San Andreas Fault Paleoseismic Study
1999 SCEC Internship Project
Kelly Schmoker, California State University, San Bernardino

Introduction

The purpose of this project was to determine the dates of some prehistoric earthquakes along the San Bernardino (Plunge Creek) segment of the San Andreas fault. This information will be useful for correlating other events on the San Andreas Fault with activity on the San Bernardino segment. It is currently not known if all of the earthquakes along the San Andreas Fault have actually ruptured the fault. If we find evidence that some of the earthquakes have not ruptured this segment of the fault, this will enable us to re-examine some important interpretations of activity on this segment.

The recurrence interval for the southern segment of the San Andreas Fault is estimated at 144 years (Segall et al., 1997). This calculation is considered based on the assumption that prehistoric earthquakes ruptured this segment of the fault. If not all of the prehistoric earthquakes actually ruptured this segment of the fault, the recurrence interval for this segment need to be reevaluated.

In digging a trench and analyzing the deformation and offset of the layers that the fault broke through, we can determine the age of the fault event. Charcoal samples from various layers can be used to bracket a date on the earthquake horizon.

The Plunge Creek Paleoseismic Site

The Plunge Creek site is located on an ancient stream channel that was covered by the distal sediment of an alluvial fan. This trench site was chosen because it is adjacent to the edge of an alluvial fan, the older sedimentation layers will not be disturbed by the contractor digging several trenches at this site. A contractor had previously dug several trenches at this site, and we decided to re-open his trench #4 (figure).

A student working on her Masters thesis, Safaa Dergham, also re-opened the contractor's trench #8 to find evidence for the 1812 earthquake on this segment. This site is located on the alluvial fan, to allow the younger sedimentation units...
Work Completed At The Plunge Creek Site

A trench was dug in two phases, the first was 5 feet deep and the second phase was deeper. The trench was excavated using a backhoe, and the walls of the trench were scraped by hand to provide a vertical wall on each side. Nails, tags of various colors were used to mark off the extent of the different layers. The trench was surveyed using a total station, and a computer log plotter was generated. This grid was then taken back to the trench, where the layers were logged by hand onto it. Charcoal samples were then collected from different stratigraphic layers as possible, to aid in later dating efforts to locate an earthquake horizon.

After phase one was finished, the trench was cut back to form benches, deepened to 10 feet. The layers were again tagged with nails and surveyed by hand and charcoal samples were collected from various layers.

After the logging was finished, both the trench wall and the logs were checked for evidence of faulting. This would include offset layers, sand fissures, and other phenomena.

Conclusion

The trench did not reveal any clear signs of a fault running through it. We did not locate an ancient channel wall, and we believe that the contractor who dug the trench mistook this for a fault. We were able to locate the bottom of the trench and for further study this trench could be deepened to find evidence of past earthquakes.

The other trench that was re-opened (trench #8), showed evidence of samples being collected from layers bracketing the earthquake horizon, waiting for the lab results. Trench #8 was not in the course of the trench #4.
References

