

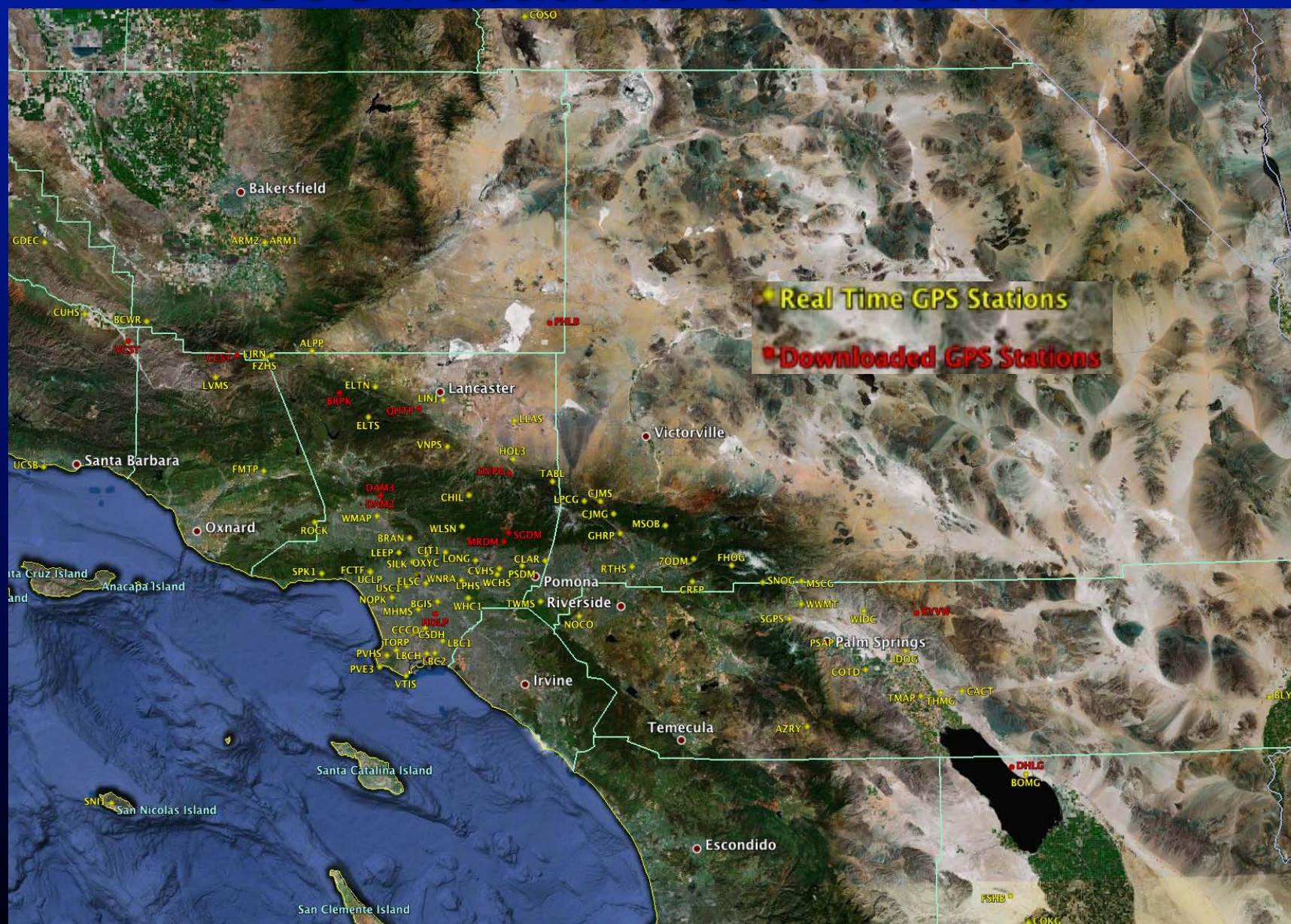
# GPS Networks in California

Dan Determan, U.S. Geological Survey  
CSRC Coordinating Council Meeting, San Diego, CA.  
May 16, 2013





# USGS Pasadena GPS Network





# USGS Pasadena Uses SCIGN Website

Browser address bar: <http://www.scign.org/realtime>

Browser tabs: <https://gsca...r.usgs.gov/> DOI Remote Access SCIGN | Apple Yahoo! Google Maps YouTube Wikipedia News (1,203) Popular >>

SCIGN SOUTHERN CALIFORNIA INTEGRATED GPS NETWORK

Navigation menu: DATA PRODUCTS **REALTIME** REPORTS SITES

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- » [USGS Time Series](#)

