2015 University of Manitoba Geophysics Field School

Selkirk Golden Boy Project: Introduction and Field Work

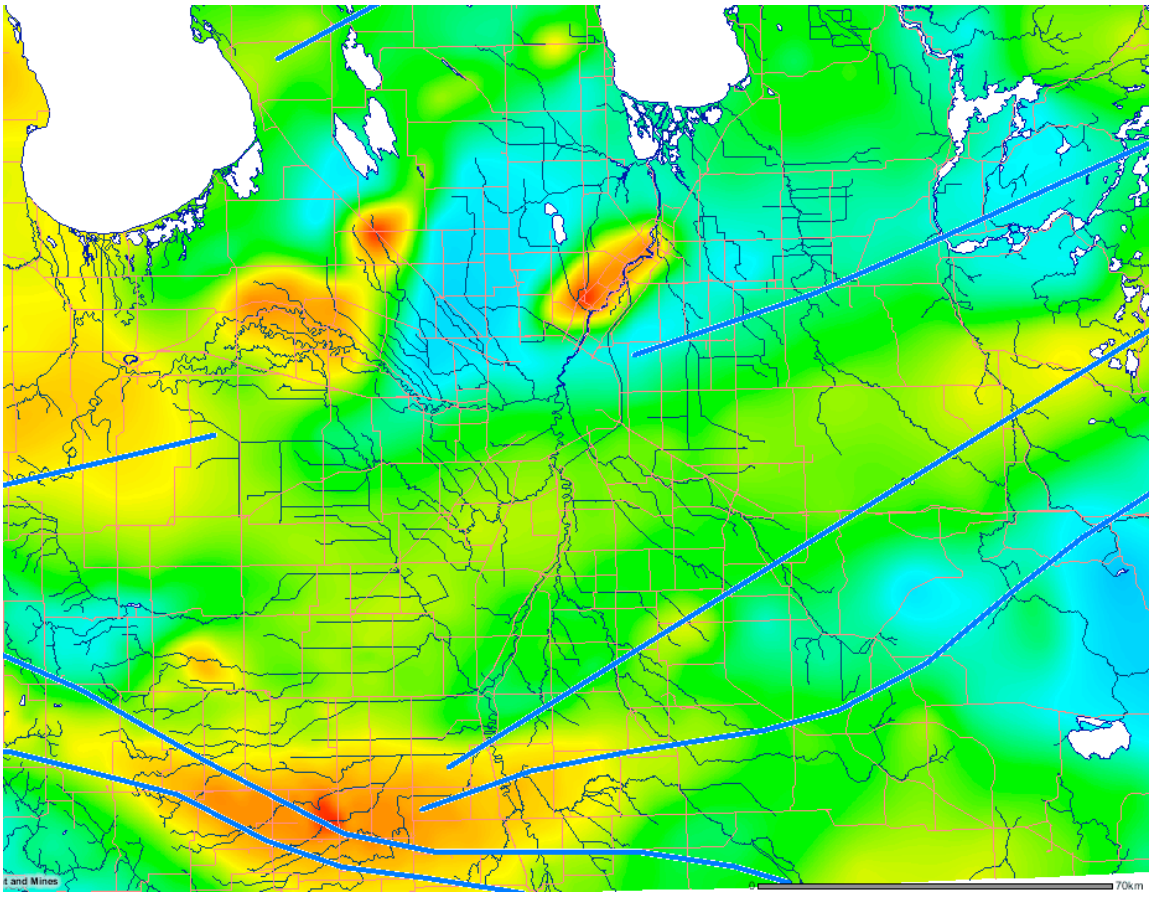
Date: May 1-2, 2015

This project will involve measurement, analysis, and interpretation of potential field (gravity and magnetic) data from the Golden Boy Project near Selkirk, Manitoba. The gravity and magnetic anomalies associated with the project are two of the strongest isolated potential field anomalies in southern Manitoba: the gravity anomaly is 380 GU and the magnetic anomaly is ~800 nT.

