



California Spatial Reference Center



Art Andrew - CSRC Chairman

The State of CSRC

April 4, 2013

Geospatial Symposium

*Riverside County Flood Control & Water
Conservation District*

MAR 23 2011





California Spatial Reference Center

- ▶ Established in 2000
- ▶ The CSRC's mandates include:
 - Establish and maintain the CSRS.
 - Provide the necessary geodetic services to ensure the availability of accurate, consistent, and timely spatial referencing data.
 - Monitor temporal changes in geodetic coordinates due to tectonic motion, earthquakes, volcanic deformation and land subsidence.
 - Establish the legal spatial reference system for California.





SOPAC/CSRC Staff



- Director: Yehuda Bock
- Researcher: Jennifer Haase
- Coordinator: Maria Turingan
- Analysis: Peng Fang
- Lead Programmer: Mindy Squibb
- System Administrator: Anne Sullivan
- SCIGN and CRTN Engineer: Glen Offield
- Graduate Students: Brendan Crowell, PhD, Diego Melgar
- Postdoctoral Researchers: Jianghui Geng, Yuval Reuveni
- PLS Consultant: John Canas





CSRC Executive Committee

2013-2014 Vacancy



- Chairperson: Art Andrew
- Vice-Chairperson: Dan Gilleland
- Secretary: Richard Maher
- Treasurer: Bill Hofferber
- Member: Armand Marios
- Member: Brian Wiseman
- Member: Larry Gill
- Member: Dave Olander
- Member: Vacant
- Past Chairperson: Dick Davis





Outline



CSRN – Challenges in Maintaining a State-Wide Network

CSRC Website

California Real Time Network (CRTN)

CSRN – NGS CORS

CRTN – Funding

CSRC – Future Projects





CSRN

Challenges in Maintaining a State-Wide Network





GPS/GNSS Positioning – Reference Frames



- The natural reference frame of GPS/GNSS is an Earth-Centered Earth-Fixed Reference Frame (ITRF)
- ITRF is defined by the positions and velocities of a global network of space geodetic tracking stations, to account for plate tectonic motions
- Precise GPS orbits (IGS) and broadcast ephemeris are with respect to ITRF (currently ITRF2008)

In California:

- We experience tectonic motion, earthquakes, subsidence, and volcanic activity so the reference network is deforming, while surveyors would like a static datum
- Multiple reference frames in use are tied to North America and the National Spatial Reference System (e.g., NAD83)
- Multiple epoch dates are in use
- Multiple positioning sources are available



CSRC/CRTN Can Help!





Current Reference Frames & Epochs

NGS

Reference Frame, Epoch

IGS08, epoch 2005.00

NAD83(2011), epoch 2010.00

CSRC

Reference Frame, Epoch

ITRF2005, epoch 2011.00

NAD83(NSRS2007), epoch 2011.00





Significant Earthquakes in Western North America (1996-2012)



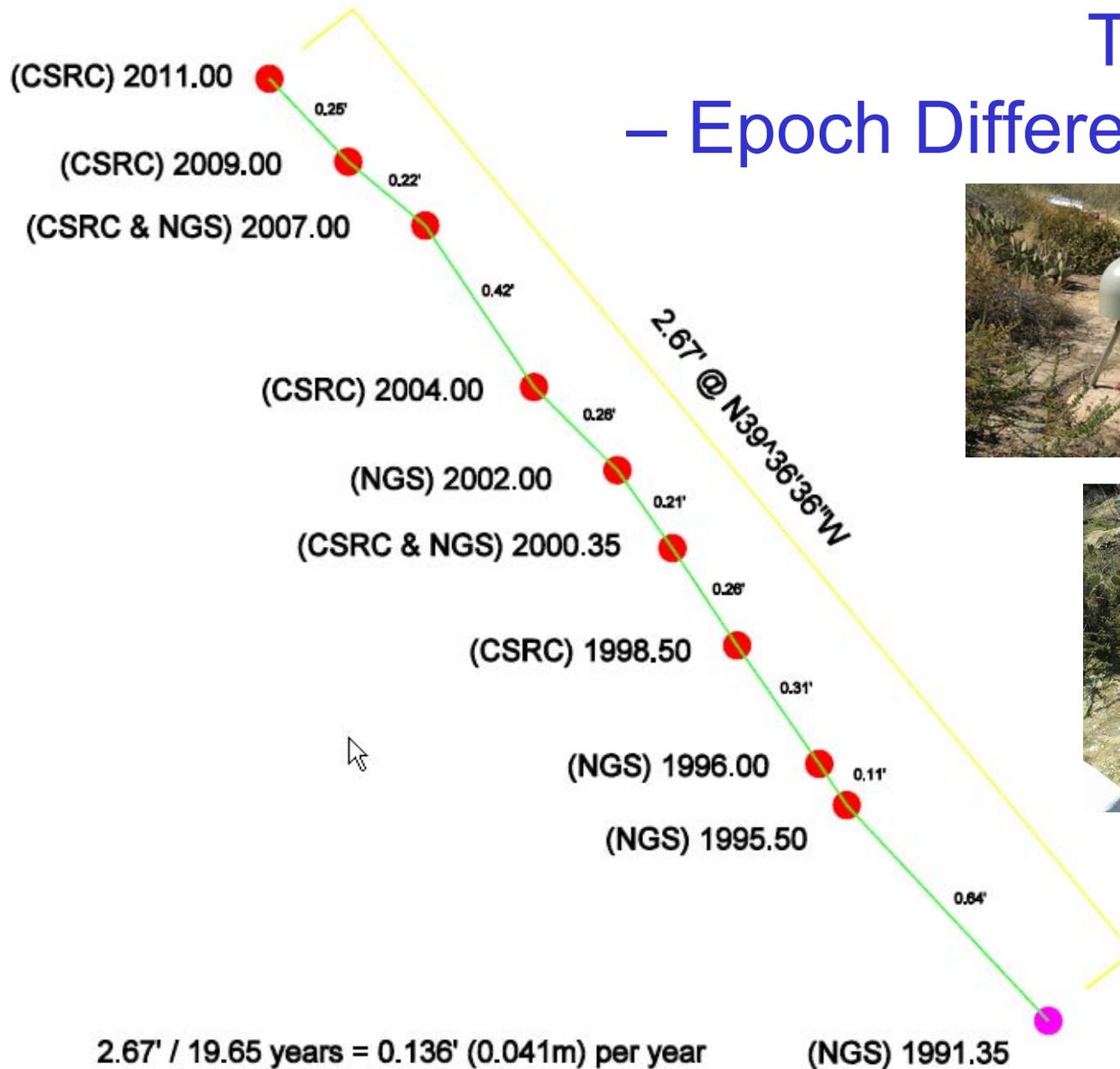
10/16/1999	Hector Mine, Southern California	7.1	142	exp	OPRD: 6 km	LAND: 408 km
2/29/2001	Nisqually Fault, Seattle	6.8	4	exp	RPT1: 30 km	HUSB: 340 km
11/3/2002	Denali, Alaska	7.9	12	exp	GNAA: 136 km	KEN1: 441 km
12/22/2003	Cambria, San Simeon, Central California	6.5	23	log	P278: 4 km	ORES: 131 km
6/28/2004	Queen Charlotte Fault	6.8	4	exp	AC64: 1023 km	AC63: 1139 km
9/28/2004	Parkfield, Central California	6.0	28	log	P281: 4 km	CUHS: 115 km
6/12/2005	Anza, Southern California	5.2	0		AZRY: 8 km	
6/15/2005	Gorda Plate, CA	7.2	5	exp	CME1: 188 km	P170: 216 km
6/16/2005	Yucaipa, Southern California	4.9	0		CRFP: 15 km	
9/2/2005	Obsidian Buttes Swarm, Salton Trough	5.1	3	exp	GLRS: 5 km	DHLG: 31 km
10/3/2006	Superstition Hill Seismic Swarm - silent slip	4.7	0		CRRS: 16 km	
10/31/2007	Alum Rock, San Jose, California	5.6	1	none	MHCB: 7 km	
7/29/2008	Chino Hills, California	5.5	1	none	TWMS: 4 km	
1/10/2010	Eureka Earthquake, Offshore Northern Califor	6.5	11	exp	P159: 45 km	P156: 95 km
2/4/2010	Offshore Northern California, Humboldt Coun	5.9	0		P159: 60 km	
4/4/2010	El Mayor-Cucapah, Northern Baja California	7.2	208	exp	P500: 62 km	P567: 485 km
6/15/2010	Aftershock, El Mayor-Cucapah	5.7	7	exp	P481: 16 km	P496: 31 km
7/7/2010	Borrego Springs, Southern California	5.4	3	exp	P490: 13 km	P742, P484: 14 k
8/26/2012	Brawley Swarm, Imperial Valley	5.3, 5.4	2	none	P506: 8 km	P498, P499



