Regional gravity survey, Carmacks area, Yukon

YGS Open File 2012-30

Report Prepared For
Yukon Geological Survey, Energy, Mines and Resources, Government of Yukon

Report Prepared By
Aurora Geosciences Ltd.

YUKON GEOLOGICAL SURVEY

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MEMORANDUM

To: Steve Israel, Carolyn Relf
Yukon Geological Survey

Date: May 15, 2012

From: Ian Kickbush
Ian.Kickbush@aurorageosciences.com

Re: Field report – YGS Gravity Survey 2012

This memorandum is a short form geophysical report describing the gravity survey extending east of Aishihik Lake to Faro, Yukon. The survey was a continuation of the 2011 regional gravity survey. The program was designed to provide a regional survey, 2km wavelength, over a large area of interest. The survey was done over 50x100 km area with an additional line extending 100 kms east. There was a total of 1302 gridded points and an additional 53 points plotted along a profile line resulting in 1355 data points collected in the 2012 program.

Survey location:

The centre of the 2012 grid is located 475000E, 6880000N NAD87 Zone 8N. The crew was based out of Carmacks, Yukon. The project area covers NTS map sheets 105 (E,F,H,I,K,L). The geophysics project extended from May 1 – Apr 14, 2012. The survey consisted of two Gravity crews transported from point to point by helicopter. 245.2 hours of helicopter time was used.

a. Crew and equipment. The surveys were conducted by the following personnel:

Ian Kickbush B.Sc	Crew chief (Grav Operator)	Mar 1 – Apr 14, 2012
Genevieve Hetu	Grav Operator	Mar 1 – Mar 25, 2012
Dave Hildes	Grav Operator	Mar 30 – Apr 1, 2012
Phil Jackson	Grav Operator	Apr 2 – Apr 3, 2012
Jeremy Beales	Grav Operator	Mar 30 – Apr 14, 2012
Daniel Mackenzie	GPS Operator	Mar 1 – Mar 26, 2012
Jessica Bulmer	GPS Operator	Mar 1 – Mar 26, 2012
Georgie Townrow	GPS Operator	Apr 4 – Apr 14, 2012
Tedd McDonald	GPS Operator	Mar 30 – Apr 14, 2012
Tom McMahon	Pilot (Canadian Helicopters)	Mar 1 – Mar 26, Apr 7 – Apr 14, 2012
Tom Brooks	Pilot (Canadian Helicopters)	Mar 30 – Apr 7, 2012
Tony Harden	Engineer (Canadian Helicopters)	Mar 1 – Mar 19, 2012
Walter Engineer	(Canadian Helicopters)	Mar 19 – Mar 26, 2012
Sheyla Olston	Engineer (Canadian Helicopters)	Mar 30 – Apr 14, 2012

The crew was equipped with the following instruments and equipment:

Gravity — Grav01 - Scintrex CG-5 Gravimeter s/n 961049349
Grav02 - Scintrex CG-5 Gravimeter s/n 911009188

GPS — 2 sets – Lieca GS15 RTK/Post Processing carrier phase Differential GPS Recievers and Transmitters.

Other:	1 - Laptop with Geosoft, Gravred2, Scintrex Software, Lieca GeoOffice 1 - Repair tools 2 - Iridium satellite phone 6 - Handheld radios 2 - Garmin handheld GPS 1 - Truck & trailer

