SCEC Annual Report for 2005

Gary Fuis and Rufus Catchings

In March 2005, we were awarded $5K from SCEC to hold a workshop on active fault and fold structure of the northern Los Angeles region. This workshop was held on October 27 and 28, 2005, at Caltech. The announcement of this workshop that was sent to the SCEC community describes its purpose:

SCEC workshop announcement:

Active Folds and Thrust Faults of the Northern Los Angeles Region
Organized by Gary Fuis, Lucy Jones, and Rufus Catchings

This Fall, we will to hold a SCEC workshop entitled "Active folds and thrust faults of the northern Los Angeles region." The chief purpose of the workshop is to understand the structure of the northern Los Angeles region to the extent currently possible given all available studies, including geologic, seismic, potential field, GPS/InSAR, and modeling studies. Recent GPS/InSAR studies by Argus et al. (JGR, 2005) have indicated that the northern Los Angeles basin is contracting in a north-south direction faster than adjacent regions (San Gabriel Mts and southern Los Angeles basin) and at a significant rate (4.5 +/- 1 mm/yr). This finding puts an exclamation point on the need better to understand this region. A second purpose of the workshop is to explore the possibility of obtaining additional critical data in this region, including geologic, shallow- and deep-seismic, potential-field, and other data, in order better to constrain the geometry of faults and hence better to constrain models of the GPS/InSAR data.

The workshop will last 2 days, with the first day, Thursday Oct. 27, devoted to scientific talks and discussion of the northern Los Angeles region and the second day, Friday Oct. 28, devoted to a discussion of the results of the first day with cities in this region and other government agencies. The second day's discussion will be aimed at attracting participation and funding assistance for future scientific investigations in this region from cities and other government agencies. The second day would be optional for scientists.

The agenda for the two days was as follows:

Agenda Day 1: October 27, 2005

9:30 AM - 5:30 PM:

SCIENCE TALKS AND DISCUSSION

Salvatori Room
Caltech Seismo Lab
(3rd floor, patio, South Mudd, Bldg 21 on Caltech Campus map:
http://www.caltech.edu/map/ See below for parking and access instructions.)

9:00-9:30 *Coffee and donuts*
(Speakers please give powerpoints to Gary Fuis at 9:00 AM)

Introduction
9:30 Fuis/Jones/Catchings

THE FOLLOWING TALKS ARE MEANT TO FOCUS ON THE SAN GABRIEL MOUNTAINS, SAN GABRIEL VALLEY, AND THE REGION OF DOWNTOWN LOS ANGELES

Geology
9:40 Yeats—An overview of tectonics
10:00 Shaw—The Puente Hills thrust fault system
10:15 Oskin—The Elysian Park thrust fault system
10:30 Dolan—The Sierra Madre fault system

10:45 *Coffee break*

11:00 Meigs--Surface and subsurface constraints on active structures
11:15 Cooke—Seismic hazard estimates for faults within the Los Angeles Basin using CFM-based mechanical models
11:30 Treiman—Deformation of the fan systems along the southern front of the San Gabriel Mts

Geophysics
11:45 Plesch—Structure of the upper crust from the Alternate CVM and the Community Fault Model (CFM)

12:00-1:00 *Lunch (provided)*

1:00 Scheirer—Gravity and magnetic data and models
1:15 Fuis—Deep crustal structure

Geodetics
1:30 Argus—Geodetically determined tectonic deformation
1:45 Bawden—The effect of aquifers and oil reservoirs
2:00 King—The Winter 2004/2005 anomaly in the eastern San Gabriel Valley: Water, tectonics, or both?
2:15 Hudnut—Progress on reducing GPS errors, horzontal and vertical

2:30 *Coffee break*

Seismicity and Hazard
2:45 Hauksson/Jones—Seismicity of the northern Los Angeles region: What does seismicity tell us about stress?
3:00 Graves/Seligman/Field--Ground Motion and Losses for a Puente Hills Earthquake - Exemplifying Emerging Technologies--CANCELED

Breakout Groups
3:15 Fuis--Instructions. Basically what we want from 3 groups, Geology, Geophysics, and Geodetics/Seismicity-Hazard is 1) a ranking of the important problems to be solved and 2) an estimate for expenses (field expenses and hardware only) for research projects focussed on these problems: Proposed group leaders: Geology—Oskin, Geophysics—Fuis, Geodetics/Seismicity-Hazard—Hudnut

4:30 Reports from breakout groups

5:30 *Adjourn for beer and group dinner at a local restaurant*

Agenda Day 2: October 28, 2005
8:30 AM - 1:30 PM

SUMMARY OF DAY 1 FOR EMERGENCY PLANNERS AND CITY AND COUNTY OFFICIALS AND DISCUSSION OF WHAT SCIENTISTS AND CITIES NEED

Beckman Institute Auditorium
Caltech
(Bldg #74 on Caltech Campus map:
http://www.caltech.edu/map/. See below for parking and access instructions.)