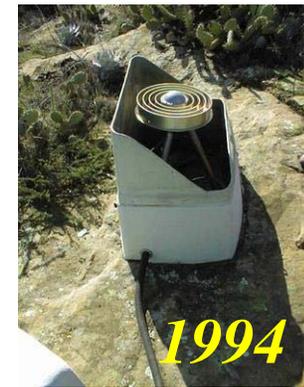


TRAK

- Epoch Differences



2011

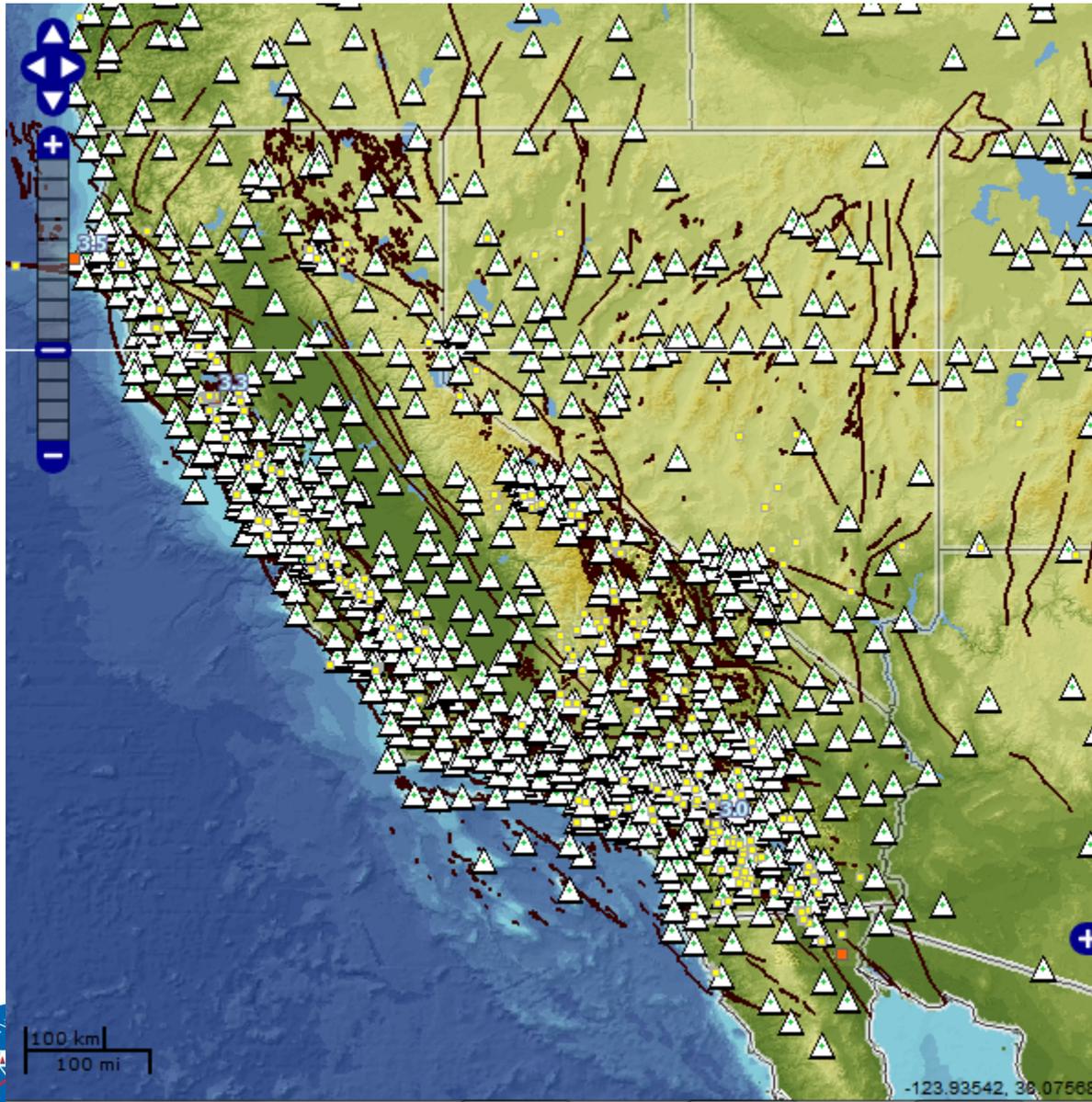


1994





California Spatial Reference Network (CSRN) Continuous GPS Stations (CGPS) only

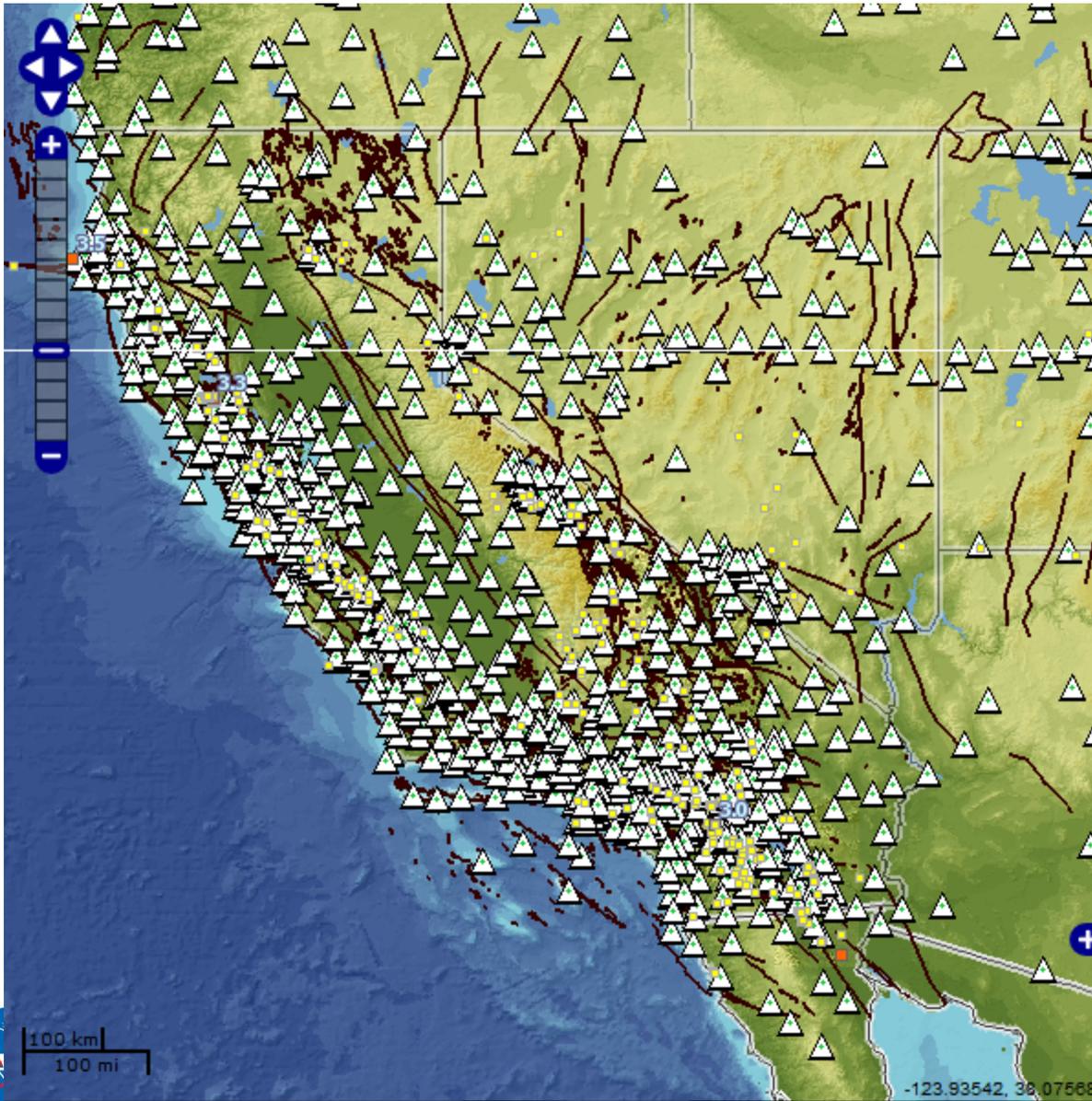


- Stations built to strict standards for mm-level crustal deformation research (SCIGN, BARD, PBO)
- With a few exceptions, monumentation consists of braced, deeply-anchored stainless steel rods or braced, shallow-anchored rods in bedrock – a few rooftops at legacy stations
- Mix of receivers (Trimble, Topcon, Ashtech, Leica) but choke rings antennas used almost exclusively





California Spatial Reference Network (CSRN) Continuous GPS Stations (CGPS) only



- Data sampled at 15 s rate and downloaded once per day by several groups (archived at SOPAC)
- Daily 3-D position time series basis for California Spatial Reference System (CSRS) maintained by CSRC
- CGPS daily position time series modeled for tectonic motion (station velocities), coseismic deformation (offsets), postseismic deformation, subsidence, and seasonal effects





CSRC Website





California Spatial Reference Center (CSRC) - Windows Internet Explorer provided by OC Public Work

http://csrc.ucsd.edu/

File Edit View Favorites Tools Help

Google Search

California Spatial Reference Center (CSRC)

CALIFORNIA SPATIAL REFERENCE CENTER

search

CSRC | SOPAC | Index | Mail | Forums | General | Reports | Contacts

Enter CSRC Data Portal | Maps | Projects

CSRC Data Portal help

Information for your California GPS projects:
 Access to CRTN Data and Coordinates
[CSRS Epoch 2011.00](#)
[CSRS Epoch 2009.00](#)
[CSRS Epoch 2007.00 \(updated\)](#)
[CSRS Epoch 2007.00](#)

via **SITE CODE / NGS PID**

via **MAP BROWSER**

or **VIEW PORTAL RESOURCES**

Featured links:

CRTN P510
 Current CRTN and CSRN Maps

[CRTN North/South Stations\(kmz\)](#)
 Google Earth Map showing all current active real-time CGPS stations available via NTRIP separated by North/South

[CRTN All Stations\(pdf\)](#)
 Map showing all current active real-time CGPS stations available via NTRIP

[CRTN Backbone\(pdf\)](#)
 Map showing proposed CRTN Backbone network as well as NGS CORS stations

[CSRN 2011.00 Epoch](#)
 Map showing all CGPS stations included in the 2011.00 Epoch adjustment

News more

[CRTN Workshop Presentations](#)

California Real-Time Network (CRTN) Workshop
 presented by the California Land Surveyors Association (CLSA) with CSRC
 Friday, September 28, 2012
 Hilton Ontario Airport, Ontario, CA
 Time: 8:00 AM to 4:30 PM

Friday, October 5, 2012
 Lyons Gate Hotel, Sacramento, CA
 8:00 AM to 4:30 PM

http://csrc.ucsd.edu/

Forums

Published Coordinates

Real-Time Map

Various CSRN & CRTN Maps

Presentations





CRTN

Featured links:



Current CRTN and CSRN Maps

[CRTN North/South Stations\(kmz\)](#)

Google Earth Map showing all current active real-time CGPS stations available via NTRIP separated by North/South

[CRTN All Stations\(pdf\)](#)

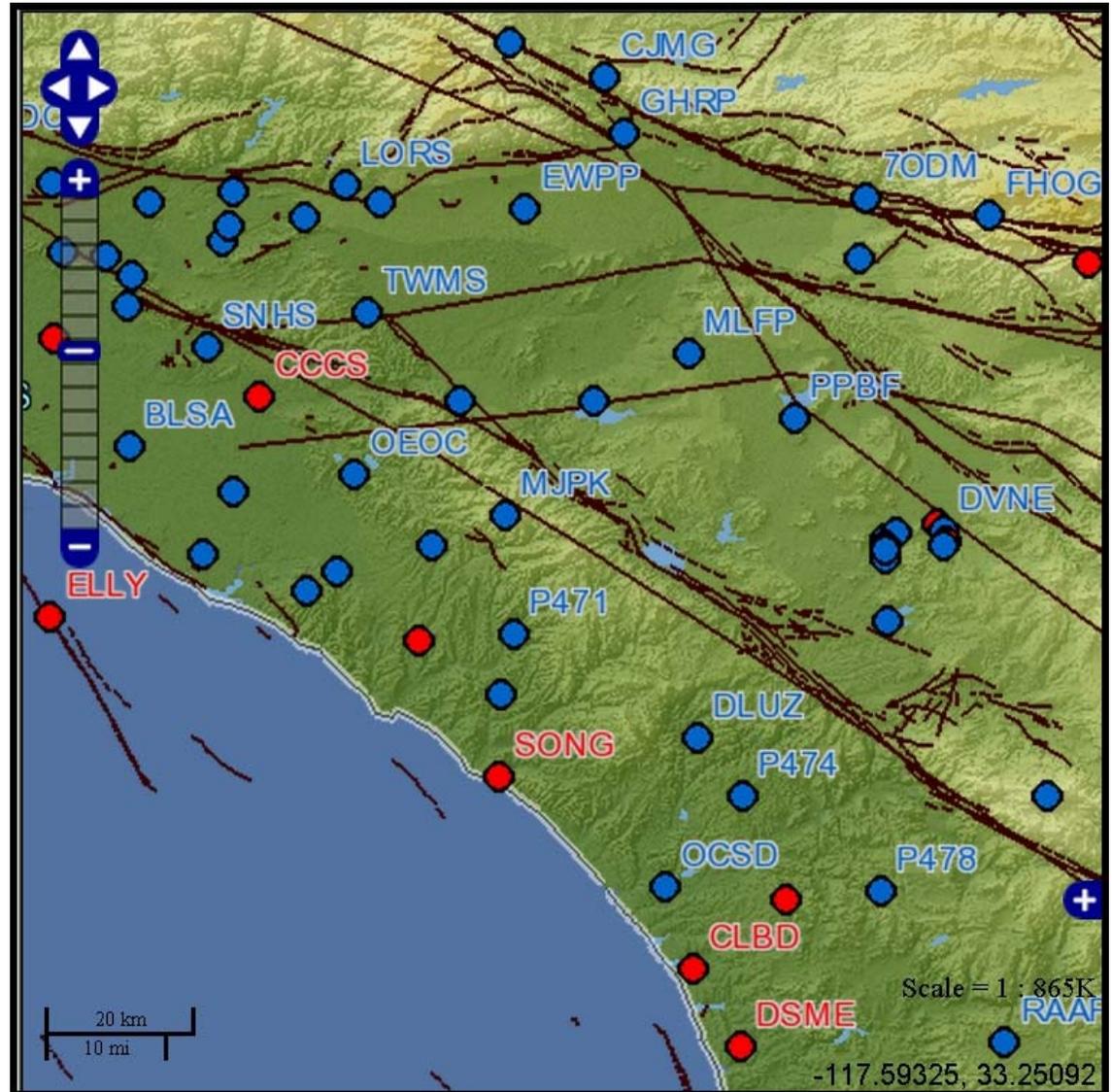
Map showing all current active real-time CGPS stations available via NTRIP

