University of Manitoba
2015 Geophysics Field School

Birds Hill Project: Data Analysis
Gravity & Elevation Surveys

Groups

- Question 1 should be completed by the data acquisition group
- Questions 2-5 should be completed in your data analysis pairs or trios
- Questions 6-7 should be completed individually.

Data Archiving

1. Enter the raw gravity and elevation survey data into a worksheet using **GRAPHER** or **EXCEL**. The data should be carefully archived in an appropriately named directory with a **README** file explaining its format, date and place of collection, the group who collected it, and any other pertinent details (but you may assume that your log book records will be available to supplement the archive information). It is necessary to submit only one set of results per field group. Submit an electronic copy of the data and of the **README** file.

Data Reduction and Analysis

2. Process the gravity data so that each base station and profile reading is represented by a single time (in minutes after the survey start) and a single reading (in GU). This procedure will involve averaging the times and readings after omission of any obviously incorrect values.

3. Correct the raw data for time variations. Using linear interpolation between base station results, calculate the base station "reading" at the time of each reading on the profile. Subtract the base station value from the other readings. Table 1 shows an example of the time-variation correction done for Wallace Building data.

4. Reduce the raw elevation readings to obtain elevations relative to the base station. Submit a table showing the analysis and results with your answer.

5. Plot the elevation profile.

Interpretation

6. Comment as to whether the elevation variations on the plot match those you observed in the field.

7. Plot the reduced gravity data. In order to compute a Bouguer anomaly, it is necessary to correct the data for latitude and for elevation (free air and Bouguer corrections). Comparing your elevation and gravity plots comment as to whether there appear to be any significant

elevation and/or latitude effects in the data. Do you think the density assumed for the Bouguer correction is the right one? If time allows, you may want to try different density values to see which one best flattens the gravity profile.

TABLE 1: WALLACE BUILDING GRAVITY READINGS (2001) AND REDUCTION:							
LOCATION	READING	TIME	Station Av reading	Av. Time after 15:00	Drift Correction	Corrected Reading	Average Reading
	(Instrument Divisions)	19NOV01 hh:mm:ss	(Div)	mm.mm	(Div)	(Div)	(GU)
GROUP 1							
Basement	1030.0	15:13:00	1029.53	18.02			
Basement	1029.1	15:18:32					
Basement	1029.5	15:22:32					
1st Floor	1026.9	15:39:40	1027.05	44.43	1030.00	-2.95	-13.57
1st Floor	1028.2	15:45:29					
1st Floor	1027.2	15:49:12					
Basement	1030.4	15:53:12	1030.30	60.96			
Basement	1029.7	16:03:01					
Basement	1030.8	16:06:40					
GROUP 2							
Basement	1032.4	16:16:42	1030.45	83.13			
Basement	1030.5	16:22:16					
Basement	1030.4	16:24:00					
2nd Floor	1023.4	16:28:10	1025.90	91.95	1030.53	-4.63	-21.30
2nd Floor	1025.6	16:30:34					
2nd Floor	1026.2	16:33:20					
Basement	1030.6	16:36:57	1030.60	99.74			
Basement	1030.7	16:40:09					
Basement	1030.5	16:42:07					
GROUP3							
Basement	1030.5	16:54:57	1030.67	120.52			
Basement	1030.2	16:59:52					
Basement	1031.3	17:06:44					
3rd Floor	1022.8	17:16:16	1023.27	140.37	1030.84	-7.57	-34.82
3rd Floor	1023.3	17:21:17					
3rd Floor	1023.7	17:23:34					
Basement	1031.6	17:29:23	1030.93	150.80			
Basement	1030.6	17:30:25					
Basement	1030.6	17:32:18					