
2014 SCEC Annual Report

Southern California Earthquake Data Center
(SCEDC) 2014 Accomplishments

Principal Investigators:

Robert W. Clayton, Ellen Yu

Institution:

California Institute of Technology
Seismological Laboratory
Pasadena, CA 91125

Proposal Category:

Data Gathering and Products

Disciplinary Committee:

Seismology

Period of Performance:

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Abstract

The SCEDC continued its key data-acquisition and archiving functions by maintaining and updating the primary online, near real-time searchable archive of seismological data for southern California. The SCEDC developed new search capabilities to allow the SCEC community to search its waveform and event parametric data archives. The SCEDC also continues to explore technologies such as cloud computing and evaluate whether adoption could further the SCEDC mission.

Technical Report

1. Added 72.2 million hours of continuous seismic data for 474 stations and parametric and waveform data for 13,602 local events and 248 teleseismic earthquakes.
2. In our mission to improve distribution of SCEDC holdings to the research community, the SCEDC continues to improve its web services. In 2014 we added these FDSN compliant services:
 - Station metadata: service.scedc.caltech.edu/fdsnws/station/1/
 - Waveform data: service.scedc.caltech.edu/fdsnws/dataselect/1

Users can either use the form or call the service programmatically via curl or wget. The API is compliant with the FDSN standard which it easier for users to re-use their code when querying other data centers. The output is a tar file containing the data and a text file with the user request.

3. The Data Center has begun implementation of the Continuous Wave Buffer (CWB) to manage its waveform archive. This software was developed and currently in use at the National Earthquake Information Center. We have migrated a number of our post processing applications to use it for waveform retrieval and have also started moving our past holdings into the system. The new system will not only simplify and streamline waveform archival, it will allow users access to continuous data within minutes of real time.
4. As part of a NASA/AIST project in collaboration with JPL and SIO, the SCEDC is archiving seismic and geodetic displacement waveforms and accelerometer waveforms produced by the California Real Time Network (CRTN <http://sopac.ucsd.edu/projects/realtime>). These waveforms are 1 sps real time GPS solutions and 100 Hz accelerometer data, which will eventually be used to produce velocity solutions. They are archived at regular intervals and converted into miniseed format by SCEDC. These channels are archived at the SCEDC as miniSEED waveforms, and now available to the user community through an STP client (<http://scedc.caltech.edu/research-tools/AIST/AISTstp.html>). This allows seismologists access to real time GPS displacements in the same manner they access traditional seismic data.
5. The SCEDC completed a search interface for its focal mechanism catalog. The SCEDC now hosts a focal mechanism catalog from 1981 to present and a double difference catalog from 1981 to 2013.
6. The SCEDC continued to make improvements to the Station Information System (SIS) with the Southern California Seismic Network (SCSN). We have made substantial progress in storing network information such as telemetry equipment and layout. To date the “first hop” and the “last hop” of the data path is tracked. Efforts continue for loading data paths for the remaining stations and developing code to distribute this information. 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.

7. The SCEDC has moved its website to the cloud and changed its domain to <http://scedc.caltech.edu>. We are using Amazon Web Services to host and serve the Recent Earthquake Map and the static pages of our website. The move addresses a long standing challenge to the SCEDC, which is how to allocate the proper amount of resources to its web servers, which experience large spikes in web traffic during a felt earthquake.
8. The SCEDC continued to host the developmental database SCEC WGCEP group for UCERF3.

2014 Stats

In 2014, the SCEDC archived:

- 13,602 local events
- 17,345,154 triggered waveforms
- 25,534,848 continuous waveforms
- 521,294 arrivals
- 3,297,450 amplitudes

Magnitude	Number of local events (le):
-1-0	137
0-1	6,726
1-2	5,764
2-3	835
3-4	129
4-5	10
5-6	1

2014 event type break down:

# events:	Event type
13,603	le (local event)
573	qb (quarry blast)
869	re (regional event)
248	ts (teleseism)
1	sn (sonic)
15,293	Total

Data transferred via STP in 2014:

	waveforms	waveforms/day	gigabytes	megabytes/day	kilobytes/sec
2013 Q4	161,167,160	1,751,817	4,615	51,369	609
2014 Q1	45,595,916	506,621	2,283	25,974	308
2014 Q2	25,025,174	275,002	1,962	22,080	262
2014 Q3	50,064,777	544,182	5,759	64,095	778
2014 Q4	67,210,236	730,546	5,608	62,423	740

Website Outreach

The SCEDC maintains a web site (scedc.caltech.edu) that has resources for researchers access to the waveform archive, event catalogs, and station metadata, as well as general information about recent and past significant earthquakes that are of interest to the public.

