Logistics
Report

For the

Helicopter Aeromagnetic Geophysical Survey

Flown over

Great Sand Dunes
&
Poncha Springs Blocks

From

Alamosa & Salida, Colorado, USA

Carried out on behalf of

UPPER LIMIT AVIATION INC.

FOR

U.S. GEOLOGICAL SURVEY

By

New-Sense Geophysics Limited

Toronto, Canada
Date: December 30th, 2008
(HMI81005-report)

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AMENDMENT RECORD

Rev	Date	Description	Report Section	Prepared by
1	January 20, 2009	Edited Gridding Section: added coordinate system information	6.4.4.	Andrei Yakovenko
2	January 20, 2009	Edited Images of Final Maps: 1) changed the DTM images for both GSD and Poncha Springs blocks; 2) edited coordinate system information description on all the images.	Appendix C	Andrei Yakovenko

DOCUMENT RECORD

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1. INTRODUCTION

A high sensitivity helicopter Magnetic airborne survey was carried out for U.S. GEOLOGICAL SURVEY, on behalf of Upper Limit Aviation Inc. (ULA) over the survey areas known as, Great Sand Dunes in the vicinity of Alamosa, Colorado, USA (contract number: 08CRCN0054) and Poncha Springs in the vicinity of Salida, Colorado, USA (order number: G09PX00129). New-Sense Geophysics (NSG) flew the survey under the terms of an agreement with ULA dated October 5th, 2008 (Great Sand Dunes) and October 25th, 2008 (Poncha Springs).

The Great Sand Dunes survey was flown between October 6th and October 25th, 2008. A total of 3609.5 line-kilometers of total field magnetic data was flown, collected, processed and plotted.

The Poncha Springs survey was flown between October 25th and October 29th, 2008. A total of 960.5 line-kilometers of total field magnetic data was flown, collected, processed and plotted.

Geophysical equipment comprised 1 high-sensitivity Cesium magnetometer mounted in a fixed helicopter stinger. Ancillary equipment included digital recorders, radar altimeter, laser altimeter (optional, not all flights, see section 5.2.4.1) and a differential global positioning system, which provided accurate real-time navigation and subsequent flight path recovery. Surface equipment included a magnetic base station with GPS time synchronization, and a PC-based field computer, which was used to check the data quality and completeness on a daily basis.

The technical objective of the survey was to provide high-resolution magnetic and digital terrain grids suitable for anomaly delineation, detailed structural evaluation and identification of lithologic trends. Fully corrected magnetic and digital terrain grids were prepared by the New-Sense Toronto office after the completion of survey activities.

This report describes the acquisition, processing and presentation of data for the Great Sand Dunes flown from Alamosa, and Poncha Springs flown from Salida, Colorado, USA.

2. SURVEY LOCATION

2.1. Survey Area Corner Coordinates, Great Sand Dunes Block

Datum: WGS84
Projection: Universal Transverse Mercator Zone 13N
Local Datum Transform: World

X_WGS84	Y_WGS84
440971.7700	4153057.9400
441235.7400	4185948.7200
439372.7300	4189646.8800
450062.2400	4189407.7300
454948.9700	4186401.5200
457127.1300	4183724.0000
456905.4700	4175233.9000
451590.3000	4163101.3800
450927.6500	4157019.3300
452959.7800	4155263.7900
456225.2900	4154214.6000
456164.2900	4152987.3700
440971.7700	4153057.9400

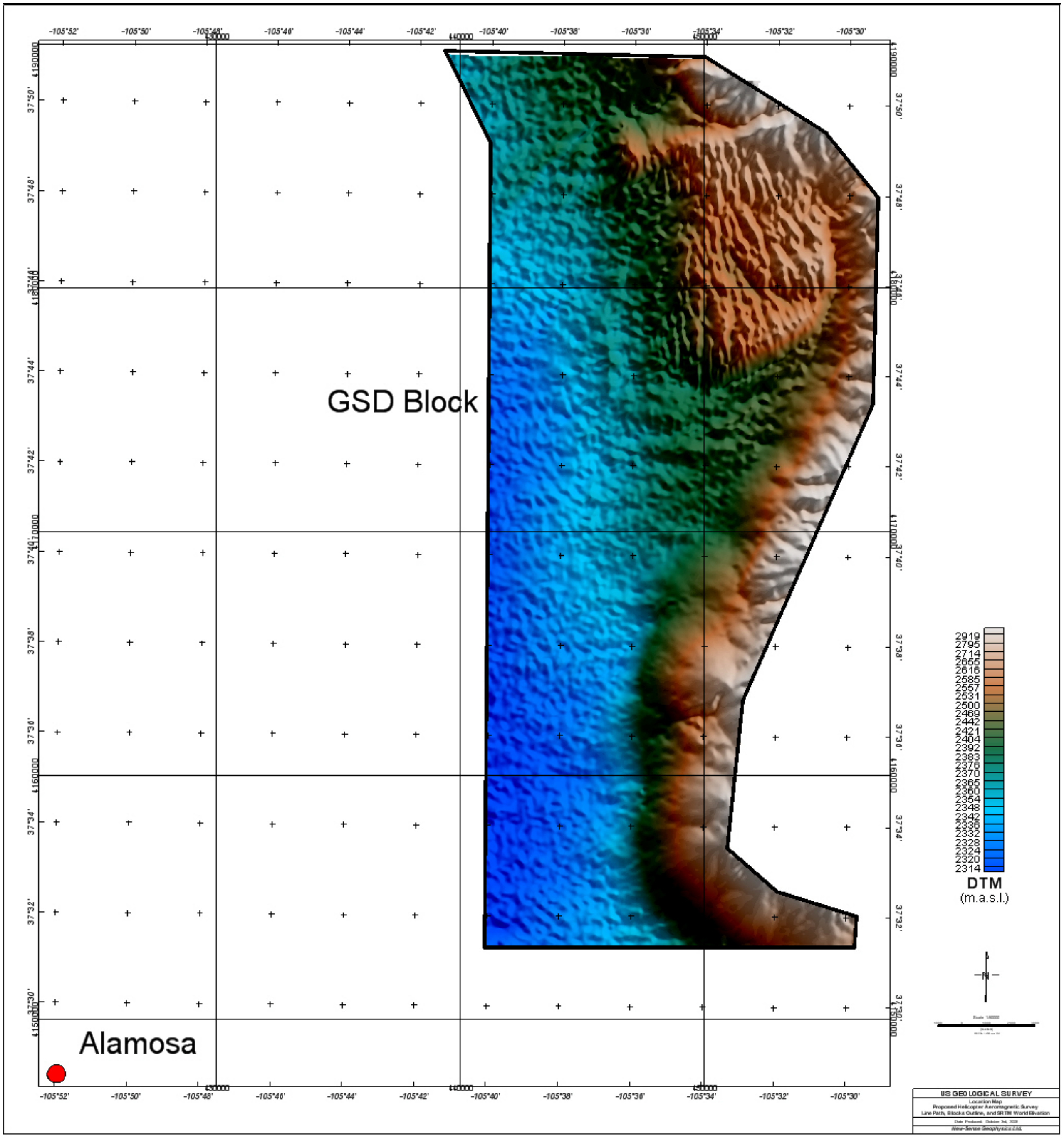


Figure 1. Location map depicting an outline and calculated DTM grid for Great Sand Dunes Block. The coordinate system is WGS84, Zone 13N, World.

2.2. Survey Area Corner Coordinates, Poncha Springs Block

Datum: WGS84
Projection: Universal Transverse Mercator Zone 13N
Local Datum Transform: World

X_WGS84	Y_WGS84
407551.10	4259274.17
394114.53	4264619.66
397752.15	4273425.55
407947.37	4268905.32
410292.12	4265255.20

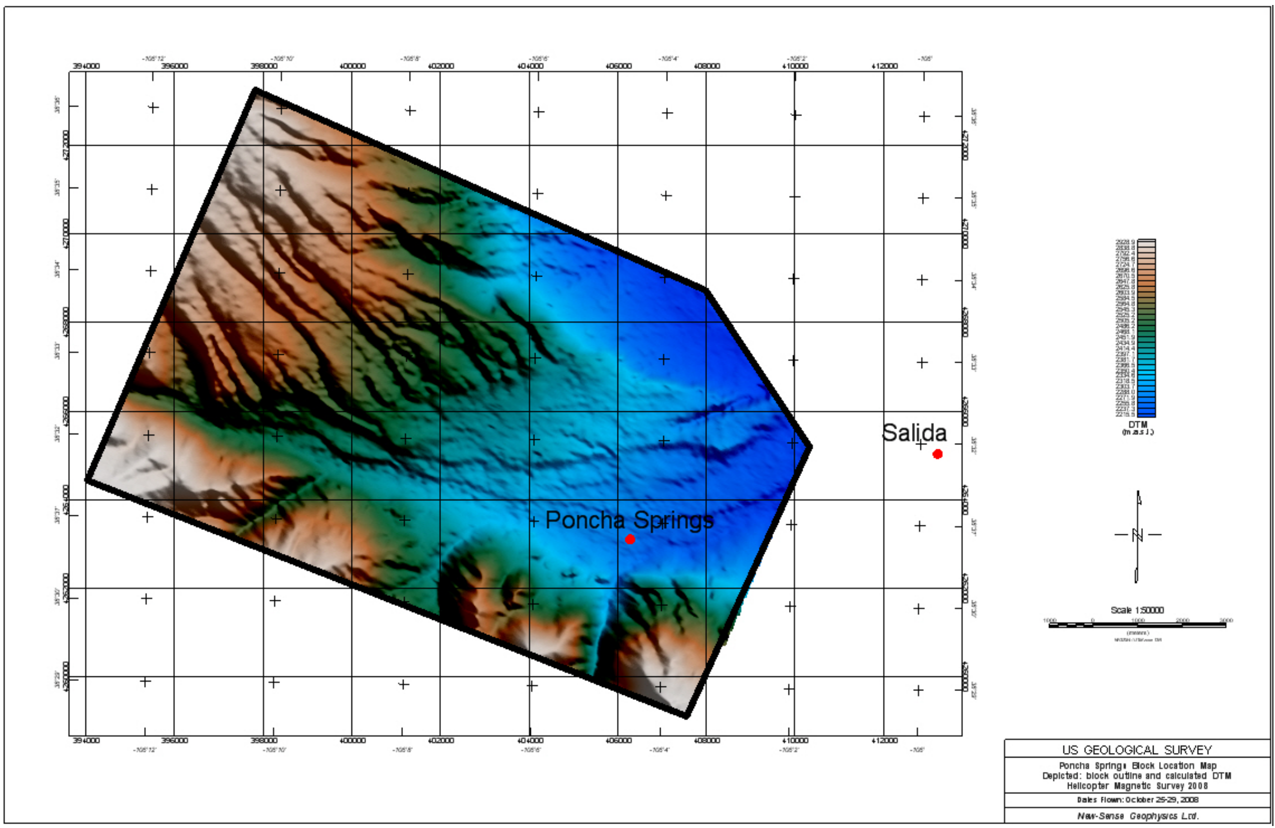


Figure 2. Location map depicting an outline and calculated DTM grid for Poncha Springs Block. The coordinate system is WGS84, Zone 13N, World.

3. PERSONNEL

3.1. Field Operations for Great Sand Dunes & Poncha Springs Areas

New-Sense Geophysics Ltd., Geo-Technician: Sean Plener

Upper Limit Aviation, Inc., Pilot: Sean Reid

3.2 NSG Office Data Processing

Great Sand Dunes Block:

OC/QA:	Andrei Yakovenko
Data Processing and Grids:	Andrei Yakovenko
Maps:	Francis Tong, Andrei Yakovenko
Logistics Report:	Andrei Yakovenko, Chris Evans

Poncha Springs Block:

OC/QA:	Andrei Yakovenko
Data Processing and Grids:	Andrei Yakovenko, Sean Plener
Maps:	Francis Tong, Andrei Yakovenko
Logistics Report:	Andrei Yakovenko, Chris Evans

3.3 Project Management and Scientist In-charge

New-Sense Geophysics Ltd.: Andrei Yakovenko

U.S. GEOLOGICAL SURVEY: Dr. V. J. S. (Tien) Grauch

4. SURVEY PARAMETERS

4.1 Great Sand Dunes Area

Traverse Line spacing	: 150 meters
Control Line spacing	: 1500 meters
Nominal Terrain clearance	: 100 meters sensor height
Average Terrain clearance	: 102.6 meters sensor height
Navigation	: Real Time DGPS
Traverse Line direction	: 90^0, 270^0
Control Line direction	: 0^0, 180^0
Measurement interval	: 0.1 sec for magnetics
Groundspeed (average)	: 115 km/hr
Measurement spacing (average)	: 3.19 meters (0.1 sec)
Airborne Digital Record	: Line Number Flight Number Fiducial Counts Time (System and GPS) Real Time DGPS data Radar Altimeter * Laser Altimeter Total Field Magnetics Magnetic compensation parameters (fluxgate mag.) iCam flight path digital video
Base Station Record:	Ambient Total Field Magnetics Raw Global Positioning System (GPS) data Time (System and GPS)

4.2 Poncha Springs Area

Traverse Line spacing	: 150 meters
Control Line spacing	: 1500 meters
Nominal Terrain clearance	: 150 meters sensor height
Average Terrain clearance	: 150.2 meters sensor height
Navigation	: Real Time DGPS
Traverse Line direction	: 23^0, 203^0
Control Line direction	: 113^0, 293^0
Measurement interval	: 0.1 sec for magnetics
Groundspeed (average)	: 93.6 km/hr
Measurement spacing (average)	: 2.6 meters (0.1 sec)
Airborne Digital Record	: Line Number Flight Number Fiducial Counts Time (System and GPS) Real Time DGPS data

Radar Altimeter
* Laser Altimeter
Total Field Magnetics
Magnetic compensation parameters (fluxgate mag.)
iCam flight path digital video

Base Station Record: Ambient Total Field Magnetics
Raw Global Positioning System (GPS) data
Time (System and GPS)

5. AIRCRAFT AND EQUIPMENT

5.1 Aircraft

The aircraft used was a Bell 206 B3 helicopter (N206BY) equipped with one Cesium magnetometer mounted in a fixed stinger assembly. The aviation company providing the aircraft service was UPPER LIMIT AVIATION INC. based in Salt Lake City, Utah, USA.

