

Lab 6: Extracting 3D information from geologic maps
EPSC 240, Geology in the Field
Oct 10, 2018

Due date: Wednesday Oct 17

Meet: In FDA 348

Bring: Ruler, protractor, calculator, pencil

Wear: Your choice!

Instructions: Geologic maps are 2D – the piece of paper you hold is flat. But they contain a wealth of information about the 3D orientation and distribution of rocks and structures in an area. In this lab, we will begin to explore how to extract this information from a map. You are provided with two maps – each has different geology, but the same topography.

1) MAP A

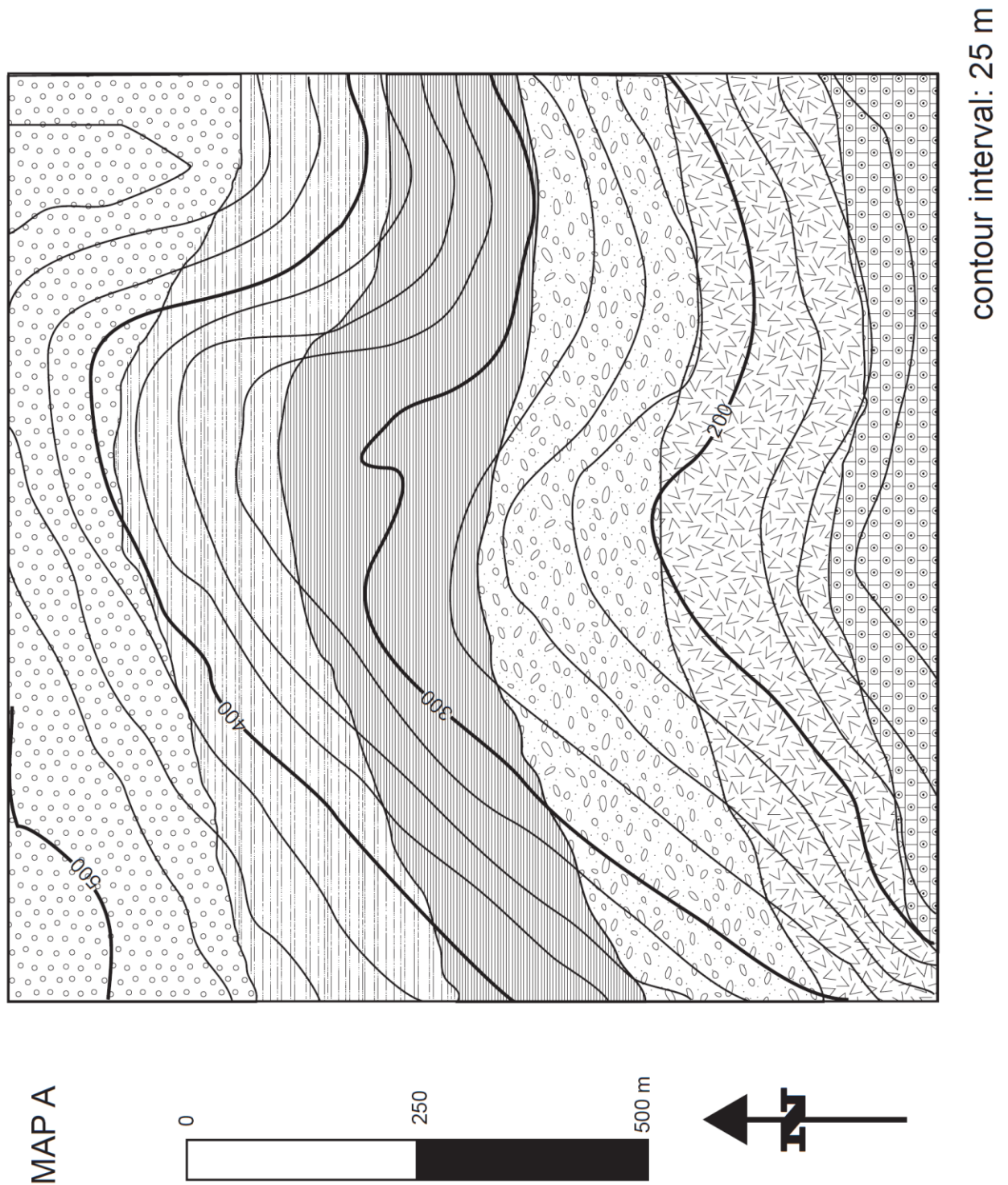
- a) Where would a river run through this area? Mark its path with a blue line.
- b) Where is the steepest area on the map? Could you hike up that?
- c) With reference to the topographic contours, describe in a sentence or two how the elevation of the contact between the conglomerate and volcanic rock would change if you walked along it from east to west. Based on this information, what is the dip direction of the contact (give N, S, E or W as your answer).
- d) What is the strike of the contact between conglomerate and volcanic rock? To determine this, find two points on the contact that are at the same elevation and draw a line through them. For a planar contact, this line of equal elevation is the strike line.
- e) Next, calculate the dip. To do this, you need two or more contours on the contact between the two units. Then calculate the slope with some trigonometry.

