
2011 SCEC Annual Report

Southern California Earthquake Data Center
(SCEDC) 2011 Accomplishments

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Proposal Category:

Data Gathering and Products

Disciplinary Committee:

Seismology

Period of Performance:

February 1, 2011 – February 1, 2012

Major 2011 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 54,478,428 hours of continuous seismic data for 438 stations and parametric and waveform data for 14,902 local events and 336 teleseismic earthquakes.
2. The SCEDC upgraded its website design. (See “Outreach” section)
3. Based on SCEC user requests, STP now populates the “AMARKER” field in SAC format with arrival picks.
4. The SCEDC has begun archiving of Cosmos V0 format waveforms from the California Geological Survey (CGS) for events > MI 4 recorded by SCSN. This allows the seismic user community to have access to a larger set of strong motion data.
5. The SCEDC has begun archiving triggered waveform data and amplitudes from NetQuakes stations. The amplitudes are also being used in ShakeMaps.
6. The SCEDC is distributing a new double difference catalog (Hauksson et. al 2012) and a focal mechanism catalog (Yang et. al 2012) on its website.
7. The SCEDC continues to make improvements Station Information System (SIS) with the Southern California Seismic Network (SCSN). We have begun storing network information such as telemetry equipment and layout. This information will help researchers in Earthquake Early Warning studies understand the role of telemetry in delays retrieving data from network as well as network detection capability, which will be useful in CSEP testing. (Figure 1)
8. The SCEDC has continued work on designing StationXML schema in collaboration with the Northern California Earthquake Data Center and IRIS. All versions of the schema are available at <http://www.data.scec.org/xml/station>. The IRIS webservice use this format and reference these pages.
9. As part of a NASA/AIST project in collaboration with JPL and SIO, the SCEDC is receiving real time 1 sps streams of GPS displacement solutions from the California Real Time Network (<http://sopac.ucsd.edu/projects/realtime>; Genrich and Bock, 2006, *J. Geophys. Res.*). These channels are archived at the SCEDC as miniSEED waveforms, which then can be distributed to the user community via applications such as STP. This will allow seismologists access to real time GPS displacements in the same manner they access traditional seismic data.
10. The SCEDC hosted a mirror site to the SCEC Earthquake Response Content Management System (ERCMS) for the November 2011 ShakeOut and was used by the SCEC community in the Tohoku and Eastern Turkey earthquakes in 2011. The SCEDC will continue to host this mirror site for SCEC.
11. The SCEDC will continue to host the developmental database SCEC WGCEP group for UCERF3.
12. The SCEDC has done preliminary investigations into cloud computing. One month of the waveform archive and a portion of earthquake catalog (1932-2011) are stored in the Google Apps Engine Cloud. Our findings show that processing of the waveform data to standard file sizes improves query performance from the cloud. We will be making a client available to the user community for beta testing and conduct a cost-benefit analysis.



Figure 1. Example of telemetry path information stored in Station Information System (SIS). SCSN Telemetered Short Period Stations.

Outreach

1. The Data Center hosted a SCEC internship to improve the Clickable Fault Map on its website. The work was presented at the SCEC Fall 2010 conference and was put into the SCEDC website <http://www.data.scec.org/significant/index.html>
2. The SCEDC upgraded its website. The changes allow easier maintenance of the site, and better communication with users if new content is available. We also upgraded two of our most popular maps, the clickable fault map <http://www.data.scec.org/significant/index.html> and the clickable station map <http://www.data.scec.org:8080/SCSNStationMap/> to use Google Maps for better user interaction

Quarter	Hits	Page views
2010, Q4	17,373,246	4,730,496
2011, Q1	22,452,603	5,903,940
2011, Q2	18,541,607	6,961,365
2011, Q3	19,288,384	7,909,785
2011, Q4	11,883,366	3,791,626

Figure 2. 2011 Web Statistics (www.data.scec.org):

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 2011, 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 Contents

