2010 SCEC Annual Report

Southern California Earthquake Data Center
(SCEDC) 2010 Accomplishments

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Proposal Category:
Data Gathering and Products

Disciplinary Committee:
Seismology

Period of Performance:
February 1, 2010 – February 1, 2011

2010 SCEDC Annual Report

Major 2010 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 780,191 days of continuous data for 416 stations and parametric and waveform data for 32,668 local events and 271 teleseismic earthquakes.

2. The SCEDC began archiving all HN channels starting Jan 1, 2010. As a result, the SCEDC now archives and distributes all seismic channels as continuous waveforms.

3. The SCEDC has increased the memory on two of its application servers to operate a wave pool in memory of 3 hours. This has improved the performance of waveform archival without causing contention of resources for other internal operations.

4. The SCEDC has archived seismic waveforms from portable stations installed by SCEC researchers Elizabeth, Octavio Lazaro-Mancilla, and Jamie Steidl for El Mayor Cucapah aftershocks. These waveforms can be downloaded through STP either as continuous waveforms or associated with events in the SCEDC earthquake catalog. This additional data will help SCSN analysts and SCEC researchers improve event locations from the sequence.

5. The SCEDC has archived 1 sps GPS displacement waveforms from the M7.2 El Mayor-Cucapah earthquake in SAC format. The time series were created by SCEC researchers Brendan Crowell, Yehuda Bock (project PI) and Mindy Squibb at SOPAC using data from the CRTN. These waveforms are available for download at http://www.data.scec.org.

6. The SCEDC continues to make improvements Station Information System (SIS) with the Southern California Seismic Network (SCSN). The user interface has been improved so that users can store non-response 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.

7. The SCEDC hosted a mirror site to the SCEC Earthquake Response Content Management System (ERCMS) for the November 2010 ShakeOut and was used by the SCEC community in the Mayor Cucapah and Darfield events. The SCEDC will continue to host this mirror site for SCEC.

8. The SCEDC has continued work on designing StationXML schema. In collaboration with the Northern California Earthquake Data Center, IRIS, and NEIC, we have released a new version of the schema, available at http://www.data.scec.org/xml/station.

9. The SCEDC will continue to host the developmental database SCEC WGCEP group for UCERF3. The SCEDC is working with SCEC intern Michael Ihrig to produce a Google Map version of the Clickable Faults Map. An example of this work is the fault information displayed on http://www.data.scec.org/req2/req2.html.

