2008 SCEC Annual Report

Southern California Earthquake Data Center
(SCEDC) 2008 Accomplishments

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Proposal Category:
Data Gathering and Products

Disciplinary Committee:
Seismology

Period of Performance:
February 1, 2008 – February 1, 2009

Funds Received:
$160,000

2008 SCEDC Annual Report

Major 2008 Accomplishments:

1. Continued our key data-acquisition and archiving functions by maintaining and updating the primary online, near real-time searchable archive of seismological data for southern California. Added 1,235,185 days of continuous data for 374 stations and parametric and waveform data for 13,296 local events and 525 teleseismic earthquakes.

2. The SCEDC has upgraded both its database servers in both hardware and database version and they are now used fully in production. One is a database cluster composing of 3 Dell nodes. The other is an IBM server that was awarded to the SCEDC through an IBM-Caltech grant. This upgrade has allowed significant performance improvements to the users of catalog search applications and STP, especially in continuous waveform searches.

3. The SCEDC has replaced its single web server with two IBM x3650 web servers. This will allow greater redundancy and ability to handle higher loads that are expected with heightened public interest from a significant event.

4. In response to user recommendations at the SCEDC town-hall meeting, the SCEDC began continuous archiving of all EH and SH channels as of Jan 1, 2008. This is a significant increase spatial coverage of the continuous archive – from 328 stations in 2007 to 374 stations in 2008.

5. In an effort with the SCSN, timing on the entire SCSN catalog is now complete. Events from 1932 to present are now all available through STP or the catalog search pages on www.data.scec.org.

6. The SCEDC continues to make improvements Station Information System (SIS) with the Southern California Seismic Network (SCSN). Station field work are entered by field technicians in SIS through a web interface, any changes to the station response are then automatically distributed to the data center databases and a dataless SEED volume is produced. The response changes are also made available to SCSN Real Time processes. All updates made by a field technician in the SIS are now available to users of SCEDC within 24 hours.
   Some developments in 2008 include a user interface called 'Channel Manager' which allows users to edit station response data for single channel epochs as well as batch updates. This kept the SCSN metadata current when SCSN renamed the HL channels of 170 stations to HN in compliance with SEED channel naming convention.

7. The SCEDC hosted a mirror site to the SCEC Earthquake Response Content Management System (ERCMS) for the November 2008 ShakeOut. The SCEDC will continue to host this mirror site for SCEC.

8. The SCEDC expanded the ANSS XML strawman and developed a schema for distributing seismic station metadata. The SCEDC has been a leader in XML formats, having previously developed an event and parametric information schema for the distribution of catalog data. The SCEDC released version 1.0 of the StationXML schema for sharing station metadata. StationXML has been accepted by the CISN and opened to review from the ANSS. The SCEDC is a leader in XML development, having previously developed an event and parametric information schema for the distribution of catalog data. StationXML and our other schemas are available at http://www.data.scec.org/xml/station/ and http://www.data.scec.org/xml/.

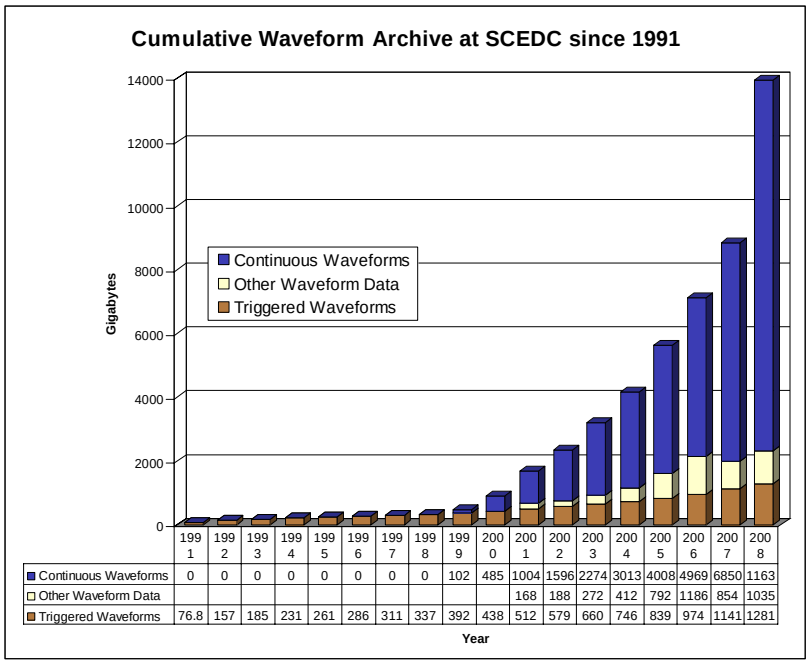
9. The SCEDC will continue to serve out fault data to the SCEC WGCEP group.