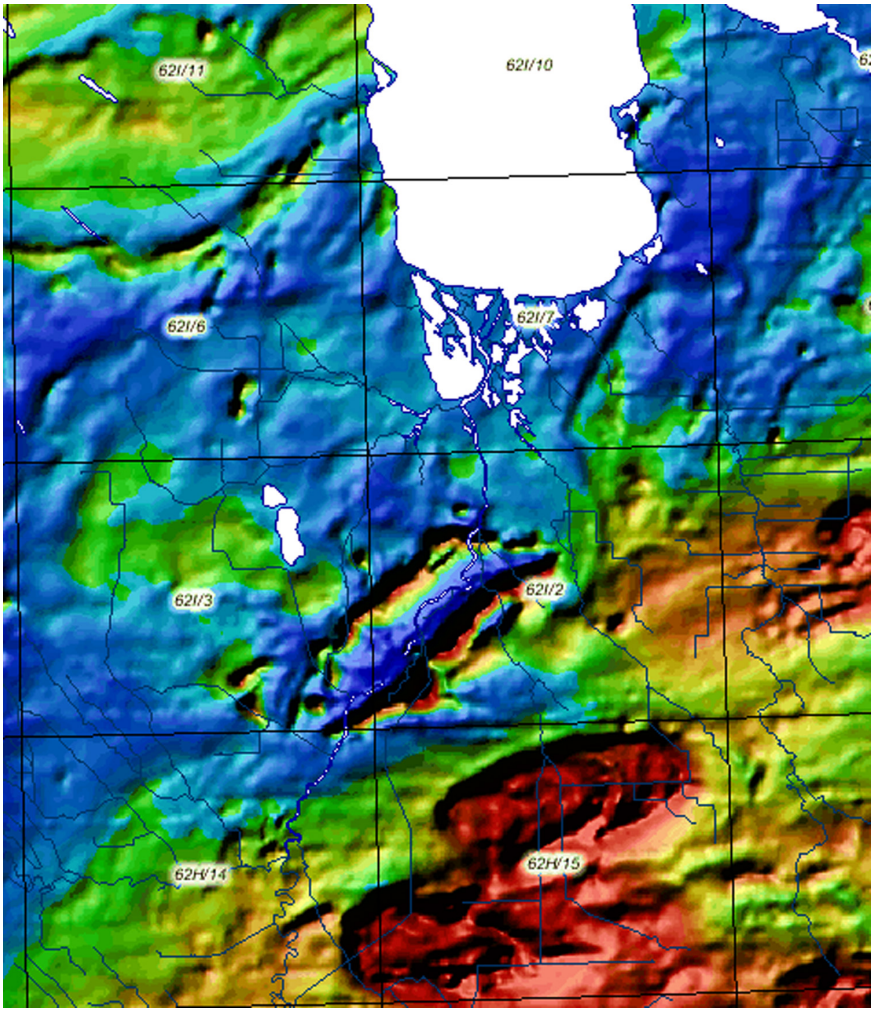
The Precambrian rocks presumed to be responsible for the anomalies lie beneath 100-150 m of Paleozoic cover and ~20 m of surficial deposits. The anomalies were examined by Pro Am Explorations Corporation as a possible exploration target in the 1990s; one of the major participants was Dr Bill Brisbin. Work on the project will involve

(**i**) Introductory material on the geology, geophysics, and history of the Golden Boy Prospect.
(**ii**) Planning and completion of a detailed magnetic survey across the western limb of the anomaly.
(**iii**) Gravity (plus elevation) and possibly EM34 survey along the magnetic profile.
(**vi**) Modelling, interpretation, and geological synthesis.

The primary question we wish to answer is: *what is the sub-surface geological structure responsible for the observed magnetic and gravity anomalies*?



Bouguer anomaly for southern Manitoba. The Golden Boy anomaly lies along the Red River just south of Lake Winnipeg,



Shaded-relief plot of the magnetic total field. The Golden Boy feature is a pair of linear anomalies trending SW-NE.

