

GEOL 110: Field Geology of the Western US

Fault Profile Activity: Pleasant and Happy Canyon, Panamint Valley fault zone

You are the lucky recipient of an internship with the Bureau of Subaerial Evaluation (BSE), a governmental organization that is interested in the seismic hazards in the southern Panamint Valley. This is a new agency recently formed, so that is probably why you have never heard of it. Your internship has placed you in a group of other lucky interns. Your group has been given an assignment to evaluate the slip rate along a series of normal faults.

For this activity, your team will prepare a topographic profile on the southeastern part of Panamint Valley, near the town of Ballarat, CA. This profile will be located in such a way as to intersect several different types of geomorphic features of Quaternary to Holocene age. Your team will interpret the surficial deposits based upon your field observations and your profile plot. Your team will make estimates of fault slip rate across some faults.

Objectives:

1. The individual will learn how to locate themselves on a provided topographic map.
2. As a team, we will learn how to measure topographic data using a Brunton Pocket Transit, a tape measure, a stadia rod, and some simple math.
3. The team will interpret surficial deposits based upon their field observations, note taking skills, and topographic profile interpretations.
4. We will make estimates of fault slip rate across some faults based upon topographic data and age estimates provided for the features that are offset.

Equipment:

- Brunton Pocket Transit
- Tape Measure
- Stadia Rod
- Graph Paper
- Field Map

Products:

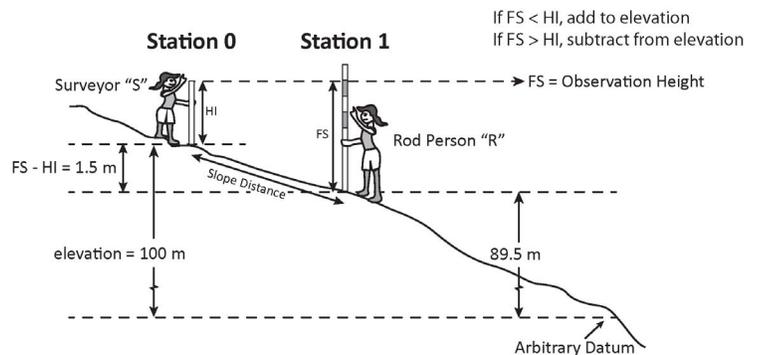
- Cross Section (including slip rate table)
- Map (showing geomorphic units and topographic profile location)
- Field Notes

Part I. Cross Section

Begin on the eastern limit of the profile. One person, the transit reader (surveyor), will stand at the beginning mark of the profile.

One person, the tape person, will lay the tape across the ground surface and work

with the rod person as a team. One person, the rod person will walk along the profile until they reach either (1) a break in slope or (2) the vertical limit measurable by the transit reader.



GEOL 110: Field Geology of the Western US

Fault Profile Activity: Pleasant and Happy Canyon, Panamint Valley fault zone

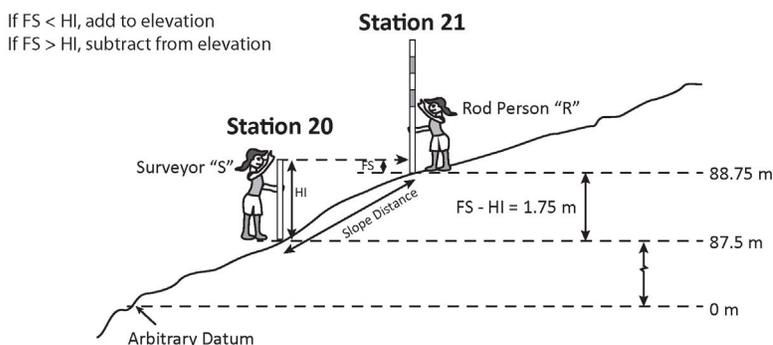
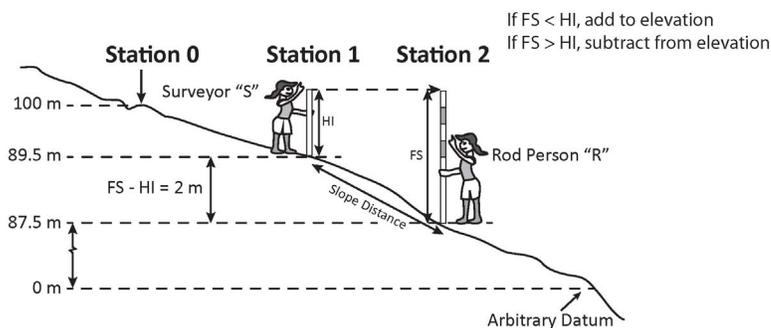
People next announce their observations so that the final team member, the note taker, can write this information into the notebook. The tape person will announce, loudly and clearly, the distance on the tape. The note taker will repeat the measurement, loudly and clearly, so that the tape person knows that they heard the correct information. The transit person will then read the height observation, loudly and clearly, so that the note taker can write this into the notebook.