Contribution to the SCEC Community

The Data Center is a central resource of SCEC and continues to be an integral part of the Center. In 2008, the SCEDC continued to contribute to the SCEC scientific community by providing online access to a stable and permanent archive of seismic waveforms and earthquake parametric data. The seismological data archive held at the SCEDC has contributed significantly to the publication of many scientific papers pertinent to the region, most of which have SCEC publication numbers. The Caltech/USGS catalog archived by the SCEDC is the most complete archive of seismic data for any region in the United States.

The SCEDC has allowed the data to be distributed to a much broader community of scientists, engineers, technologists, and educators than was previously feasible. The electronic distribution of data allows researchers in the world-wide scientific community to analyze the seismic data collected and archived in southern California and contribute their results to the SCEC community.

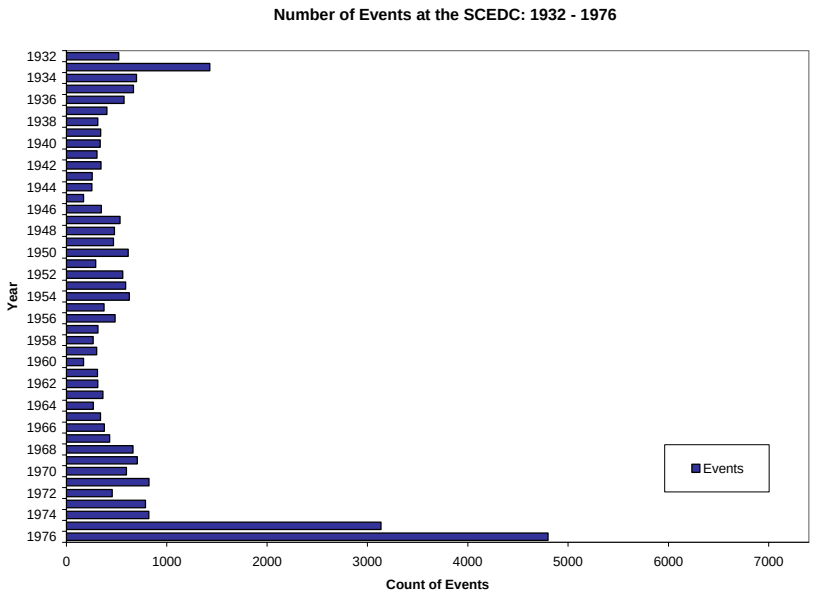
Archive Size and Contents



	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Continuous Waveforms	0	0	0	0	0	0	0	0	102	485	1004	1596	2274	3013	4008	4969	6850	1163
Other Waveform Data											168	188	272	412	792	1186	854	1035
Triggered Waveforms	76.8	157	185	231	261	286	311	337	392	438	512	579	660	746	839	974	1141	1281