GRAVITY SURVEY

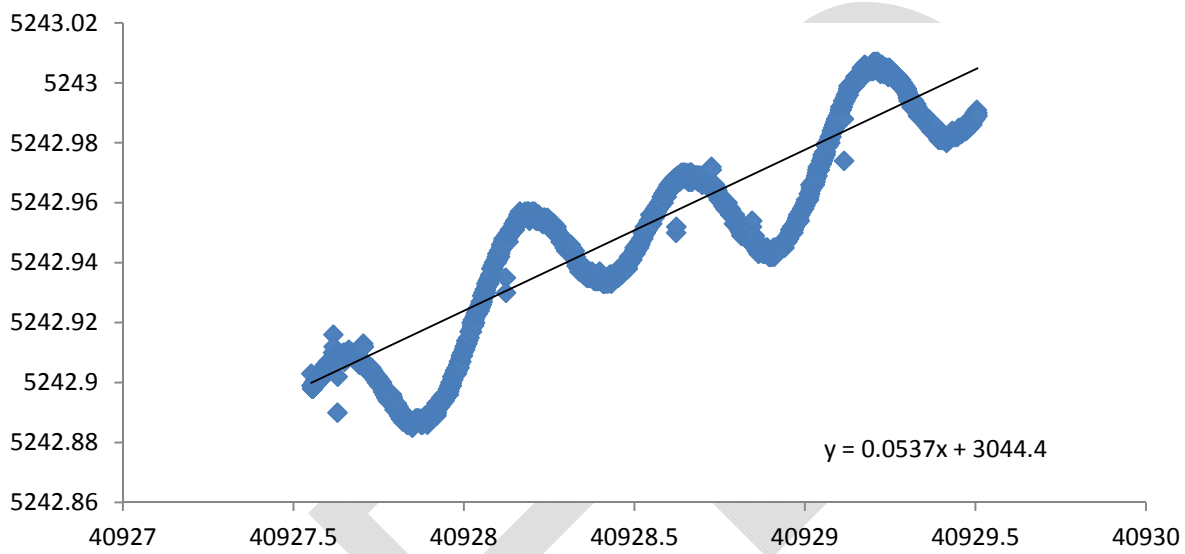
Each Gravity station's coordinates were determined from position measurements taken with Post Processed Differential GPS system and recorded in WGS84 and then transformed into Yukon Albers coordinates in the NAD83 datum. Station spacing was approximately 2000 metres. A total of 1302 gravity stations were occupied on the grid and an additional 53 along a single profile line.

Geographic datum & projection:	UTME, UTMN, NAD83 datum 8N
Elevation datum:	Mean sea level using Geoid EMG96
Station locations:	Stations were located with non-differential GPS receivers.
Station marking:	Stations were marked with tagged and flagged nails driven flush to ground level where possible.
Gravimeter preparation:	Both gravimeters were levelled on a cement block and warmed up for a period of 48 hours to stabilize. After the spring stabilized, the instruments were cycled for 12 to 24 hours taking readings for 60 seconds every minute to determine the remnant instrument drift and to reset instrument drift constants. The instruments remained under power at all times throughout the survey operation.
Gravity readings:	Readings were stacked for 60 s and maximum standard deviation in reading error was kept to less than 50 microGal if possible. When this was not possible, readings were repeated several times to ensure that the data is repeatable. Seismic filters were engaged to remove wind noise.
Gravity Base Station:	Installed at NAD 83 8N, UTME UTMN coordinates: 437776.320E, 6887568.186N

Gravimeter drift for CG-5 961049349 (Grav 01):

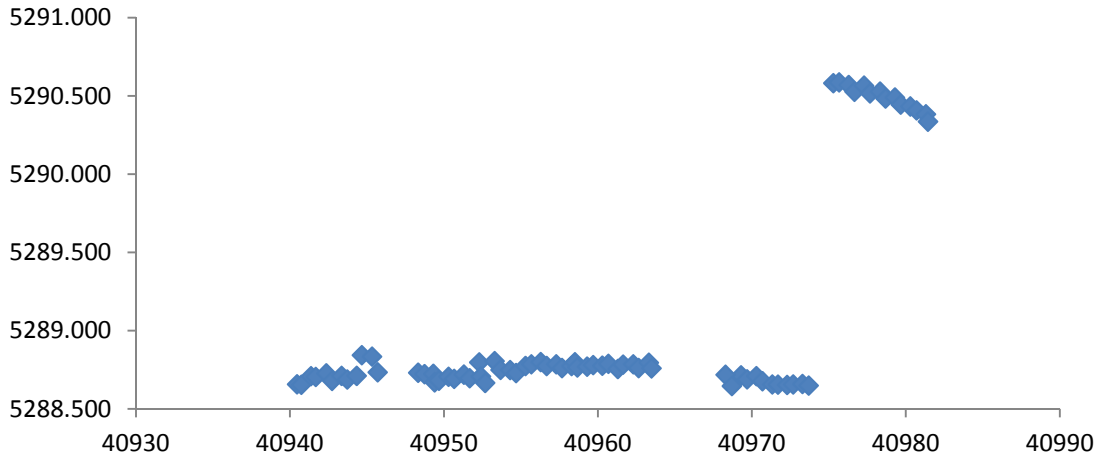
The gravimeter was checked daily for instrument drift prior to surveying by occupying a drift station in camp. During the survey, a minimum initial and final tie-in drift measurement were made prior to and after each day's survey.