The main component of the geophysical survey is a magnetometer survey along Hwy. 67, approximately 5 km south of Selkirk and 3 km north of Lockport. We will survey a 4 km long profile with the aim of taking sufficiently dense measurements to characterize the lateral magnetic variations in the underlying Precambrian units (allowing correlation with projected borehole data). On the second day of the project we will complete the survey and possibly add readings along additional lines on nearby roads: survey planning will be based on the results from the first day.

The first survey method is magnetics. Magnetic measurements should be made every 25 m along the road with the side of the road chosen so as to minimize the effects of cultural features. Temporal magnetic variations will be a source of noise in the magnetic survey. Prior to departing for the field you should examine the magnetic forecast and recent field variations on the internet. In order to allow for possible correction of the data for time-variations, it is critical to record the time of each magnetic measurement. It will be useful to make base-station readings every hour to monitor the level of field variations. It is also critical to note the presence of any cultural features along the profile that may have affected the magnetic readings (*e.g.* culverts, power line crossings, parked cars *etc*). You should also be recording the position of major cultural features such as road intersections.

The second survey method is gravity and associated elevation readings. Gravity measurements should be made at 200 m intervals along the survey line with the elevation, GPS location, instrument height,

and time of each reading noted. You will need to establish a base-station that should be revisited every hour to two hours. It is critical for the readings at the base station to be as accurate as possible.

Schedule

Friday, May 1

09:00-9:30	Introduction to history, geology, and geophysics of region by Dr. Bill Brisbin
09:30-10:30	Planning session and magnetic forecast checking.
10:30	Depart for Selkirk
11:30-13:00	Gravity, elevation, and magnetic surveys.
13:00-13:45	Lunch in Selkirk or Lockport
13:45-16:00	Gravity, elevation, and magnetic surveys
16:00	Depart for Winnipeg
17:00-17:30	Put batteries on charge, end of day

Friday, May 1st

08:30-09:00	Planning, instrument preparation, packing, magnetic forecast checking.
09:15	Depart for Selkirk
10:15-12:30	Gravity, elevation, magnetic surveys.
12:30-13:15	Lunch in Selkirk or Lockport
13:00-16:00	Gravity, elevation, magnetic surveys
16:00	Depart for Winnipeg
17:00-17:30	Put batteries on charge, end of day

Saturday, May 2nd

08:30-14:00	Data reduction, plotting, and qualitative interpretation
14:00-18:00	Magnetic and gravity modelling
18:00-21:00	Magnetic and gravity modelling

Sunday, May 3rd

08:30-10:30	Magnetic and gravity modelling
10:30-1800	Integrated data interpretation and project report.

Equipment

We will need all the equipment for the following methods :
1. Magnetometers (we have three modern units available, one of which measures the gradient)
2. Gravity, with spare batteries and bulbs, and elevation
3. Three GPS units and numerous survey tapes

Groups

For this survey there will be three data acquisition groups, working co-operatively. You will be expected to help plan and to coordinate the survey yourselves, ensuring that everyone participate in all methods. Given the distances involved in the survey, it will be important to coordinate the use of the three vehicles *e.g.* picking the gravimeter and magnetometer up for the base station recordings.

Name	Group	Data pair
Dhatt, Amandeep	1	1a
Sato, Easton	1	1a
Naseem, Qaisar	1	1a
Mann, Harsimran	1	1b
Ulom, Tony	1	1b