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- [Import](#)
- [My account](#)
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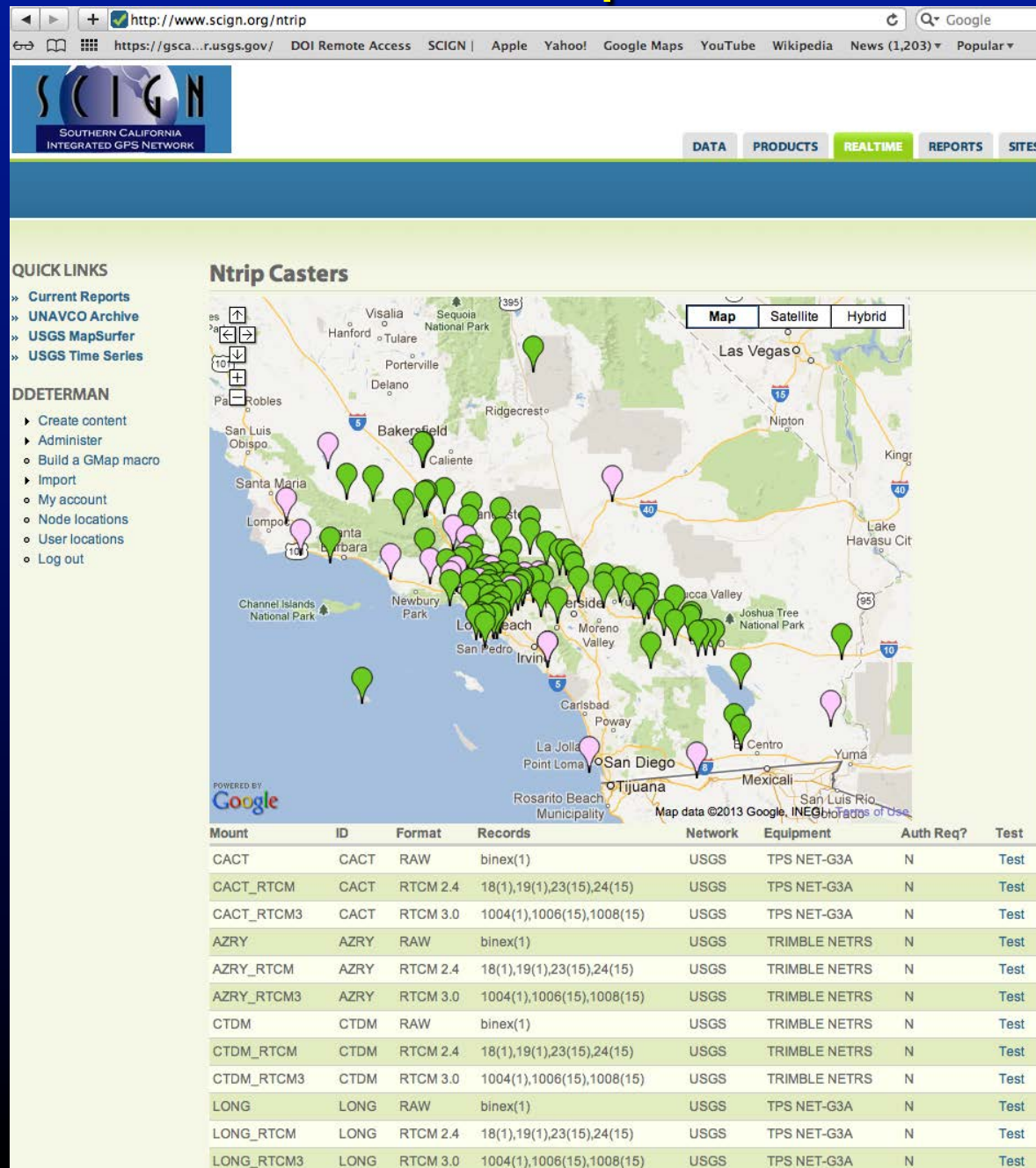
**VIEW EDIT TRACK**

## Real Time at USGS


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[NTrip Source Table](#)  
[Ustream Statistics](#)  
[NTrip Access Information](#)  
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# USGS Pasadena Ntrip Casters Status



# Accessing Real-Time GPS Data



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REALTIME PROCESS MENU

- ANZA
- ANZA\_1
- OXY
- SSAFa
- coachella\_valley\_salton\_sea
- el\_tunnel
- eltn\_elts
- elts\_eltn
- kfs\_test
- la\_nw
- la\_south
- lisowski
- northwest
- pppar
- san\_gabriel
- san\_gorgonio\_pass
- thmg\_tmap
- tmap\_thmg

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## Realtime Output Data Access

The output for the real time data runs through our [RabbitMQ server](#) and is available through our [NodeJS powered SocketIO](#) instance.

The simplest case to access the data directly is to do the following:

1. [Install NodeJS](#)
2. [Install Socket.io-client](#)
3. Download the [rt\\_client.txt](#) script attached to this post and rename to `rt_client.js`

You will need to copy the script into the same directory as the `node_modules` directory created by installing the `Socket.IO-client` package in order for the libraries to be found.

The script includes a subroutine called `"printData"` which shows how to handle the JSON formatted output messages properly. You can rewrite this procedure to handle the data properly.

The `timetag` is a Unix `TimeStamp` (number of seconds since Jan 1, 1970). An example of how to use is in the script.

Running the script without argument will attach to our server and stream all of the output data for every region. You can limit the data output by adding a command line argument as a single `'` separated string with the following entries:

`[Processing Engine].[Region].[Site Code].[Solution Type]`


All 4 elements must be in place. A `*` will act as a wild card.

