total Magnetic Field (right)
084582_SF2023_1VDL.tif	-Calculated First Vertical Derivative from Total Magnetic Field (left)
084582_SF2023_1VDR.tif	-Calculated First Vertical Derivative from Total Magnetic Field (right)
084582_SF2023_2VDL.tif	-Calculated Second Vertical Derivative from Total Magnetic Field (left)
084582_SF2023_2VDR.tif	-Calculated Second Vertical Derivative from Total Magnetic Field (right)
084582_SF2023_AS�.tif	-Calculated Analytic Signal from Total Magnetic Field (left)
084582_SF2023_ASR.tif	-Calculated Analytic Signal from Total Magnetic Field (right)
084582_SF2023_SuscL.tif	-Calculated Apparent Susceptibility from Total Magnetic Field (left)
084582_SF2023_SuscR.tif	-Calculated Apparent Susceptibility from Total Magnetic Field (right)
084582_SF2023_RES7200Hz.tif	-Calculated Resistivity (in ohm-metres) for 7200 Hz coplanar coils
084582_SF2526_MagL.tif	-Total Magnetic Field (left)
084582_SF2526_MagR.tif	-Total Magnetic Field (right)
084582_SF2526_1VDL.tif	-Calculated First Vertical Derivative from Total Magnetic Field (left)
084582_SF2526_1VDR.tif	-Calculated First Vertical Derivative from Total Magnetic Field (right)
084582_SF2526_2VDL.tif	-Calculated Second Vertical Derivative from Total Magnetic Field (left)
084582_SF2526_2VDR.tif	-Calculated Second Vertical Derivative from Total Magnetic Field (right)

084582_SF2526_AS�.tif	-Calculated Analytic Signal from Total Magnetic Field (left)
084582_SF2526_ASR.tif	-Calculated Analytic Signal from Total Magnetic Field (right)
084582_SF2526_SuscL.tif	-Calculated Apparent Susceptibility from Total Magnetic Field (left)
084582_SF2526_SuscR.tif	-Calculated Apparent Susceptibility from Total Magnetic Field (right)
084582_SF2526_RES7200Hz.tif	-Calculated Resistivity (in ohm-metres) for 7200 Hz coplanar coils
084582_SF2700_MagL.tif	-Total Magnetic Field (left)
084582_SF2700_MagR.tif	-Total Magnetic Field (right)
084582_SF2700_1VDL.tif	-Calculated First Vertical Derivative from Total Magnetic Field (left)
084582_SF2700_1VDR.tif	-Calculated First Vertical Derivative from Total Magnetic Field (right)
084582_SF2700_2VDL.tif	-Calculated Second Vertical Derivative from Total Magnetic Field (left)
084582_SF2700_2VDR.tif	-Calculated Second Vertical Derivative from Total Magnetic Field (right)
084582_SF2700_AS�.tif	-Calculated Analytic Signal from Total Magnetic Field (left)
084582_SF2700_ASR.tif	-Calculated Analytic Signal from Total Magnetic Field (right)
084582_SF2700_SuscL.tif	-Calculated Apparent Susceptibility from Total Magnetic Field (left)
084582_SF2700_SuscR.tif	-Calculated Apparent Susceptibility from Total Magnetic Field (right)
084582_SF2700_RES7200Hz.tif	-Calculated Resistivity (in ohm-metres) for 7200 Hz coplanar coils

Additional files with filename extensions of *.gi contain projection information for each TIFF image.

SHP\

Shapefile (a set of four binary files with extensions .shp, .dbf, .prj, and .shx, collectively called a shapefile, that contain spatial and attribute information for points, lines, or polygons; for use in ESRI ArcMap software)

084582_SF0607_AGMag_AGFEM.shp	-Boundary of the survey area (SF0607)
084582_SF1000_AGMag_AGFEM.shp	-Boundary of the survey area (SF1000)
084582_SF1116_AGMag_AGFEM.shp	-Boundary of the survey area (SF1116)
084582_SF1200_AGMag_AGFEM.shp	-Boundary of the survey area (SF1200)
084582_SF1718_AGMag_AGFEM.shp	-Boundary of the survey area (SF1718)
084582_SF2023_AGMag_AGFEM.shp	-Boundary of the survey area (SF2023)
084582_SF2526_AGMag_AGFEM.shp	-Boundary of the survey area (SF2526)
084582_SF2700_AGMag_AGFEM.shp	-Boundary of the survey area (SF2700)

CREATION OF GRIDS

Total Magnetic Field and Resistivity

These grids were generated by using Geosoft's (styling itself as geosoft) Rangrid minimum-curvature algorithm with 12.5 m grid cell size.