[CRTN Backbone\(pdf\)](#)

Map showing proposed CRTN Backbone network as well as NGS CORS stations

[CSRN 2011.00 Epoch](#)

Map showing all CGPS stations included in the 2011.00 Epoch adjustment





Google Earth

Featured links:



Current CRTN and CSRN Maps

[CRTN North/South Stations\(kmz\)](#)

Google Earth Map showing all current active real-time CGPS stations available via NTRIP separated by North/South

[CRTN All Stations\(pdf\)](#)

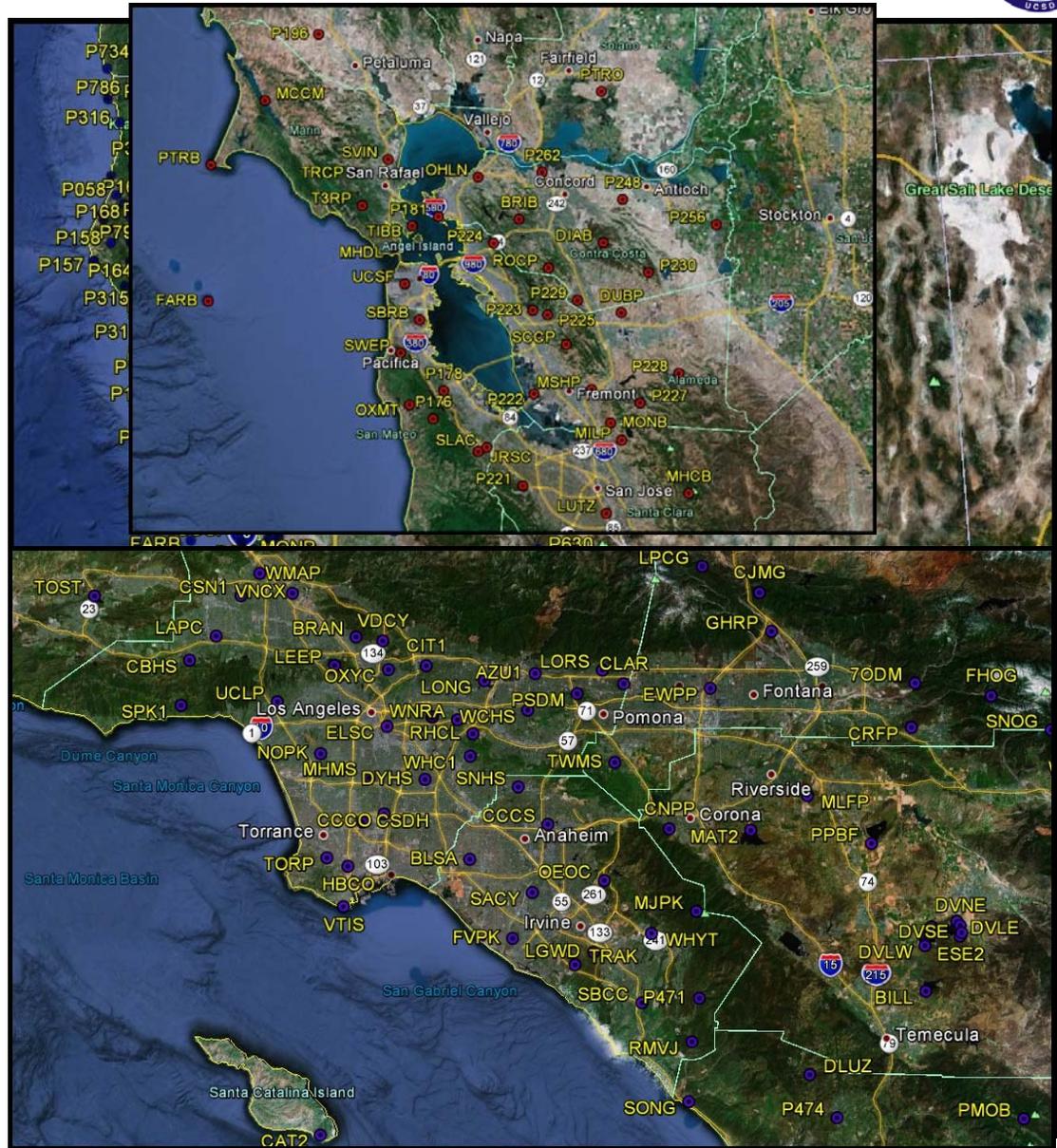
Map showing all current active real-time CGPS stations available via NTRIP

[CRTN Backbone\(pdf\)](#)

Map showing proposed CRTN Backbone network as well as NGS CORS stations

[CSRN 2011.00 Epoch](#)

Map showing all CGPS stations included in the 2011.00 Epoch adjustment





CRTN Backbone

Featured links:



Current CRTN and CSRN Maps

[CRTN North/South Stations\(kmz\)](#)

Google Earth Map showing all current active real-time CGPS stations available via NTRIP separated by North/South

[CRTN All Stations\(pdf\)](#)

Map showing all current active real-time CGPS stations available via NTRIP

[CRTN Backbone\(pdf\)](#)

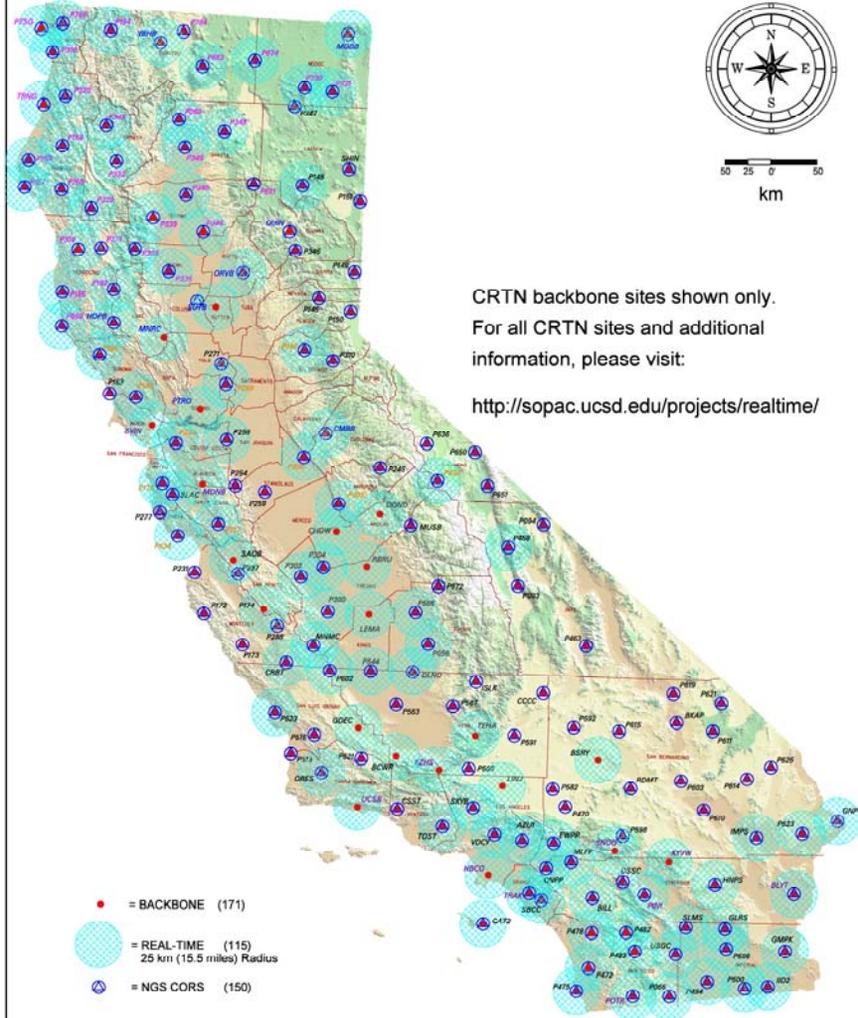
Map showing proposed CRTN Backbone network as well as NGS CORS stations

[CSRN 2011.00 Epoch](#)

Map showing all CGPS stations included in the 2011.00 Epoch adjustment



CSRC - California Real Time Network (CRTN) Proposed Backbone Network



50 25 0 50
km

CRTN backbone sites shown only.
For all CRTN sites and additional information, please visit:

