Interpretation of maps
Cross sections showing subsurface projections
Ties together:
Outcrops, contacts, stratigraphy, orientations and topography into a complete “whole”
How does your map “work”?
Apparent dip
Practice in 3-D interpretation
Selection of mapping teams of 2 people
Quiz in the field
Come grab some pizza!

and learn about opportunities in environmental consulting

Wednesday
February 27, 2008
4:00 to 5:00 pm
Room 365 Mccone Hall

Earth and Planetary Science alumni Nick Walchuk and Mauricio Escobar of ENVIRON will discuss:

- an inside view of environmental consulting
- skills we know you'll need
- classes we wish we took
- how to put it all to use in the future
All to be followed by a Q&A session.

Pizza, salad, and drinks will be provided.
All undergraduate and graduate EPS students are invited to attend.

www.envirocorp.com/ucpers
Here Kitty Kitty
Top: A topographic map showing a stream valley and the line along which a topographic profile is to be drawn. Bottom: A profile of the land along the line A–B. Note that the distance from point A to point B is greater if measured on the ground than it is if measured on the map.

Map Scale

1" = 600'

1" = 600 ft (12 inches)

\[ l = \frac{600 \times 12}{84} \]

\[ l = 7,200 \]

dip in cross section

In interpreting subsurface geology, use stratigraphy, continuity and make the most simple interpretation consistent with all data.
6-5. Office Routines; Constructing Vertical Cross Sections

Routine tasks in the field camp are described in Sections 1-6 and 1-7. Preparing accurate, detailed cross sections is one of the more important procedures late in the field season. Cross sections not only develop and clarify geologic relations for the investigator, they are necessary for others who will read the report or use the map. In many cases, traverses may have to be made along the lines of section in order to check important relations and add attitudes of structures. In all cases, the sections must be prepared and studied thoroughly when it is still possible to go back to the field and look. The sections may be constructed from the topographic-geologic map as follows:

1. Select a section line that will develop as much of the mapped geology as possible and pass through or near to areas where data are especially reliable and abundant. In order to show more or less true dips and true thicknesses, orient the section line within 20° of perpendicular to the strike of structures. Consider all possibilities thoroughly, because selection of a line of section is by far the most important step in the procedure. Note that some features not crossed by the line will dip or plunge into the section below the surface.

2. Draw the section line on the map using a sharp pencil and an accurate straightedge. Hold the pencil consistently vertical so that the line will be straight, and check its straightness by laying the straightedge along the opposite side of the line. Draw short crosslines (ticks) perpendicular to the section line at its two ends. ($A - A'$)

3. Prepare a strip of drafting film or tracing paper wide enough to include the highest and lowest points along the section line plus space for geologic features under the ground profile. Use quadrille-ruled material if the divisions can be calibrated to contour intervals, at map scale, or rule a set of horizontal lines on blank material, spacing them at some contour interval. Do not use an exaggerated vertical scale except in the rare cases where it is needed; for example, to show sequences of surficial deposits in detail (Fig. 16-6).

4. Lay the strip over the map and parallel with the section line. Orient the strip so that the right-hand end is either the more easterly end or is oriented due north. However, if two or more subparallel sections are oriented roughly north-south, all their northern ends should be on the right. Trace the ends of the line on the strip exactly and extend them as end lines perpendicular to the horizontal lines of the strip (Fig. 5-4A). Label the horizontal lines with elevation numbers.

5. Plot points for the ground profile by either (a) raising or lowering the strip until the elevation line equivalent to a contour lies over the section line (Fig. 6-6A), or (b) taping the strip in place and using a triangle and straightedge to project each point where the section line is crossed by a contour to the corresponding elevation line on the strip (Fig. 6-6B). If relief is at least moderate, plot elevation points at about 40 meter intervals, and draw the profile between these points by visual inspection from the other contours. Draw the profile line in pencil, using a straightedge or drafting curve for reasonably smooth slopes. Check the line carefully against the map; then ink it so that it will not be smudged when geologic data are added.

6. Lay the strip over the map again, exactly matched at its ends, and mark the profile at each point where a contact, fault, hinge line, or strike line crosses the section line.
Apparent dip model
FIGURE 4-10 A nomograph, used to convert true dips to apparent dips (or vice versa). (From Palmer, H. S., U.S. Geological Survey Professional Paper 120-G.)
APPENDIX 13: Table for Interconversion of True Dip and Apparent Dip

The true dip of a planar feature is seen in vertical sections oriented perpendicular to the strike of the feature. Vertical sections oriented otherwise show apparent dip. All beds have horizontal apparent dips in any vertical section parallel to their strike, and the apparent dip increases as the acute angle between the vertical section and the strike increases, approaching the true dip as the angle between the section and the strike approach 90°. The values of apparent dip given below correspond to the true dips shown at the left of the table and to the angles between strike and the line of the vertical section shown at the top of the table and in the diagram. The values of apparent dip are rounded to the nearest 0.5° because dips are rarely measured or plotted more precisely.

![Diagram](image)

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ACUTE ANGLE BETWEEN STRIKE AND LINE OF VERTICAL SECTION
FIGURE 10-4 (a and b) Block diagrams and corresponding geologic maps for an open, symmetrical anticlinal fold (top) and an asymmetric anticlinal fold (bottom). Neither fold is plunging. (c) A plunging anticline with corresponding map (right).
Practice in structural interpretation before going into the field:

To help you succeed in structural interpretation, an exercises in the lab before going into the field can help

Interpretation of folds and faults depends on appreciating stratigraphy and the dip directions of contacts and beds

From the maps provided it is possible to determine the sub-surface structure under each surface map.

Assume that the topography is essentially flat
Interpretation of maps:

Cross sections showing subsurface projections
Ties together:
  Outcrops, contacts, stratigraphy and orientations into a complete “whole”

How does the map “work”? The map is not an end in itself- but the principal basis of interpretation

Practice in 3-D interpretation
For each geological map, check the appropriate box and draw in either a fold axis or fault on the map.

Faults: / Anticline

Syncline then draw a cross section looking north.
Draw cross sections for each section line
And mark the box for The type of structure
You are learning a successful **strategy** for working each day by **design** using a **deliberate plan** and using the **geological tools** to **find** and **recognize meaning** in the earth.

Pre-Professional Training- “**the patient deserves to live**”
Purpose: to prepare you to **think** and **work independently** and to succeed in **finding out** the geological **truth**- There is a right answer and can **mean lives**

Not being led around and shown what is happening

Once in a group, being able to be a **contributory member** of a team

**Scientific self-discipline** for time management

**Deliberately making steady progress** towards a defined goal of accurately mapping the geology of the Berkeley/Oakland Hills and working out the history of processes.
Quiz today in the field on stratigraphy, cross sections and landscape

and again Monday March 3 on cross sections
Importance of location

Everything Works!

Rhyolite

Informed Results

Wrong location

Nothing Works!

Improved Accuracy will improve your speed

Speed & Accuracy are compatible with craftsmanship
Schedule:

Wednesday- Introduction to digital mapping systems

We will start digitizing your maps in Lab on Wednesday

Teams of 2 people: In filling your “Dance Card”:

Each team member needs to be a contributory part of the team.
Each day check all Lights and turn signals On all trucks

Today’s Plan

Continue mapping the dacite from where we left off and wait at the saddle

Shuttle the trucks

GMRS Radios
For communication

Take an orange vest and wear it on HW 24