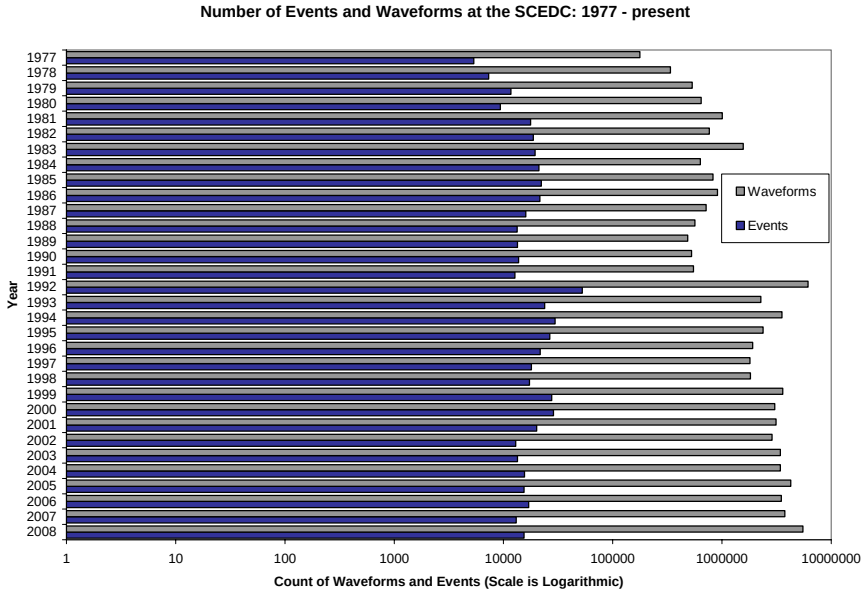
The archive at the SCEDC currently has the following holdings:

- The Caltech/USGS catalog of over 631,854 earthquakes spanning 1932-present.
- 12.92 terabytes of continuous and triggered waveforms.
- 11.1 million phase picks.
- 70.1 million triggered waveform segments.
- Nearly 8 years of continuous broadband recording of representing more than 7,515,675 days of continuous waveforms.
- 15.4 million amplitudes available for electronic distribution.
- Triggered data for more than 9,475 significant teleseismic events.



YEAR	# EVENTS	YEAR	# EVENTS
1932	520	1955	374
1933	1428	1956	485
1934	699	1957	313
1935	668	1958	266
1936	574	1959	300
1937	404	1960	171
1938	311	1961	308
1939	341	1962	312
1940	336	1963	363
1941	303	1964	268
1942	344	1965	339
1943	257	1966	377
1944	254	1967	430
1945	170	1968	663
1946	347	1969	707
1947	533	1970	597
1948	478	1971	822
1949	469	1972	457
1950	615	1973	787
1951	291	1974	821
1952	561	1975	3134
1953	590	1976	4801
1954	626		

Event parametric data for this era is available electronically



YEAR	# EVENTS	# WFs
1977	5348	177417
1978	7297	336533
1979	11663	533299
1980	9368	644542
1981	17740	1005322
1982	18717	765445
1983	19453	1563899
1984	21078	633208
1985	22196	825298
1986	21496	908084
1987	16037	714975
1988	13350	564993
1989	13400	485335
1990	13755	525263
1991	12723	547003
1992	52643	6136719
1993	23834	2269606
1994	29586	3532232
1995	26530	2377957
1996	21661	1904673
1997	17950	1799151
1998	17316	1816596
1999	27639	3597964
2000	28599	3032392
2001	20101	3116068
2002	12920	2866999
2003	13400	3415492
2004	15584	3415492
2005	15436	4265334
2006	17005	3484835
2007	13074	3754910
2008	15434	5505843

All event parametric and waveform data for this era are available electronically.

Data Volume Served and Archived

Number of earthquakes in the 1932-present Caltech/USGS catalog 613898 earthquakes
Total size of the waveform archive: 13952.27 GB
Size of SCEDC parametric and waveform database: 350881778 rows.

