

Folds and Stereonets – Magog-Sutton Field Trip
Geology in the Field – EPSC 240
Oct 2 & 5 2019

Meet: Oct 2: Lab in FDA 348. Oct 5: 8 am at Milton Gates. We will arrive at outcrop at about 10:45 am, and leave for home around 4:30 pm to arrive at 6:00 pm.

Bring: Field kit (notebook, hand lens, pencils, colors, magnet and acid, camera), Lunch, snacks and lots of water.

Wear: WARM clothes, sun and rain protection. Gloves – hard to write with cold hands. Umbrella

Instructions: We will visit several road cuts today, starting with folded sediments of the Magog Formation near Sherbrooke, for measurements of folds and associated cleavages. The Magog Formation is part of a sedimentary basin known as the Dunnage Zone which forms part of the foreland of the Appalachians. We will then visit a series of additional outcrops to introduce more greenschist-facies metamorphic rocks, part of the Humber Zone of the Appalachians. The Humber Zone rocks are more metamorphosed and more deformed than the Dunnage Zone rocks, but locally represent similar lithologies and are of similar age. The two Zones are separated by the Brompton-Baie Verte line, which is probably a fault.

Source of the Appalachian foreland region geologic map: <http://geogratis.gc.ca/api/en/nrcan-rncan/ess-sst/7ca799d3-e2dc-5283-b11c-1e15c830a24b.html>

In lab:

1. Introduction to stereonet
 - (a) Reminder about strike and dip
 - (b) Practice matching strike and dip with plexiglass hemispheres
 - (c) Projection onto stereonet grid
 - (d) Plotting planes practice:
 - i. 344/22S
 - ii. 230/78N
 - iii. 015/48W
 - (e) Determine intersections trend and plunge of all three plane intersections
 - (f) Plot trend and plunge of lines:
 - i. 22/140
 - ii. 45/280
 - iii. 80/090
2. Introduction to folds
3. Measuring limbs to find hinge
4. Folds on stereonet

In the field (in notebook and on paper provided):

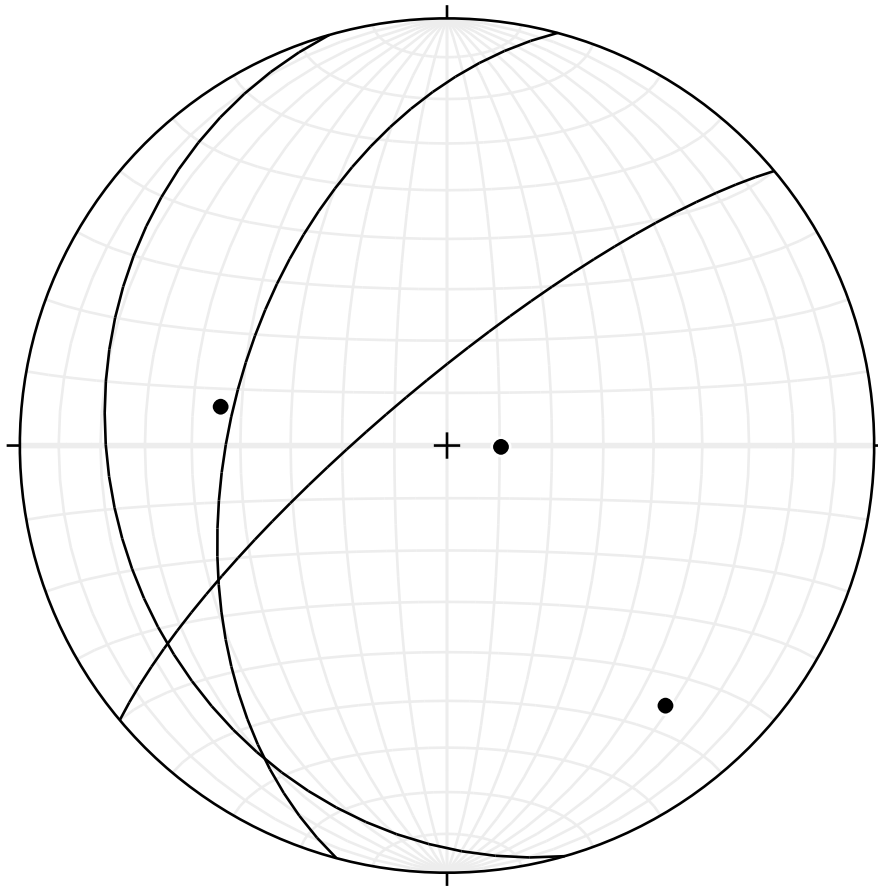


Figure 1: Your practice stereonet should look like this

1. The first outcrop we will visit is on the offramp of exit 106 from Hwy 10E, between Magog and Sherbrooke (nearest searchable landmark is Le Bar Shelby). Pull off on the wider gravel shoulder on the right side of the offramp. The best outcrop is on the left (north) side of the outcrop, but is hidden by some small trees. Traffic is usually sparse but take care when crossing the road. We will spend 2 hours here so you will need to work efficiently. Collect the following data and observations (in whatever order is convenient).
 - (a) Walk up and down the outcrop and get a feeling for the shape and size of the folds. Count how many antiforms and synforms are exposed in the road cut.
 - (b) Identify the bedding surfaces in the rock.
 - (c) Measure the wavelength of the folds.
 - (d) In your notebook, do a scaled and oriented sketch of the outcrop (this doesn't have to be a work of art, but it will serve to record the locations of your measurements so make it as accurate as possible).
 - (e) Measure the strike and dip of bedding on at least 8 different fold limbs. Mark the location of each measurement on your outcrop sketch.
 - (f) Measure the orientation of axial planar cleavage on at least 3 different folds. Mark the location of each measurement on your outcrop sketch.