For example, to get all RTNet processed data for site code `"WHC1"`, the following command would be used:

```
node rt_client.js RTNet.*.WHC1.*
```

Attachment	Size
<a href="#">rt_client.js</a>	2.11 KB

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# Current Real Time Processing Regions

SCIGN SOUTHERN CALIFORNIA INTEGRATED GPS NETWORK

DATA PRODUCTS REALTIME REPORTS SITES

QUICK LINKS

- Current Reports
- UNAVCO Archive
- USGS MapSurfer
- USGS Time Series

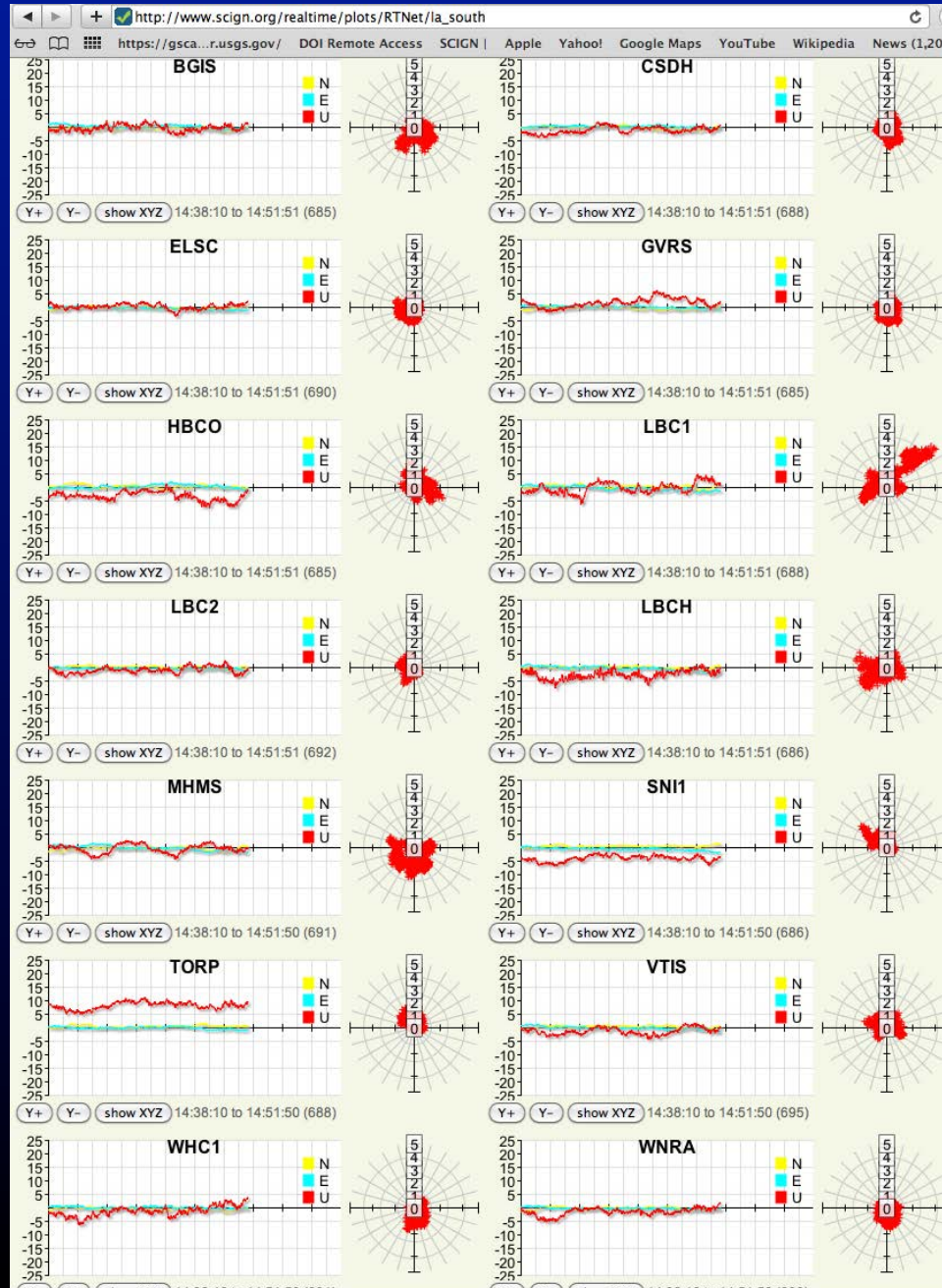
DETERMAN

- Create content
- Administer
- Build a GMap macro
- Import
- My account
- Node locations
- User locations
- Log out