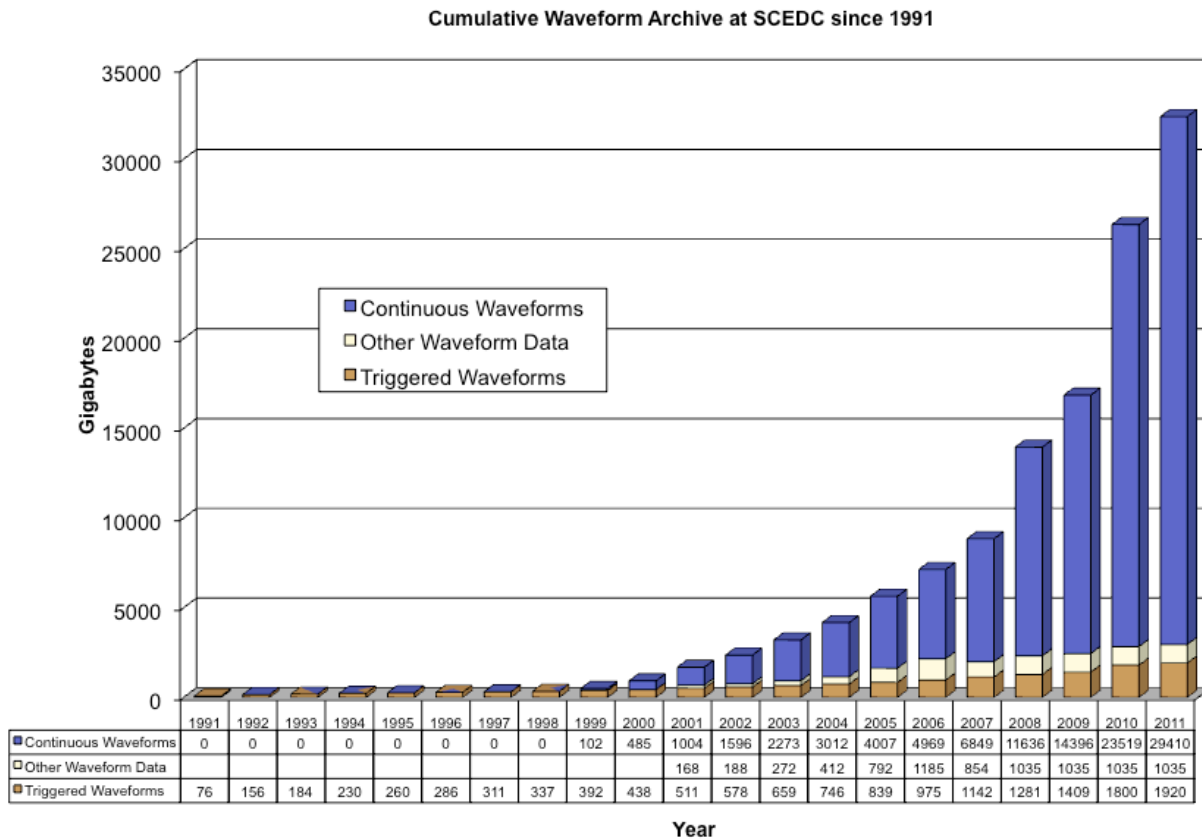
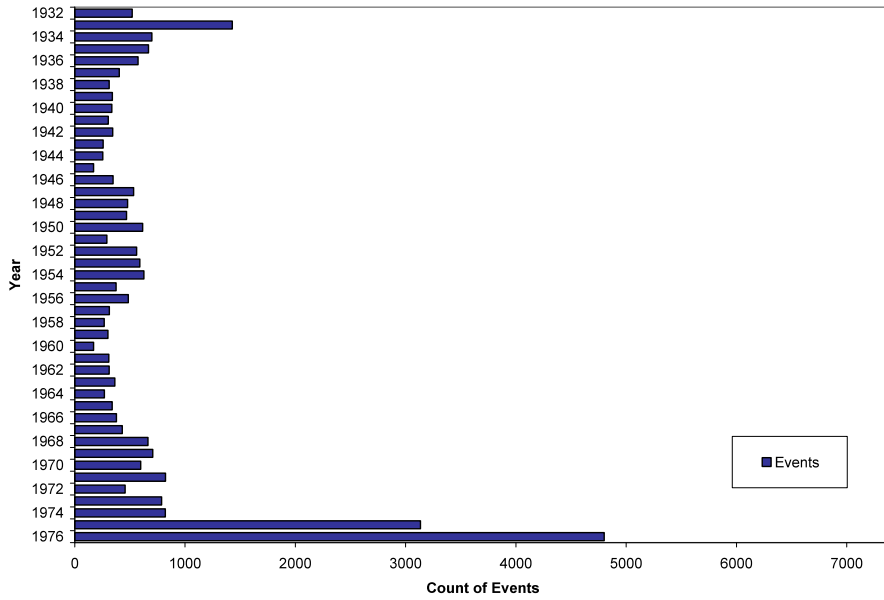