2014 Web Statistics (scedc.caltech.edu)

Quarter	Hits	Page views
2013, Q4	41,646,300	10,743,677
2014, Q1	72,476,519	17,752,142
2014, Q2	60,347,708	15,248,941
2014, Q3	36,060,950	11,352,551
2014, Q4	42,551,321	5,479,792

Archive Contents

The archive at the SCEDC currently has the following holdings:

- The Caltech/USGS catalog of over 733,063 earthquakes spanning 1932-present.
- 54 terabytes of continuous and triggered waveforms.
- 15 million phase picks.
- 194 million triggered waveform segments.
- 10+ years of continuous broadband, high sample short period and strong motion waveforms.
- 47.1 million amplitudes available for electronic distribution.
- Triggered data for more than 11,902 significant teleseismic events.

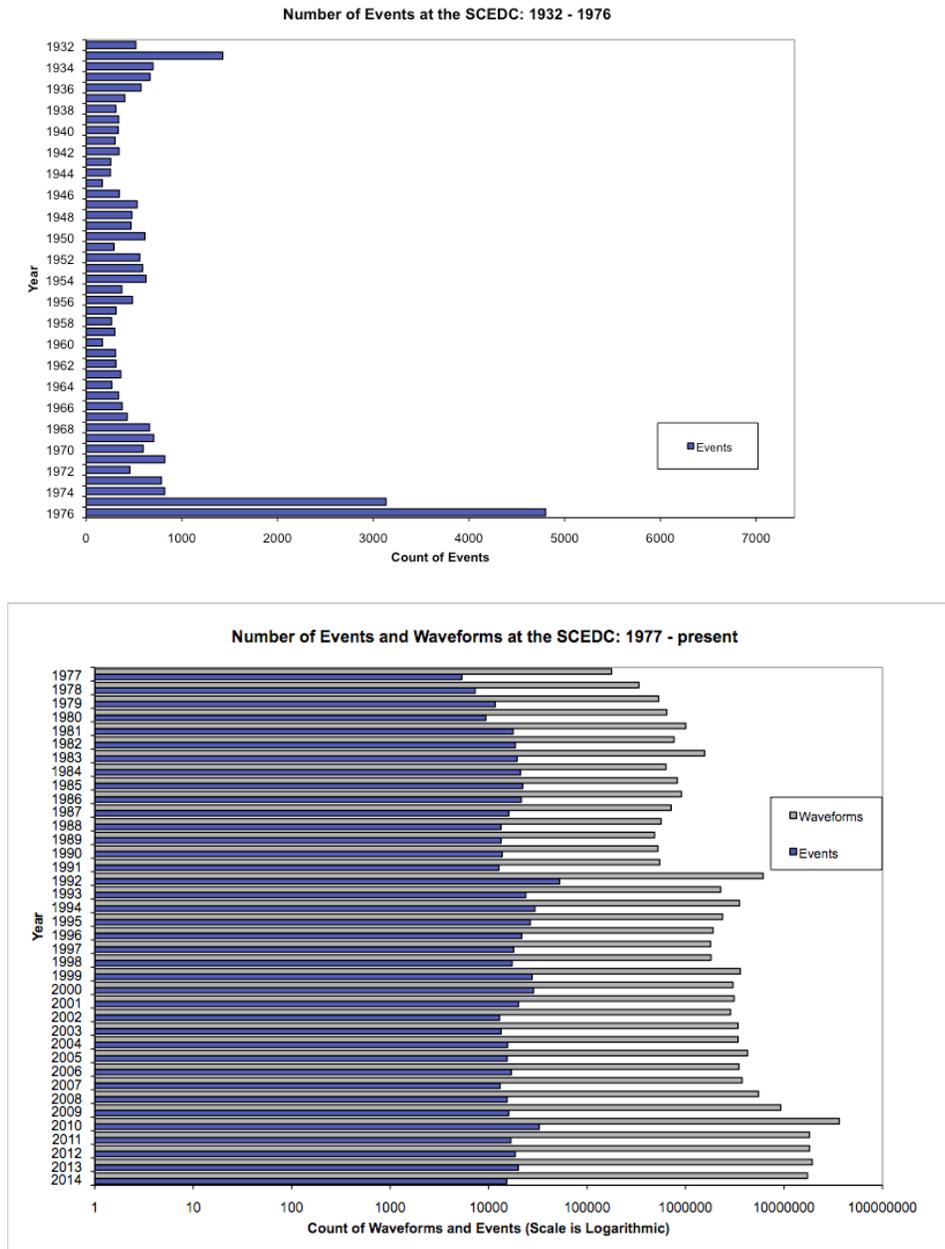


Figure 1. Number of events and event associated waveforms in the archive over time