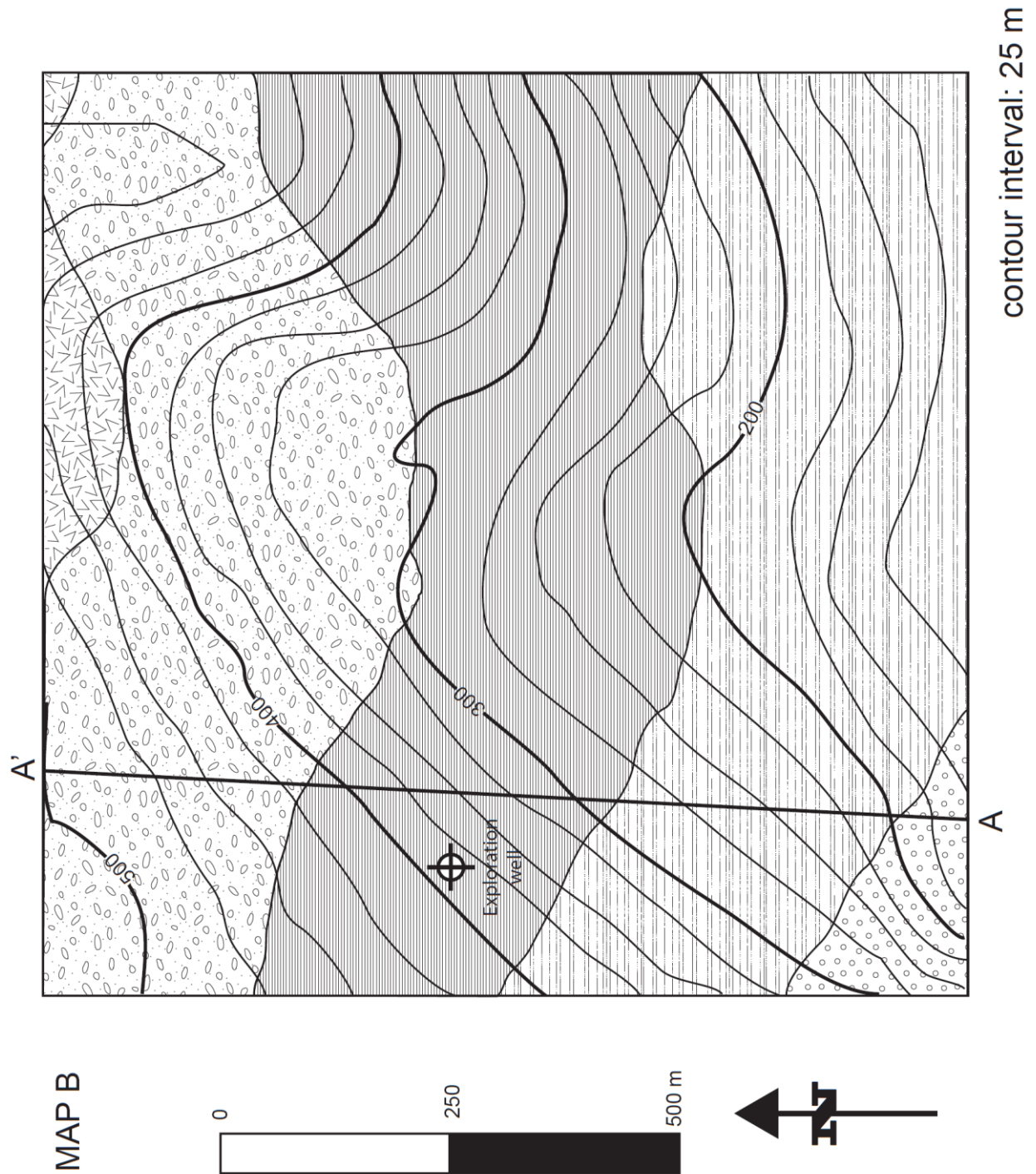
2) MAP B

- a) Is the shale tabular (i.e., does it have parallel edges)? To evaluate this, you need to find the orientation (strike and dip) of the contacts on either side of the shale.
- b) Assuming the rocks are the "right way up" (so not overturned), which contact is the upper contact (e.g., original stratigraphic top of the shale bed)?
- c) Rank the units from oldest (1st) to youngest (6th).
- d) Write a short story explaining the geologic history of the area, based on Map B. Include EVERYTHING you can think of that contributed to the current outcrop pattern and landforms.
- e) A well is shown on the map. Assuming the well is perfectly vertical, at what depth will it reach fresh water stored in the diamictite?
- f) Construct a cross section along line A – A'. Show the topographic profile, the locations of the contacts between the units at the surface, and the projection of the units in the subsurface. Make sure to construct the section without any vertical exaggeration.
- g) What is the true thickness of the shale?

Turn in:

1. Answers to all questions.
2. Any work sheets showing calculations and including work done on maps (SHOW ALL WORK).





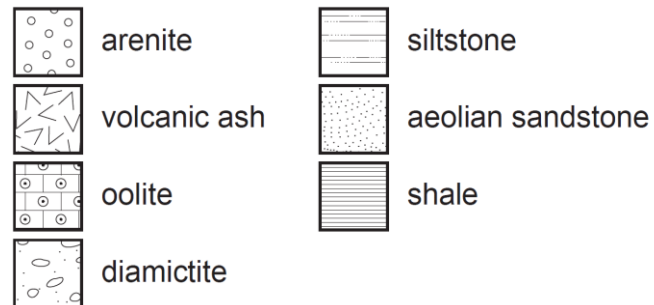


Figure 1: Key to rock type patterns for Lab 5 Maps A and B. Note: no stratigraphic order is implied in this legend.