5.2 Airborne Geophysical System

5.2.1 Magnetometer

One Scintrex CS-3 Optically Pumped Cesium Split Beam Sensor was mounted in a fixed stinger assembly. The magnetometer Larmor frequency output was processed by a KMAG-4 magnetometer counter, which provides a resolution of 0.15 ppm (in a magnetic field of 50,000 nT, resolution equivalent to 0.0075 nT).

5.2.2 Magnetic Compensation

The proximity of the aircraft to the magnetic sensor creates a measurable anomalous response as a result of the aircraft movement. The orientation of the aircraft with respect to the sensor and the motion of the aircraft through the earth's magnetic field are contributing factors to the strength of this response. A special calibration flight (i.e., FOM) was flown to record the information necessary to compensate for these effects.

The FOM maneuvers consist of a series of calibration lines flown at high altitude to gain information in each of the required line directions. During this procedure, the pitch, roll and yaw of the aircraft are varied. Each variation is conducted in succession (first pitch, then roll, then yaw), providing a complete picture of the aircrafts effects at designated headings in all orientations.

A three-axis Bartington fluxgate magnetometer was used to measure the orientation and rates of change of the magnetic field of the aircraft, away from localized terrestrial magnetic anomalies. The QC Tools digital compensation algorithm was then applied to generate a correction factor to compensate for permanent, induced, and eddy current magnetic responses generated by the aircrafts movements.

5.2.3 DGPS Navigation

Using a Trimble AgGPS 332 DGPS receiver with a subscription to an OmniStar VBS service to obtain DGPS corrections, and a U-BLOX RCB-LJ sixteen channel GPS receiver; the U-BLOX RCB-LJ applied real time DGPS corrections to the raw position data. This is an integral component of the iNAV V3 computer system, and was used to run the flight control system providing precise positioning of the aircraft.

Accuracy of AgGPS 332 VBS service is between 60cm – 100cm horizontally, up to 200cm vertically.

5.2.4 Altimeters

5.2.4.1 Radar Altimeter

A TRA 3500 radar altimeter was mounted in the stinger. This instrument operates with a linear performance over the range of 0 to 2,500 feet and records the terrain clearance of the sensors.

Note: Radar altimeter was unable to return accurate results over sand dune terrain because of the scattering affect of the sand on the radar signal.

5.2.4.1 Laser Altimeter*

A Universal Laser Sensor (ULS) produced by Laser Technology Inc. was used in addition to the radar altimeter. The laser altimeter was mounted to the base of the stinger and was used in a ”Last Target” operation mode (designed to penetrate airborne particulate such as dust and fog), with an accuracy of approximately $\pm 6cm$.

Due to scattering affect of the sand dunes on the radar signal, a laser altimeter was shipped to the Great Sand Dunes, was received and installed on October 16, 2008. From flights 12 and onward (of Great Sand Dunes project), both laser and radar altimeters data was recorded.

There were initial technical difficulties with the ULS altimeter; noise spikes were present on flights 13-18 in the laser altimeter readings. As such, the laser altimeter was only used as the height measure during portions of flight lines where the radar altimeter data was scattered (the sand dunes). *New Sense Geophysics cannot take responsibility of the accuracy of height measurements using the laser altimeter during this period.* However, New Sense Geophysics has done its best to process, remove the spikes present, and interpolate the height of the aircraft during these periods on the Great Sand Dunes Block. For the Poncha Springs block, laser altimeter data was not needed for data processing and as such was left untreated.

From flights 19 of Great Sand Dunes and on, most technical difficulties with the laser altimeter had been resolved. In terrain where radar altimeter signals were being scattered, laser altimeter data was substituted.

* The use of the ULS Laser Altimeter was not outlined in the initial contract with ULA and U.S. GEOLOGICAL SURVEY, and was only suggested as an alternative by New Sense Geophysics when radar altimeter data was not measured accurately. New Sense Geophysics does not guarantee the

accuracy of measurements using the ULS Laser Altimeter on Flights 13-18 of the Great Sand Dunes survey.

5.2.5 Geophysical Flight Control System

New-Sense's iNAV V3 geophysical flight control system monitored and recorded magnetometer, spectrometer, altimeter and GPS equipment performance. Input from the various sensors was monitored every 0.005 seconds for the precise coordination of geophysical and positional measurements. The input was recorded ten times per second.

GPS positional coordinates and terrain clearance were presented to the pilot by means of a Pilot Indicator and a touch screen displays. The magnetometer response, 4th difference, altimeter profile and profiles of the radiometric windows were also available on the touch screen display for real-time monitoring of equipment performance.

5.2.6 iDAS Digital Recording

The output of the CS-3 magnetometer, spectrometer, fluxgate magnetometer, altimeter(s), DGPS coordinates as well as time (system and GPS) were recorded digitally on a Compact Flash card at a sample rate of ten times per second by the iNAV V3 system.

5.2.7 iCAM Digital Video Recording

A digital video flight record was produced for all flight lines in the Great Sand Dunes and Poncha Springs survey areas.

A Panasonic Colour CC TV Camera, model number WV-CP484, was mounted below the body of the helicopter and positioned directly facing the ground surface. The WV-CP484 camera features a 1/3 inch pick-up CCD tube with a 768×494 pixel array.

A Panasonic WV-LA210C3 2.1mm aspherical TV (fish eye) lens was used on the WV-CP484 camera. This super wide-angle lens features a 1:1.0 maximum aperture ratio and an angular field of view of $107.6^{\circ} H \times 88.0^{\circ} V$.

The video signal was captured, processed and recorded using the iCAM system, a digital flight path video camera system. Using iDAS and GPS system input the iCAM overlays current flight data onto the video frames and produces a MPEG4 encoding format AVI file. The video produced is in the standard NTSC 30 frames per second format, at 720x480 pixel resolution.

The overlayed text information is presented in two columns as shown below:

Left column (IDAS System Information)

1) Current line number
2) Current flight number
3) GPS clock (GPS_WEEKSEC, 1.0/sec)
4) Navigation file in use

Right Column (GPS Information)

5) GPS clock (GPS_WEEKSEC, 1.0/sec)
6) Latitude (WGS 84) – formatted ddmm.mmmmmN
7) Longitude (WGS 84) – formatted dddmm.mmmmmW
8) GPS signal quality indicator
9) GPS height (meters above sea level) (WGS 84)
10) Number of satellites visible

All flight videos have been included on 13 DVD's for Great Sand Dunes (titled, "GSD Flights VIDEO") and 5 DVD's for Poncha Springs (titled, "PON Flights VIDEO"). The DVD's have been labeled "iCAM Video for Flights:" On each DVD there includes a directory for each flight labeled "iCAM FLTXX" (ie: "ICAM FLT01" for flight 1). Included in each flight directory are the AVI flight videos, 1 for each line, a single ".cor" file and a single ".log" file.

The AVI file names are formatted as "Flight line"_"Flight number"_"file version (optional)".avi (ie: 10050_1 represents flight line 10050, flight 1). Multiple versions of files only created if duplicate on the system, only final copy recorded to DVD.

The COR file is a time correlation file that can be used by a software package, Video Link System (VLS), to display video segments that correspond to geophysical data being viewed in Geosoft Oasis Montaj.

The LOG file is used to record critical information in the operation of the iCAM. It can be used to diagnose issues with iCAM system if there are video quality concerns.

Both COR & LOG filenames are formatted in the following method, YYYYMMDDHHmmSS.cor & YYYYMMDDHHmmSS.log

YYYY	Year, Example: 2004
MM	Month (01-12), Example: February = "02"
DD	Day (01-31), Example: "05"
HH	Hour (00-23), Example: noon = "12"
mm	Minute (00-59), Example: 8 minutes = "08"
SS	Seconds (00-59), Example: 7 seconds = "07"

5.3 Ground Monitoring System

5.3.1 Base Station Magnetometer

A Cesium magnetometer (Scintrex CS-3) was used at the base of operations within or near the survey area, in an area of low magnetic gradient and free from cultural electric & magnetic noise sources. The sensitivity of the ground magnetometer is better than 0.01 nT. Data was recorded continuously at least every one second throughout the survey operations in digital form. Both the ground and airborne magnetic readings were synchronized based on the GPS clock.

5.3.2 Recording

The output of the magnetic and GPS monitors was recorded digitally on a dedicated TC 10 computer. A visual record of the last three hours was graphically maintained on the computer screen to provide an up to date appraisal of magnetic activity. At the conclusion of each production flight raw GPS and magnetic data was transferred to the main field compilation computer.

5.4 Field Compilation System

A Pentium laptop computer was used for field data processing and presentation. The raw data was imported to Geosoft Oasis montaj for QA/QC and processing purposes. After the data was checked for quality control, the database with uncompensated magnetic readings was exported to QCTools software package for magnetic compensation and base station data merging purposes. The compensated database was then imported back to Oasis for the subsequent and final processing.

6. OPERATIONS AND PROCEDURES

6.1 Flight Planning and Flight Path

The block outline coordinates (section 2.) were used to generate pre-calculated navigation files. The navigation files were used to plan flights at the designated traverse line spacing of 150 meters and tie line spacing of 1500 meters for Great Sand Dunes and Poncha Springs survey blocks.

Preliminary flight path maps and magnetic maps were plotted and updated to monitor coverage of the survey area.

6.2 Base Station Location

A magnetic base station was established in a magnetically quiet area.

6.2.1 Great Sand Dunes Block

For Great Sand Dunes, approximately 2 km south of the flight block (WGS 84, World, Latitude: 37.504173; Longitude: -105.613689).

6.2.2 Poncha Springs Block

For Poncha Springs, the base station was located approximately 0.5 km south of the airport within the survey block (WGS 84, World, Latitude: 38.534651; Longitude: -106.049762).

The base stations was monitored to ensure that the diurnal variation did not any exceed the following condition during survey flights:

- Monotonic changes in the magnetic field of 5 nT in any five-minute period
- Pulsations having periods of 5 minutes or less shall not exceed 2 nT
- Pulsations having periods between 5 and 10 minutes shall not exceed 4 nT
- Pulsations having periods between 10 and 20 minutes shall not exceed 8 nT

6.3 Airborne Magnetometers

A test of the performance of the CS-3 and fluxgate magnetometers was performed in order to monitor the ability of the system to remove the effects of aircraft motion on the magnetic measurement.

6.3.1 Great Sand Dunes FOM Results

On October 10th, 2008 prior to collecting any survey line data an FOM flight was flown in the southern vicinity of the Great Sand Dunes block. The results of the

FOM test measured to an error of less than 1.19 nT with a noise envelope within 0.13 nT. See Appendix A.

6.3.2 Poncha Springs FOM Results

On October 26, 2008 prior to collecting any survey line data an FOM flight was flown in the north-eastern vicinity of the Poncha Springs block. The results of the FOM test measured to an error of less than 1.19 nT with a noise envelope within 0.12 nT. See Appendix A.

6.4 Data Compilation

Data recorded by the airborne and base station systems was transferred to the field compilation system. As each flight was completed, the following compilation operations were carried out:

6.4.1 Flight Path Corrections & Datum Conversion

The navigational correction process yields a flight path expressed in WGS 84, Zone 13N, World. As requested, final product data was transformed to correspond to NAD 27, USA NADCON geoid:99 Conterminous US, UTM ZONE 13N.

The transformation was done in Geosoft with the following projection parameters:

	Semi-major axis (a)	Semi-minor axis (b)	Ellipsoid
WGS 84	6378137.0000	6356752.3142	WGS84
NAD 27	6378206.4	6356583.8	Clark 1866

Local datum shift applied: WGS 84, World to NAD 27, NAD 27, USA NADCON geoid:99 Conterminous US.

Grid-based transform: conus.ll2

UTM central meridian: -105 (Zone 13N)

False Easting : 500,000
False Northing : 0

6.4.2 Magnetic Corrections

All aeromagnetic data was compensated for permanent, induced, and eddy current magnetic noise generated by the aircraft. The compensated magnetic data was stored in the MAG_COMP channel.

6.4.2.1 Great Sand Dunes Block

6.4.2.1.1 Diurnal Corrections

Diurnal variations recorded by the base station were filtered with a 101 point low pass filter. The filtered data was then subtracted directly from the aeromagnetic measurements to provide a first order diurnal correction. When the magnetic variations were recognized to be caused by man-made sources (such as equipment passing by the sensor), they were removed prior to applying the diurnal corrections.

After base station removal, the total magnetic field values become very small. To bring the total magnetic measurements back to 'normal' values, a project average from the base station readings were added back to the magnetic data. The resulting base station corrected data was stored in the MAG_DIURNAL_CORRD channel.

6.4.2.1.2 Heading and Lag Corrections

Optically pumped cesium magnetic sensors have an inherent heading error, typically 1 to 2 nT peak-to-peak, as the sensor is rotated through 360 degrees. On reverse flight line directions the heading effect is reasonably predictable.

The base station corrected channel (MAG_DIURNAL_CORRD) was then corrected for the heading and lag errors. The heading test was flown at higher altitude (~10,000ft) in each survey line direction.

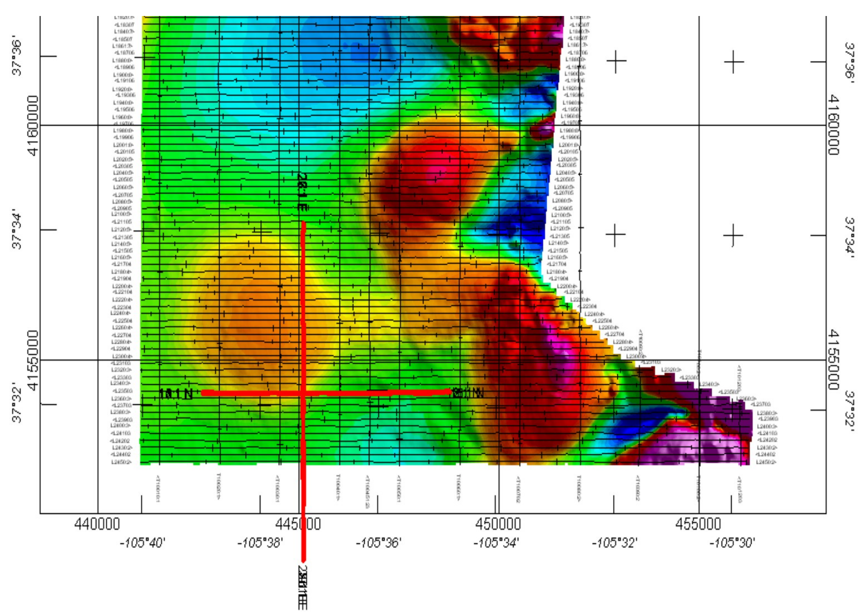


Figure 3. Showing the location of the heading test lines (red) in relation to the survey block.