<http://sopac.ucsd.edu/projects/realtime/>

03.12.13





CRTN – 2013

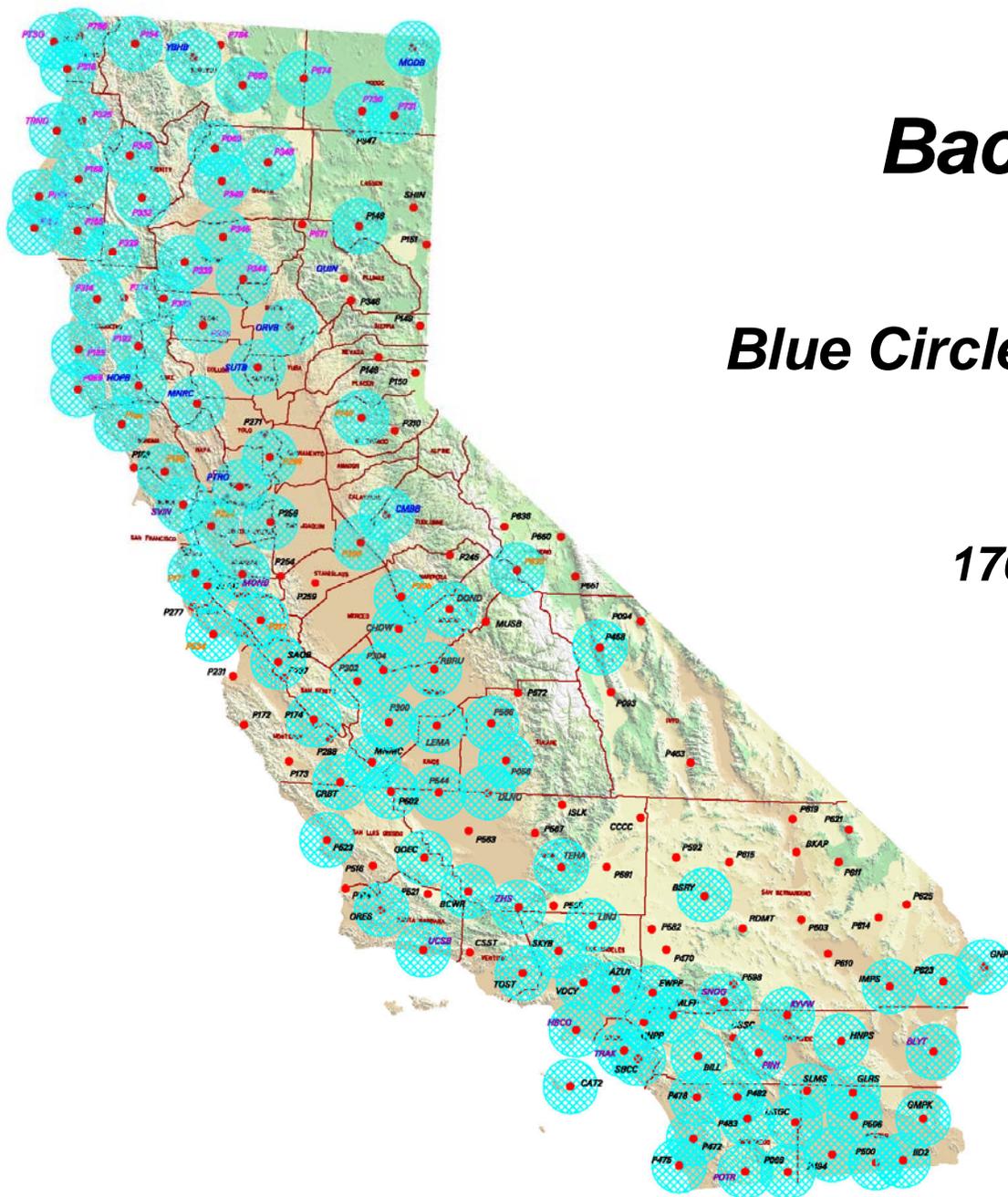
Backbone Network

Based on 50 km Grid

**Blue Circles = 25km (15.5 mile)
Radius**

**170 existing CGPS stations
from various networks:**

**115 stations (93 in 2012)
currently streaming
in real-time
(22 new)**





CRTN All

Featured links:



Current CRTN and CSRN Maps

[CRTN North/South Stations\(kmz\)](#)

Google Earth Map showing all current active real-time CGPS stations available via NTRIP separated by North/South

[CRTN All Stations\(pdf\)](#)

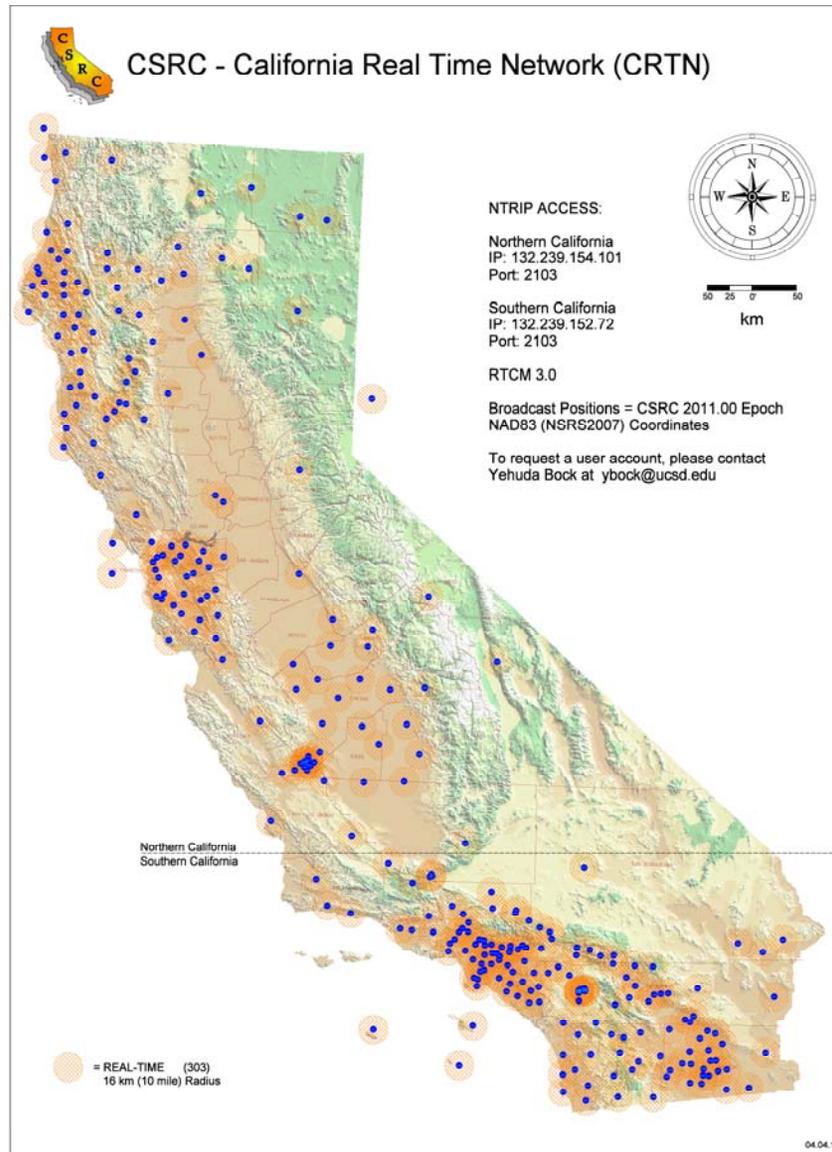
Map showing all current active real-time CGPS stations available via NTRIP

[CRTN Backbone\(pdf\)](#)

Map showing proposed CRTN Backbone network as well as NGS CORS stations

[CSRN 2011.00 Epoch](#)

Map showing all CGPS stations included in the 2011.00 Epoch adjustment





CRTN – 2013

All CRTN sites

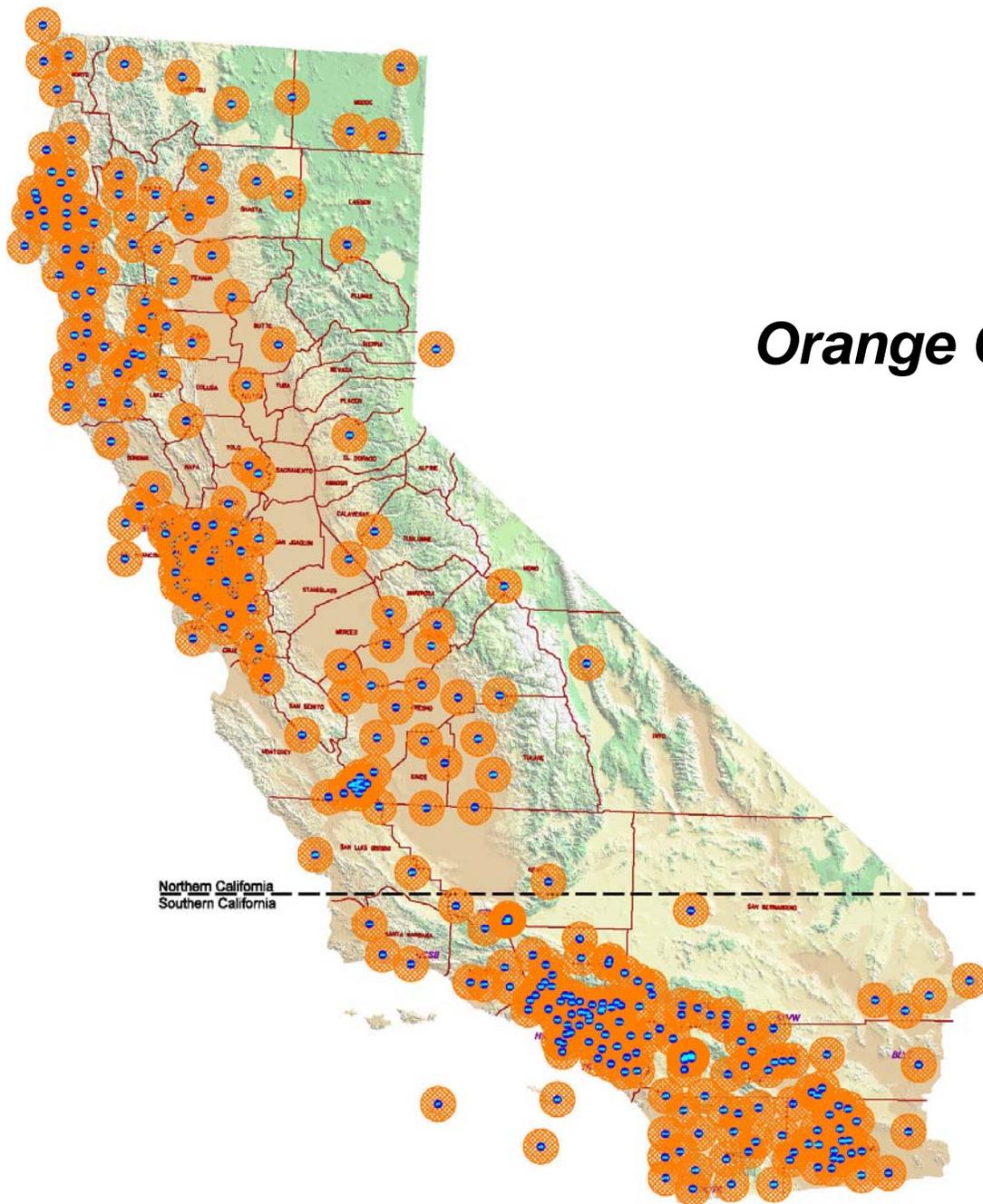
**Orange Circles = 16km (10 mile)
Radius**

