Alex Hatem
Leo Hall and Gloria Radke Awards Recipient

My name is Alex Hatem, and I am starting the second year of the Geology MS program. My MS thesis focuses on the evolution of restraining bends within wet kaolin analog modeling. I am documenting fault propagation and abandonment, as well as strike-slip efficiency, when varying initial fault geometries. Hopefully, by understanding modeled complexities in strike-slip fault zones, I can provide some insight into natural systems. Fully understanding an analog or numerical model requires careful study indoors, as well as complimentary field work to provide physical context for meaningful models. I was fortunate enough to complete field work in July-August 2013 with funds from the Leo Hall and Gloria Radke memorial foundations. My work would not have been financially possible without such funding.

My advisor, Michele Cooke, sent me to work on a paleoseismic trenching trip along the southern San Andreas fault zone in Lake Elizabeth, California. The trip was led by Kate Scharer (USGS-Pasadena), Sean Bemis (Univ. of Kentucky) and James Dolan (USC), with some of their graduate students. The purpose of the field season was to identify Lake Elizabeth as a possible site for rich, paleoseismic study; Lake Elizabeth is in a critical location along the San Andreas to determine the rupture length of known major earthquakes throughout the Holocene (i.e. 1857 Fort Tejon event). There are many known, high resolution paleoseismic sites along the southern San Andreas, and the Lake Elizabeth site could add to the wealth of data by constraining rupture length and periodicity along particular fault segments. We excavated four fault perpendicular trenches for rupture logging and carbon dating. Preliminary data is showing older than expected rupture events preserved at this site (pre 1857). Further dating and field work could indicate that the fault zone is either wide at this site, newer ruptures preservation was destroyed by modern debris flows, or there are multiple active fault strands in a narrow area. Our work indicates that Lake Elizabeth is likely to enhance the paleoseismic record of the southern San Andreas.

Combining paleoseismic field work with my restraining bend analog models provided me with a fuller comprehension of fault mechanics. Instead of manipulating miniature faults over the course of an afternoon in a controlled environment, I observed how fault systems behave in the natural system over time. I interacted with field geologists, who provided insight making my models more accessible who might apply my findings to their own work. Completing the paleoseismic field work has encouraged me to explore new collaborations with my analog models with the trip leaders. I'm now considering working on my PhD on this or a similar type of project. I recently presented posters at the Southern California Earthquake Center (SCEC) meeting on both analog modeling of restraining bends and paleoseismicity at Lake Elizabeth (abstracts available at http://www.scec.org/core/cis/2013am/abstract_list.php).

Above: Me in a trench, standing right in front of a (likely) co-seismic swail. Right: Some trench team members, in one of four trenches dug over the course of two weeks.