All directions were flown twice to minimize the diurnal effect. The initial heading error was then estimated by subtracting the total field data flown in each direction from the averaged total field data flown traverse and control line directions.

Heading Table Great Sand Dunes Block

Direction (degrees)	Mean in that direction (nT)	Mean in the same direction (nT)	Mean in two directions (nT)	Error (nT)
0	51443.22	51433.935	51431.9975	-1.9375
0	51424.65			
180	51428.65	51430.06		1.9375
180	51431.47			
90	51425.73	51425.625	51435.2975	9.6725
90	51425.52			
270	51445.47	51444.97		-9.6725
270	51444.47			

After applying the above corrections it was discovered that the heading error in 90^0 and 270^0 directions were too high, and consequently overcorrected the traverse lines. As a result, lesser heading correction numbers were applied to traverse lines. See below example images and a copy of heading table corrections used.

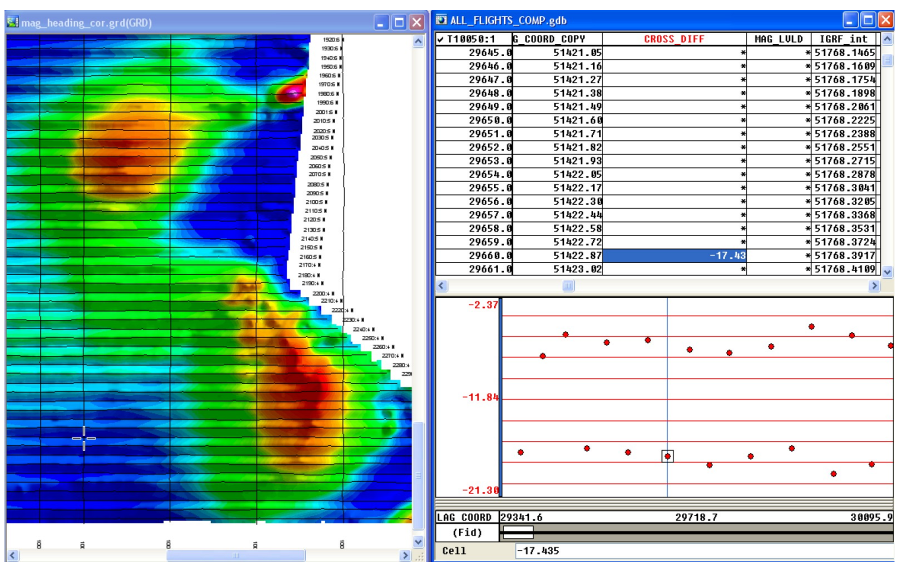


Figure 4. An example of data before any heading corrections were applied. The red dots on the profile window are the intersection points between traverse and control lines. The horizontal lines on the profile window are 2 nT apart.

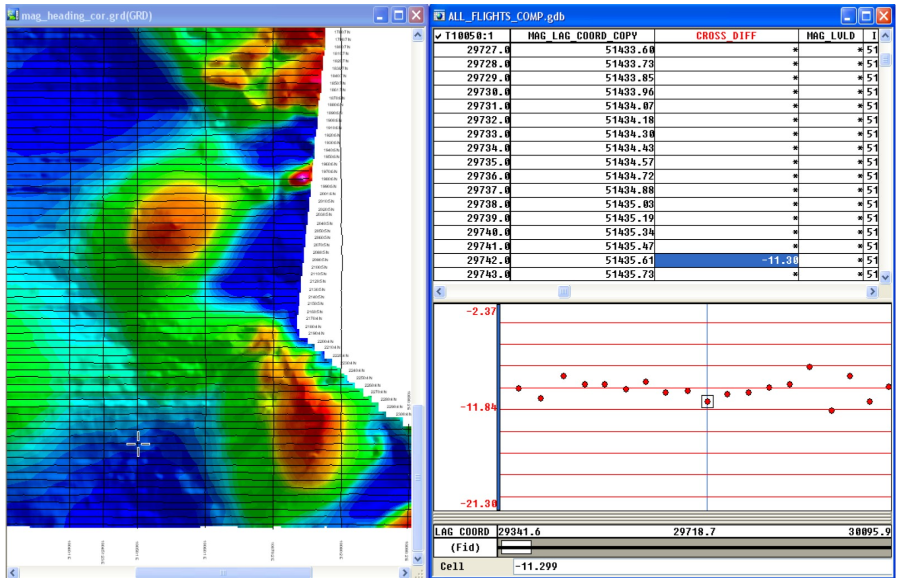


Figure 5. An example of data after the empirically determined (5 nT to 90^0, and -5nT to 270^0) heading corrections were applied. If the heading corrections from the heading test flight, 9.67nT and -9.67nT would be used the data would be greatly overcorrected.

The following heading corrections were applied:

/ Geosoft Heading Correction Table
/= Direction:real:i
/= Correction:real
/ Direction Correction

Direction	Correction
0	-1.94
90	5
180	1.94
270	-5
360	-1.94

The resulting heading corrected data was stored in the MAG_HEADING_CORRD channel.

There is no time lag to NSGs iDAS system. The distance lag error was empirically determined by dividing the distance from the GPS antenna to the sensor head by the averaged sample rate distance.

2.4m / 1.8m per sample = 0.8 = ~1 (lag of +1 was applied to the dataset)

The resulting lag corrected data was stored in the MAG_LAG_CORRD channel.

6.4.2.1.3 Leveling Corrections

After the heading and lag corrections, a survey line/control line network (i.e., Simple Leveling) was created in order to determine differences in magnetic field at the traverse and control line intercepts. The differences were calculated, tabulated, and were used to guide subsequent manual leveling on any lines or line segments which required adjustments.

The resulting leveled data was stored under MAG_LVLD channel.

6.4.2.1.4 IGRF Corrections

The total field strength of the International Geomagnetic Reference Field (IGRF) was calculated using for every data point (based on the spot values of Latitude, Longitude and GPS altitude), using the 2005 model. This IGRF was removed from the simple leveled (i.e. MAG_LVLD) data on a point-by-point basis.

The resulting IGRF corrected data was stored under MAG_LVLD_IGRF_CORRD channel.

6.4.2.1.5 Microleveling

The resulting magnetic data (MAG_LVLD_IGRF_CORRD) still depicted some line-to-line linear noise features. To level that data further it was decided to apply a microleveling technique developed by Paterson, Grant & Watson Limited and available through Geosoft Oasis montaj with the following key parameters:

Decorrugation noise channel high-pass filter - 600;
Amplitude Limit – 3.74 nT with a zero mode;
Naudy filter length – 750, with tolerance of 0.0001

The resulting microleveled data was stored in the TMI_FINAL channel.

6.4.2.2 Poncha Springs Block

6.4.2.2.1 Diurnal Corrections

Diurnal variations recorded by the base station were filtered with a 31 point low pass filter. The filtered data was then subtracted directly from the aeromagnetic measurements to provide a first order diurnal correction. When the magnetic variations were recognized to be caused by man-made sources (such as equipment passing by the sensor), they were removed prior to applying the diurnal corrections.

After base station removal, the total magnetic field values become very small. To bring the total magnetic measurements back to ‘normal’ values, a project average from the base station readings were added back to the magnetic data. The resulting base station corrected data was stored in the MAG_DIURNAL_CORRD channel.

6.4.2.2.2 Heading and Lag Corrections

Optically pumped cesium magnetic sensors have an inherent heading error, typically 1 to 2 nT peak-to-peak, as the sensor is rotated through 360 degrees. On reverse flight line directions the heading effect is reasonably predictable.

The base station corrected channel (MAG_DIURNAL_CORRD) was then corrected for the heading and lag errors. Heading test was flown at higher altitude (~10,000ft) in each survey line direction.

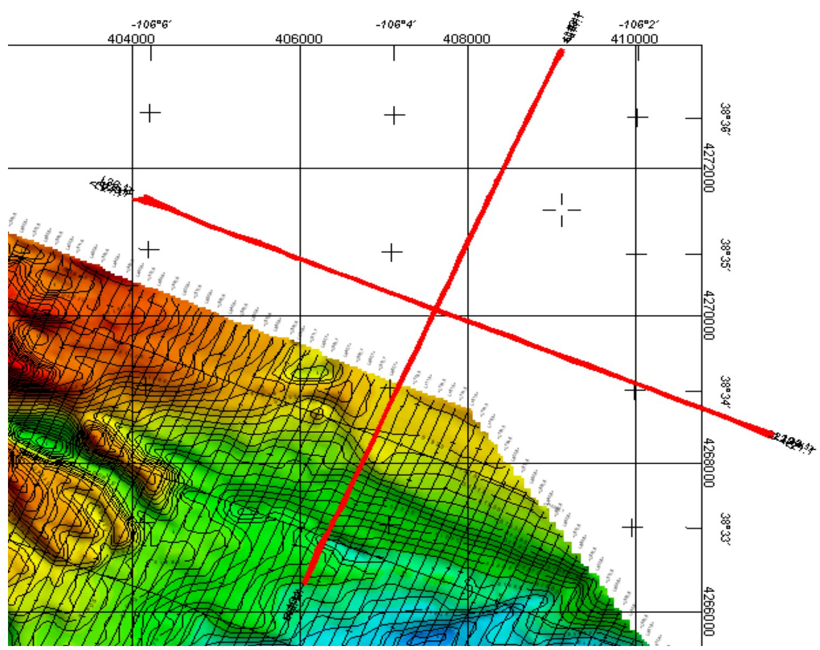


Figure 6. Showing the location of the heading test lines (red) in relation to the survey block.

All directions were flown twice to minimize the diurnal effect. The initial heading error was then estimated by subtracting the total field data flown in each direction from the averaged total field data flown traverse and control line directions.

Heading Table Poncha Springs Block

Direction (degrees)	Mean in that direction (nT)	Mean in the same direction (nT)	Mean in two directions (nT)	Error (nT)
23	51988.77	51989.985	51986.6975	-3.2875
23	51991.2			
203	51988.19	51983.41		3.2875
203	51978.63			
113	51983.28	51982.675	51989.0475	6.3725
113	51982.07			
293	51995.7	51995.42		-6.3725
293	51995.14			

However, after applying the above corrections it was discovered that the heading error in 23^0 and 203^0 directions were too low, and consequently under corrected the traverse lines. As a result, higher heading correction numbers were applied to traverse lines. See below example images and a copy of heading table corrections used.

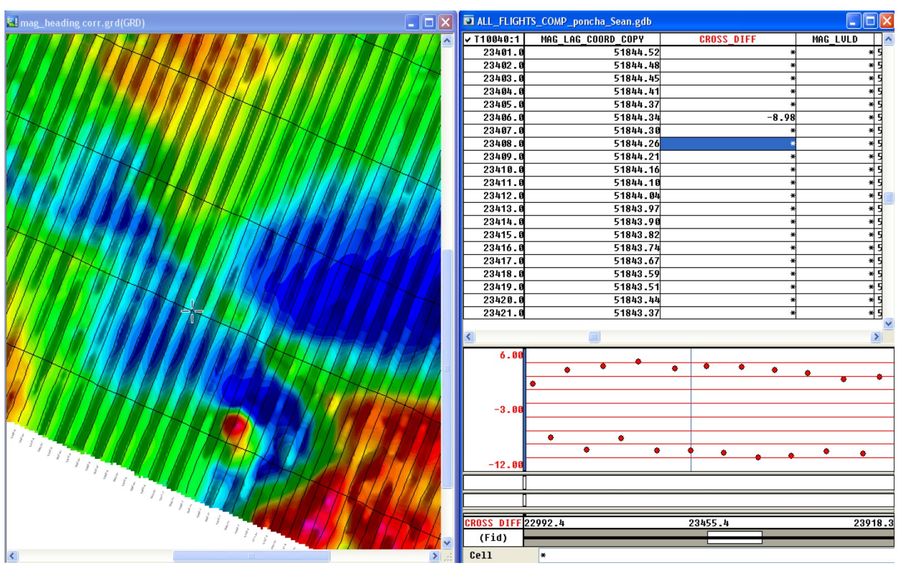


Figure 7. An example of data before any heading correction were applied. The red dots on the profile window are the intersection points between traverse and control lines. The horizontal lines on the profile window are 2 nT apart.

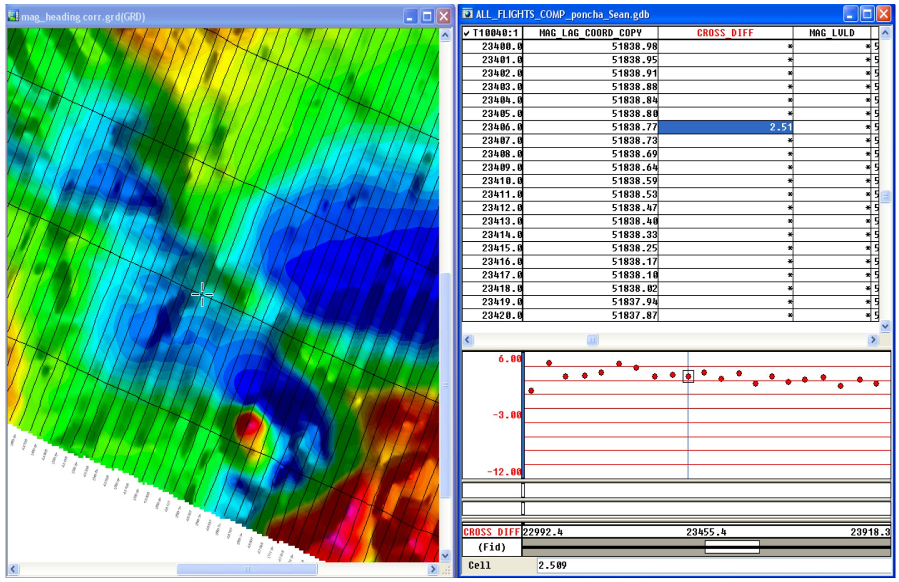


Figure 8. An example of data after the empirically determined (-5.92 nT to 23^0, and 5.92nT to 203^0) heading corrections were applied. If the heading correction from a heading test flight (-3.29nT and 3.29nT) would be used the data would be under corrected.