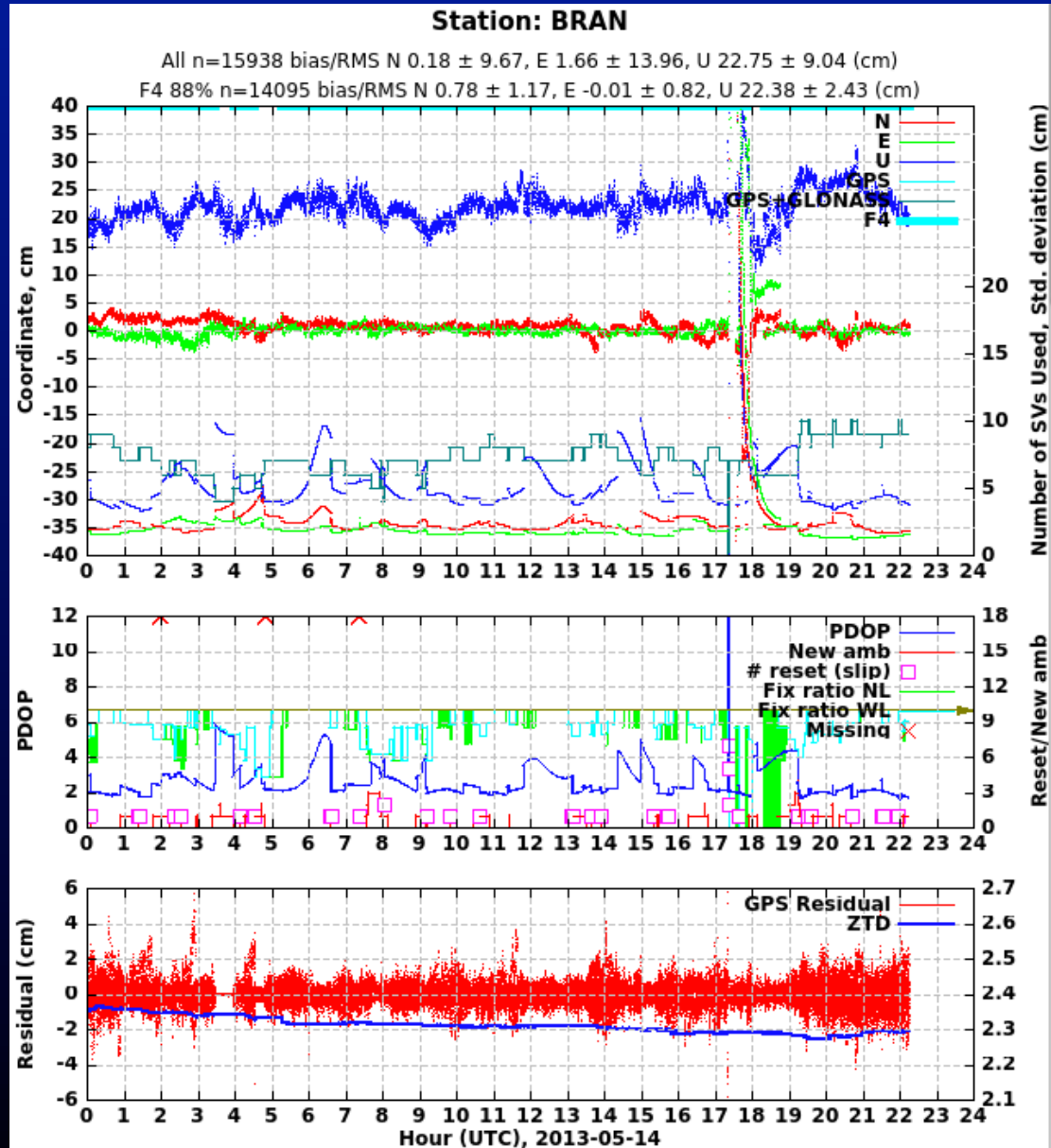
Process Name	Base Station	Enable RTNet	Enable TrackRT	Roaming Stations
7odm_crfp	7ODM			CRFP
ANZA	NOCO	Enable		AZRY
				COTD
				IDOG
				IDQG
				PSAP
				sgps
				TMAP
				WIDC
				WWMT
ANZA_1	PSAP	Enable		AZRY
				CACT
				COTD
				IDOG
				IDQG
				MSCG
				sgps
				THMG
				TMAP
				WIDC
				WWMT
coachella_valley_salton_sea	TMAP	Enable	Enable	AZRY
				BLYT
				BOMG
				CACT
				FSHB
				IDOG
				IDQG
				MSCG
				PSAP
				SNOG
crfp_7odm	CRFP			7ODM
eltn_elts	ELTN	Enable		elts
elts_eltn	elts	Enable		ELTN
el_tunnel	OXYC	Enable		ELTN
				elts
fzhs_ljrn	FZHS			LJRN
kfs_test	FZHS	Enable		LJRN