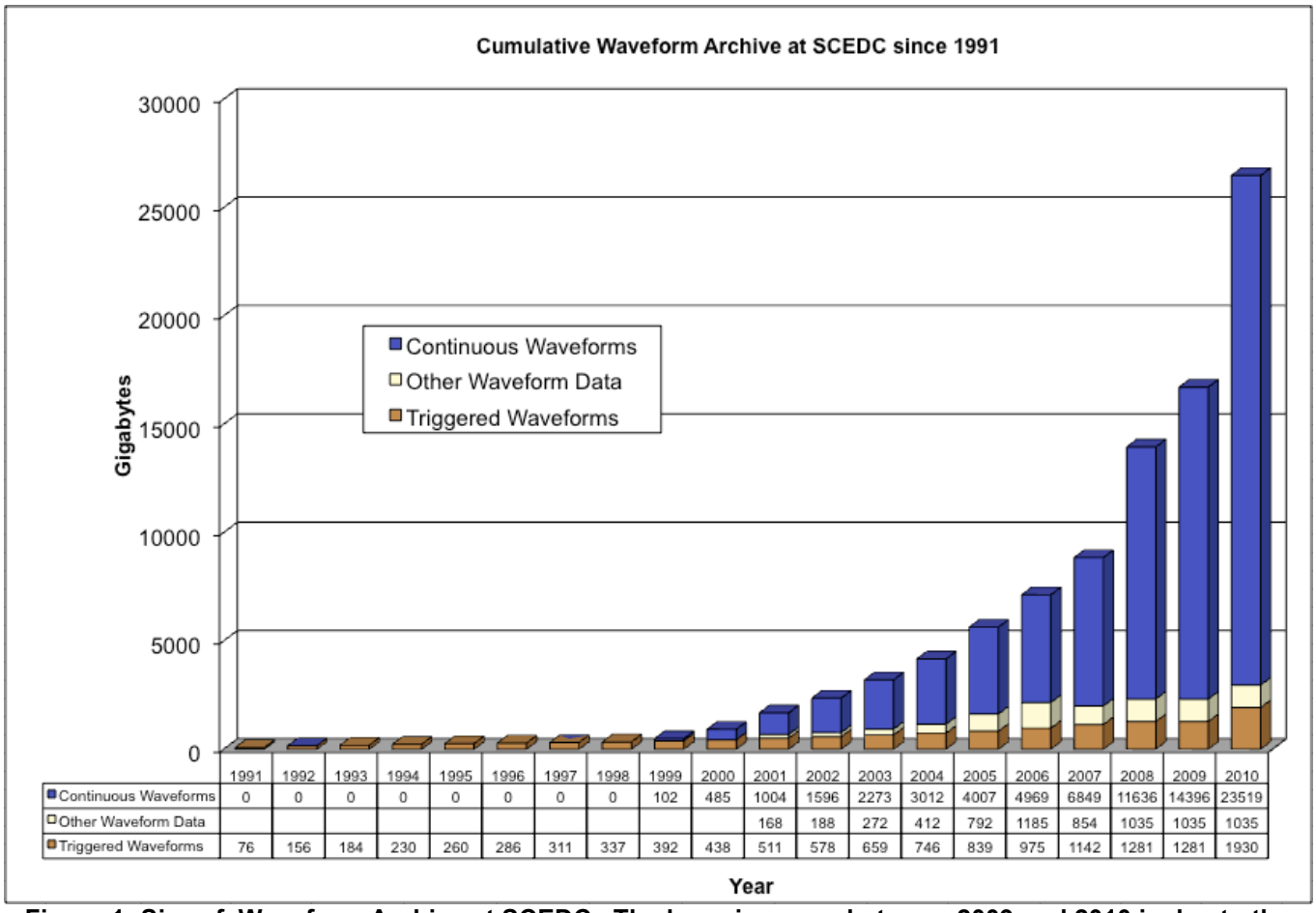
10. As part of a NASA/AIST project in collaboration with JPL and SIO, the SCEDC will receive real time 1 sps streams of GPS displacement solutions from the California Real Time Network (http://sopac.ucsd.edu/projects/realtime; Genrich and Bock, 2006, *J. Geophys. Res.*). These channels will be archived 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.

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 2010, 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