8:00-8:30 *Coffee and donuts*

8:30-8:45 Arrival and Welcome—Jones, Fuis

8:45-11:15

1. Overview of Earthquake Hazard in the Northern Los Angeles Basin and San Gabriel Valley
   Jones—The basics of earthquakes, origin of strong shaking, and earthquake hazard maps
2. Available Earthquake Products and Services
   Hauksson
3. The Function of the USGS
   Fuis—What the USGS Does Before and After Earthquakes

Coffee break

4. Unique Earthquake Hazards of the Northern Los Angeles Region—What Our Research Has Shown Us
   Fuis—Summary from Day 1
5. Recent Examples of How Research Has Paid Off
   Hudnut--New technology for earthquake early warning systems and for real-time damage assessment
   Jordan—Shaking from a scenario earthquake on the Puente Hills fault system
6. What Do Cities Need?
   Jones, Fuis—Open discussion of the concerns of cities, counties, and other government agencies

11:15-12:30 *Lunch* (*provided*)

Summary of Results of the Workshop

Day 1

We had approximately 60 SCEC scientists, including the speakers, attend Day 1. From our own perspective, which includes comments made by colleagues, this day was quite stimulating in that the work reported was focussed and included the most recent results for the northern LA region, published and unpublished. The breakout groups returned the following priorities for future work in the northern Los Angeles region (as summarized in lay language for the public on Day 2):

Geology

1) Need more paleoseismology, or info on "old earthquakes." This info is gathered by trenching across faults to get an earthquake history that goes back through as many past quakes as possible. This information feeds directly into calculating hazard maps.

2) Need more dates on uplifted surfaces.

3) Need high-resolution seismic imaging across faults (both ultrasound- and catscan-type imaging).

4) Need more LIDAR along faults so that we can tell immediately what happened during a big quake--LIDAR is taking photos with radar. It gets thru many surface vegetation, unlike aerial photos. We have done this for the southern San Andreas fault, from San Bernardino to the Salton sea.

Geodesy

1) Need to replace old GPS receivers, which are noisy. Signals take much longer to distinguish thru noisy data than cleaner data.

2) Need more InSAR satellites (special type of GPS satellite), which takes pictures from the same place in the sky so that any changes in the earth's surface from the last pass (months to years ago) can be detected.

3) Pumping water into and out of aquifers makes the ground go up and down. We can't distinguish this man-made signal from premonitory earthquake uplift. Need a better record from water wells from around the LA basin.

Seismology/Hazard

1) Need to educate the public in the use of some of our products--e.g., "ShakeMap." Many don't use it, even though is is crucial in locating areas of high damage after a quake.

2) Although we have made great strides in identifying faults, we need to know their slip rates and the nature of their interconnections to calculate hazard.

Seismic-imaging

1) Need to acquire oil-company reflection and well data in key areas, such as along our proposed seismic profile from the San Gabes to downtown LA.

2) Need to acquire high-resolution seismic data across many faults, along our proposed profile, including, importantly, ones near downtown LA.

3) Need to acquire images of the deep structure along our proposed profile to determine if a decollement (deep slippery surface) is transferring strain to the faults below LA in a fashion similar to what we see on the two existing LARSE lines.

Day 2

We had a sign-up list of 60 city, county, and federal government officials concerned with emergency preparedness, law enforcement, fire-suppression, utilities, and land stewardship (US Forest Service). About _ of these attended. In addition, we had approximately 20 scientists from Day 1 attend. We now have some contacts to pursue in our quest to get some of the above-prioritized research needs funded.

The sign-up list is given below:

Tony Trabbie	Fire Chief, Arcadia
David O'Dell	Battalion Chief, Arcadia
Don Anderson	Director of Safety, Duarte

Ted Rizk	Engineering Department, Monrovia
Astrid Garcia	Rep. Becerra's Office
Mike Conley	Exec. Dir. of Red Cross, Claremont
Yvonne Fino	Police Department, Irwindale
Robert Barnes	Police Department Lt., Irwindale
Aileen Flores	Senior Mgmt. Analyst, Claremont
Lisa Prasse	City Planner, Claremont
Belle Newman	Principle Planner, Claremont
Patrick Prescott	Assoc. Planner, La Verne
Robert Elkin	Police Department Lt., El Monte
Ralph Nunez	Emergency Service Coord., El Monte
A. D. Vasquez	Emergency Coord., LA County Library
Gill Yanow	LA Sheriff's Office, Diamond Bar
Lisa Bailey	Pres/CEO Chamber of Commerce, Irwindale
Beth Costanza	Chamber of Commerce, Arcadia
Russ Garside	City Manager, Arcadia
Ellen Velasquez	Red Cross Emerg. Planner, Arcadia
Khanh Nguyen	Deputy Exec. Officer, LA County
Mike Nagaoka	Dir. of Public Safety, City of Industry
A. D. Hall	Deputy Sheriff, City of Industry
Don Aldsachs	Exec. Dir. Chamber of Commerce, City of Industry
Larry Gabriel	Communications, LADPW
Barbara Cienfuegos	Los Angeles
Jim Sims	Public Health Emerg. Planner, Los Angeles
Barbara Jackson	Emerg. Program Coord., Monterey Park
Nick Conway	San Gabriel Valley Council
Tony Recalde	Consultant, La Verne
Kevin Lowndes	Consultant, La Verne
Marco Recalde	La Verne
April Kelly	Earthquake Solutions
Jim Longthorne	Communications, LADPW
Brook Riley	Asst. Professor, Cal Poly Pomona
Pat Shanen	Deputy Director, LAUSD
Irv Dawson	Emerg. Service Coord., Baldwin Park FD
Egill Hauksson	Senior Researcher, Caltech
Jean Prendergast	Dir., Office od Emerg. Management, DWP
Loretta Brazil	Emergency Prep. Coordinator, DWP
Larry Meyerhofer	Emergency Manager, Los Angeles
George Whitney	Project Manager, Los Angeles
Don Feser	Angeles National Forest
Vic Andresen	Angeles National Forest

Website

We plan to have powerpoint presentations from Days 1 and 2 posted on a USGS website for the SCEC community to access.