Pre-survey:



Graph 1: Shows the linear trend of the spring drift throughout the 24 hours on March 20, 2012, pre-survey. X-axis: time in decimal hours. Y-axis: mGal. 0.057 is the drift spring constant.

During Survey (Tie File):

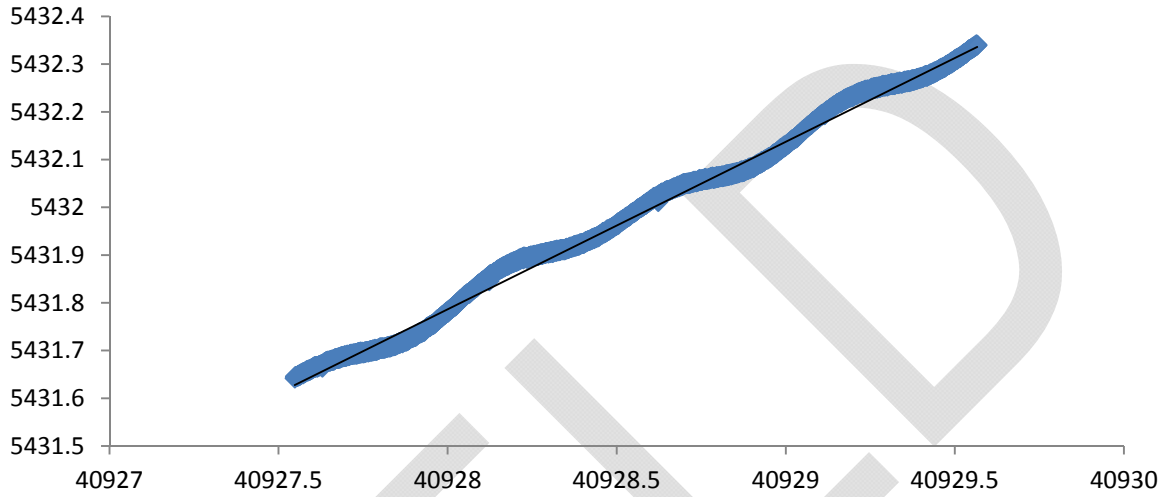


Graph 2: Shows the spring drift throughout the survey from March 1 to April 14, 2012. X-axis: time in decimal hours. Y-axis: mGal. The outliers at the end of the survey is due to a static shift from resetting the gravimeters memory.

Gravimeters drift for CG-5911009188 (Grav 02):

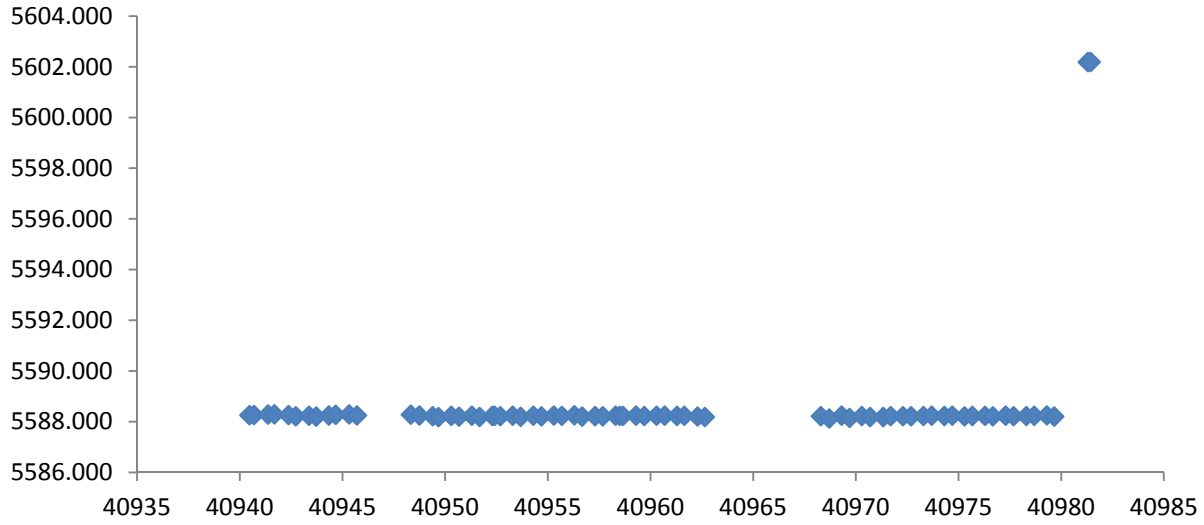
The gravimeter was checked daily for instrument drift prior to surveying by occupying a drift station in camp. During the survey, a minimum initial and final tie-in drift measurement were made prior to and after each day's survey.