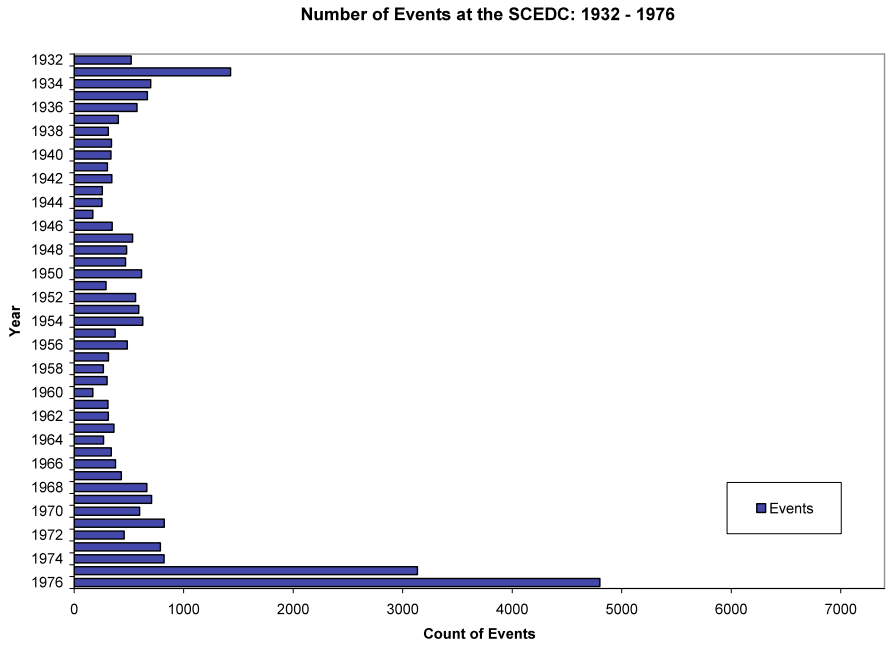


	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Continuous Waveforms	0	0	0	0	0	0	0	0	102	485	1004	1596	2273	3012	4007	4969	6849	11636	14396	23519
Other Waveform Data											168	188	272	412	792	1185	854	1035	1035	1035
Triggered Waveforms	76	156	184	230	260	286	311	337	392	438	511	578	659	746	839	975	1142	1281	1281	1930

Figure 1: Size of Waveform Archive at SCEDC. The large increase between 2009 and 2010 is due to the addition of high sample rate strong motion channels (HN*) to the continuous archive.

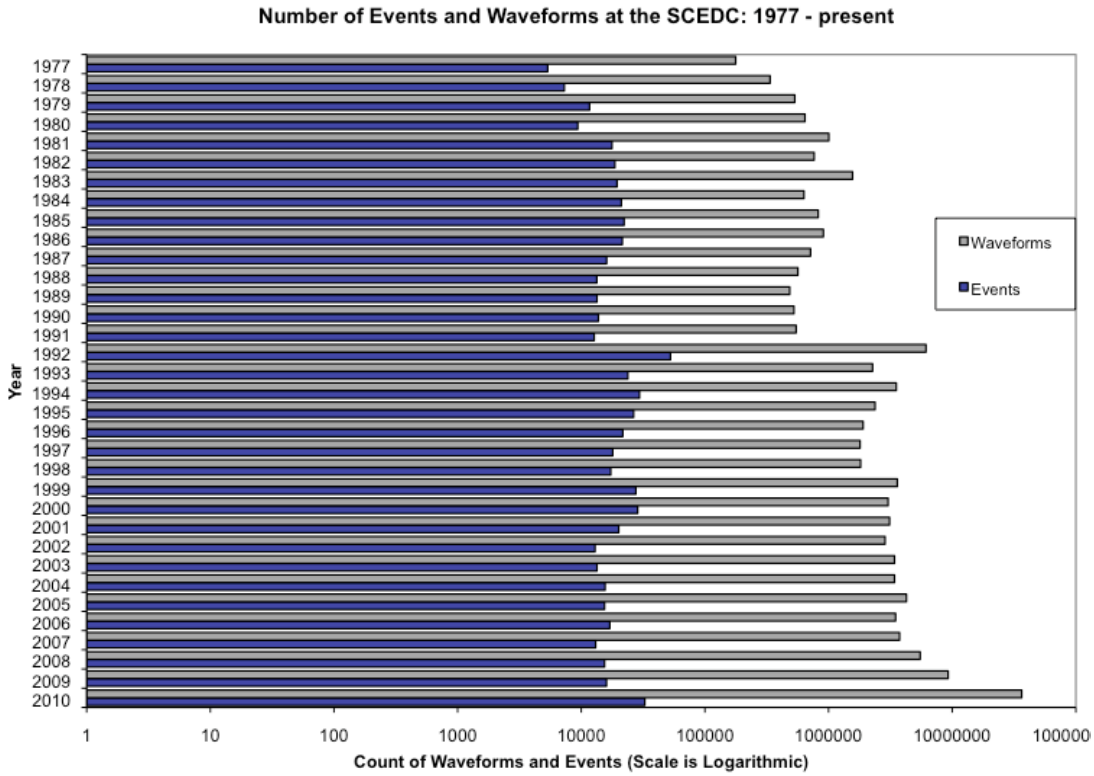
The archive at the SCEDC currently has the following holdings:

- The Caltech/USGS catalog of over 656,169 earthquakes spanning 1932-present.
- 16.81 terabytes of continuous and triggered waveforms.
- 19.5 million phase picks.
- 118.4 million triggered waveform segments.
- 10+ years of continuous broadband, high sample short period and strong motion waveforms.
- 20.3 million amplitudes available for electronic distribution.
- Triggered data for more than 10,238 significant teleseismic events.



Event parametric data for this era is available electronically

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		



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

YEAR	# EVENTS	# WFs	YEAR	# EVENTS	# WFs
1977	5348	177417	2002	12920	2866999
1978	7297	336533	2003	13400	3415492
1979	11663	533299	2004	15584	3415492
1980	9368	644542	2005	15436	4265334
1981	17740	1005322	2006	17005	3484835
1982	18717	765445	2007	13074	3754910
1983	19453	1563899	2008	15434	5505843
1984	21078	633208	2009	16004	9273880
1985	22196	825298	2010	32668	36502437
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			

Data Volume Served and Archived

Number of earthquakes in the 1932-present Caltech/USGS catalog 656160 earthquakes
Total size of the waveform archive: 26483 GB

Data transferred via STP in 2009:

	waveforms	waveforms/day	gigabytes	megabytes/day	kilobytes/sec
2009 Q4	15,196,809	165,183	2,821	31,395	372
2010 Q1	31,688,377	351,871	1018	11,584	137
2010 Q2	10,575,904	116,219	761	8,625	102
2010 Q3	64,555,387	701,689	2014	22,414	266
2010 Q4	39,216,295	426,264	1835	20,427	242

In 2010, the SCEDC archived:

- 33948 events
- 36,502,437 triggered waveforms
- 18,623,307 continuous waveforms
- 3,292,642 arrivals
- 20,531,887 amplitudes

Magnitude	Number of local events (le):
-1-0	99
0-1	7822
1-2	15850
2-3	7448
3-4	1341
4-5	145
5-6	7
6-7	0
7-8	1

# events:	Event type
32668	le (local event)
436	qb (quarry blast)
557	re (regional event)
1	sn (sonic blast)
271	ts (teleseism)
4	Other (unknown)
33948	Total

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

Quarter	Hits	Page views
2009, Q4	19,996,326	9,654,259
2010, Q1	23,791,004	6382,466
2010, Q2	40,792,770	8,614,510
2010, Q3	23,451,397	6,543,012
2010, Q4	17,373,246	4,730,496