339 stations (303 in 2012)

currently streaming

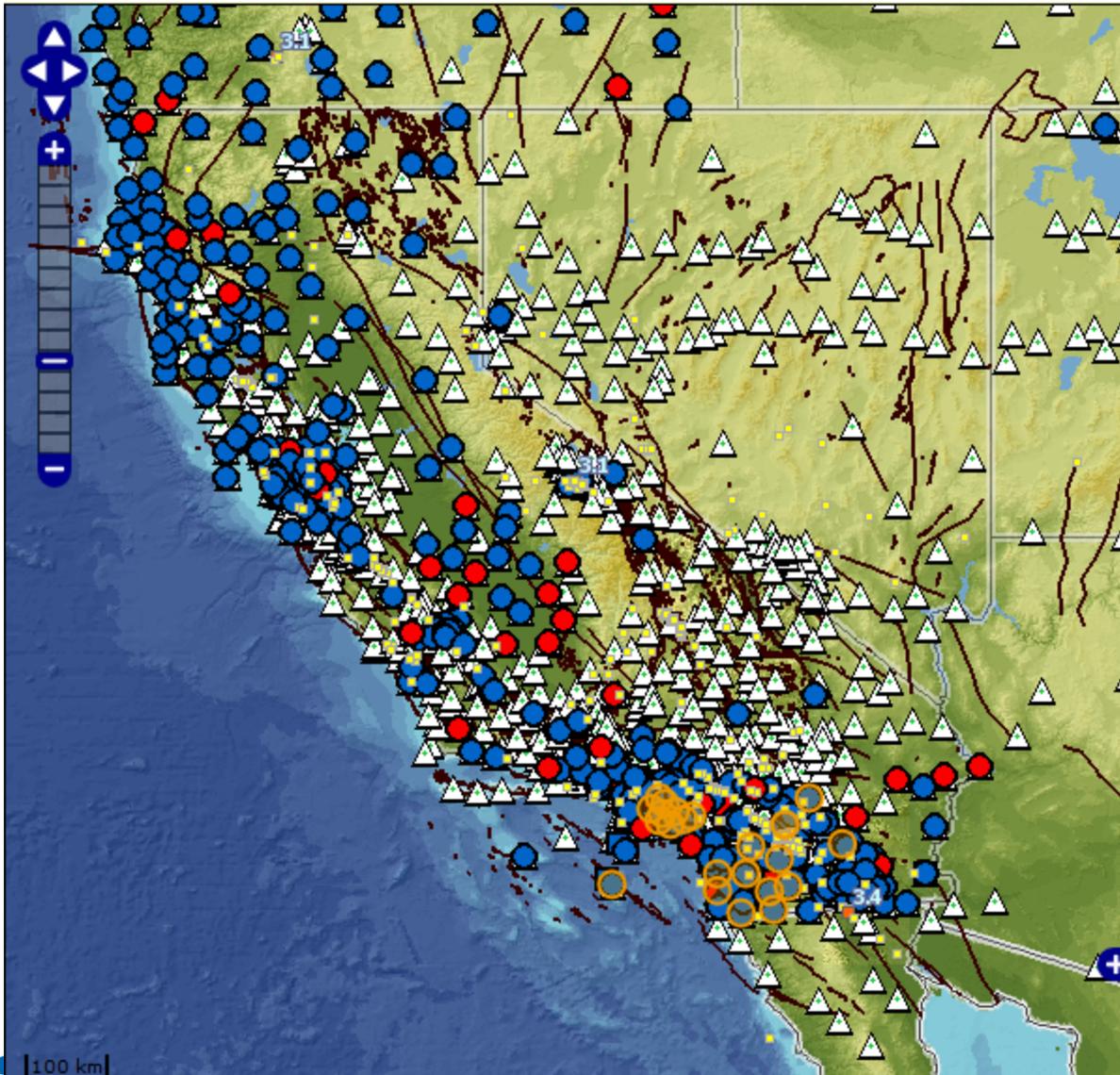
in real-time

(36 added)





Topcon GNSS Receivers – GPS/GLONASS



- Topcon NET-G3A GNSS capable receivers at 96 CRTN stations
- Only 23 of these stream GLONASS data – all in southern California by CRTN Consortium members
- Working on extending capability to USGS and BARD Topcon receivers, in southern California, the greater SF Bay Area and northern California





CSRN 2011.00

Featured links:



Current CRTN and CSRN Maps

[CRTN North/South Stations\(kmz\)](#)

Google Earth Map showing all current active real-time CGPS stations available via NTRIP separated by North/South

[CRTN All Stations\(pdf\)](#)

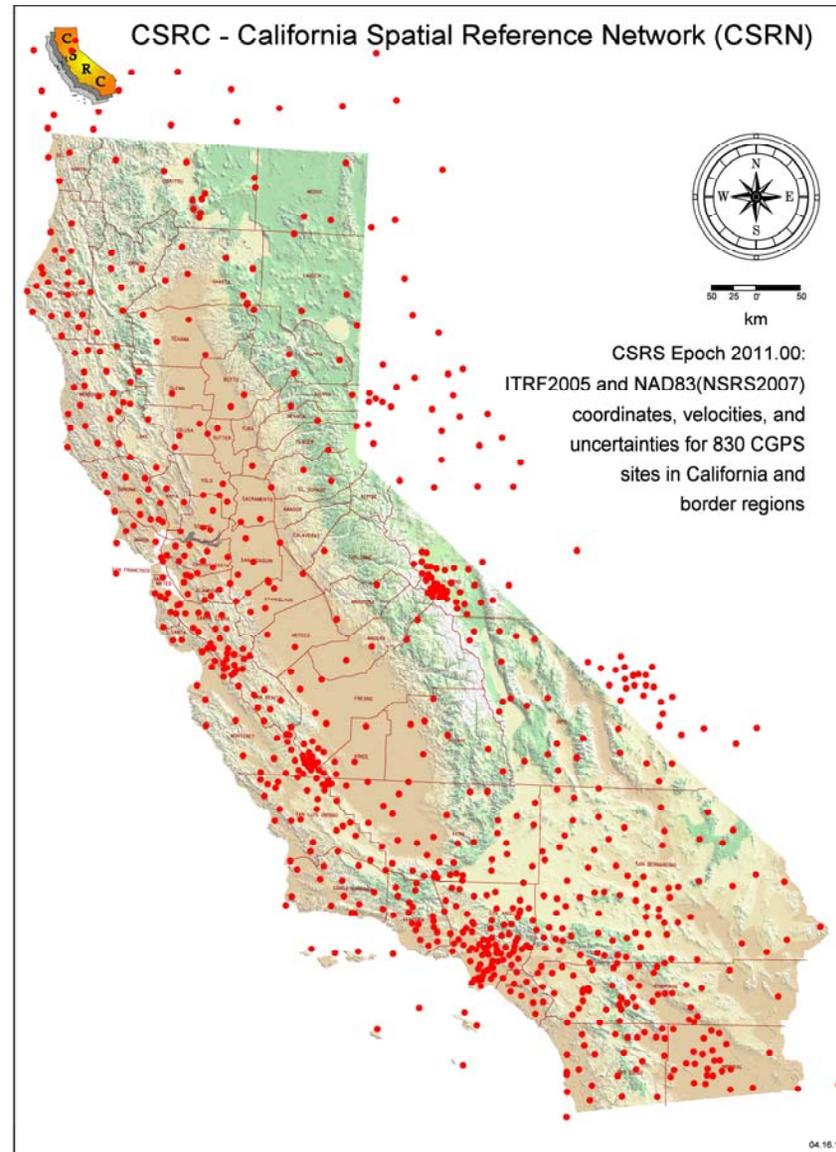
Map showing all current active real-time CGPS stations available via NTRIP

[CRTN Backbone\(pdf\)](#)

Map showing proposed CRTN Backbone network as well as NGS CORS stations

[CSRN 2011.00 Epoch](#)

Map showing all CGPS stations included in the 2011.00 Epoch adjustment





CSRN

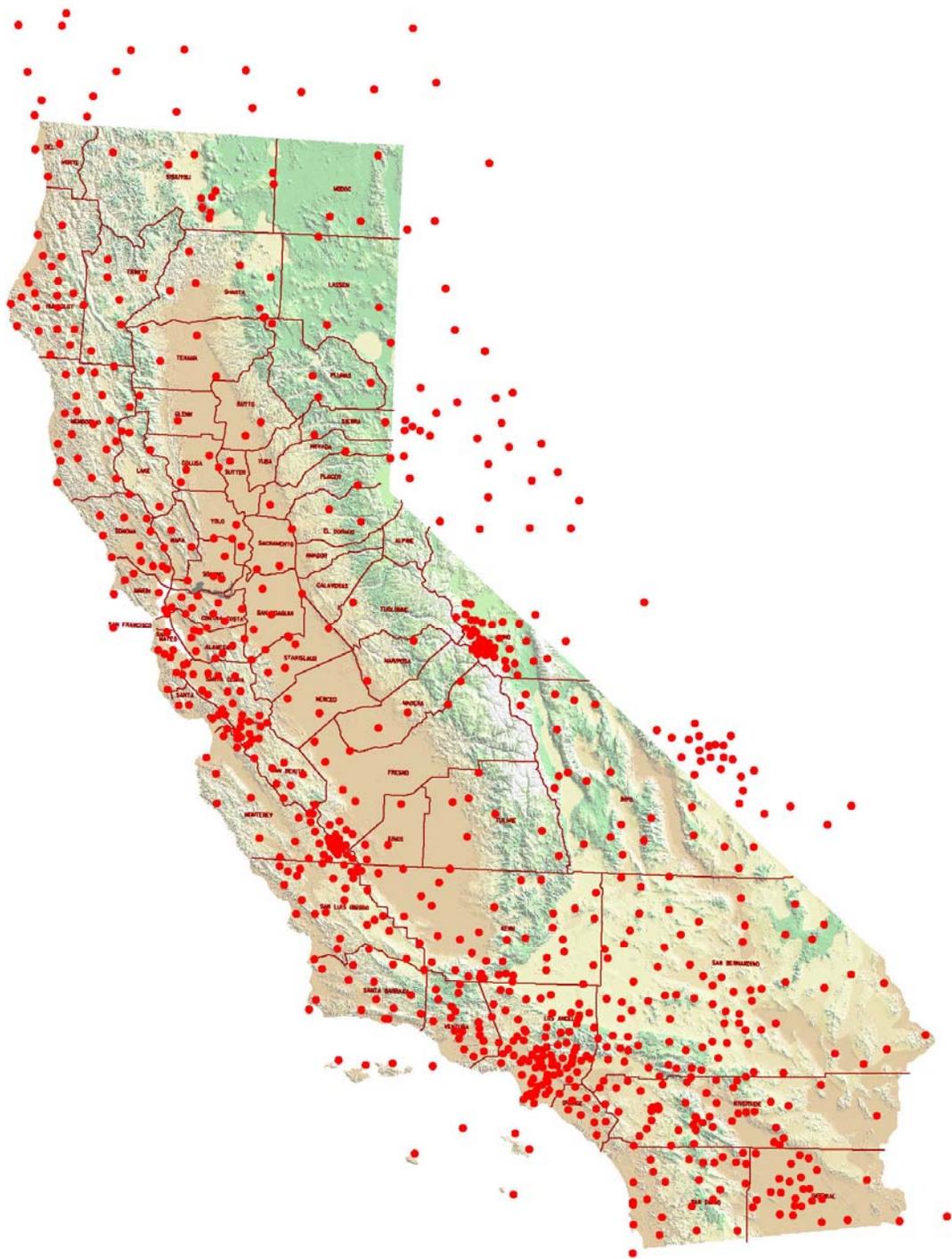
2011.00 Epoch

***Coordinates, velocities,
and uncertainties***

830 CGPS

***ITRF2005 & NAD
83(NSRS2007)***

EPOCH - 2011.00





Forums

UBB.classic

SOPAC Geophysical Forums

[login](#) | [register](#) | [search](#) | [faq](#) | [forum home](#)