Pre-survey:



Graph 4: Shows the linear trend of the spring drift throughout the 24 hours on March 20, 2012, pre-survey. X-axis: time in decimal hours. Y-axis: mGal. 0.322 is drift spring constant.

During Survey (Tie File):



Graph 5: Shows the spring drift throughout the survey from March 1 to April 14, 2012. X-axis: time in decimal hours. Y-axis: mGal. The outlier at the end of the survey is due to a static shift from resetting the gravimeters memory.

DGPS survey base station:

Two GPS base stations were installed. The main GPS base station, Base 1, was installed to transmit RTK position corrections and record positioning at 1 second epoch intervals. Base 1 was installed at NAD 83 8N, UTME UTMN coordinates: 437804.4022, 6887556.1739 elevation 545.811m with base height of 1.243m.

The secondary GPS base station, Base 2, was installed to record positioning at 1 second epoch intervals. Base 2 was installed at a single RTK point from Base 1. Installed at NAD 83 8N, UTME UTMN coordinates: 437803.3943, 6887557.0395 elevation 545.8339m with base height of 1.340m.

Both base stations are marked with a flagged nail on the exact location. No picket was erected in the area due to high traffic. Locations of base stations relative to the weather station at the Carmacks airport.

DGPS survey rover:

Antenna was placed on the gravity survey station hub and elevations corrected for rover antenna height of 2m. A minimum of 300 coincidental epochs with the base were measured.

Post-Processing accuracy for DGPS:

On average the epochs taken per station were between 300 and 420. 50kms from the base station estimated error is on the order of 0.393 m.

Elevation corrections:

Elevation corrections: Free Air, Bullard B, Bouguer; Bouguer density: 2.67, Datum: 0.0 (sea level), Centre of Grid: 62.1, -136.1 (475000E 6880000N) was used for on-board Gravimeter tide corrections. For the latitude correction a UTM Declination of 0 was used.

Near station terrain measurement:

Terrain elevations within 25 m of the gravity station were directly measured applied to the data as near-station terrain corrections.

Inner DTM — Terrain corrections from 25 m to approximately 10 km were calculated. A DEM equivalent to a 1:50 000 NTS topographic map was used, modified to be consistent with the GPS data collected over the course of this survey.

Outer DTM — Terrain corrections from 10km to approximately 100 km were calculated. A DEM equivalent to a 1:250 000 NTS topographic map was used, modified to be consistent with the GPS data collected over the course of this survey.

c. Data processing

The gravity data was downloaded and processed daily in the field using propriety software package 'Gravred2'. All of the field maps and databases were created in Geosoft Oasis Montaj. Long wavelength features were isolated by upward continuing the data to 4000 m above ground level. These features were then removed by differencing the upward continued grid with the ground data leaving only the higher spatial frequency features.

d. Data formats

The unedited ASCII instrument dump files are named for the date (survey type/day/month /operator's initials) on which they were produced. The RTK GPS dump files include the hyper, rover, base folders. The Near Terrain Corrections (NTC) are in an excel spreadsheet. The final processed data are in Geosoft data base (.gdb) format and in ASCII (.xyz) format.

e. Products

The following are attached to the digital version of this report

Digital Database:	Geosoft database Geosoft .xyz file ASCII Raw unedited data	gravFinal2012.gdb gravFinal2012.xyz
Processing Files:	Explains channels of database files	Channel.txt
Maps:	Gravity colour map .pdf Gravity colour map with filter .pdf Gravity colour profile .pdf Geosoft grid of colour map .grd Geosoft grid of col our filter map 4000m .grd	gravFinal2012.pdf gravFinal2012_filter.pdf gravProfile2012.pdf gravFinal2012.grd gravFinal2012_filter4000.grd
Reports:	This report in .pdf format	Carmacks_survey_specs.pdf

Respectfully submitted,
AURORA GEOSCIENCES LTD.

Ian Kickbush, B.Sc.