The following heading corrections were applied:

```
/ Geosoft Heading Correction Table
/=   Direction:real:i
/=   Correction:real
/      Direction   Correction
           0          -4.41
           23         -5.92
           113        6.37
           203        5.92
           293       -6.37
           360        -4.41
```

The resulting heading corrected data was stored in the MAG_HEADING_CORRD channel.

The is no time lag to NSGs iDAS system. The distance lag error was empirically determined by dividing the distance from the GPS antenna to the sensor head by the averaged sample rate distance.

2.4m / 1.8m per sample = 0.8 = ~1 (lag of +1 was applied to the dataset)

The resulting lag corrected data was stored in the MAG_LAG_CORRD channel.

6.4.2.2.3 Leveling Corrections

After the heading and lag corrections, a survey line/control line network (i.e., Simple Leveling) was created in order to determine differences in magnetic field at the traverse and control line intercepts. The differences were calculated, tabulated, and were used to guide subsequent manual leveling on any lines or line segments which required adjustments.

The resulting leveled data was stored under MAG_LVLD channel.

6.4.2.2.4 IGRF Corrections

The total field strength of the International Geomagnetic Reference Field (IGRF) was calculated using for every data point (based on the spot values of latitude, longitude and GPS altitude), using the 2005 model. This IGRF was removed from the simple leveled (i.e., MAG_LVLD) data on a point-by-point basis.

The resulting IGRF corrected data was stored in the MAG_LVLD_IGRF_CORRD channel.

6.4.2.2.5 Microleveling

The resulting magnetic data (MAG_LVLD_IGRF_CORRD) still depicted some line-to-line linear noise features. To level that data further it was decided to apply a microleveling technique developed by Paterson, Grant & Watson Limited and available through Geosoft Oasis montaj with the following key parameters:

Decorrugation noise channel high-pass filter - 600;
Amplitude Limit – 3.74 nT with a zero mode;
Naudy filter length – 750, with tolerance of 0.0001

The resulting microleveled data was stored in the TMI_FINAL channel.

6.4.3 Calculating Digital Terrain Model (DTM)

6.4.3.1 Great Sand Dunes Block

6.4.3.1.1 Radar Altimeter Issue

Shortly after flying the first few survey lines it was discovered that radar altimeter (section 5.2.4.1) was losing lock when flying over the sand dunes area. To rectify the problem NSG sent a laser altimeter (section 5.2.4.2) to the Great Sand Dunes and installed it on the aircraft (it is important to note that NSG takes no responsibility of the laser altimeter data, as use of such instrument was not required by the contract).

The laser altimeter data was then cleaned from any spikes and inserted into the radar altimeter data in the sand dunes area.

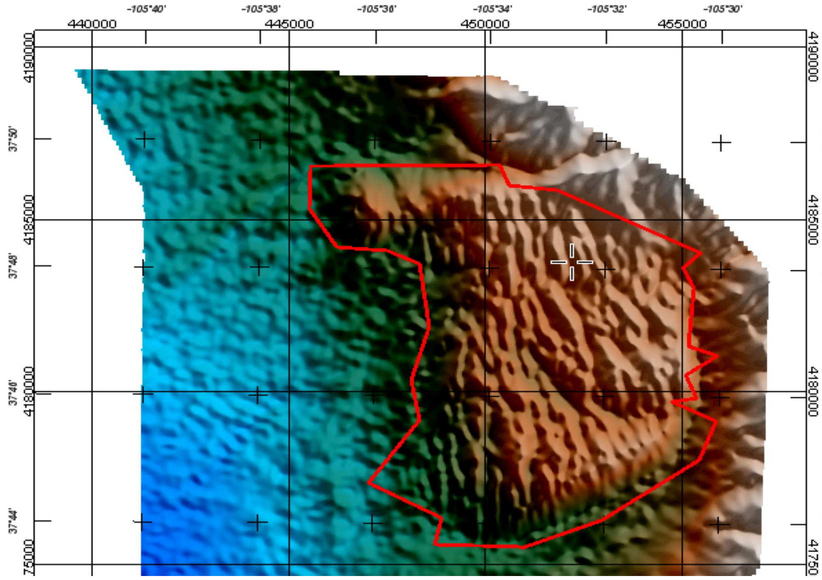


Figure 9. Section of the DTM map. Red outline shows area where the laser altimeter was used instead of the radar altimeter data. For the rest of the block only radar altimeter was used in calculating the DTM.

The radar and laser altimeters collect data by different means and produce slightly different readings while positioned in the same GPS location. Consequently, after merging the two data sets, “stepping” effects were recognized where the two profiles met. In order to smooth those junction points it was decided to trim a few records from the two ends of the data and interpolate between using Akima method. See image below for a graphic depiction of the process.

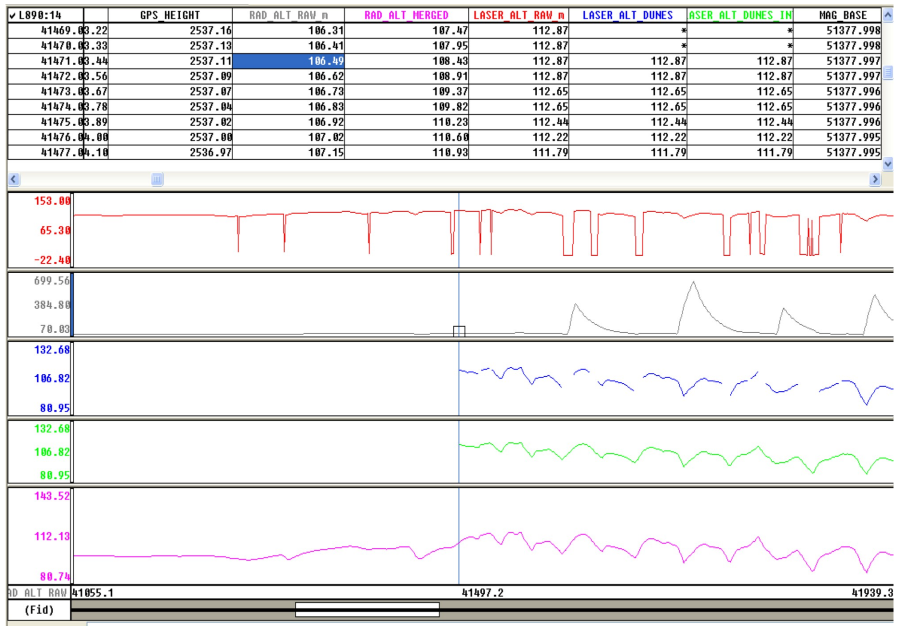


Figure 10. The top profile is raw laser altimeter data, the next one from the top is raw radar altimeter (showing sand dunes noise to the right), the next is di-spiked laser altimeter (over the sand dunes only), the following profiles show interpolated laser altimeter, and last profile depicts the merged radar and laser altimeter's data.

6.4.3.1.2 Calculating the DTM

The merged radar-laser altimeters data was then subtracted from the GPS_HEIGHT channel to produce DTM data. The resulting DTM data was then conventionally leveled and microleveled with the following key parameters:

Decorrugation noise channel high-pass filter - 600;
Amplitude Limit – 20 nT with a clip mode;
Naudy filter length – 300, with tolerance of 0.0001

The resulting data was stored in the DTM channel.

6.4.3.2 Poncha Springs Block

6.4.3.2.1 Radar Altimeter Issue

TRA 3500 Radar Altimeter has a beam width of 30^0 when flying under 1500 ft above ground. At the nominal altitude of 150 meters (the survey altitude) the altimeter would cover a foot print of ~80m. The averaged data from that foot print then returns to the receiver antenna. Given that the helicopter is typically has various pitch orientations when climbing up or descending or flying straight forward, the beam would be pointing down the ground at different angle and consequently increasing its footprint and shifting the footprint away from the aircraft. In addition, the situation becomes even more complex if flying over steep and variable slopes.

To accommodate that issue, a lag number had to be determined in order to shift the radar altimeter readings to their most appropriate positions over the slopes. It was found out that if using lag of 15, the resulting DTM grid looked most corrected.

6.4.3.2.2 Calculating the DTM

The lagged radar altimeter data was then subtracted from GPS Height data and microleveled with the following key parameters:

Decorrugation noise channel high-pass filter - 600;
Amplitude Limit – 15 nT with a clip mode;
Naudy filter length – 150, with tolerance of 0.0001

The resulting data was stored in the DTM channel.

6.4.4 Gridding

All the grids for the two blocks were gridded using a bi-directional line gridding method with a grid cell size of 30 m and Akima spline across and spline down the lines.
DTM grid from GSD block was also filtered with a 9x9 Symmetric convolution filter with 3 passes.
Both DTM grids were gridded in WGS84, World, Zone 13N; where the TMI grids were gridded in NAD27, USA NADCON geoid:99 Conterminous US, UTM ZONE 13N.

6.4.5 Data Deliverables

The following is the list of items delivered to U.S. GEOLOGICAL SURVEY

Hard and Soft Copy Maps (x2):

Map Name	Block Name	Scale	No of Copies Printed	Information Depicted	DVD Disk Location
TMI Contour-GSD	GSD	50,000	2	Magnetic Contour Lines, Flight Line Path, Grid and Survey Parameters	FINAL DELIVERABLES\MAPS\MAPS-GSD BK
TMI Contour-Poncha Springs	Poncha Springs	50,000	2	Magnetic Contour Lines, Flight Line Path, Grid and Survey Parameters	FINAL DELIVERABLES\MAPS\MAPS-Poncha Springs BK

Grids (x2):

Grid Name	Block Name	Database Channel	Gridding Method	Grid Cell Size (m)	Spline Across and Down Line	DVD Disk Location
TMI_Final	GSD	TMI_FINAL	bi-directional line gridding	30	Akima	FINAL DELIVERABLES\Grids\GRIDS-GSD BK
DTM	GSD	DTM	bi-directional line gridding	30	Akima	FINAL DELIVERABLES\Grids\GRIDS-GSD BK
TMI_Final	Poncha Springs	TMI_FINAL	bi-directional line gridding	30	Akima	FINAL DELIVERABLES\Grids\GRIDS-PONCHA SPRINGS BK
DTM	Poncha Springs	DTM	bi-directional line gridding	30	Akima	FINAL DELIVERABLES\Grids\GRIDS-PONCHA SPRINGS BK

Databases (x2):

Database Name	Format	DVD Disk Location	Description
GSD_Final	Geosoft GDB	FINAL DELIVERABLES\DATABASES\DATABASE-GSD BK	See Appendix B
GSD_Final	Geosoft ASCII	FINAL DELIVERABLES\DATABASES\DATABASE-GSD BK	See Appendix B
Poncha_Springs_Final	Geosoft GDB	FINAL DELIVERABLES\DATABASES\DATABASE-Poncha Springs BK	See Appendix B
Poncha_Springs_Final	Geosoft ASCII	FINAL DELIVERABLES\DATABASES\DATABASE-Poncha Springs BK	See Appendix B

Reports (x2):

Report Name	Hard Copy Printed (yes/no)	Format	Description	DVD Disk Location
Logistics Report – GSD and Poncha Springs 2008	Yes	MS Word	Complete report on all logistical, technical, and data processing steps	FINAL DELIVERABLES\ REPORTS
Weekly and Line Progress Report - GSD	No	MS Excel	Complete report on all lines flown and day-to-day field operations	FINAL DELIVERABLES\ REPORTS
Weekly and Line Progress Report – Poncha Springs	No	MS Excel	Complete report on all lines flown and day-to-day field operations	FINAL DELIVERABLES\ REPORTS

Video Files (x1):

Disk No	Block Name	Flights	Lines	Description
1	GSD	FLT01, FLT02	T10000-10060, T10070-10100, L2420-2450	All video files, each per line; xxx.log and xxx.cor files flight specific
2	GSD	FLT03, FLT04	L2310-2410, T101120, L2170-2300	All video files, each per line, xxx.log and xxx.cor files flight specific
3	GSD	FLT05, FLT06	L2010-2160, L1870-2001	All video files, each per line, xxx.log and xxx.cor files flight specific
4	GSD	FLT07	L1670-1861	All video files, each per line, xxx.log and xxx.cor files flight specific
5	GSD	FLT08	L1490-1660	All video files, each per line, xxx.log and xxx.cor files flight specific
6	GSD	FLT09, FLT10	L1370-1480, L1230-1360	All video files, each per line, xxx.log and xxx.cor files flight specific
7	GSD	FLT11	L1090-1220	All video files, each per line, xxx.log and xxx.cor files flight specific

8	GSD	FLT12, FLT13	L970-1081, L910-960	All video files, each per line, xxx.log and xxx.cor files flight specific
9	GSD	FLT14, FLT15	L810-900, L690-800	All video files, each per line, xxx.log and xxx.cor files flight specific
10	GSD	FLT16, FLT17	L660-680, L560-650	All video files, each per line, xxx.log and xxx.cor files flight specific
11	GSD	FLT18, FLT19	L460-550, L380-451	All video files, each per line, xxx.log and xxx.cor files flight specific
12	GSD	FLT20, FLT21	L240-370, L210-231, T10110, T100090-100100	All video files, each per line, xxx.log and xxx.cor files flight specific
13	GSD	FLT22, FLT23, FLT24	L70-200, T10451, L20-63	All video files, each per line, xxx.log and xxx.cor files flight specific
14	Poncha Springs	FLT01, FLT02	T10000-10050, L11-110	All video files, each per line, xxx.log and xxx.cor files flight specific
15	Poncha Springs	FLT03, FLT04	L121-240, L970-981	All video files, each per line, xxx.log and xxx.cor files flight specific
16	Poncha Springs	FLT05	L252-400	All video files, each per line, xxx.log and xxx.cor files flight specific
17	Poncha Springs	FLT06, FLT07	L411-600, L611-690	All video files, each per line, xxx.log and xxx.cor files flight specific
18	Poncha Springs	FLT08, FLT09	L794-961, L702-781	All video files, each per line, xxx.log and xxx.cor files flight specific

Raw Data (x2):

See Appendix D for the list, detail description, and storage location of the raw files.