2. By popular demand: Bathroom break at the tourist info center on Hwy 10 west of Magog.
3. Sutton Schist at Mt. Sutton ski area
4. Tibbit Hill Formation greenstone at Auberge des Rocheurs Bleu
5. Back to McGill

Report due Weds, October 16 should include the following sections.

- I) Introduction: Purpose of report, brief description of the Appalachian Orogen including appropriate citations, locations of field observations.
- II) Stereonets from in-lab exercise (2: one with data given on assignment sheet, and one with data from “outcrops” set up in class).
- III) Field trip: Rock descriptions for each outcrop, written out in prose (not bullets). Each rock described should include mineralogy, grain size, name of the rock, interpreted protolith and justification. You may include figures (photos or sketches).
- IV) Description of rock fabrics (foliations, cleavages, etc.) at each outcrop.
- V) Folds in Magog Group sedimentary rocks
 - (a) Describe the folds in terms of their scale, orientation, and shape:
 - i. Are the folds gentle, open, closed, tight, or isoclinal?
 - ii. Describe any additional structures you observed (scale, orientation, description). Examples: veins, cleavages, strain shadows.... many options possible!
 - (b) Stereonet showing all planar measurements (plotted in different colors for limbs vs. axial planes) and estimate of the fold hinge from the limb and cleavage intersection(s).

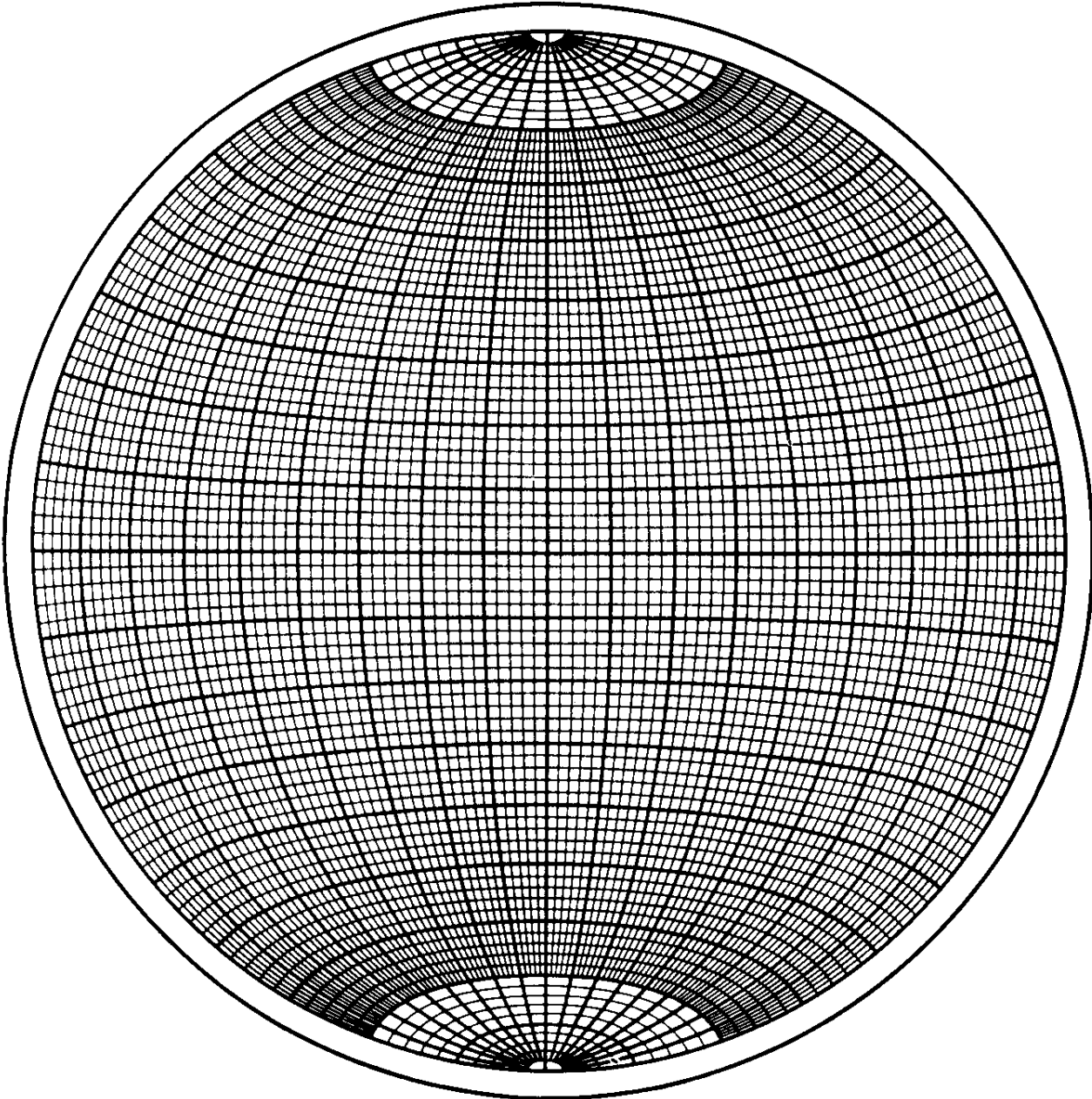


Figure 2: Stereonet - stick on some cardboard and you are ready to go