» [Today's Active Topics](#) «

» You are not logged in. [Login](#) or [register](#)

Registered Members: 1247
Welcome to our newest member: [Bob MacKenzie](#)

SOPAC Geophysical Forums Recent Visitors: 50

50 guest(s)

Forum Categories	Total Forums in Category
MEASURES/REASoN	7
SOPAC	7
GSAC	1
CSRC California Spatial Reference Center. Includes forums on CSRC website, height modernization projects, and PGM (Pocket GPS Manager).	16
CRTN The California Real Time Network provides real-time GPS connectivity in California. Enter the forum to view general notices or participate in discussions pertaining to CRTN.	3
SOMI Discussion, feature requests, bug reports and announcements for the SOPAC Online Mapping Interface (SOMI).	6
GPS Explorer Discussion, feature requests, bug reports and announcements for GPS Explorer.	7

CRTN

[Contact Us](#) | [SOPAC Homepage](#)

POWERED BY P
UBB.classic™ 6.7.2

Forum	Topics	Posts	Last Post	Moderators
CRTN The California Real Time Network provides real-time GPS connectivity in California. Enter the forum to view general notices or participate in discussions pertaining to CRTN.				
CRTN Community Notices CRTN notices of community-wide relevance. All messages posted here (by moderator) go to the crtm-1@gpsmail.ucsd.edu mailing list. Go to the CSRC to register.	86	90	CRTN CVSRN stations (ybock) 03-04-2013 07:24 AM	crtm-1 administrator
CRTN General Discussion CRTN-related topics, user-specified and updated. Topics may be posted here by any user.	26	71	Re: Single Data Stream or... (ybock) 04-10-2012 09:51 PM	ybock , Marti , mindy , Maria Turingan , Anne Sullivan
RYO Format Discussion of the RYO format, streaming and conversion.	0	0		no one

Icon Legend

New Posts Since Your Last Visit	No New Posts Since Your Last Visit
---------------------------------	------------------------------------

[Contact Us](#) | [SOPAC Homepage](#)





CRTN Community Notices

	Topic	Topic Starter	Replies	Last Post
	CRTN CVSRN stations	ybock	0	03-04-2013 07:24 AM
	UNAVCO Network Upgrades and Outages	Maria Turingan	0	02-11-2013 04:00 PM
	All RTCM3 streams okay	ybock	0	01-29-2013 10:12 AM
	QCRTN & CVSRN updates	ybock	0	12-10-2012 10:21 AM
	New CRTN Stations	ybock	0	11-20-2012 09:17 PM
	Topcon RTCM3 and GLONASS Tracking	ybock	0	08-13-2012 09:42 AM
	GLONASS satellites available in San Diego	ybock	0	07-31-2012 11:17 AM
	SOPAC 20th Anniversary and Your Feedback	Maria Turingan	0	07-06-2012 12:30 PM
	RTCM streams for Trimble/Sokkia Users	ybock	0	06-01-2012 10:37 AM
	Transition to NTRIP	ybock	0	03-13-2012 03:41 PM
	Update from UNAVCO	Maria Turingan	0	02-28-2012 04:09 PM
	UNAVCO-PBO outage	Maria Turingan	0	02-28-2012 01:39 PM
	Extension to March 1	ybock	0	02-12-2012 11:10 AM
	Important: Access to CRTN Data after February 17th	ybock	0	01-26-2012 10:30 AM
	Important CRTN changes	ybock	0	01-17-2012 10:48 AM
	CRTN NTRIP Servers and RTCM3.0	ybock	0	01-05-2012 12:19 AM

[UBBFriend: Email this page to someone!](#)

Author	Topic: CRTN CVSRN stations
ybock Member Member # 17 Member Rated: ★★★★★	<p> posted 03-04-2013 07:24 AM </p> <p>CRTN transmits RTCM3.0 data streams obtained from the Caltrans' Central Valley Spatial Reference Network (CVSRN) server. We now stream data from all 22 stations (P056, P300, P302, P544, P566, RBRU, ALTH, CRCN, *DONO, RAPT, CHOW, DOND, DLNO, LEBC, LEMA, *MULN, TEHA, TAFT, TRLK, SHP5, *JLN5, SIMM). The stations with an asterisk are not currently available. We've also updated the transmitted Epoch 2011.00 NAD83 (NSRS2007) coordinates for those stations that were not part of the Epoch 2011.00 adjustment (except for JLN5 from which we have not yet obtained any data). As such they should be considered as provisional. See http://sopac.ucsd.edu/input/realtime/CRTN_Access.xls, which will be updated later today, for details. The changes are reflected in the CRTN Northern California NTRIP source table @ http://132.239.154.101:2103/. Thanks to Anthony Beliew who pointed out a problem with our RBRU coordinates and to Eric Adney and Bryan Banister at Caltrans for their assistance. Please notify us of any problems that you may experience. --Yehuda</p> <p>Posts: 215 Registered: Feb 2005 IP: Logged</p>





CRTN General Discussion

CRTN General Discussion Recent Visitors: 1				
Art Andrew				
	Topic	Topic Starter	Replies	Last Post
	Single Data Stream or Multiple	J.Morris	1	04-10-2012 09:51 PM
	MWDRTN Server Outage	bwiseman	0	08-26-2011 05:39 PM
	CRTN Topcon Sites - Data Stream Issues	Art Andrew	6	08-04-2011 02:35 PM
	CRTN site GVRS not plotted	Art Andrew	2	03-22-2011 04:37 PM
	Test	Art Andrew	1	10-20-2010 10:43 AM
	Trouble connecting to CRTN stations	ybock	1	10-07-2010 08:04 PM
	High rate (1 sec) data	Jas Arnold	2	09-24-2010 05:00 PM
	RTCM 2.2 Streams	ybock	0	09-16-2010 03:24 PM
	CRTN Access	Robert Shellman	4	09-03-2010 01:27 PM
	CRTN Coordinates?	bwiseman	2	08-24-2010 02:24 PM
	OCGeomatics Link	Art Andrew	1	05-05-2010 02:30 PM
	Post-EQ coordinate change timing inquiry	Marti	0	04-13-2010 08:03 AM
	CRTN map feedback	Marti	1	03-19-2010 01:36 PM
	Coordinates in CRTN Access file	ybock	0	12-29-2009 10:23 AM
	CRTN Coords (GoogleEarth)	Rich Maher	2	12-27-2009 10:37 AM
	RTD Guest	Ken Joyce	2	12-08-2009 02:26 PM
	CRTN access	Wolfgang Ziegler	1	09-21-2009 08:48 AM
	Trimble data collector configuration	Mike Zarlengo	1	08-19-2009 09:44 AM
	Planned MWDRTN Server Outage	bwiseman	0	08-13-2009 12:45 PM
	Highrate Raw Data	jfa5150	6	06-25-2009 12:49 PM
	web availability of proposal 4.0	Marti	1	10-07-2008 01:33 PM
	CRTN Down?	Art Andrew	1	04-15-2008 08:40 AM
	Down Stations in LA County	Ken Joyce	2	08-07-2006 04:03 PM
	CRTN - from Anaheim	Michael Scharber	5	03-21-2006 09:40 AM
	Streaming (via Ntrip Client) Not Working	Fusion Numerics	1	12-21-2005 05:25 PM
	RTK and CORS	J.Morris	2	10-04-2005 11:32 AM





Presentations

CSRC Presentations - Windows Internet Explorer provided by OC Public Works

http://csrc.ucsd.edu/general/presentations.html

File Edit View Favorites Tools Help

Google Search

IntelliTime VTI OCPW Help Desk OCPW Telephone Direc... Hotmail Recent Earthquakes in ... Boundary Geodetic Unit...

CSRC Presentations

 CALIFORNIA SPATIAL REFERENCE CENTER

search

CSRC | SOPAC | Index | Mail | Forums | General | Reports | Contacts

Enter CSRC Data Portal | Maps | Projects

CSRC Presentations

Note: many presentation files are large in size

September 2012 CRTN Workshop

- [California RealTime Network \(CRTN\)](#), Art Andrew
- [CSRN and CGPS: Usage Advantages and Limitations](#), Yehuda Bock
- [Connecting to the CRTN](#), Richard Maher
- [Geoid Models an the Future of Bench Marks](#), Gregory Helmer
- [Geodetic Datums and Reference Frames](#), Michael R. McGee
- [Guidelines for Surveying with the CRTN](#), Dave Olander

October 2008 Semi-Annual Meeting

- [Director's Report](#)

May 2008 CSRC Coordinating Council Meeting

- [Wisconsin Height Modernization](#)
- [CRTN Discussion](#)
- [Director's Report](#)

April 2006 CSRC Semi-Annual Meeting

- [Future of NGS](#), Dru Smith
- [Public Resources Code Revision](#), Dick Davis
- [Director's Report](#), Yehuda Bock
- [REASoN Project Update](#), Frank Webb
- [PBO Update](#), Brian Coyle/Chris Walls





CRTN





California Real Time Network



- ❖ CRTN is a multipurpose statewide real-time network that utilizes the existing geophysical CGPS infrastructure in California.
- ❖ CRTN provides the backbone for the geodetic control network that is outlined in the CSRC Master Plan.
- ❖ CRTN provides accurate and reliable real-time positioning services that are consistent and in a common reference system – California Spatial Reference System (CSRS).
- ❖ CRTN fulfills the requirements of the California Public Resources Codes 8856(c)(e), 8857(c), and 8858(b) for GPS-derived geodetic coordinates and orthometric heights.
- ❖ CRTN offers (free) RTCM data streams for single-base RTK positioning with respect to the CSRS reference epoch (2011.00)
- ❖ CRTN offers multiple real-time data streams to Contributing and Consortium members.