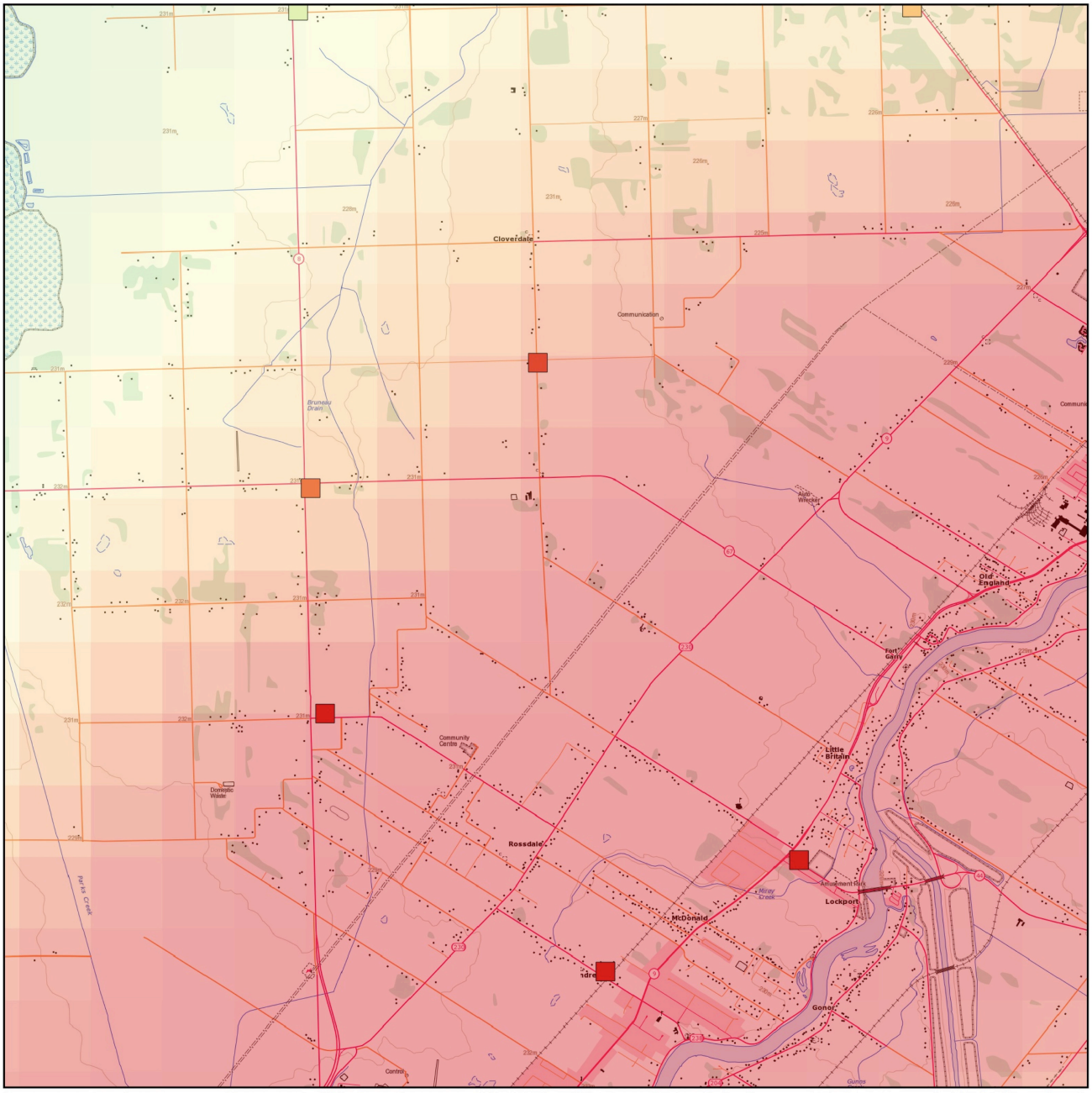
Ishola, Sodiq	2	2a
Gill, Shehryar	2	2a
Tyomkin, Yana	2	2b
Clark, Neil	2	2b
Ramlakhan, Kevin	3	3a
Cornick, Jason	3	3a
Kachappilly, Steve	3	3b
Ibikunle, Gafaar	3	3b

Data Analysis

All data should be appropriately archived and should be completed on the evening of Saturday 28th April. Data archiving will be done by each group for the data they collected. At this point the whole data set will be made available to the class.

Instructions for the data reduction and analysis will be provided following the data archiving. The gravity and magnetic data reduction and basic plotting of results will be done in the groups of four people. More advanced modelling and the writing up will be done in pairs. As this project is intended to be a realistic geophysical project I will expect a (typed) project report at the end containing a brief description of: the project aim, site information, and site history; a summary of surveys performed; description of results, analysis, and interpretation. A report is to be prepared by each *data analysis pair*. All material to be submitted by 6:00 PM, Monday, May 4th.

Topo map of study area with gravity overlay



Topo map of study area with magnetic total field overlay