

**University of Manitoba  
2015 Geophysics Field School**

**Birds Hill Project: Data Analysis  
Electromagnetic Survey**

**Groups:**

- Questions 1 and 2 should be completed by the data acquisition group
- Questions 3-6 should be completed with your partner(s)
- Questions 7-9 should be completed individually.

All work is due at 10 PM.

- The data archiving must be submitted *electronically* on a jump drive to an instructor, in a folder with project name and group number in the name, and subfolders indicating the particular survey.
- Data reduction and analysis answers should be submitted in hard-copy with one copy submitted for each data analysis pair or trio. The results can be submitted in hand-written form.
- The interpretation answers should be submitted in hard-copy with one copy submitted for each person. The results can be submitted in hand-written form.

**Data Archiving:**

1. Enter the EM31 data into worksheets using GRAPHER or EXCEL. The data should be carefully archived with a README file explaining its format, date and place of collection, the group who collected it, the group who archived it, and any other pertinent details. It is useful to make a simple site map using GRAPHER. Hand in an electronic copy of the data and README files.

2. The EMP-400 data will provided as data file. Create a README file to accompany this file. Hand in an electronic copy of both files.

**Data Reduction and Analysis:**

3. Plot the EM31 data from the reader comparison line for your group (where the instrument was carried by different people).

4. Describe the sensitivity of the EM31 instrument to magnetic and conductive objects and to instrument height.

5. Plot a contour map of the horizontal and vertical dipole mode EM31 responses.

6. Plot a contour map of the EMP-400 apparent conductivity responses.

**Interpretation:**

7. Describe the EM31 results, including the lateral variations in apparent conductivity and the difference between the horizontal and vertical dipole modes.

8. Compare the EM31 and EMP-400 responses, and make a qualitative interpretation of the results in terms of how the conductivity varies as a function of depth. Figure 1 shows the sensitivity curves for the two dipole modes.

9. Provide a brief geological interpretation of the results. Use the map of Bird's Hill for the general geological setting and published values for the conductivity for the different materials (e.g., Figure 2).

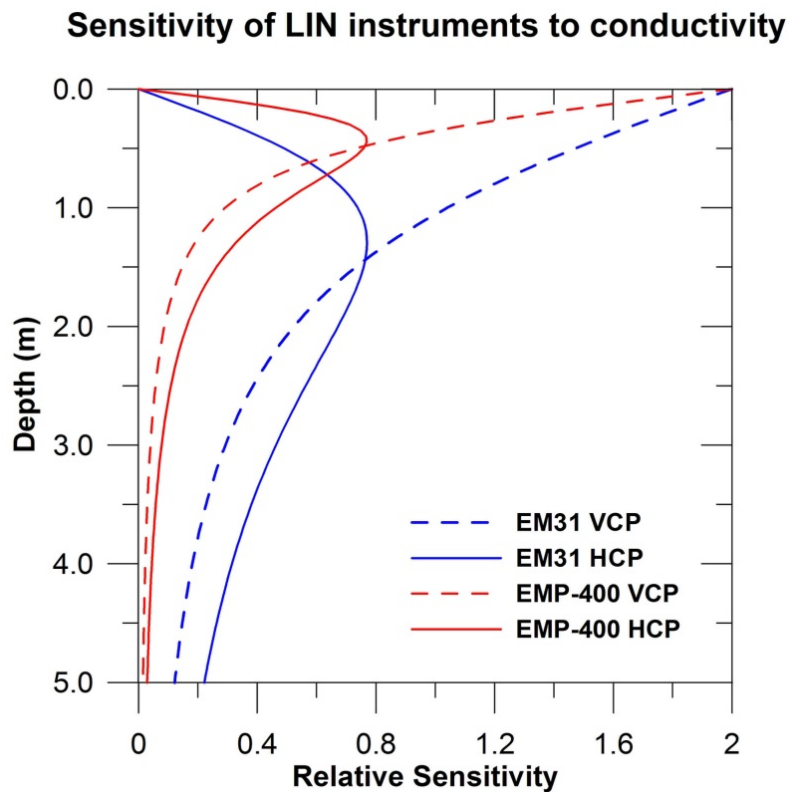


Figure 1. Sensitivity of EM instruments.

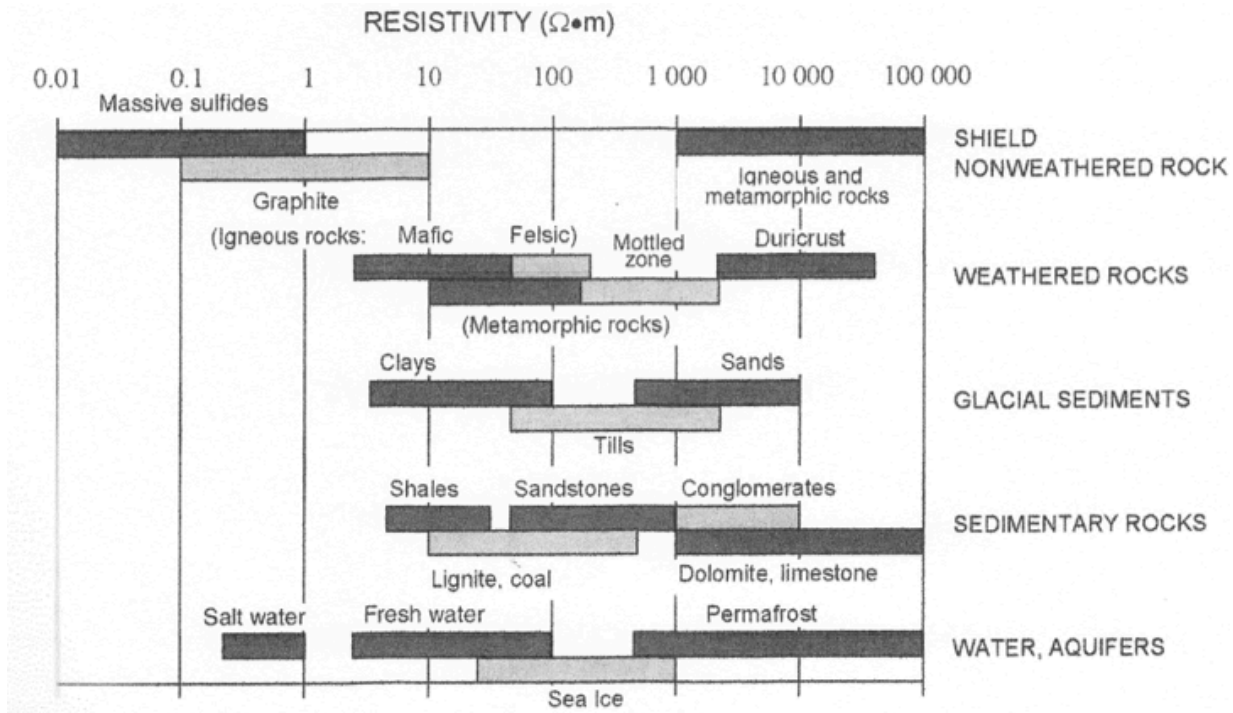


Figure 2. Typical range of resistivities of geologic materials (Knight and Endres, 2005).

## REFERENCES

Knight, R.J., & Endres, A.,L., 2005. An Introduction to Rock Physics Principles for Near Surface Geophysics. Chapter 3 in *Near-Surface Geophysics*, ed. Butler, D.K., Society of Exploration Geophysicists, Tulsa, Okla. p. 31-70.