Analytic Signal

The total magnetic field grid was used to calculate the analytic signal grid using a fast Fourier transform method.

The analytic signal does not depend on the direction of magnetization or the direction of the Earth's magnetic field. As a result, bodies of the same geometry will have the same analytic signal shape, even where their total-field shapes would differ. The analytic signal is also useful in locating the edges of magnetic source bodies, particularly where remanence and/or low magnetic latitude complicates interpretation. The analytic signal is the square root of the sum of the squares of the derivatives in the x, y, and z directions of the total magnetic field.

First Vertical Derivative

The total magnetic field grid was used to calculate the first vertical derivative grid by applying the following filters:

1. Derivative
 - a. Direction = Z
 - b. Order of differentiation = 1
2. Butterworth:
 - a. Cutoff wavelength = 50
 - b. Filter order = 8

The vertical derivative indicates the rate of change of the magnetic field with height. The first vertical derivative (1VD) has the effect of sharpening anomalies, allowing improved spatial location of source axes and contacts. It also provides better definition and resolution of near-surface magnetic units as well as defines weak features that may not be evident in the total magnetic field.

Second Vertical Derivative

The total magnetic field grid was used to calculate the second vertical derivative grid by applying the following filters:

1. Derivative
 - a. Direction = Z
 - b. Order of differentiation = 2
2. Butterworth:
 - a. Cutoff wavelength = 50
 - b. Filter order = 8

The second vertical derivative is the rate of change of the 1VD with height. It is used to enhance local anomalies and help outline the edges of anomalous bodies. A second vertical derivative map is a powerful interpretive tool that can be used to assist in the delineation of causative bodies and accurately locate changes in the magnetic field gradients. Better definition of discontinuities and their relation to geology can be gained from the use of this tool. A second vertical derivative map will show steep gradients over faults and positive closures over up-thrown blocks.

Apparent Magnetic Susceptibility

The total magnetic field grid was used to calculate the apparent susceptibility grid by applying the following filters:

1. Apparent Susceptibility
 - a. Field strength = 59710 nT
 - b. Inclination = 83.1°
 - c. Declination = 22.1°
 - d. Depth of source = 25m
2. Butterworth:
 - a. Cutoff wavelength = 50
 - b. Filter order = 8

The magnetic susceptibility is a dimensionless number that represents the degree to which a body can be magnetized in response to the presence of a magnetic field. (It is the ratio of magnetization within the material to the strength of the applied magnetic field.) It is the fundamental parameter in magnetic prospecting, since the magnetic response of the rocks is a combination of the strength of the earth's field at a given point and the amount and type of magnetic material in them.

In the absence of being able to directly measure magnetic susceptibility, apparent susceptibility values can be calculated by making certain assumptions. Typically, the geometry of the source is represented by a collection of vertical, square-ended prisms of infinite depth extent, the horizontal dimensions of which are taken to be equal to the cell size of the input grid. To calculate susceptibility, a compound filter is applied that performs: a reduction to the pole (see below), downward continuation to the chosen source depth, correction for the geometric effect of the prisms, and division by the total magnetic field. The first three operations estimate the magnetization of the rocks, and the last generates the susceptibility ratio. The resulting apparent susceptibility data is in SI units.

Reduction to the pole attempts to eliminate the effect of the direction of the Earth's magnetic field, which points more downward near the poles and closer to horizontal near the equator. The reduction to the pole operation recalculates total magnetic intensity data as if the inducing magnetic field was vertical, transforming some types of asymmetrical magnetic anomalies to symmetrical ones centered over their causative bodies. Reduction to the pole makes the simplifying assumption that the rocks in the survey area are all magnetized parallel to the earth's magnetic field, and performs best at middle to high latitudes.

Downward continuation is a method of estimating the magnetic field at a datum lower than that at which it was measured. A number of calculation methods are available, but all require the assumption that the field is continuous, which can be misleading if there are anomalies between the measured surface and the new datum. The method increases the horizontal resolution of anomalies but noise can be exaggerated.

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