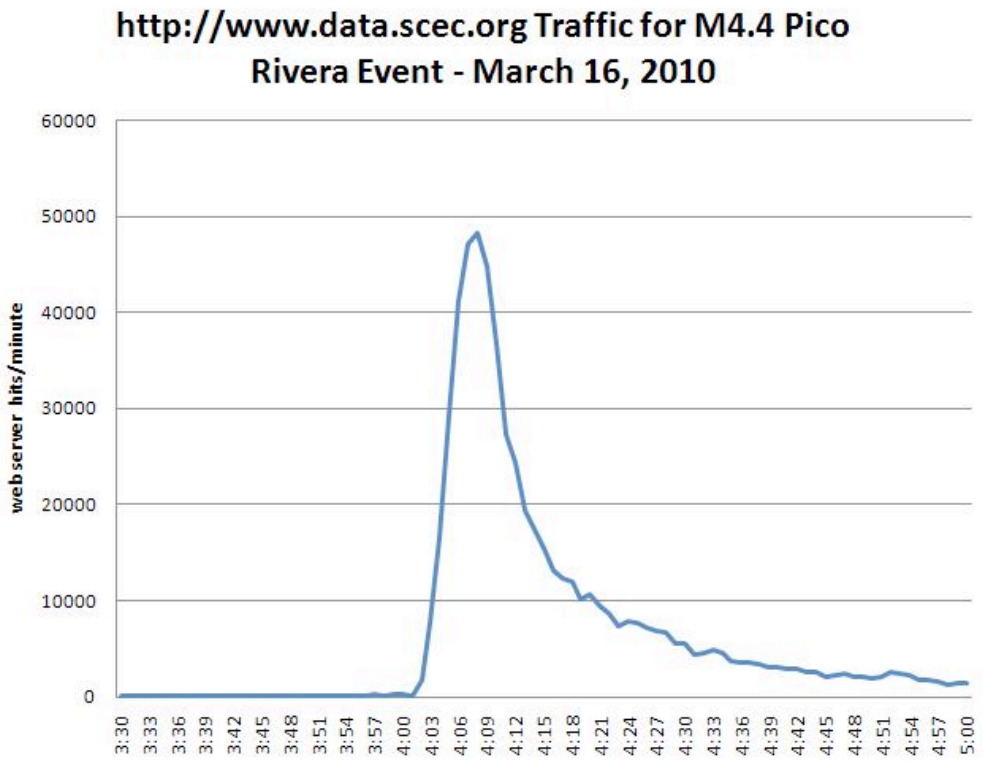


Figure 2 – web hits on SCEDC web server shows sharp increase in traffic seconds after MI 4.4 Pico Rivera event.

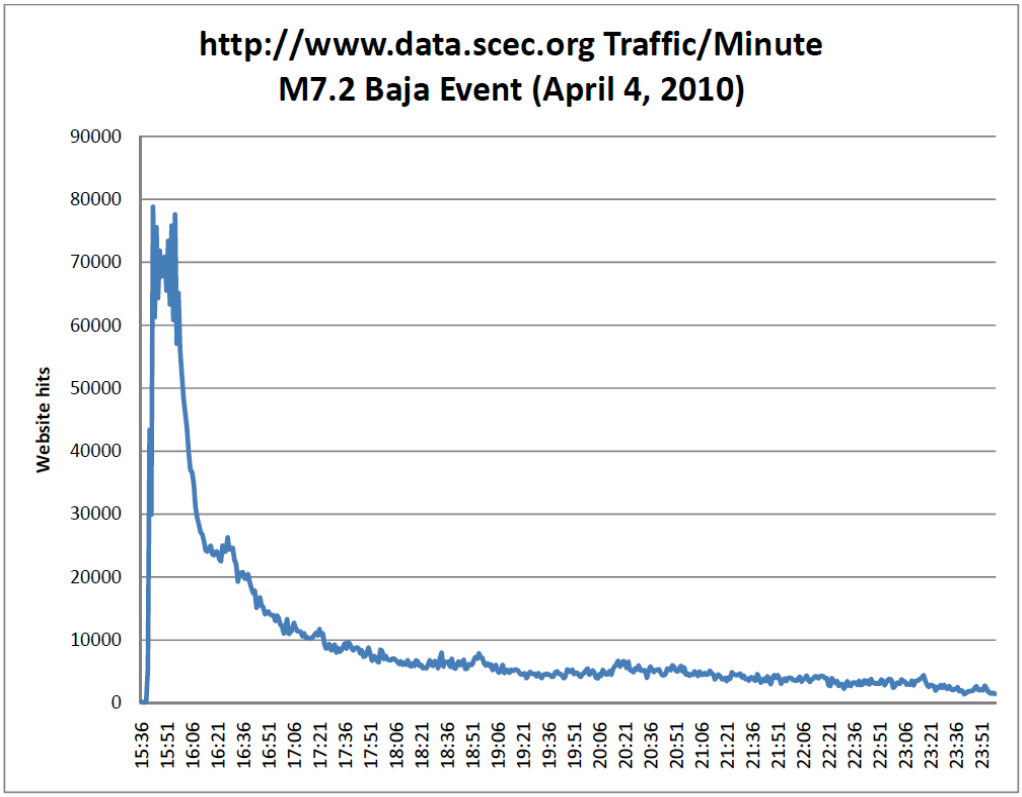


Figure 3: Increase in web traffic for the M7.2 Mayor Cucapah event.