# RTNet Regional Plots



# RTNet PPPAR Real Time Plots

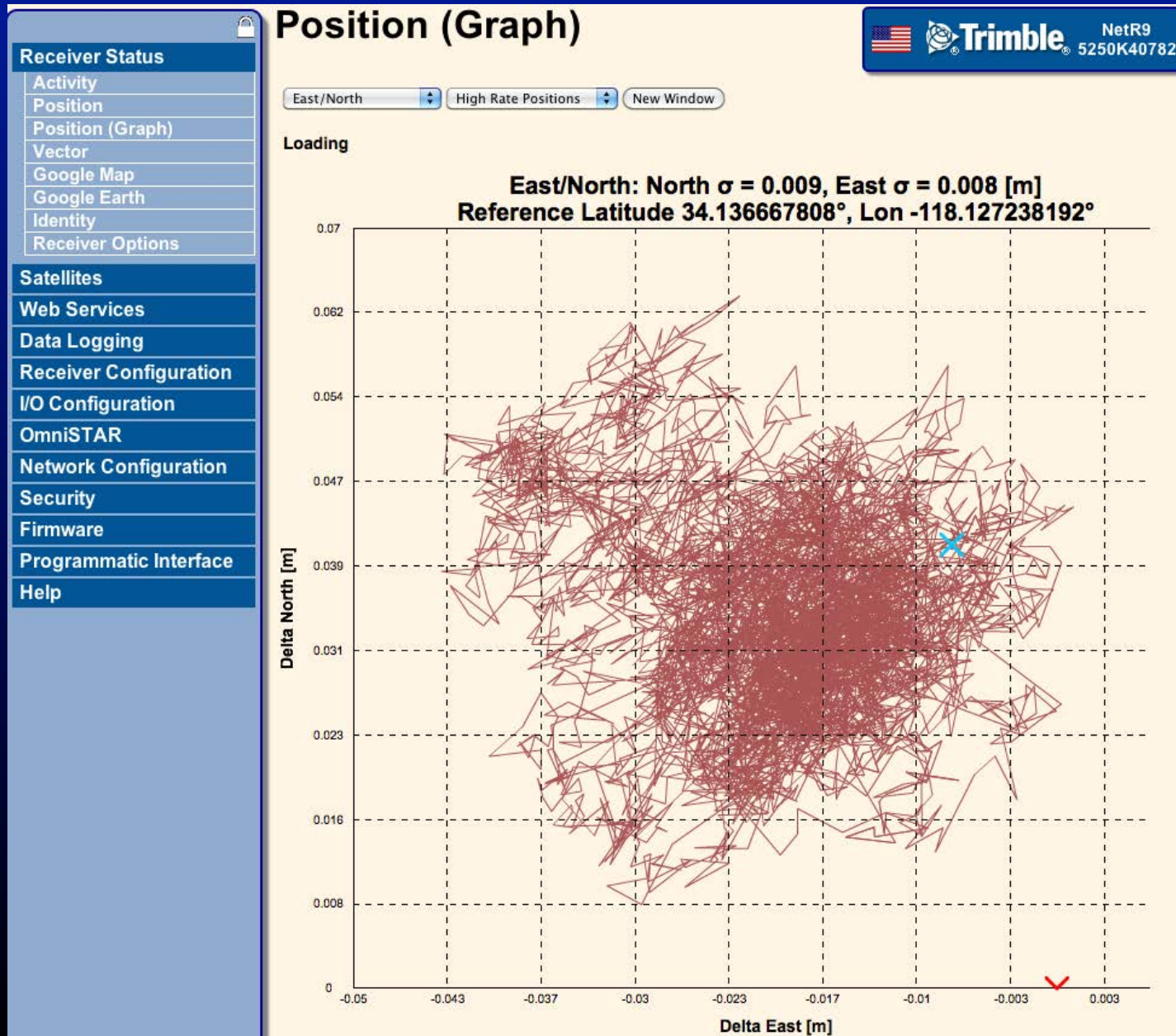


Plot updated: less than a minute ago

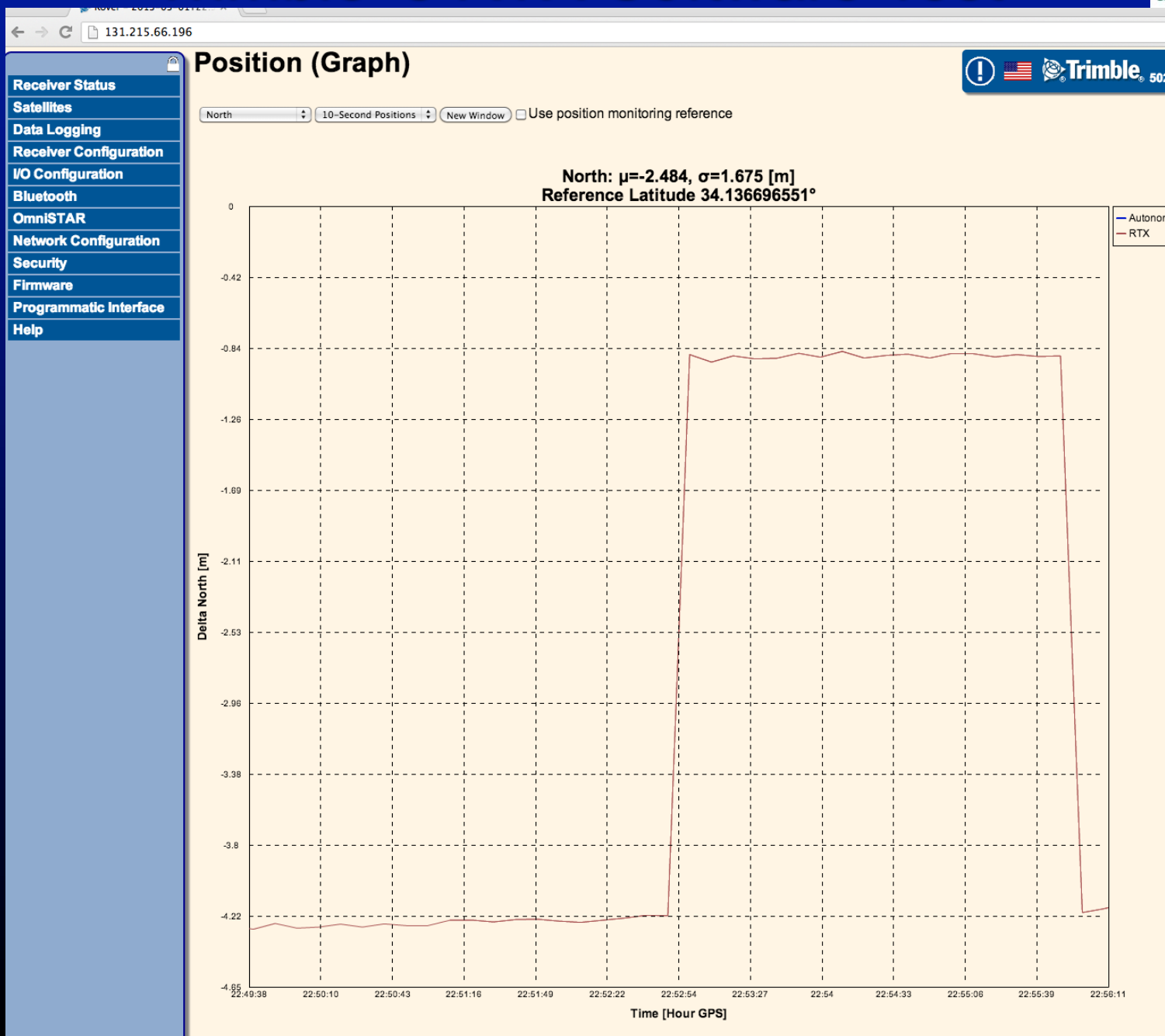
Copyright 2012 GPS Solutions



# Trimble's RTX Software Plots



# Trimble's RTX Software Test





# ZABBIX: Pasadena's Monitoring

http://noc2.stratait.com/dashboard.php?sid=0161722f36211511

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**ZABBIX**

Monitoring | Inventory | Reports

Dashboard | Overview | Web | Latest data | Triggers | Events | Graphs | Screens | Maps | IT services |

History: Custom graphs » Custom screens » Network maps » IT services » Custom graphs

PERSONAL DASHBOARD

System status

Host group	Disaster	High	Average	Warning	Information	Not classified
USGS Freewaves	0	0	0	0	0	0
USGS GPS Sites	0	8	8	0	0	0
USGS NAS	0	0	1	0	0	0
USGS Servers	0	3	3	0	0	0
USGS Topcons	0	0	0	0	0	0
USGS Trimble	0	8	8	0	0	0

Updated: 15:48:50

Host status

Host group	Without problems	With problems	Total
USGS Freewaves	4	0	4
USGS GPS Sites	87	8	95
USGS NAS	1	1	2
USGS Servers	5	6	11
USGS Topcons	83	0	83
USGS Trimble	4	8	12

Updated: 15:49:49

Last 20 Issues



Host	Issue	Last change	Age	Ack	Actions
jbay.gps.caltech.edu	Processor load is too high on jbay.gps.caltech.edu	15 May 2013 09:15:07	6h 34m 42s	No	-
topanga.gps.caltech.edu	Processor load is too high on topanga.gps.caltech.edu	15 May 2013 07:39:49	8h 10m	No	-