CRTN – Real-Time Data Access

- March 1, 2012 – real-time data available with NTRIP
- A user account is required and requested by emailing the CSRC director, Yehuda Bock (ybock@ucsd.edu)
- 162 organizations registered
- 194 individual NTRIP accounts





CRTN – NTRIP

Northern California

IP: 132.239.154.101

Port: 2103

Southern California

IP: 132.239.152.74

Port: 2103

RTCM 3.0

CSRC 2011.00 Epoch

NAD83 (NSRS2007)

Coordinates

176 – North

163 - South

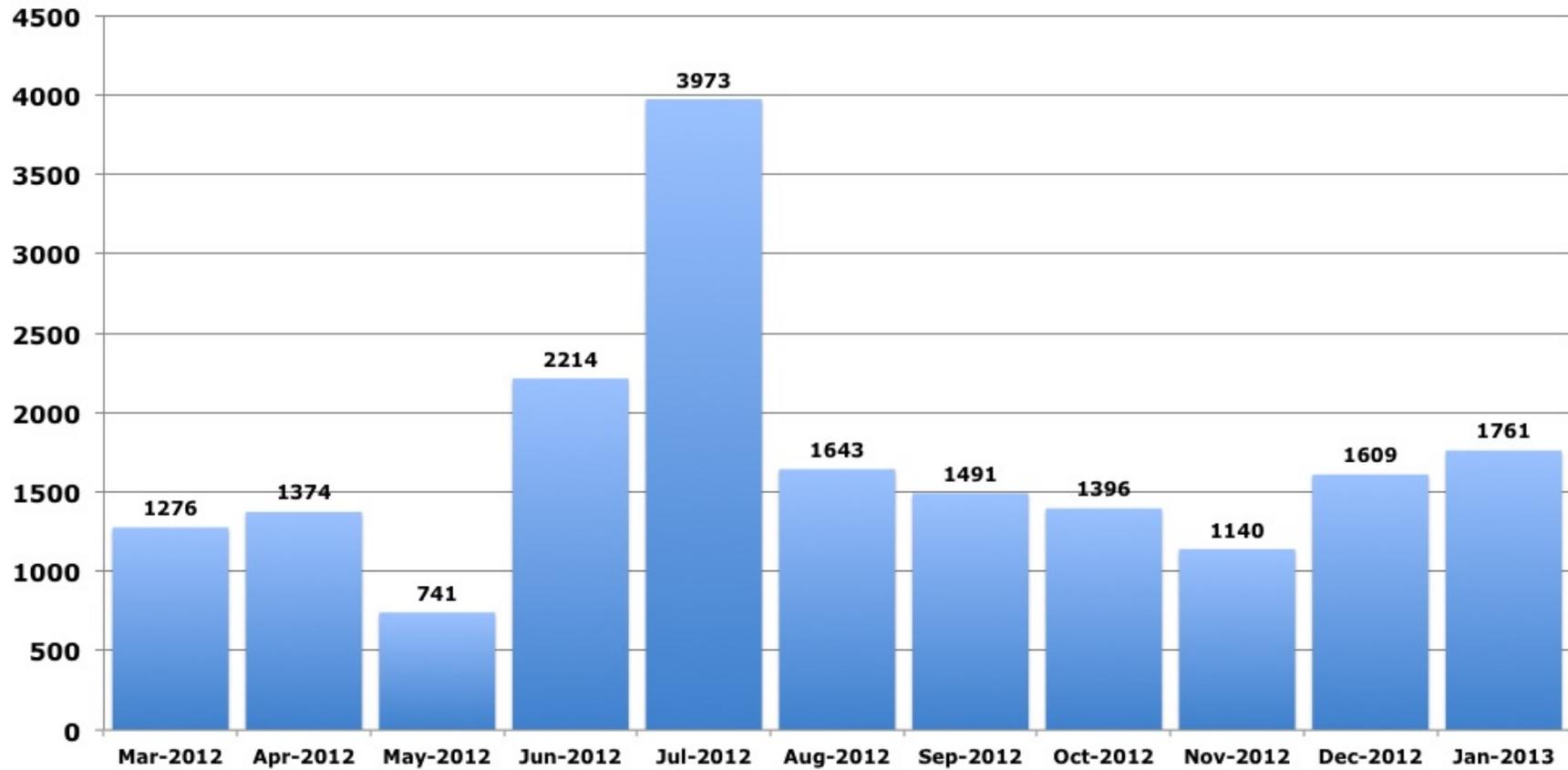


Northern California
Southern California



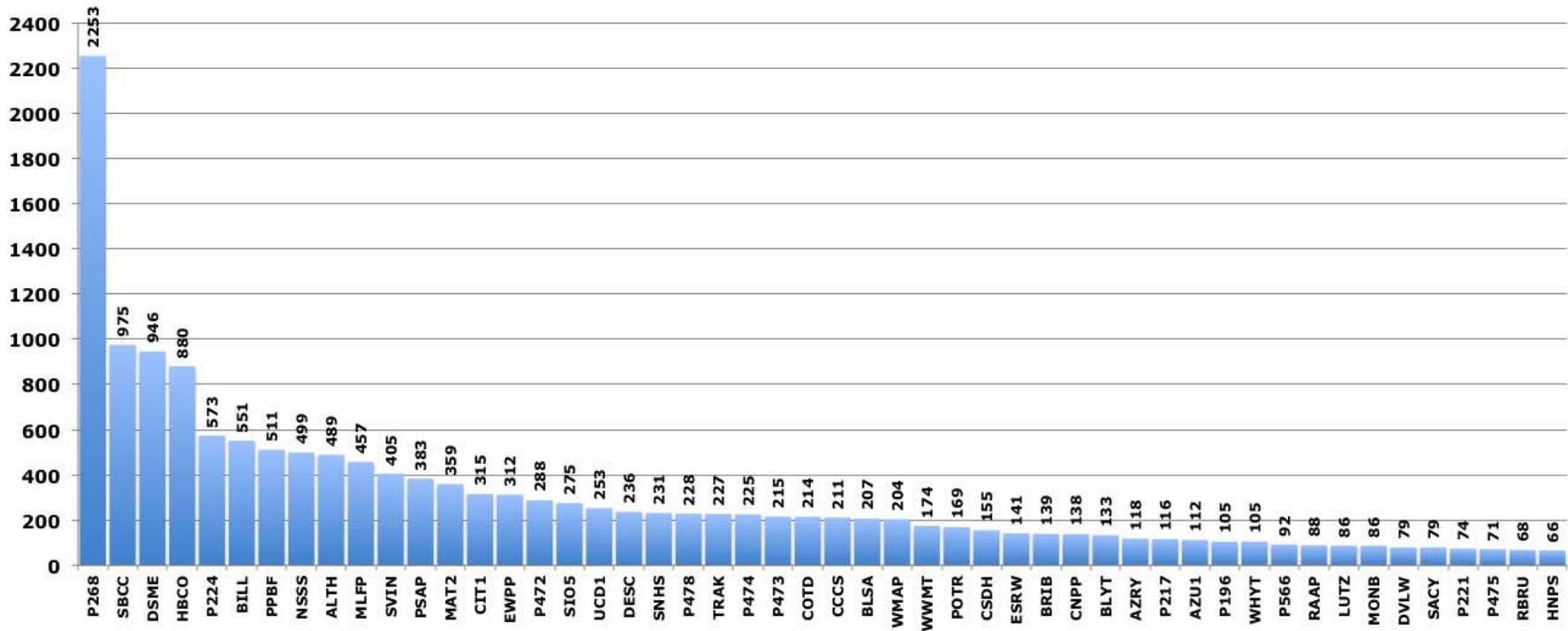


Number of CRTN NTRIP Connections by Login





**Number of CRTN NTRIP Connections by Station
from February 2012 to January 2013 (Top 50 Stations with Total Connections ≥ 66)**





Relevant CRTN Metadata

Essential:

- ***Coordinates of CGPS stations – CSRS Epoch 2011.00 NAD83 (NSRS2007)***
- ***Type/manufacturer of antenna***
- ***Type/manufacturer of receiver***
- ***Antenna reference point (ARP)***
- ***Antenna offsets from reference point (height, mainly)***

Optional:

- ***Receiver serial number***
- ***Antenna serial number***

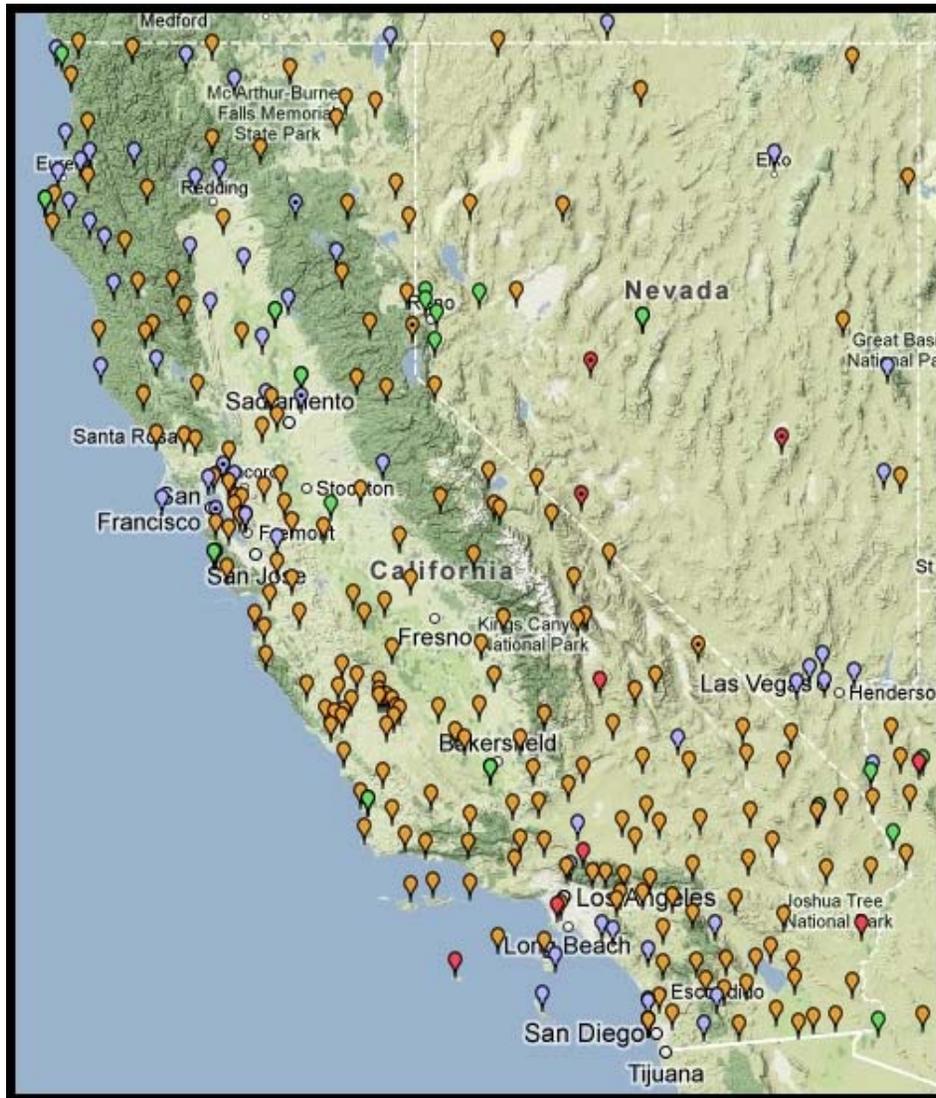
Transmitted in RTCM 3.0 message for real-time stations