Exemplary Figure

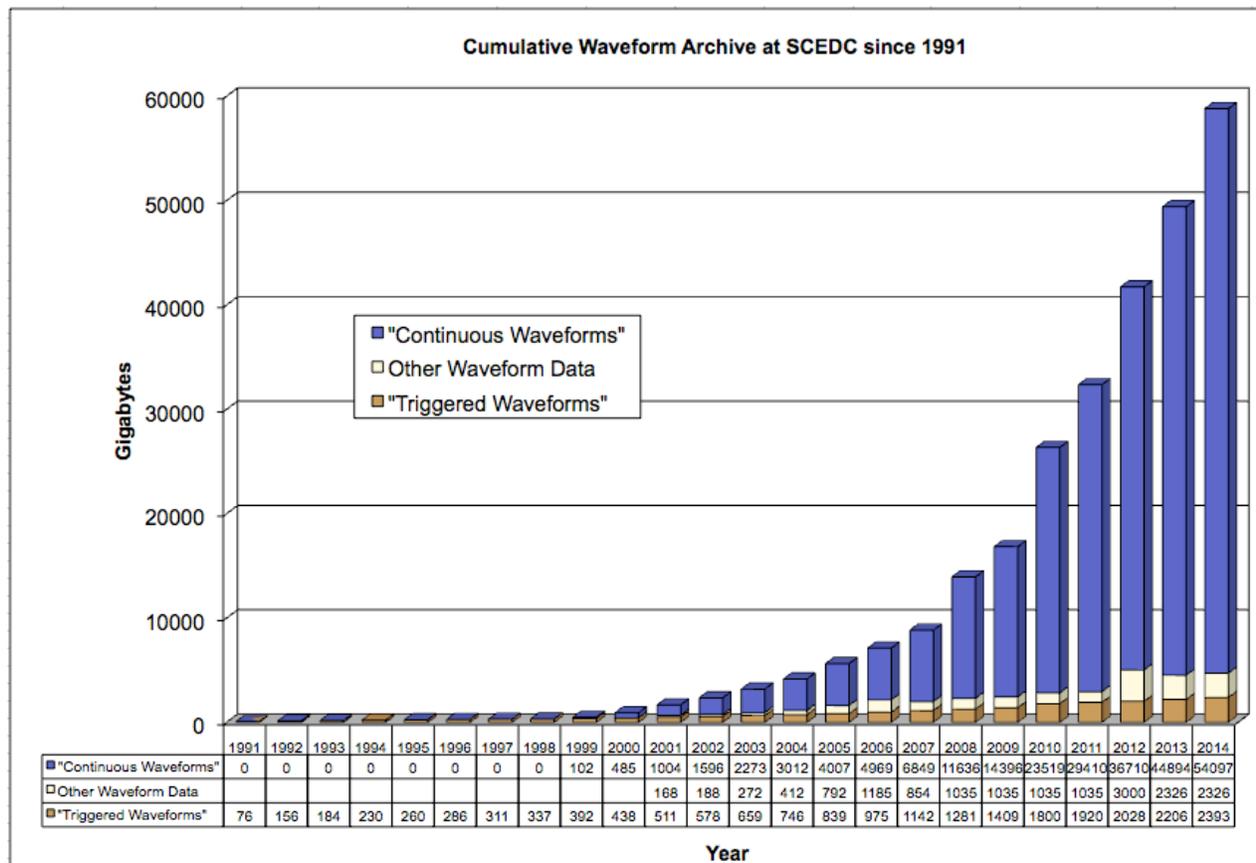


Figure 3. Size of the Waveform Archive at Southern California Earthquake Data Center, Caltech 1991-2014

Intellectual Merit and Broader Impacts

The Data Center is a central resource of SCEC and continues to be an integral part of the Center. In 2014, 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.