7. SUMMARY and RECOMENDATIONS

This report describes the logistics of the survey, equipment used, field procedures, data acquisition and presentation of results.

The various maps included with this report display the magnetic properties of the survey area.

Further processing of the data may enhance subtle features that can be of importance for exploration purposes.

It is recommended that the survey results be reviewed in detail, by a qualified geoscientist, in conjunction with all available geophysical, geological and geochemical information.

Respectfully submitted,

Andrei Yakovenko
New-Sense Geophysics Ltd.
Date: December 30th, 2008

Appendix A FOM RESULTS

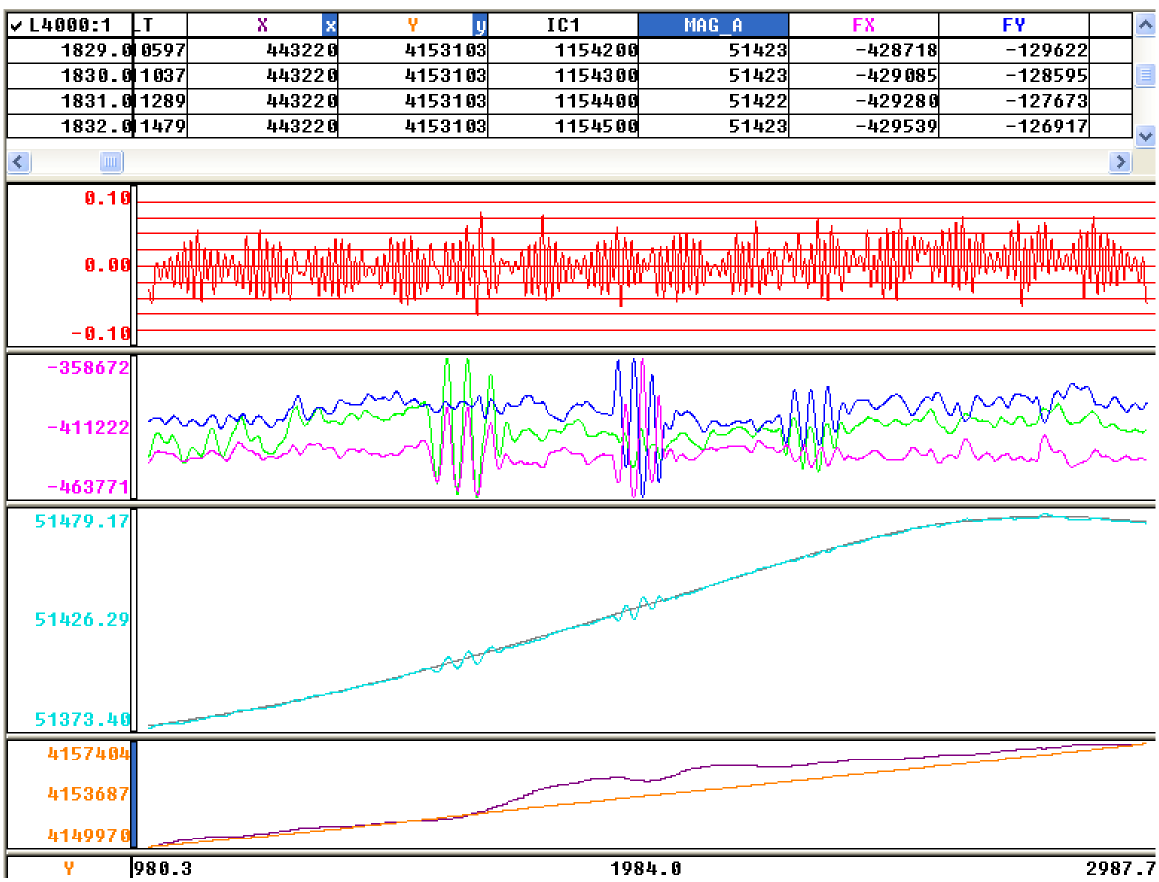
Great Sand Dunes

The FOM was flown on October 10th, 2008 with the following results:

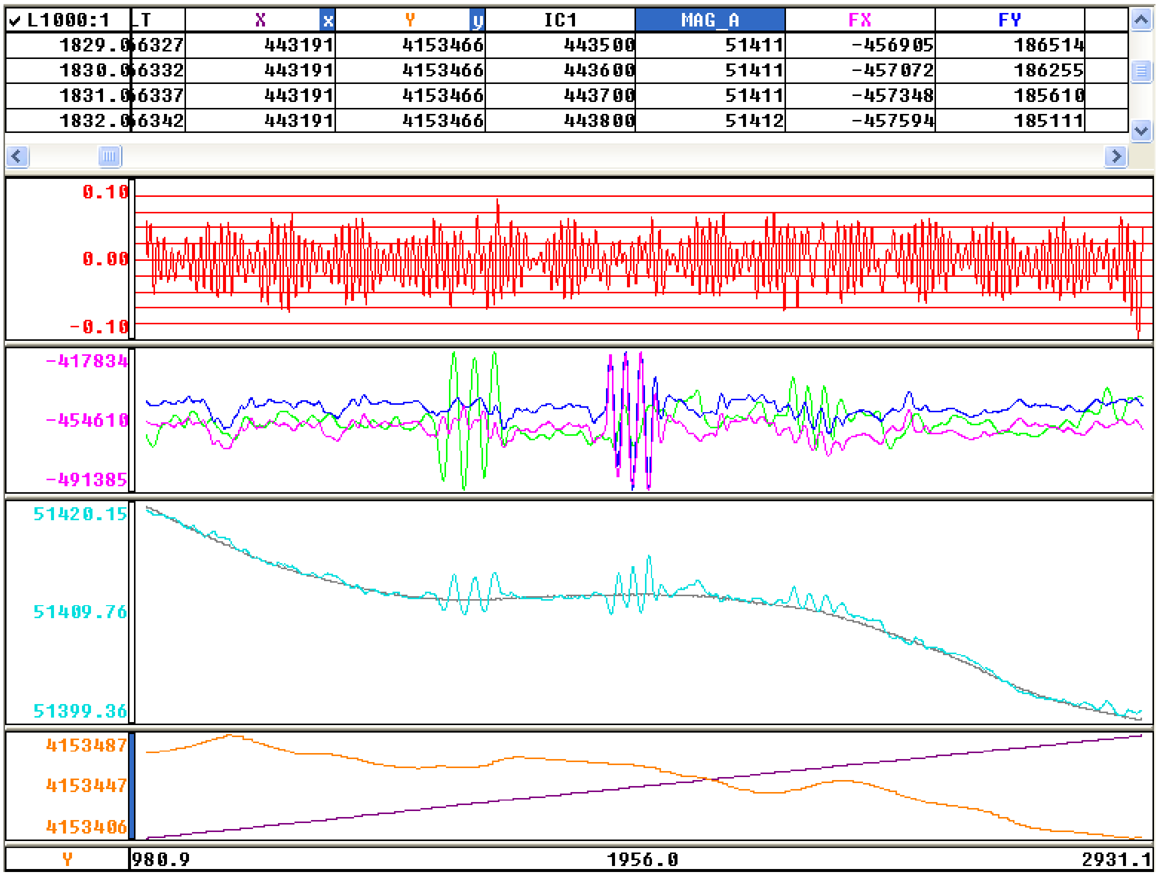
USGS Colorado Project Oct. 10, 2008					
Line	**Direction**	**Pitch**	**Roll**	**Yaw**	**Total**
1000	**East**	0.13	0.1	0.1	0.33
2000	**South**	0.08	0.07	0.1	0.25
3000	**West**	0.1	0.08	0.12	0.3
4000	**North**	0.12	0.09	0.1	0.31
	Total	0.43	0.34	0.42	**1.19**

The compensated results per line are displayed below. The top profile is the residual compensated magnetic data; the second from top are the three-fluxgate channels; next are the raw (blue) and compensated (grey) total field data; and the bottom profiles are UTM X and Y coordinates.

Northbound Line

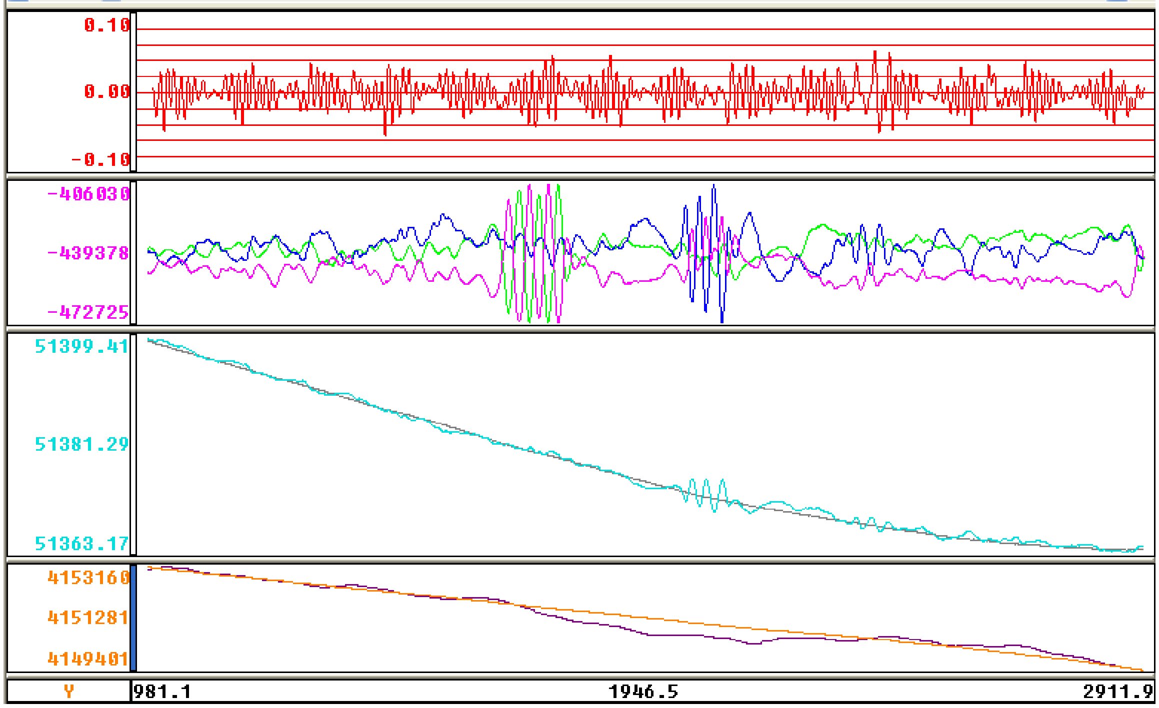


Eastbound Line

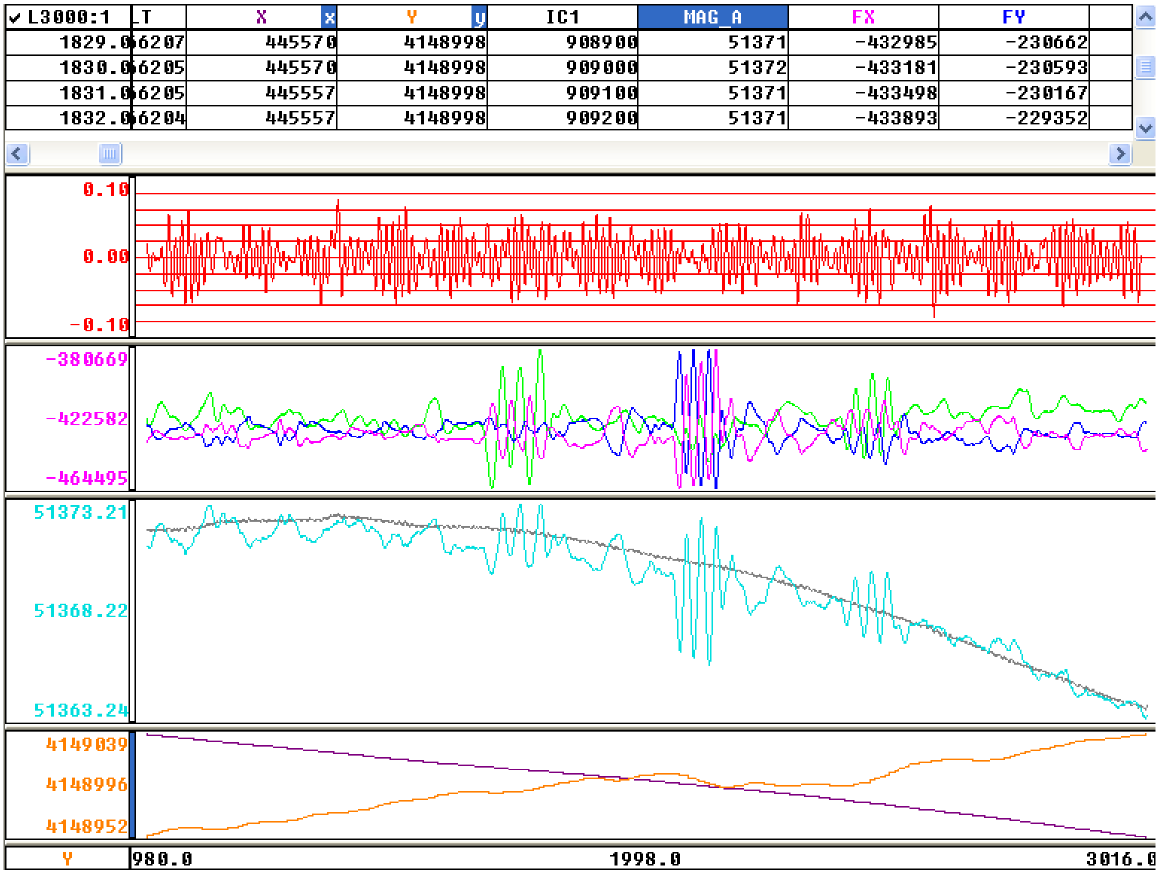


Southbound Line

✔ L2000:1	_T	X	Y	IC1	MAG_A	FX	FY
1829.0	5581	447455	4151518	666400	51378	-441351	-49171
1830.0	5497	447455	4151518	666500	51378	-441895	-50978
1831.0	5116	447455	4151518	666600	51378	-442272	-52256
1832.0	4779	447455	4151518	666700	51378	-442721	-53610