Data transferred via STP in 2008:

	waveforms	waveforms/day	gigabytes	megabytes/day	kilobytes/sec
2007 Q4	4,233,532	46,016.65	268.44	2987.82	35.41
2008 Q1	3,134,363	46799.78	494.68	5567.09	65.98
2008 Q2	2,485,309	27311.09	462.12	3748.38	61.63
2008 Q3	5,803,768	63084.43	674.29	7505.09	88.95
2008 Q4	1,974,819	21465.42	304.42	3388.29	40.16

In 2008, the SCEDC archived:

- 15,434 events
- 5,505,843 triggered waveforms
- 12,798,399 continuous waveforms
- 456833 arrivals
- 1,711,602 amplitudes

Magnitude	Number of local events (le):
-1-0	12
0-1	4745
1-2	6697
2-3	1611
3-4	196
4-5	25
5-6	5

# events:	Event type
13296	le (local event)
614	qb (quarry blast)
845	re (regional event)
284	sn (sonic blast)
378	ts (teleseism)
17	Other (unknown)
15434	Total

Web Statistics (www.data.scec.org):

Quarter	Hits	Page views
2007, Q4	13,425,390	4,246,327
2008, Q1	14,366,863	3,236,933
2008, Q2	14,972,402	2,417,908
2008, Q3	14,778,608	3,100,777
2008, Q4	12,980,873	3,621,955

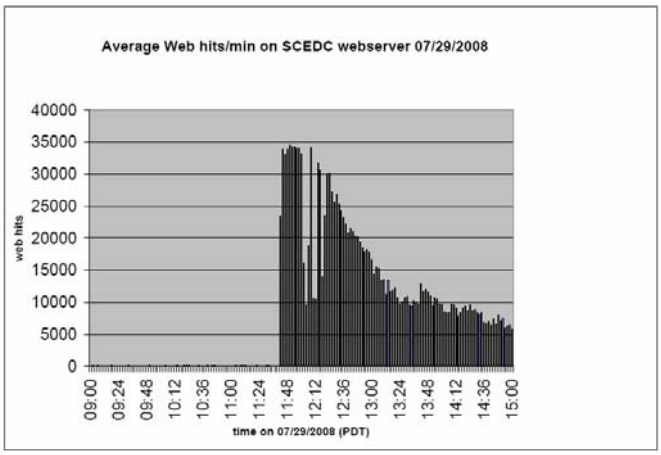


Figure 1 – web hits on SCEDC web server shows sharp increase in traffic seconds after Chino Hills event.

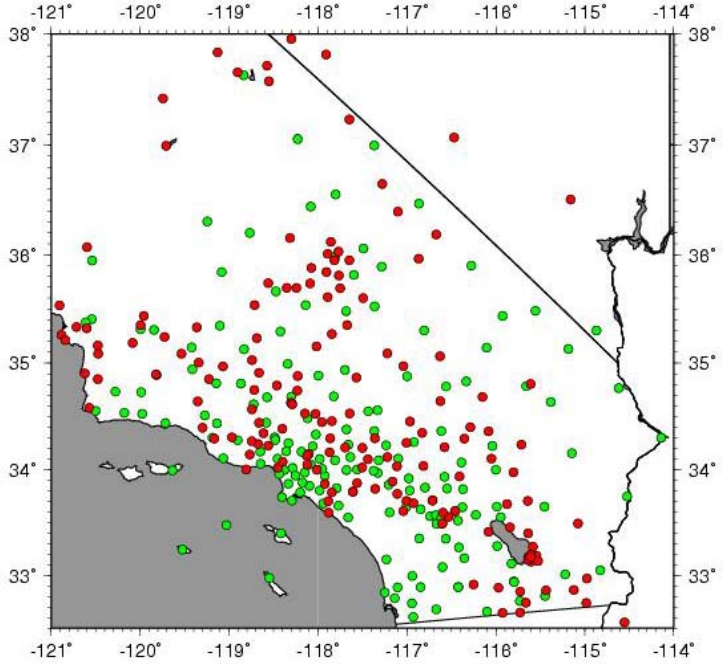


Figure 2 – red circles indicate addition of continuously archived stations beginning in 2008.