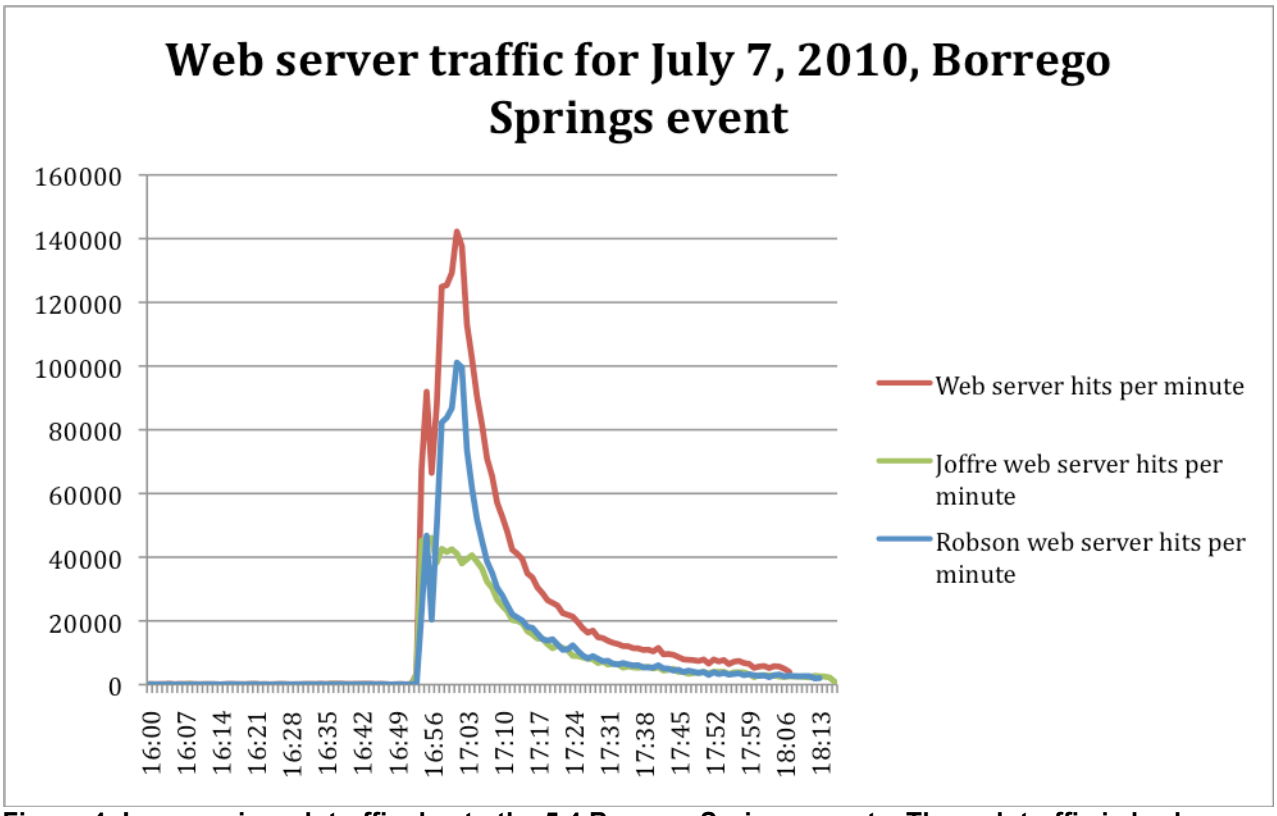


Figure 4: Increase in web traffic due to the 5.4 Borrego Springs event. The web traffic is broken down by the load on each server (two total) serving the www.data.scec.org pages.