Lab 2: Treasure Island maps (pace and compass exercise)
EPSC 240, Geology in the Field
Sept 12, 2018

Due date: Monday Sept 17

Meet: 1:35pm in FDA 348 to walk together to the grassy area west of Burnside and Otto Maas, next to Sherbrooke St.

Bring: Bound, hardcover field notebook, ruler, protractor. You will check out a Brunton compass for the afternoon, and return it when you are done. The replacement value of a Brunton compass is currently $400 CAD, so do not lose or damage it! Make sure the TAs check your compass back in before you leave.

Wear: Comfortable clothes for the weather conditions – check the forecast and plan accordingly (sun or rain protection).

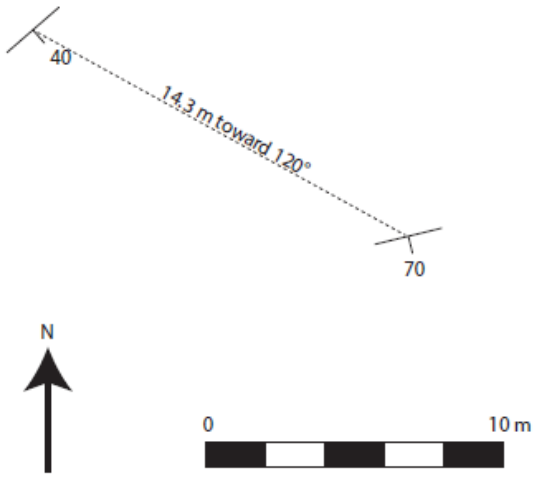

Figure 1: Example map – two outcrops plotted with the distance and azimuth between them, north arrow and scale

Instructions: Determining the orientation of features in 3D is a key skill for understanding the spatial distribution of rocks, which in turn is needed to understand the geological history, and also other things such as the depth of groundwater aquifers. Today we will practice measuring strikes and dips on artificial outcrops and locating those outcrops relative to each other using pace and compass mapping.

1. Work with a partner - each person will turn in their own paper, but staying together and double-checking all measurements with your partner will help you verify your map before you start plotting.

2. Determine the length of your pace -
   a) Walk normally! along the measuring tape, recording your paces using a pace counter. Record your results.
   b) Walk uphill, downhill, and horizontally to see how your pace changes.
   c) Repeat measurements twice or three times, making sure your results are consistent.
   d) Compare with your partner to establish the difference between you - do you both show similar variation with slope?

3. Practice sighting the azimuth -
   a) Set up test azimuths - far and near – for example, using the flags on Sherbrooke or the pillars on the Roddick gates.
   b) Confirm the accuracy of your sighting technique - if no match between partners, check that declination is correct on your compass.

4. Collect data for the treasure map -
   a) Using your pace to measure, and sighting with your compass, determine the distance and angle between two outcrops.
   b) Repeat until all outcrops are located with respect to other outcrops.
   c) Make a web of measurements so that each outcrop's location is determined by multiple measurements - this redundancy will help you if you find conflicts in the data when you are plotting.
   d) Work with your partner to double-check your sightings, pacing as you go.
   e) At each outcrop, measure the strike and dip of the plane.
5. Return your Brunton compass – make sure it is checked in by the TAs.
6. Plot your map -
   a) Determine the appropriate scale for your map to make sure you can fit all the outcrops on one page. Orient the north direction on the page.
   b) Starting in one corner of your area, plot an outcrop using the strike and dip symbol (as seen on geologic maps).
   c) Measure the distance (according to your scale) and the orientation (relative to your north arrow) to a second outcrop, and plot the strike and dip at that outcrop. Indicate the measured distance/orientation with a dashed line (see Figure 1).
   d) Continue until all outcrops are plotted.
   e) Plot your redundant measurements in pencil until all measurements are plotted. DO NOT just draw lines connecting the outcrops, actually plot the measurements. Do not adjust or change your measurements. If they don't connect to the outcrops you've previously plotted (and some probably won't), just end the line where your measurement ends.
   f) Where you have gaps between the end of the lines and the location of the outcrop, measure the gaps. If they are greater than 5% of the length of the line that was measured, colour the line red.

Evaluation:

The grade for this lab will be based on the following:

- Accuracy of strike and dip measurements, reporting measurements in correct format: 30%
- Accuracy of map, including relative distances and directions between outcrops, drawn to an appropriate scale, orientation measurements shown correctly, work shown: 70%