

## VI. SCEC2 Facilities

### Office and Research Facilities

The University of Southern California is committed to providing 11,000 square feet of space in North Science Hall for future SCEC activities. This space will media center, conference room, a training center, advanced computing facilities, laboratories, office space for visitors, and the administrative center of SCEC2. Triggered by the needs of SCEC2, the university is planning to spend \$32M over the next 2 years to remodel North Science Hall and bring the building's infrastructure into the 21<sup>st</sup> century. This renovation will begin as Phase 1 from May-September, 2000 with Phase 2 being completed from May-September, 2001. The cost of preparing this space for SCEC2 is \$8M. When completed, SCEC2 will have a state-of-the-art research and administrative facility located less than 5 km south of the main Los Angeles government/business district.

### Infrastructure Facilities

The scientists in the SCEC2 will share a number experimental facilities. While the facilities will be housed at various institutions, data will be available to all researchers in the Center and the broader scientific community on the web. It will be the policy of SCEC2 to make data available to academic and government scientists without cost. Should commercial firms begin to access the data for profit-making enterprises, a user-fee system may be developed. The SCEC2 shared facilities are described below:

### Seismology Infrastructure

**SCEDC Operations in SCEC2.** The purpose of the SCEDC is to archive, and make available to a general audience, information and data related to earthquakes and earthquake studies in Southern California. The primary source for this data archive is the new TriNet system which operates over 300 seismic stations, and has access to 400 dial-up strong motion sites. The SCEDC also archives waveforms from recent seismic surveys, e.g. LARSE, approximately 500 scenes recorded by SAR, and the raw and RINEX data files from GPS campaign-mode surveys.

The primary types of datasets available for scientific users of the SCEDC are:

1. The Southern California event and phase catalog from 1932 to the present (~400,000 events/4,000,000 picks).
2. Seismogram segments for all triggered events (over 20 million seismograms from short period, strong motion and broadband sensors).
3. Continuous waveform recording of all 20 sample-per-second or lower broadband channels (in place since October of 1999).
4. Specially compiled waveform data sets for significant events (e.g. 1 hour and 24 hour snap shots of the entire array for the Hector Mine Earthquake).
5. SAR images (500 scenes).
6. LARSE I and II datasets.
7. SCEC 3D Velocity model (Version 2.2).
8. Campaign GPS data.

The seismic waveform data is available to scientific users through various WWW interfaces, e.g. the IRIS BREQ-FAST program for seed-formatted files, or through a "seismic-transfer-program" for a variety of user formats, such as SAC. Scientific users may also maintain individual accounts on the Data Center computers in order facilitate special data requests.

The initial earthquake parameters and the triggered waveform data are generally available within a few minutes of the occurrence of a local earthquake. The continuous waveform data is available for user retrieval 15 minutes after each completed hour.

The SCEDC facilities consist of a 5 Tbyte optical-disk based mass-storage system and a suite of computers which run the Oracle and waveform archive databases, web server software, and user interfaces. The Data Center is staffed by a full-time manager, a three-quarter time data archivist, and a part-time user-interface programmer. In addition, the SCEDC shares a full-time Oracle database specialist with TriNet.

**Strong Motion Data Base.** SCEC2 will continue to support the maintenance and operation of the SCEC Strong Motion DataBase (SMDDB) housed at UC-Santa Barbara for at least 3 years. The SMDDB is a relational database containing parametric information for 5,559 accelerograms, 121 earthquakes, and 654 strong motion stations—all of the data recorded within the state of California. Users can query the database directly from the World Wide Web (<http://smdb.crustal.ucsb.edu/>) and download the strong motion data from an on-site FTP server, or, whenever possible, from outside FTP sites, such as the U.S. Geological Survey and the California Strong Motion Instrumentation Program sites. It is the only relational database for strong motion that is web-based.

Some of the parametric information in the database include peak ground acceleration, hypocentral distance, closest distance to the fault, response spectral amplitudes, instrument trigger times, earthquake locations, magnitudes, station locations, site geology, and references to original data sources.

Six methods for accessing the data have been developed and can be found on the home page. Station and event summaries allow the user to view summaries of all of the data which are available for a particular station or earthquake. Users can also query the database through two HTML forms pages, a basic search page and a custom search page. An interactive Java map applet has also been written that allows the user to easily search for earthquakes and stations in particular locations. Finally, for those users familiar with the database query language, SQL, a search page is available that allows the user to input a SQL query directly.

SMDB has plans to expand the database to include all US strong motion data with the possibility of making it a national strong motion database. The basic SMDB structure will allow for this expansion as well as it becoming a worldwide database. As the SMDB moves to being a national database, funding will likely come from other sources.

The database is currently being served on a Sun Ultra 10 computer with a 300 MHz UltraSPARC processor, 17 GB of disk space, and 640 MB of RAM. The database software is the latest version of Oracle8 and includes the Oracle Web Application Server. A dedicated ethernet line is connected to a single port on a 10Base-T ethernet switch that is connected directly to the UCSB campus FDDI backbone.

## **Geodesy Infrastructure**

SCEC2 will provide partial support for maintaining the existing Global Positioning System network in southern California (SCIGN). SCIGN is being built and maintained by JPL, the USGS, USC, and the University of California at San Diego. Most of the SCEC support will go to the Scripps Orbit and Permanent Array Center (SOPAC) at the University of California, San Diego, the main data archive. It is the current policy of SCIGN to have Rinex data from all stations available on-line as soon as they can be physically moved from the site to the archive, i.e. within a few hours. The only restriction attached to the data is that users acknowledge the source of the data

and its funders. Daily coordinate, periodic velocity solutions, and plots of resulting positions or position differences are also available promptly to the scientific community. SCEC2 support will include salary support for computer engineers to maintain the data archive, storage media, and computer usage.

## **Geology Infrastructure**

**Hardware for Field Investigations.** An ongoing headache for geologists opening, maintaining, and closing trenches for paleoseismology studies is the cost of backhoe rental to open and close trenches, and shoring rental to keep the trenches from collapsing. These two items can be 25% of a typical budget for a project that involves trenching. We plan to buy a backhoe and train a technician at one of the universities (most likely San Diego State) to operate the equipment so that we can reduce this cost significantly in the future. We also plan to buy shores for use in trenching projects to reduce the cost of rental.

## **GIS Center for Archiving Geologic Data Bases.**

Rapid and reliable access to and use of digital map databases will be important to the proper functioning of the California Earthquake Research Center. From the rapid construction of maps of surface faulting, seismicity and geodetic measurements in the aftermath of a large, destructive earthquake, to the creation of maps of stress evolution from paleoseismic and geodetic data, SCEC2 scientists will have an abundant need for GIS (Geographic Information System) and image-processing software. Our education and outreach functions will also require development of the capability to provide maps to a wide variety of users in government, industry, and the public-at-large.

A facility is envisaged that includes the hardware, software, databases and supporting technical staff necessary to support a wide variety of SCEC2 activities.

## **Computer Facilities**

Computer facilities are widely available at all academic institutions. SCEC2 scientists will have access to these facilities for this research. As an example, USC scientists have access to a Linux cluster, Sun 3000 and 4000 servers, several Ultra workstations, PC's, and laptops.