Strike-view Cross Section of the Persnickety Pass Region

Geologic maps and cross sections provide raw field data for structural geologists. Accordingly, it is very important for maps to be prepared carefully. Some of the key reasons structural geologists prepare geologic maps and cross sections are:

1. To document the geometry of geologic structures. This can be an end goal or just part of an investigation. For example, if recoverable petroleum is known to be associated with structures of a certain geometry, one might wish to know if structures of such a geometry are present in an area.
2. To determine the sequence of geologic events and the history of geologic deformation. This establishes the kinematics of deformation (i.e., how points in a body moved through time without regard to the forces that caused the deformation).
3. To evaluate, at least in a general sense, the boundary conditions that are reasonable to use in investigating how the observed geologic structures formed. This is done to help define the mechanics of deformation (i.e., the nature of the forces that produced the deformation and the reaction of the body to those forces). This step could be viewed as the end goal of complete evaluation of geologic structures.

One cannot proceed validly to step 3 without executing steps 1 & 2 first.

A critical part of doing good structural geology work is determining the essential form of the features you are studying (this indeed is a fundamental part of most scientific research). Doing this requires some mental flexibility. For example, in many cases the geometry of a geologic structure does not appear in its simplest, most essential form, in map view, but rather in a geologic cross section.

In this exercise you are dealing with bedded rocks and a fault; these are tabular and planar features, respectively. You are to prepare a geologic cross section by projecting structural information along the strike of the beds and the fault onto a vertical cross section plane. The vertical cross section is drawn perpendicular to the direction of strike of the units. The strike of a unit is the orientation of a horizontal line contained in the unit. This will reveal the geometry of these features in their simplest form. This exercise should take about an hour.

Based on the accompanying map, answer the following questions:

- What is the strike of the sandstone? _____
- What is the strike of the fault? _____
- What should the strike of your cross section be? _____

Now prepare the strike view cross section (see the attached page from McAlester & Hay, 1975). After the cross section is completed, answer the following based on the cross section:

Geometry

- Is the sandstone folded or not? _____ If so, what kind of fold exists? _____
- How thick is the sandstone unit? _____

Kinematics

- What kind of fault is this? Circle one of the following: Strike-slip. Normal. Reverse.
- Does the fold look faulted, or does that fault look folded?
- What is the relative displacement, as measured parallel to the fault, of the sandstone bed?_____

Mechanics

- If the faulting occurred in response to particularly strong compressive stresses, do you think these strong compressive stresses were oriented roughly north-south, east-west, or vertically?