The transit reader (surveyor) will move to the station where the rod person was. The tape and rod people will move to the next station. Every now and then, the tape will need to be reset to zero.

Notebooks will be configured with columns with the following headings: Station, Slope Distance, HI, FS, Elevation, Distance, and Notes.

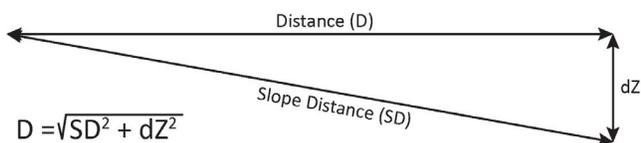
Station is a consecutive number related to the location of a measurement. The profile will begin at station 0 and the first measurement made will be station 1 (the first place that the rod is placed).

Slope Distance will be the measurement made using the tape measure. HI is the eye height of the transit person. FS is the measurement made using the Brunton Pocket Transit by observing the level measurement on the rod. Elevation is the elevation of the ground surface at the station. Use an arbitrary elevation for station 0. Distance is the horizontal distance between stations calculated with the Pythagorean Formula.



Stn	SD	HI	FS	Elevation	Distance	Notes
0	0	—	—	100	0	Beginning of survey...
1						

Notes will be taken to describe any observations made of the ground surface at the station location. These notes can help with interpreting the profile data later.



Observations could be about what material is on the surface (e.g. sand, gravel, vegetation aerial density and type, etc.). One important type of observation that you might want to document in the notes section is whether the station is at the top or bottom of a fault scarp. This will help you measure fault offsets which will be the basis for your slip rate calculations.

GEO 110: Field Geology of the Western US

Fault Profile Activity: Pleasant and Happy Canyon, Panamint Valley fault zone

Plot the profile on the grid paper as the survey proceeds. Keep the plot as neat as possible because this will be turned in with your assignment. The plot should have labels for (1) station numbers, (2) axis titles including the units, (3) vertical exaggeration, and (4) any more important information that the Bureau might be interested in. You might want to label the parts of the profile that you think are the top and bottom of the fault scarps.

Part II. Map

We will be mapping the location of the topographic profile on the base map provided. Make sure to mark some of the stations on the profile, most notably station 0.

We will map the surficial deposits on the field map based upon our observations made along the profile. Incorporate the profile data to help with this. Try to break out different deposits of the same type with relative age based upon their relative position. Example geomorphic units could be alluvial fan, shoreline, or alluvial/fluviol channel. Include a legend on the map that informs us.

Part III. Fault Slip Rate

Use the profile plot to estimate the distance of fault offset for each fault. The Bureau will provide you with ages for the surficial deposits, but you need to make a request to the Bureau for these data. Once your team has prepared the map and made estimates for the fault offsets, contact the Bureau to submit your request. Your team may want to consult with the Bureau to find out if your slip-rate calculation methods are reasonable approach given your data.

Prepare a table in your notes showing how your team calculated the slip rates. Once these data are finalized, place this table on your profile plot.