Westbound Line



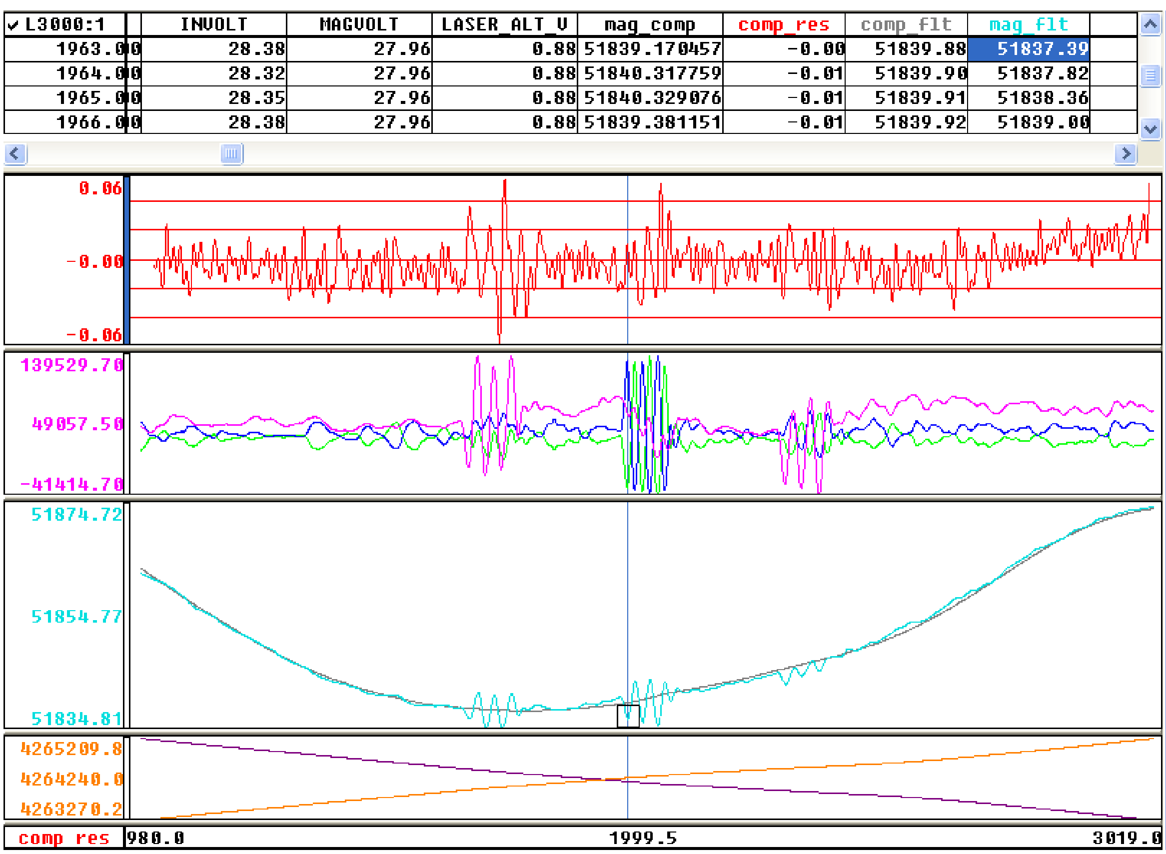
Poncha Springs

The FOM was flown on October 26, 2008 with the following results:

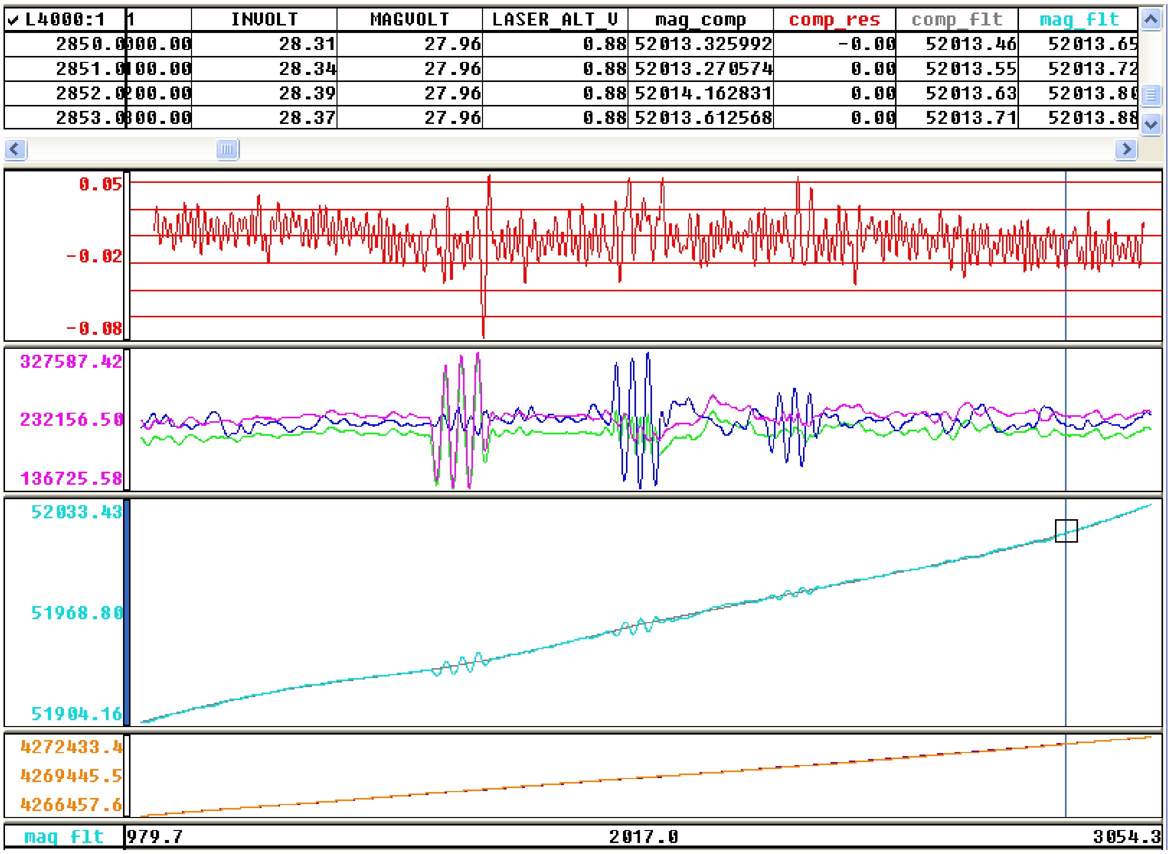
USGS Colorado Project Oct. 26, 2008					
Line	**Direction**	**Pitch**	**Roll**	**Yaw**	**Total**
1000	**South**	0.1	0.05	0.08	0.33
2000	**West**	0.06	0.07	0.10	0.25
3000	**North**	0.12	0.08	0.05	0.3
4000	**East**	0.12	0.08	0.06	0.31
	Total	0.43	0.34	0.42	**1.19**

The compensated results per line are displayed below. The top profile is the residual compensated magnetic data; the second from top are the three-fluxgate channels; next are the raw (blue) and compensated (grey) total field data; and the bottom profiles are UTM X and Y coordinates.

Northbound Line

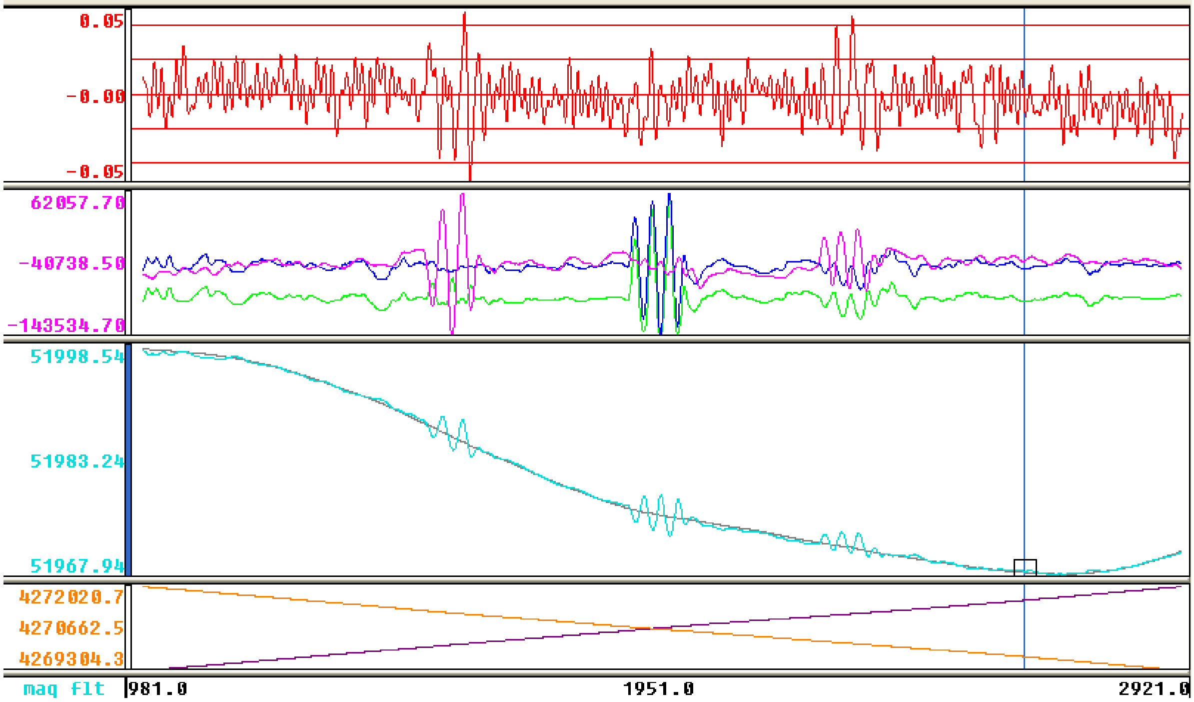


Eastbound Line



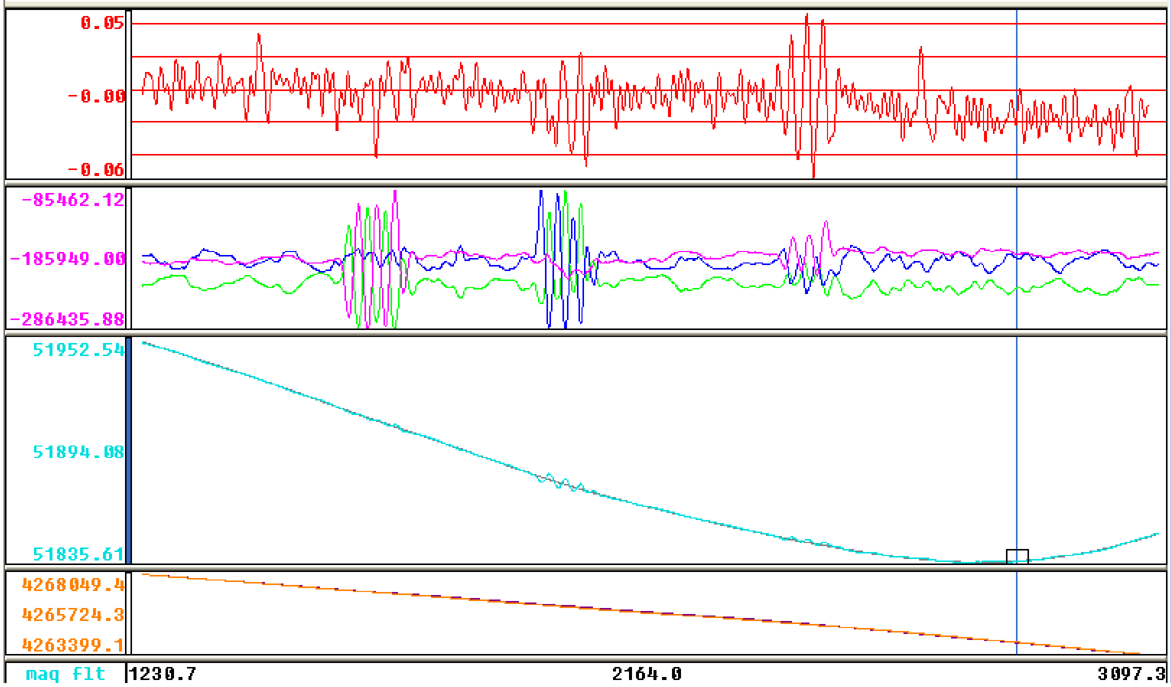
Southbound Line

✔ L1000:1	INVOLT	MAGVOLT	LASER_ALT_V	mag_comp	comp_res	comp_flt	mag_flt
2614.00	28.35	27.96	0.88	51968.761177	-0.01	51968.78	51968.97
2615.00	28.33	27.96	0.88	51968.931980	-0.01	51968.77	51968.97
2616.00	28.29	27.96	0.88	51968.691532	-0.01	51968.77	51968.97
2617.00	28.33	27.96	0.88	51968.592112	-0.01	51968.76	51968.98



Westbound Line

L2000:1	INVOLT	MAGVOLT	LASER_ALT_V	mag_comp	comp_res	comp_flt	mag_flt
2821.00	28.36	27.96	0.88	51838.633600	-0.02	51838.52	51838.39
2822.00	28.33	27.96	0.88	51838.095374	-0.02	51838.54	51838.42
2823.00	28.28	27.96	0.88	51838.506719	-0.02	51838.56	51838.45
2824.00	28.29	27.96	0.88	51838.944704	-0.01	51838.59	51838.48



