Lab 3: Champlain Sea Sediments – Sablière du Coteau (Sand quarry trip)
EPSC 240, Geology in the Field
Sept 19, 2018

Due date: Monday Sept 24

Meet: 1:35 pm in the courtyard behind FDA - go to the bottom of the stairwell in the Adams building and go through the door to the courtyard outside.

Bring: Hardcover field notebook, ruler, protractor, pencil crayons, hand lens. We will provide long measuring tapes and acid bottles to borrow. You will check out a Brunton compass for the afternoon, and return it when you are done. 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 cool weather, sun and rain protection (check the weather forecast), sturdy shoes, we will definitely get sandy!

Instructions: Variations in rock type through a section of stratigraphy record changes in the past environment over time - including changes in climate, sea level, and ecosystem. Collaborate with a partner to collect data, but each student must complete their own stratigraphic column and explanation. Read all the instructions before you begin, so you are sure to collect all the necessary data as you go. Feel free to share data with your peers. Your final stratigraphic column should be in black ink (fine lines) and the units and legend coloured with pencil crayon. Colour very lightly and evenly.

In the Field:

1. Establish your line of section in a location. The section line should be measured perpendicular to bedding planes. So, if the bedding is horizontal, you should measure along a vertical line. If the sedimentary bedding is dipping, adjust your line of section accordingly. Choose a place to measure section which has as much continuous section as possible.

2. Contacts:
    a) Determine the strike and dip of the contact
    b) Describe the contact (sharp/gradational/interfingering, planar/wavy/irregular, conformable/nonconformable/disconformable/angular unconformity)
    c) Measure the thickness of each unit (space between contacts) and make sure that it adds up to your total section thickness as originally measured.

3. Lithology:
    a) As you familiarize yourself with the section of sediment, define categories of the sediment for individual description. These will show up in your stratigraphic column and legend as a 1-line definition and symbol, and as a 1-2 paragraph description in your written report. Remember to describe the same characteristics that we did in Week 1 at the limestone outcrop.
    b) The number of different units you define is up to you, and determines the level of detail of your column. They should be different enough that you can easily explain how to tell one apart from another, and so you can identify identical sediments from another section. But, the descriptions should not be so specific that each and every bed is "different" – it is most common to see repetitions of lithologies through parts of the section. Aim for between 5 - 10 different types, depending on how variable your section is.

c) Units might be distinguished from each other by the population of sedimentary grains, or by the arrangement into sedimentary structures (bedding, cross bedding, etc.) Describe all these elements in detail. You should include: grain size and distribution of grain sizes, mineralogy, grain shape, any special grains (fossils?), trace fossils, burrows, etc. Ask for help to identify or name things that you find.

d) Identify the symbols that you will need to record the bedding features and fossils to use in your strat column.

4. Profile
   a) In general, the profile of the stratigraphic column (distance along x-axis) represents grain size or erosion. For this assignment we will use grain size. So, classify the grain size of each unit carefully as you go, as this will form the basis for your profile next week.

5. Sketches
   a) Make a minimum of 2 sketches for your explanation - one of the overall setting (~10 m area) and one close up (few cm) of an interesting feature within your section line. If you wish, you may include photos alongside the sketches to help display your observations.

Stratigraphic Column and Explanation:

1. Stratigraphic column (50%) - see example below.
   a) Construct your stratigraphic column on a piece of graph paper with black ink (if working by hand) or draft it using the computer software of your choice.
   b) Determine the scale. Add up the total stratigraphic thickness of the units you measured, and "blank" areas which contribute to the total height, but where you were unable to make detailed observations due to lack of exposure. Scale this height to the height of one piece of graph paper. Leave at least a 2 cm margin around the edge of the page. Draw the scale on the left side of the page (leaving at least 2 cm margin at left).
   c) Determine the width scale (corresponding to grain size) and mark this scale at the top and bottom of your vertical scale.
   d) Determine the total number of lithologic symbols/colours and the symbols for sedimentary features which you will use in your section. Planning ahead (pencil first!), neatly lay out your legend on the right side of the page. Colour very lightly with the pencil crayons!
   e) Mark in the contacts and outline the individual units on the section. Insure that the contacts between units are at the right location on the scale and the thicknesses correspond to your field measurements.
   f) Draw in the right edge of your section, minding the horizontal (grain size) scale.
   g) Fill in the symbols for sedimentary structures.
   h) Fill in the lithologic symbols and colours.