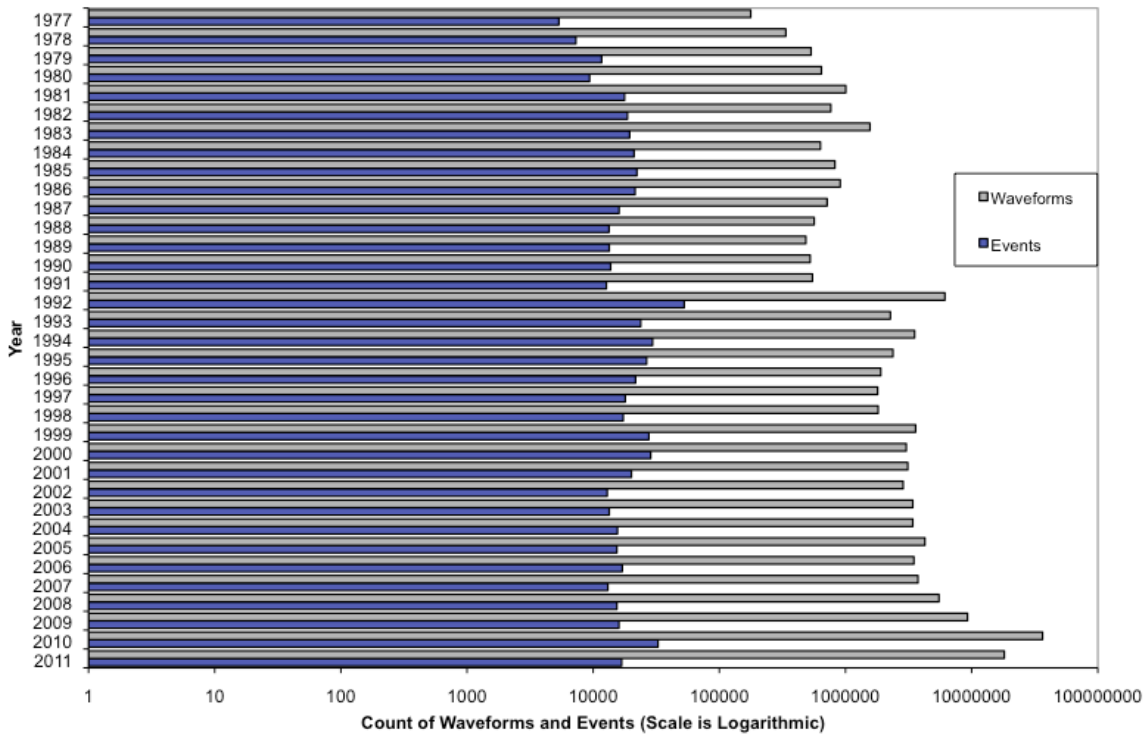
Figure 3: Size of Waveform Archive at SCEDC.

Number of Events at the SCEDC: 1932 - 1976



Event parametric data for this era is available electronically

Number of Events and Waveforms at the SCEDC: 1977 - present



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

The archive at the SCEDC currently has the following holdings:

- The Caltech/USGS catalog of over 686,987 earthquakes spanning 1932-present.
- 31.3 terabytes of continuous and triggered waveforms.
- 13.1 million phase picks.
- 137.8 million triggered waveform segments.
- 10+ years of continuous broadband, high sample short period and strong motion waveforms.
- 30.8 million amplitudes available for electronic distribution.
- Triggered data for more than 11,064 significant teleseismic events.

Data Volume Served and Archived

Data transferred via STP in 2011:

	waveforms	waveforms/day	gigabytes	megabytes/day	kilobytes/sec
2010 Q4	39,216,295	426,264	1835	20,427	242
2011 Q1	27,915,028	310,167	850	9667	115
2011 Q2	23,203,072	254,979	1819	20,473	243
2011 Q3	67,443,867	733,085	7915.681	88,105	1044
2011 Q4	29,101,940	316,325	2933	32,652	387

In 2011, the SCEDC archived:

- 14902 local events
- 18145965 triggered waveforms
- 20178545 continuous waveforms
- 493,836 arrivals
- 4,414,323 amplitudes

Magnitude	Number of local events (le):
-1-0	99
0-1	6813
1-2	5238
2-3	1503
3-4	222
4-5	26
5-6	1

2011 event type break down:

# events:	Event type
14901	le (local event)
560	qb (quarry blast)
899	re (regional event)
2	sn (sonic blast)
336	ts (teleseism)
125	sh (shot)
1	ex (explosion)
16825	Total

References

Hauksson, E. and W. Yang, and P. M. Shearer, Waveform Relocated Earthquake Catalog for Southern California (1981 to June 2011); Submitted to: *Bull. Seismol. Soc. Am.*, January 2012

Yang, W., E. Hauksson, and P. Shearer, Computing a large refined catalog of focal mechanisms for southern California (1981 – 2010): Temporal Stability of the Style of Faulting, *Bull. Seismol. Soc. Am.*, (*accepted*), January 2012.