Appendix B TABLE DESCRIPTION

Great Sand Dunes Block

Database Names: GSD_Final.gdb and GSD_Final.XYZ
Formats: Geosoft .gdb and XYZ ASCII
Number of Channels: 35

Channel Name	Units	Description
FIDUCIAL	number	Fiducial count (flight specific)
LINE	number	Line Number
LINE_DIRECTION	degrees	Direction in which a line was flown
DATE_YMMDD	date	Date flown (YMMDD)
JULIAN_DATE_YYYYDDD	date	Date flown, Julian calendar, YYYYDDD
HOURS	time	Hour flown
MINUTES	time	Minute flown
SECONDS	time	Second flown
LATITUDE	degrees	GPS latitude, WGS 84, World
LONGITUDE	degrees	GPS Longitude, WGS 84, World
UTM_X_WGS84	meters	UTM East in WGS84, World, Zone 13N
UTM_Y_WGS84	meters	UTM North in WGS84, World, Zone 13N
UTM_X_NAD27	meters	UTM East in NAD27, USA NADCON:geoid99-Conterminous US, zone 13N
UTM_Y_NAD27	meters	UTM North in NAD27, USA NADCON:geoid99-Conterminous US, Zone 13N
UTC_TIME	seconds	UTC time of position (hhmmss.ss), day specific
GPS_HEIGHT	meters	Height above sea level
RAD_ALT__RAW_m	meters	Raw radar altimeter, height above ground
RAD_ALT_MERGED	meters	Radar altimeter (RAD_ALT_RAW_m) merged with laser altimeter (LASER_ALT_DUNES_INT). The radar altimeter data was overwritten by laser altimeter in the areas of overlap.
LASER_ALT_RAW_m	meters	Raw laser altimeter, height above ground ((laser_alt_v-1.76)/0.0141)/3.28
LASER_ALT_DUNES	meters	Laser altimeter data over dunes only, with spikes removed.
LASER_ALT_DUNES_INT	meters	Laser altimeter data over dunes only, with spikes removed and interpolated.
MAG_BASE	nT	Base station magnetometer data (filtered with 101 low pass filter)
FLUX_X	volts	Fluxgate x-axis
FLUX_Y	volts	Fluxgate y-axis
FLUX_Z	volts	Fluxgate z-axis
MAG_RAW	nT	Raw magnetometer data
MAG_COMP	nT	Compensated magnetometer data (filtered with 11 point low pass filter)
MAG_DIURNAL_COORD	nT	Base station corrected magnetometer (MAG_COMP)

MAG_HEADING_CORRD	nT	Heading corrected magnetometer (MAG_DIURNAL_CORRD)
MAG_LAG_CORRD	nT	Lag corrected magnetometer (MAG_LAG_CORRD)
MAG_LVLD	nT	Conventionally leveled magnetometer (MAG_LAG_CORRD)
IGRF	nT	Calculated IGRF, using 2005 model
MAG_LVLD_IGRF_CORDD	nT	IGRF corrected magnetometer (MAG_LVLD)
TMI_FINAL	nT	Microleveled magnetometer (MAG_LVLD_IGRF_CORRD)
DTM	m.a.s.l.	Calculated DTM; vertical datum in WGS84, World; refer to section 6.4.3.1.2 for more details

Poncha Springs Block

Database Names: Poncha_Springs_Final.gdb and Poncha_Springs_Final.XYZ
Formats: Geosoft .gdb and XYZ ASCII
Number of Channels: 34

Channel Name	Units	Description
FIDUCIAL	number	Fiducial count (flight specific)
LINE	number	Line Number
LINE_DIRECTION	degrees	Direction in which a line was flown
DATE_YMMDD	date	Date flown (YMMDD)
JULIAN_DATE_YYYYDDD	date	Date flown, Julian calendar, YYYYDDD
HOURS	time	Hour flown
MINUTES	time	Minute flown
SECONDS	time	Second flown
LATITUDE	degrees	GPS latitude, WGS 84, World
LONGITUDE	degrees	GPS Longitude, WGS 84, World
UTM_X_WGS84	meters	UTM East in WGS84, World, Zone 13N
UTM_Y_WGS84	meters	UTM North in WGS84, World, Zone 13N
UTM_X_NAD27	meters	UTM East in NAD27, USA NADCON:geoid99-Conterminous US, zone 13N
UTM_Y_NAD27	meters	UTM North in NAD27, USA NADCON:geoid99-Conterminous US, Zone 13N
UTC_TIME	seconds	UTC time of position (hhmmss.ss), day specific
GPS_HEIGHT	meters	Height above sea level
RAD_ALT_m	meters	Raw radar altimeter, height above ground
RAD_ALT_LAG_m	meters	Lagged radar altimeter
LASER_ALT_V	volts	Raw laser altimeter in volts
LASER_ALT_m	meter	Laser altimeter data converted to meters ((laser_alt_v-1.772)/0.0071)/3.28 Use coefficients from GSD block for FLT1-3
MAG_BASE	nT	Base station magnetometer data (filtered with 31 low pass filter)
FLUX_X	volts	Fluxgate x-axis
FLUX_Y	volts	Fluxgate y-axis
FLUX_Z	volts	Fluxgate z-axis
MAG_RAW	nT	Raw magnetometer data
MAG_COMP	nT	Compensated magnetometer data (filtered with 11 point low pass filter)
MAG_DIURNAL_COORD	nT	Base station corrected magnetometer (MAG_COMP)
MAG_HEADING_CORRD	nT	Heading corrected magnetometer (MAG_DIURNAL_CORRD)
MAG_LAG_CORRD	nT	Lag corrected magnetometer (MAG_LAG_CORRD)

MAG_LVLD	nT	Conventionally leveled magnetometer (MAG_LAG_CORRD)
IGRF	nT	Calculated IGRF, using 2005 model
MAG_LVLD_IGRF_CORDD	nT	IGRF corrected magnetometer (MAG_LVLD)
TMI_FINAL	nT	Microleveled magnetometer (MAG_LVLD_IGRF_CORRD)
DTM	m.a.s.l.	Calculated DTM; vertical datum in WGS84, World; refer to section 6.4.3.2.2 for more details

Appendix C IMAGES OF FINAL MAPS

Great Sand Dunes

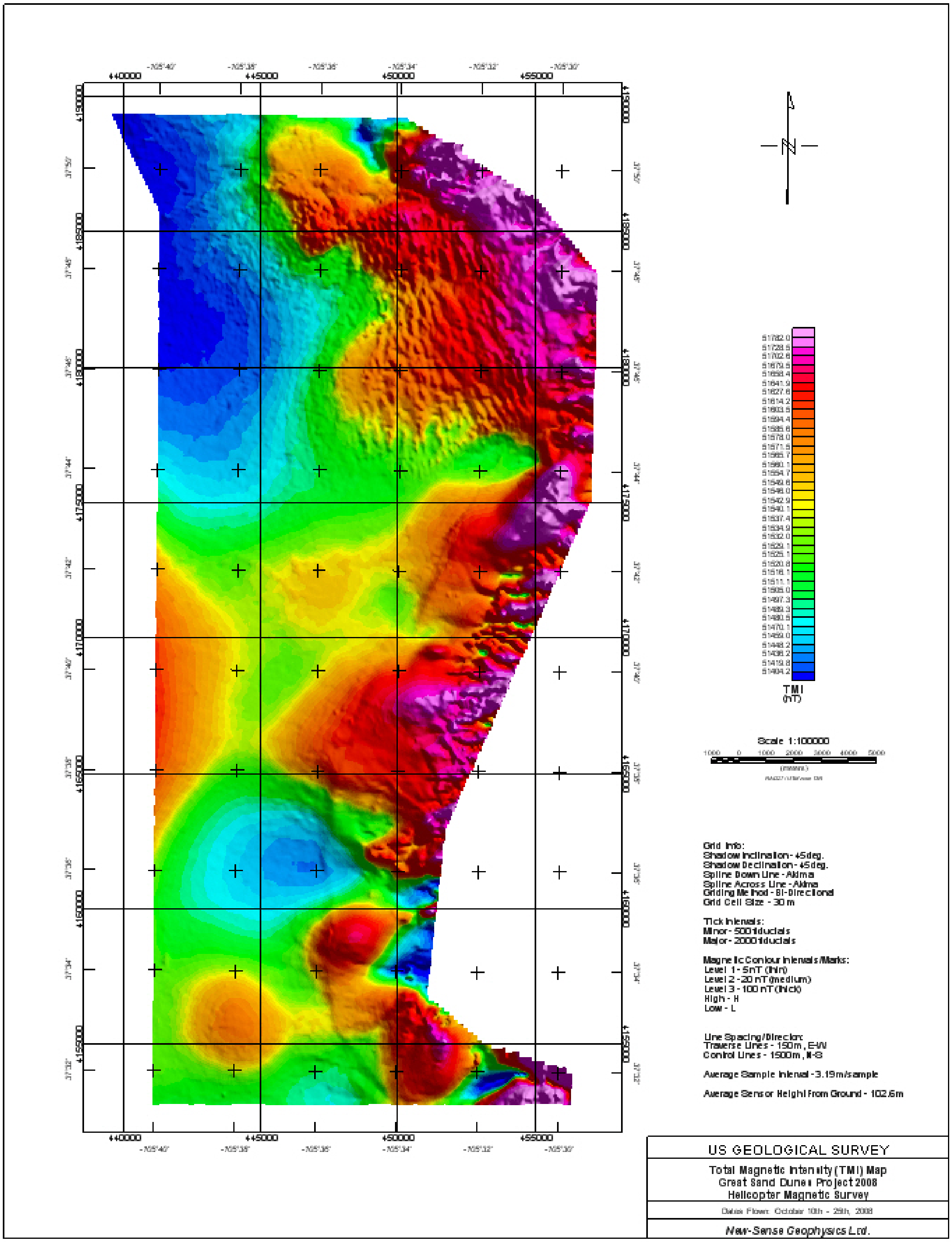


Image of color shaded TMI Map. Coordinate system: NAD 27, USA NADCON geoid:99 Conterminous US, UTM ZONE 13N