NGS CORS





NGS CORS

NAD83(2011), epoch 2010.00

258 in California

235 (91%) are part of CSRN

148 (57%) are part of CRTN Backbone

93 (36%) are part of CRTN





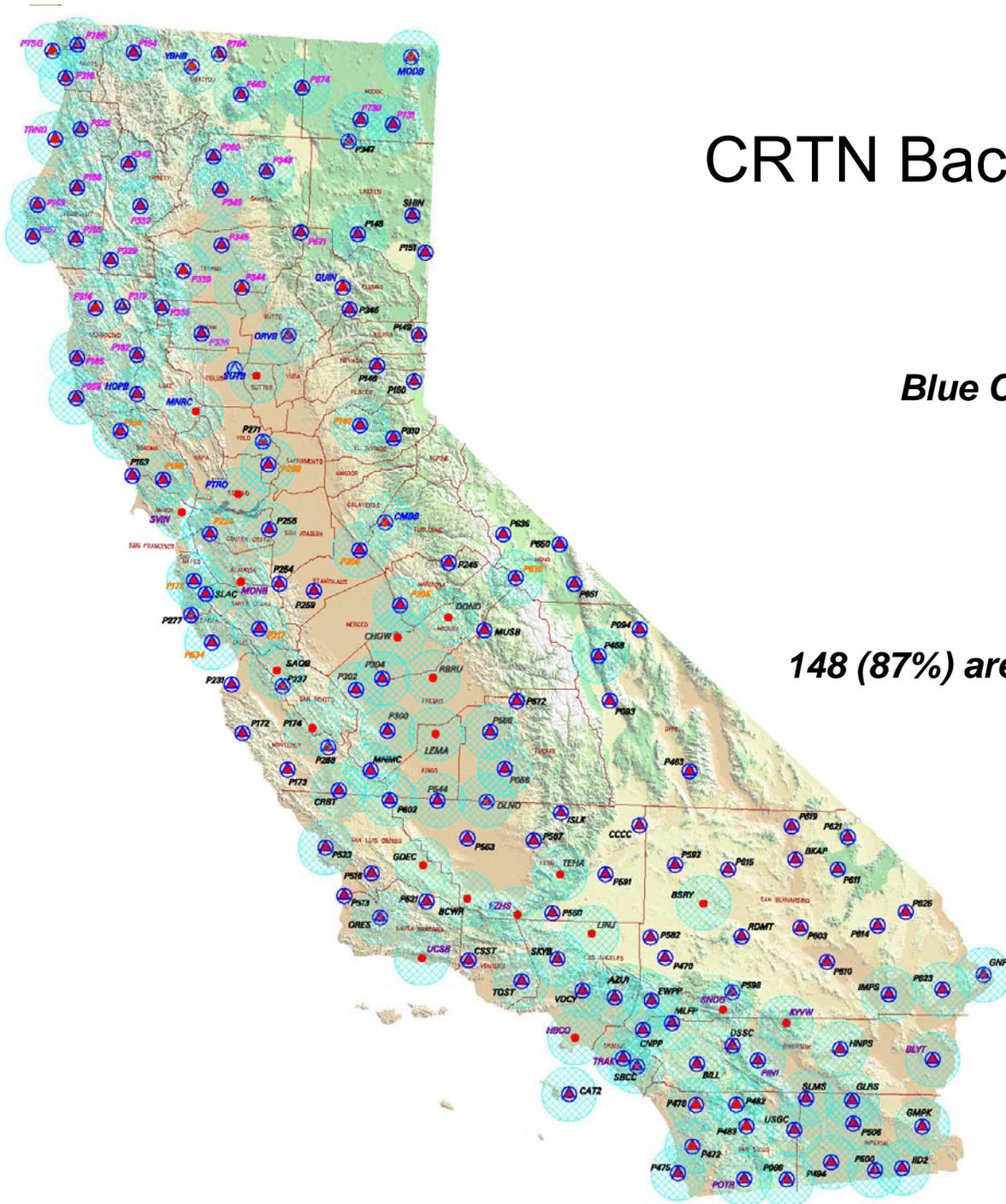
CRTN Backbone / NGS CORS

Based on 50 km Grid

Blue Circles = 25km (15.5 mile) Radius

*170 existing CGPS stations
from various networks*

148 (87%) are part of the NGS CORS Network



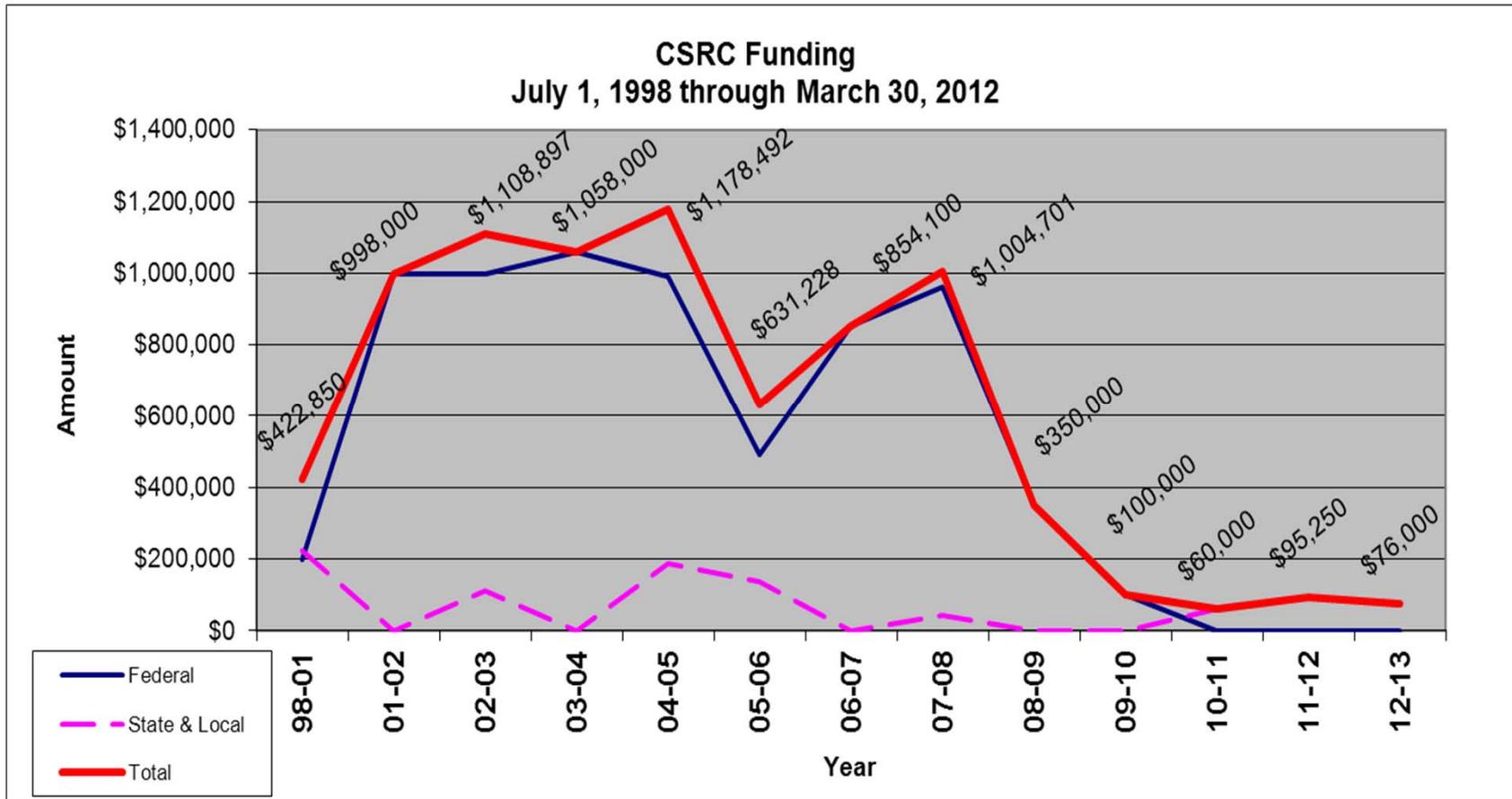


CSRC Funding





CSRC – Funding



*Current budget is based on CRTN Consortium fees.
CSRC benefits from other funded SOPAC projects.*





CRTN – Consortium/Contributing Members



- ***CRTN Consortium Membership Tiers:***
 - **CRTN Contributing Members:** donate \$1,000 annually, which provides access to a **second** NTRIP account for real-time access to RTCM 3.0 data (all users have free access to a single account). Additional access increases by \$1,000 per account. Please note that contributing members do not participate in oversight/management of the network.
 - **CRTN Consortium Members:** contribute \$15,000 annually, which provides access to any 20 real-time CGPS sites 24/7. This membership has voting privileges on the CRTN Consortium, which oversees the development and management of the network.
 - **Statewide CRTN Consortium Members:** contributes \$150,000 annually to fund CRTN and has access to **ALL** real-time CGPS sites 24/7. This membership has voting privileges but is limited to three voting members, and also includes being part of the team that will oversee the development and management of the network.





Current Membership

- Consortium Members

- County of Orange
- San Diego County
- City of Los Angeles
- Riverside County Flood Control District
- Santa Clara Valley Water District
- Riverside County Transportation
- Long Beach Gas & Oil (pending)

- Contributing Members

- East Bay Municipal Utility District
- East Bay Regional Park District





CSRC/CRTN Donations

ONLINE GIVING



Gift and Personal Information



★ required

Your Gift Information



QUESTIONS?

UC San Diego Gift Processing
 (858) 534-4493
onlinegift@ucsd.edu

The California Real Time Network (CRTN) is a multipurpose statewide real-time network that utilizes the existing geophysical GPS infrastructure in California and provides the backbone for the geodetic control network that is outlined in the California Spatial Reference Center (CSRC) Master Plan. It provides accurate and reliable real-time positioning services that are consistent and on a common reference system, the California Spatial Reference System (CSRS), which fulfills the requirements of the California Public Resources Codes 8856(c)(e), 8857(c), and 8858(b) for GPS-derived geodetic coordinates and orthometric heights. CRTN offers multiple real-time data streams to CRTN Consortium Members as well as free open access to RTCM data streams for single-base RTK positioning with respect to the CSRS.

Your donation will be used towards operating and maintaining CRTN and our data services. You will receive a charitable donation receipt for your files. If you would like to become a CRTN Consortium Member or need additional information, please call or email Maria Turingan at (858) 822-2156 or mariaturingan@ucsd.edu.

When you submit personal information to us, we use a secure server and a secure server software (SSL) that encrypts all information you input. We keep information about you secure and confidential. However, if you would prefer to send your donation by mail, please write a check to "The Regents of the University of California," email Maria so we can be on the look out for it, and address it as follows: Attention: Maria Turingan; Dept. IGPP, SIO, UCSD; 9500 Gilman Drive #0225, La Jolla, CA 92093.

Thank you for your donation!

Fund **California Real Time Network Support (86384)**

Comment

Payment





Projects at SOPAC/CSRC

- Developing prototype early warning system along the West coast
- Re-analyzing of all CGPS data since 1992 in ITRF2008
- Planning to publish new CSRS epoch-date coordinates tied to NGS National Adjustment of 2011 (NA2011), NAD 83(2011) epoch 2010.00 – can be provided for multiple reference epochs
- Planning to implement statewide “network solution” for CRTN users, based on precise point positioning (PPP) architecture developed at SOPAC using troposphere and ionosphere models, accessible through NTRIP servers and existing field equipment
- Planning to modernize websites (CSRC, SOPAC, CRTN)





Questions?



(Left to right) Charlie Challstrom - NGS Director; Yehuda Bock, Bill Young, Charles Kennel - SIO Director