FCTF	WEB (HTTP) server is down on FCTF	15 May 2013 05:14:04	10h 35m 45s	No	-
FCTF	Trimble Real Time Port on FCTF	15 May 2013 05:10:37	10h 39m 12s	No	-
steamers.gps.caltech.edu	Processor load is too high on steamers.gps.caltech.edu	10 May 2013 21:21:55	4d 18h 27m	No	-
WIDC	WEB (HTTP) server is down on WIDC	10 Apr 2013 16:40:54	1m 4d	No	-
MSOB	WEB (HTTP) server is down on MSOB	10 Apr 2013 16:40:26	1m 4d	No	-
LJRN	WEB (HTTP) server is down on LJRN	10 Apr 2013 16:40:23	1m 4d	No	-
IDQG	WEB (HTTP) server is down on IDQG	10 Apr 2013 16:40:17	1m 4d	No	-
IDOG	WEB (HTTP) server is down on IDOG	10 Apr 2013 16:40:16	1m 4d	No	-
WIDC	Trimble Real Time Port on WIDC	10 Apr 2013 16:36:30	1m 4d	No	-
LJRN	Trimble Real Time Port on LJRN	10 Apr 2013 16:36:25	1m 4d	No	-
IDQG	Trimble Real Time Port on IDQG	10 Apr 2013 16:36:17	1m 4d	No	-
IDOG	Trimble Real Time Port on IDOG	10 Apr 2013 16:36:12	1m 4d	No	-
MSOB	Trimble Real Time Port on MSOB	10 Apr 2013 16:35:59	1m 4d	No	-
COSO	WEB (HTTP) server is down on COSO	10 Apr 2013 12:54:58	1m 5d	No	-
FZHS	WEB (HTTP) server is down on FZHS	10 Apr 2013 12:54:04	1m 5d	No	-
FZHS	Trimble Real Time Port on FZHS	10 Apr 2013 12:50:36	1m 5d	No	-
COSO	Trimble Real Time Port on COSO	10 Apr 2013 12:50:29	1m 5d	No	-

# ZABBIX: Overview Tab

Navigation bar: [Monitoring](#) | [Inventory](#) | [Reports](#)