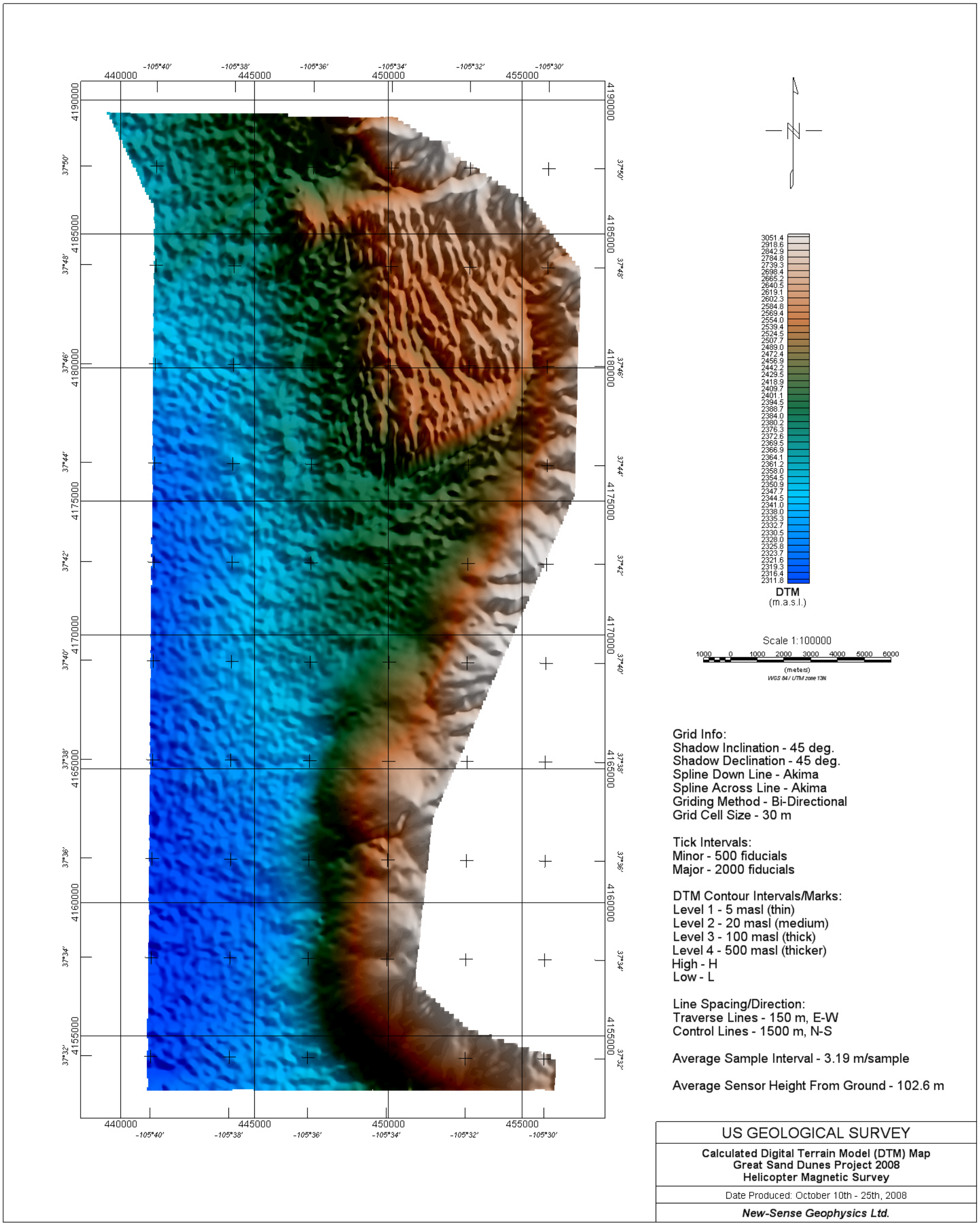


Image of color shaded DTM Map. Coordinate system: WGS84, World, Z13N

Poncha Springs Block

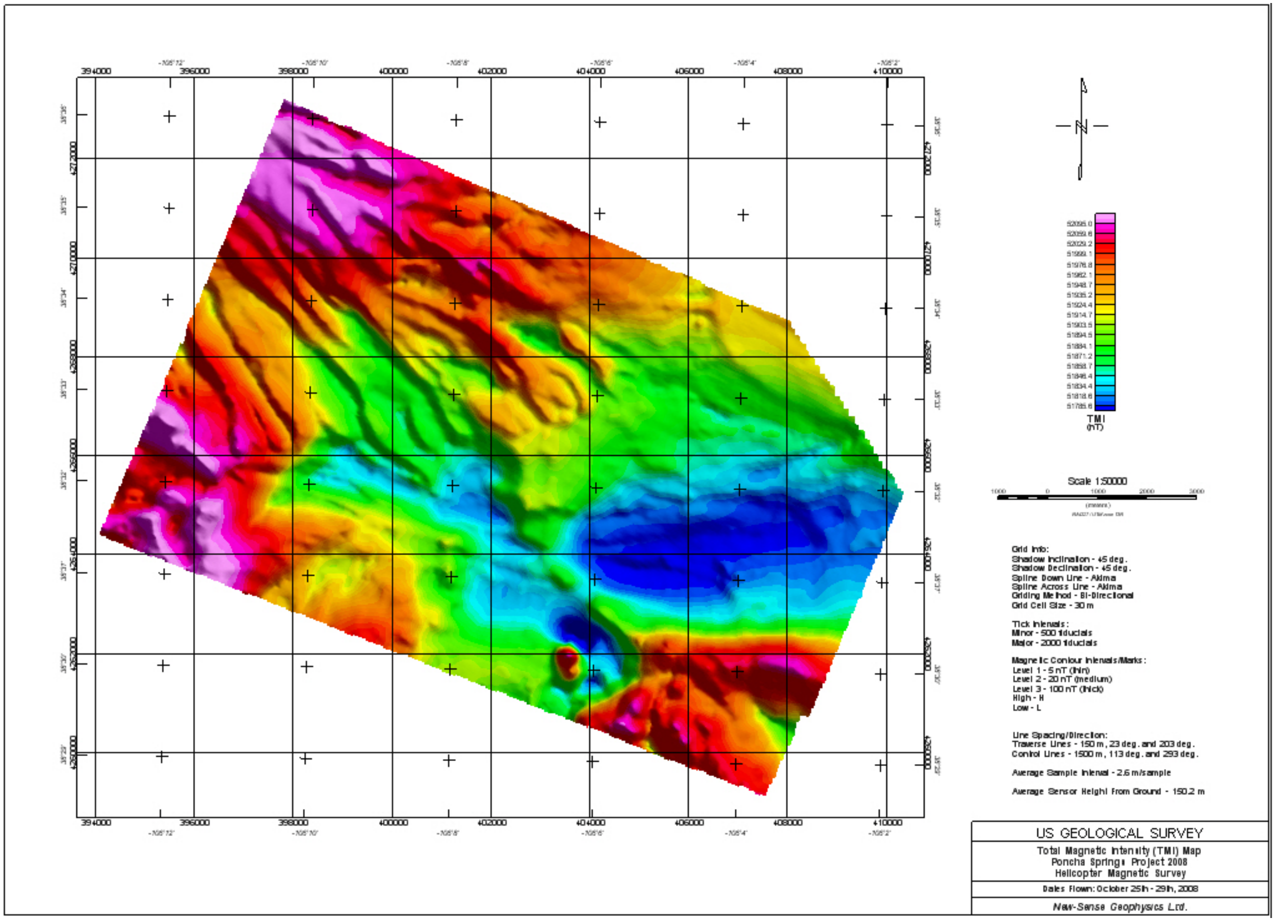


Image of color shaded TMI Map. Coordinate system: NAD 27, USA NADCON geoid:99 Conterminous US, UTM ZONE 13N

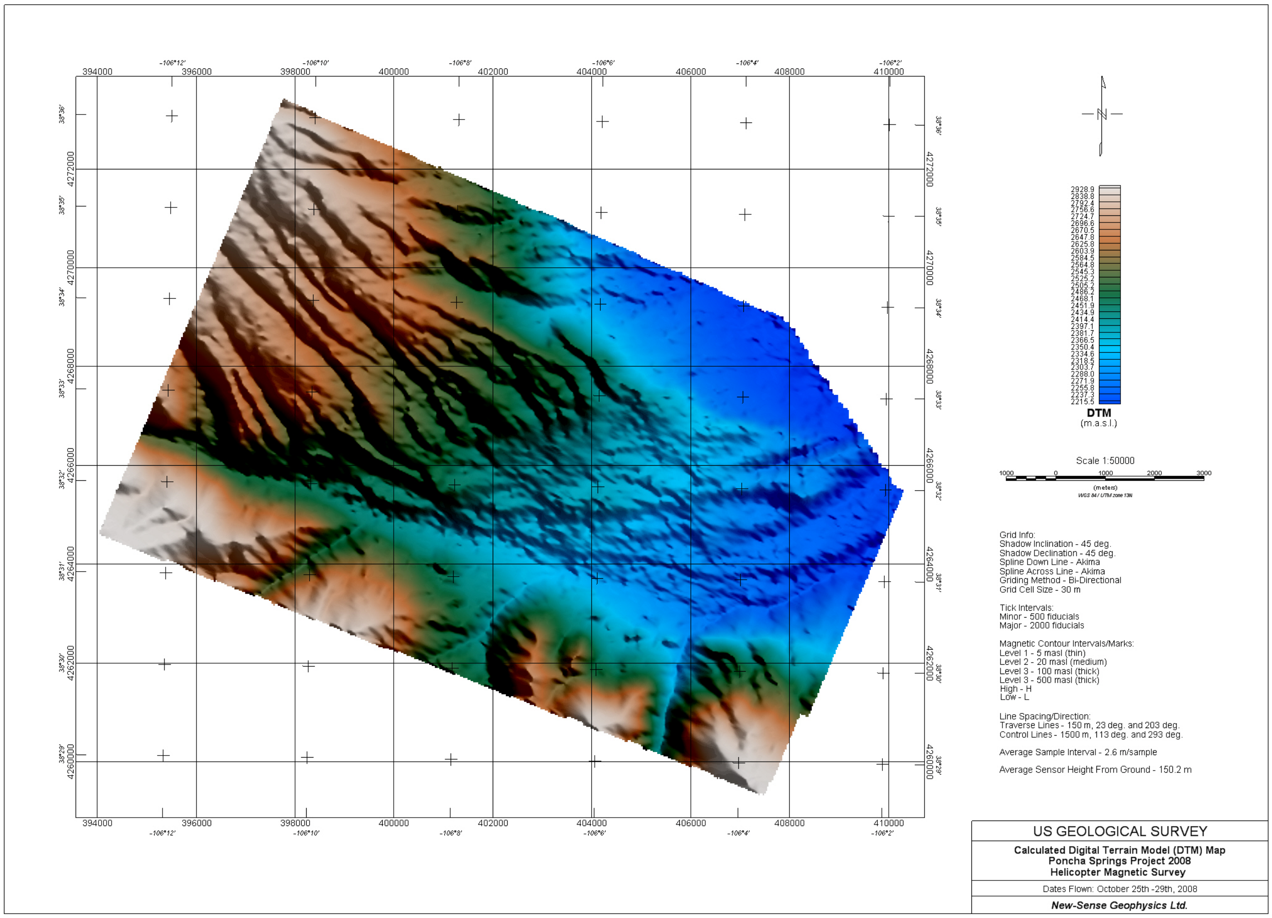


Image of color shaded DTM Map. Coordinate system: WGS84, World, Z13N.

Appendix D RAW DATA INFORMATION

File Description:

Files with Extensions DXX - Raw data in Blocked Binary format
Files with Extensions LXX - Log information in ASCII format
Files with Extensions GXX - GPS data in Binary format plus NEMA GPGGA sentences

Files with prefix N - Airborne data
Files with prefix B - Base Station data

GSD Block:

FLIGHT	FILE NAME	DIRECTORY ON DVD DISK
1	B8101308.D28	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8101308.L28	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8101308.G28	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101310.D32	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101310.L32	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101310.G32	FINAL DELIVERABLES\RAW DATA\GSD BK
2	B8101310.D47	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8101310.L47	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8101310.G47	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101313.D01	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101313.L01	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101313.G01	FINAL DELIVERABLES\RAW DATA\GSD BK
3	B8101313.D04	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8101313.L04	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8101313.G04	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101315.D57	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101315.L57	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101315.G57	FINAL DELIVERABLES\RAW DATA\GSD BK
4	B8101511.D25	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8101511.L25	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8101511.G25	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101514.D26	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101514.L26	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101514.G26	FINAL DELIVERABLES\RAW DATA\GSD BK
5	B8101514.D30	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8101514.L30	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8101514.G30	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101516.D55	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101516.L55	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101516.G55	FINAL DELIVERABLES\RAW DATA\GSD BK
6	B8101608.D10	FINAL DELIVERABLES\RAW DATA\GSD BK

	B8101608.L10	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8101608.G10	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101610.D14	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101610.L14	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101610.G14	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8101610.D36	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8101610.L36	FINAL DELIVERABLES\RAW DATA\GSD BK
7	B8101610.G36	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101613.D17	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101613.L17	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101613.G17	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8101614.D05	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8101614.L05	FINAL DELIVERABLES\RAW DATA\GSD BK
8	B8101614.G05	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101616.D30	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101616.L30	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101616.G30	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8101708.D15	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8101708.L15	FINAL DELIVERABLES\RAW DATA\GSD BK
9	B8101708.G15	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101710.D23	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101710.L23	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101710.G23	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8101710.D38	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8101710.L38	FINAL DELIVERABLES\RAW DATA\GSD BK
10	B8101710.G38	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101713.D00	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101713.L00	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101713.G00	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8101713.D37	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8101713.L37	FINAL DELIVERABLES\RAW DATA\GSD BK
11	B8101713.G37	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101716.D16	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101716.L16	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101716.G16	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8101813.D27	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8101813.L27	FINAL DELIVERABLES\RAW DATA\GSD BK
12	B8101813.G27	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101815.D34	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101815.L34	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101815.G34	FINAL DELIVERABLES\RAW DATA\GSD BK
13	B8101816.D00	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8101816.L00	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8101816.G00	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101818.D15	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101818.L15	FINAL DELIVERABLES\RAW DATA\GSD BK

	N8101818.G15	FINAL DELIVERABLES\RAW DATA\GSD BK
14	B8101908.D05	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8101908.L05	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8101908.G05	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101910.D15	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101910.L15	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101910.G15	FINAL DELIVERABLES\RAW DATA\GSD BK
15	B8101910.D25	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8101910.L25	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8101910.G25	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101912.D43	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101912.L43	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101912.G43	FINAL DELIVERABLES\RAW DATA\GSD BK
16	B8101913.D20	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8101913.L20	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8101913.G20	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101915.D44	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101915.L44	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8101915.G44	FINAL DELIVERABLES\RAW DATA\GSD BK
17	B8102008.D14	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8102008.L14	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8102008.G14	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8102010.D21	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8102010.L21	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8102010.G21	FINAL DELIVERABLES\RAW DATA\GSD BK
18	B8102010.D35	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8102010.L35	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8102010.G35	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8102012.D44	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8102012.L44	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8102012.G44	FINAL DELIVERABLES\RAW DATA\GSD BK
19	B8102308.D00	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8102308.L00	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8102308.G00	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8102308.D29	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8102308.L29	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8102308.G29	FINAL DELIVERABLES\RAW DATA\GSD BK
20	B8102310.D30	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8102310.L30	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8102310.G30	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8102310.D40	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8102310.L40	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8102310.G40	FINAL DELIVERABLES\RAW DATA\GSD BK
21	B8102408.D11	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8102408.L11	FINAL DELIVERABLES\RAW DATA\GSD BK

	B8102408.G11	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8102408.D24	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8102408.L24	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8102408.G24	FINAL DELIVERABLES\RAW DATA\GSD BK
22	B8102410.D16	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8102410.L16	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8102410.G16	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8102410.D25	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8102410.L25	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8102410.G25	FINAL DELIVERABLES\RAW DATA\GSD BK
23	B8102413.D07	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8102413.L07	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8102413.G07	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8102413.D18	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8102413.L18	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8102413.G18	FINAL DELIVERABLES\RAW DATA\GSD BK
24	B8102508.D39	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8102508.L39	FINAL DELIVERABLES\RAW DATA\GSD BK
	B8102508.G39	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8102509.D06	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8102509.L06	FINAL DELIVERABLES\RAW DATA\GSD BK
	N8102509.G06	FINAL DELIVERABLES\RAW DATA\GSD BK

Poncha Sprigs Block:

FLIGHT	FILE NAME	DIRECTORY ON DVD DISK
1	B8102614.D35	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	B8102614.L35	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	B8102614.G35	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	N8102614.D47	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	N8102614.L47	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	N8102614.G47	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
2	B8102708.D20	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	B8102708.L20	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	B8102708.G20	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	N8102708.D27	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	N8102708.L27	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	N8102708.G27	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
3	B8102710.D38	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	B8102710.L38	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	B8102710.G38	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	N8102710.D48	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	N8102710.L48	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	N8102710.G48	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK

	B8102713.D51	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	B8102713.L51	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
4	B8102713.G51	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	N8102714.D03	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	N8102714.L03	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	N8102714.G03	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	B8102807.D24	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	B8102807.L24	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
5	B8102807.G24	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	N8102807.D36	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	N8102807.L36	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	N8102807.G36	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	B8102810.D11	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	B8102810.L11	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
6	B8102810.G11	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	N8102810.D17	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	N8102810.L17	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	N8102810.G17	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	B8102812.D52	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	B8102812.L52	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
7	B8102812.G52	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	N8102812.D58	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	N8102812.L58	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	N8102812.G58	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	B8102815.D25	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	B8102815.L25	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
8	B8102815.G25	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	N8102815.D33	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	N8102815.L33	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	N8102815.G33	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	B8102907.D34	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	B8102907.L34	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
9	B8102907.G34	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	N8102907.D49	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	N8102907.L49	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK
	N8102907.G49	FINAL DELIVERABLES\RAW DATA\Poncha Springs BK