

2000 Proposal for scientific research  
To the Southern California Earthquake Center

**HISTORIC AND PALEOSEISMIC BEHAVIOR OF THE SOUTH-CENTRAL  
SAN ANDREAS FAULT BETWEEN CHOLAME AND THE CARRIZO  
PLAIN**

Submitted by  
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Collaborative proposal with Lisa Grant, University of California, Irvine

**Category:** Science **Working Group:** Earthquake Geology (Group C)

**Major emphasis:** Earthquake Potential

**SCEC Task C1:** Paleoseismic research along the San Andreas Fault

Attempt to refine estimates of the timing of surface rupture with paleoseismic investigation

Attempt to determine slip per event during the last earthquakes with three dimensional paleoseismic investigation

Publish the results of a previously funded study to date the penultimate surface rupture with paleoseismic investigation

**Progress report:** Arrowsmith progress report accompanies this proposal.

**Proposed start date:** March 1, 2000

**Requested amount of support:** \$ 56,997

## Project plan

**Research priority and experience.** We propose a prioritized, two stage continuation of our work at the LY4 site along the Cholame segment of the San Andreas Fault (SAF; Figure 1). to further evaluate the recent earthquake record there: 1) Another SAF-perpendicular excavation to improve the record we developed in the last year, and 2) A three-dimensional excavation to determine slip per event in the last couple of earthquakes at the site. Our prioritization is based on the primary importance of earthquake recurrence information, the feasibility of it based upon our experience at the site, and the extent of the three-dimensional excavation may destroy much of the record of event timing during its execution. Refer to figures in the progress report.

**Event trench investigation.** We will excavate an SAF perpendicular trench about 50 m northwest of the site of the 1999 excavation. It will be approximately 20-m long and about 4 m deep. Standard logging methods will be employed to document the stratigraphy and structure preserved on the trench walls. We have chosen this location in order to enhance the dating constraints for the chronology developed so far. The four events at the LY4 site are younger than 2 radiocarbon dates at 1070-1280 cal AD. The youngest event may cut sediment that is younger than 1873. In the proposed trench, we expect to encounter the same older paleosols, but possibly a meter or so deeper on the southwest side (Figure 4) because paleotopography between the two shutter ridges (Figure 3) may have been lower. Thus, we should have the same maximum age constraint, but possibly better event resolution stratigraphically in the younger fan units.

**3D slip/event trench investigation** A three dimensional excavation following the generally SAF-perpendicular debris flow and channel margins in the fan units toward and across the SAF may provide data that let us determine the offset in each of the last couple of events at this site. Given the ambiguity of the timing of the last event (and the possibility that it is historic), it will be valuable to have this information. Furthermore, no stratigraphic evidence for slip per event is available from this reach of the SAF, and gathering some here may help to clarify the uncertainty in the geomorphic data (Sieh, 1978; Lienkaemper and Sturm, 1989). Grant performed a similar investigation at the Phelan Fan site (Grant and Sieh, 1993) and we will build upon her experience as we design our strategy for this task. We will focus this work on the distal end of the LY4 fan (Figures 3 and 4). We expect to reoccupy the 1999 survey for topography and trench control.

## Project management plan

**Personnel.** This project and associated geologic and geomorphic mapping will constitute the masters thesis of ASU student Jeri J. Young. Elizabeth M. Stone has performed strongly in the completion of the first phase of this work and as she finishes her M.S., we have begun an orderly transfer of knowledge and expertise to Young. Stone plans to remain in the Phoenix area for the next 6 months, and we will consult with her in the office and the field. 8 students in Arrowsmith's research group (<http://activetectonics.la.asu.edu>) were involved in last year's investigation and they will be called upon again for field assistance. Arrowsmith and Grant will supervise the research in the field. Grant will provide technical review of the research plan, initial results, and final interpretations, as well as lead the investigation of the historic surveys. This will entail several trips to the field and office consultations. Arrowsmith will participate strongly in the field operations and requests 0.5 month summer support to help wrap the work up in June.

**Field operations.** The field portions of the proposed work will be completed in spring 2000. We request 4 roundtrip airfares for travel to/from Burbank from Pheonix, in order to transfer field assistants and deliver Arrowsmith for supervision for each of the principal tasks.

**Age control.** We have communicated our plans to Gordon Seitz and he agrees to include our plans for up to 10 radiocarbon dates in the LLNL omnibus dating proposal. We will welcome his collaboration in the consideration of dating strategy and in sample collection. Furthermore, our success with simple pollen analysis will continue, and we expect that the silts will again contain sufficient quantities of pollen for description, and possibly radiocarbon dating (G. Seitz, personal communication). We will work with Professor Pat Fall, a palynologist in the ASU Geography Department who helped us with our 1999 research.

**Presentation of research results.** We will present preliminary findings of our work at the annual SCEC Meeting. We hope to submit our analysis for publication in the Special Section of the Bulletin of the Seismological Society of America dedicated to Paleoseismology of the San Andreas fault (submission deadline December 15, 2000).