2. Explanation (50%) - This is basically an extended caption to accompany your stratigraphic section. Include the following sections:
   a) Introduction: 1-2 paragraphs describing the Champlain Sea and the location where the section was measured (Sablière du Coteau: 45°24'09.84"N, 73°02'12.71"W).
   b) Description of section: 1 paragraph overview (including height of section, whether it was continuous from top to bottom or sections are being added together). Include your overview sketch as Figure 1.

i. For each different sedimentary unit, include a description of at least 1 paragraph. This should be consistent with, and fill in the detail for, the short name you give on the legend of your stratigraphic column.

ii. Include sketches and photos wherever possible.

c) Discussion: 1-2 paragraphs summarizing what you learned about the environment of sediment deposition in the Champlain Sea (with reference to specific features in your stratigraphic column).

Refer to readings or web sources to justify any interpretations or speculations about the environment. Indicate the specific source of any information you find in readings or on the web by citing at the specific place in the text (e.g., Kirkpatrick et al., 2017), and include the complete citation in a reference list at the end of the document.

d) Outstanding questions: What information is missing, or what questions are unanswered? 1-2 paragraphs.

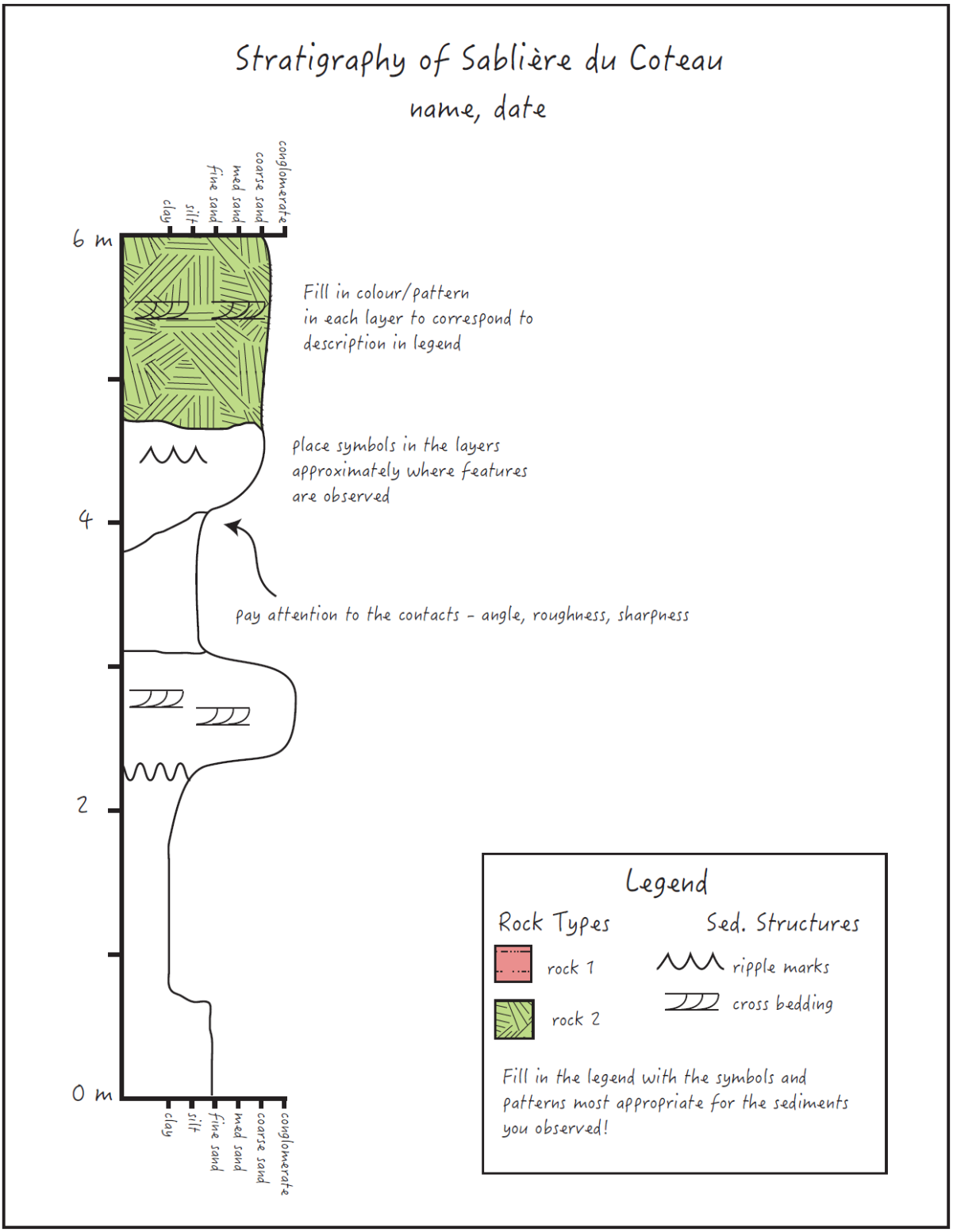

Figure 1: Example stratigraphic column (not complete)