Dashboard | **Overview** | Web | Latest data | Triggers | Events | Graphs | Screens | Maps | IT services | SEARCH:

History: Custom screens » Network maps » IT services » Custom graphs » Dashboard


OVERVIEW  

Group:  Type:

Hosts location:

Triggers	ALPP	ARM1	ARM2	BCWR	BGIS	BLYT	BOMG	BRAN	BRPK	CACT	CCCO	CHIL	CIT1	CJMS	CLAR	CMP8	CMP9	COSO	COTD	CRFP	CSDH	CSN1	CUHS	CVHS	DAM2	DAM3	DHLG	DVPB	DYH2	ELSC	ELTN	ELTS	FCTF	FHOG
Low Voltage on {HOSTNAME}	Green	Green	Green	Green	Green	White	Green	Green	Grey	Green	Green	Green	Green	Green	Green	Grey	Green	White	Grey	Green	Green	Green	Green	Grey	Grey	Grey	Grey	Green	Green	Grey	Green	White	Green	
Trimble Real Time Port on {HOSTNAME}	Grey	Grey	Grey	Grey	Grey	Green	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Red	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Red	Grey	
WEB (HTTP) server is down on {HOSTNAME}	Grey	Grey	Grey	Grey	Green	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Red	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Red	Grey	

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# ZABBIX: Latest Data Tab

http://noc2.straitait.com/latest.php?open=1&applicationid=0&groupid=12&hostid=0&fullscreen=0&select=&sid Google

https://gsca...r.usgs.gov/ DOI Remote Access SCIGN | Apple Yahoo! Google Maps YouTube Wikipedia News (1,208)

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Monitoring Inventory Reports

Dashboard Overview Web Latest data Triggers Events Graphs Screens Maps IT services SEARCH:

History: Custom graphs » Dashboard » Overview » Status of Web monitoring » Latest data

LATEST DATA

ITEMS Group: USGS GPS Sites Host: all

Filter

Show items with description like

Filter Reset

Host	Description	Last check	Last value	Change	History
ALPP	- other - (4 Items)				
	Backup Power	15 May 2013 15:45:17	3.76 Volts	-	<a href="#">Graph</a>
	Board Temperature	15 May 2013 15:45:17	50.9 celsius	-	<a href="#">Graph</a>
	Board Voltage	15 May 2013 15:45:17	14 Volts	-0.4 Volts	<a href="#">Graph</a>
	External Voltage	15 May 2013 15:45:17	14 volts	-0.4 volts	<a href="#">Graph</a>
ARM1	- other - (4 Items)				
	Backup Power	15 May 2013 15:45:20	3.7 Volts	+0.02 Volts	<a href="#">Graph</a>
	Board Temperature	15 May 2013 15:45:20	57.6 celsius	+0.2 celsius	<a href="#">Graph</a>
	Board Voltage	15 May 2013 15:45:20	13.5 Volts	-	<a href="#">Graph</a>
	External Voltage	15 May 2013 15:45:20	13.5 volts	-	<a href="#">Graph</a>
ARM2	- other - (4 Items)				
	Backup Power	15 May 2013 15:45:22	3.74 Volts	+0.01 Volts	<a href="#">Graph</a>
	Board Temperature	15 May 2013 15:45:22	60.6 celsius	+0.2 celsius	<a href="#">Graph</a>
	Board Voltage	15 May 2013 15:45:22	13.6 Volts	+0.1 Volts	<a href="#">Graph</a>
	External Voltage	15 May 2013 15:45:22	13.6 volts	+0.1 volts	<a href="#">Graph</a>
BCWR	- other - (4 Items)				
	Backup Power	15 May 2013 15:45:25	3.73 Volts	-	<a href="#">Graph</a>
	Board Temperature	15 May 2013 15:45:25	48.4 celsius	+0.2 celsius	<a href="#">Graph</a>
	Board Voltage	15 May 2013 15:45:26	14 Volts	-0.2 Volts	<a href="#">Graph</a>
	External Voltage	15 May 2013 15:45:25	14 volts	-0.2 volts	<a href="#">Graph</a>
BGIS	- other - (4 Items)				
	Backup Power	15 May 2013 15:45:30	3.7 Volts	-	<a href="#">Graph</a>
	Board Temperature	15 May 2013 15:45:30	48.5 celsius	-0.1 celsius	<a href="#">Graph</a>
	Board Voltage	15 May 2013 15:45:30	12 Volts	+0.2 Volts	<a href="#">Graph</a>
	External Voltage	15 May 2013 15:45:30	12 volts	+0.2 volts	<a href="#">Graph</a>
BLYT	- other - (4 Items)				
	FTP Port	15 May 2013 15:43:46	1	-	<a href="#">Graph</a>
	ICMP ping	15 May 2013 15:53:44	Up (1)	-	<a href="#">Graph</a>
	Trimble Real Time Port	15 May 2013 15:54:15	1	-	<a href="#">Graph</a>
	WEB (HTTP) server is running	15 May 2013 15:53:44	Up (1)	-	<a href="#">Graph</a>
BOMG	- other - (4 Items)				
	Backup Power	15 May 2013 15:45:33	3.73 Volts	-0.01 Volts	<a href="#">Graph</a>

# ZABBIX: Triggers Tab



Browser address bar: [http://noc2.stratait.com/tr\\_status.php?sid=0161722f36211511](http://noc2.stratait.com/tr_status.php?sid=0161722f36211511)

Navigation links: [Help](#) | [Get support](#) | [Print](#) | [Profile](#) | [Logout](#)

**ZABBIX**

Monitoring | Inventory | Reports

Dashboard | Overview | Web | Latest data | **Triggers** | Events | Graphs | Screens | Maps | IT services | SEARCH:

History: Custom graphs » Dashboard » Overview » Status of Web monitoring » Latest data

STATUS OF TRIGGERS [15 May 2013 15:55:28]

**TRIGGERS**

Group:  Host:

Displaying 1 to 16 of 16 found

Filter

<input type="checkbox"/>	Severity	Status	Last change	Age	Acknowledged	Host	Name	Comments
<input type="checkbox"/>	Average	PROBLEM	<a href="#">15 May 2013 05:14:04</a>	10h 41m 29s	<a href="#">Acknowledge</a> (436)	FCTF	WEB (HTTP) server is down on FCTF	<a href="#">Add</a>
<input type="checkbox"/>	High	PROBLEM	<a href="#">15 May 2013 05:10:37</a>	10h 44m 56s	<a href="#">Acknowledge</a> (2071)	FCTF	Trimble Real Time Port on FCTF	<a href="#">Add</a>
<input type="checkbox"/>	Average	PROBLEM	<a href="#">10 Apr 2013 16:40:54</a>	1m 4d	<a href="#">Acknowledge</a> (1)	WIDC	WEB (HTTP) server is down on WIDC	<a href="#">Add</a>
<input type="checkbox"/>	Average	PROBLEM	<a href="#">10 Apr 2013 16:40:26</a>	1m 4d	<a href="#">Acknowledge</a> (1)	MSOB	WEB (HTTP) server is down on MSOB	<a href="#">Add</a>
<input type="checkbox"/>	Average	PROBLEM	<a href="#">10 Apr 2013 16:40:23</a>	1m 4d	<a href="#">Acknowledge</a> (1)	LJRN	WEB (HTTP) server is down on LJRN	<a href="#">Add</a>
<input type="checkbox"/>	Average	PROBLEM	<a href="#">10 Apr 2013 16:40:17</a>	1m 4d	<a href="#">Acknowledge</a> (1)	IDQG	WEB (HTTP) server is down on IDQG	<a href="#">Add</a>
<input type="checkbox"/>	Average	PROBLEM	<a href="#">10 Apr 2013 16:40:16</a>	1m 4d	<a href="#">Acknowledge</a> (1)	IDOG	WEB (HTTP) server is down on IDOG	<a href="#">Add</a>
<input type="checkbox"/>	High	PROBLEM	<a href="#">10 Apr 2013 16:36:30</a>	1m 4d	<a href="#">Acknowledge</a> (1)	WIDC	Trimble Real Time Port on WIDC	<a href="#">Add</a>
<input type="checkbox"/>	High	PROBLEM	<a href="#">10 Apr 2013 16:36:25</a>	1m 4d	<a href="#">Acknowledge</a> (1)	LJRN	Trimble Real Time Port on LJRN	<a href="#">Add</a>
<input type="checkbox"/>	High	PROBLEM	<a href="#">10 Apr 2013 16:36:17</a>	1m 4d	<a href="#">Acknowledge</a> (1)	IDQG	Trimble Real Time Port on IDQG	<a href="#">Add</a>
<input type="checkbox"/>	High	PROBLEM	<a href="#">10 Apr 2013 16:36:12</a>	1m 4d	<a href="#">Acknowledge</a> (1)	IDOG	Trimble Real Time Port on IDOG	<a href="#">Add</a>
<input type="checkbox"/>	High	PROBLEM	<a href="#">10 Apr 2013 16:35:59</a>	1m 4d	<a href="#">Acknowledge</a> (1)	MSOB	Trimble Real Time Port on MSOB	<a href="#">Add</a>
<input type="checkbox"/>	Average	PROBLEM	<a href="#">10 Apr 2013 12:54:58</a>	1m 5d	<a href="#">Acknowledge</a> (1)	COSO	WEB (HTTP) server is down on COSO	<a href="#">Add</a>
<input type="checkbox"/>	Average	PROBLEM	<a href="#">10 Apr 2013 12:54:04</a>	1m 5d	<a href="#">Acknowledge</a> (379)	FZHS	WEB (HTTP) server is down on FZHS	<a href="#">Add</a>
<input type="checkbox"/>	High	PROBLEM	<a href="#">10 Apr 2013 12:50:36</a>	1m 5d	<a href="#">Acknowledge</a> (2065)	FZHS	Trimble Real Time Port on FZHS	<a href="#">Add</a>
<input type="checkbox"/>	High	PROBLEM	<a href="#">10 Apr 2013 12:50:29</a>	1m 5d	<a href="#">Acknowledge</a> (1)	COSO	Trimble Real Time Port on COSO	<a href="#">Add</a>

Bulk acknowledge  Go (0)

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# ZABBIX: Events Tab



Browser address bar: <http://noc2.stratait.com/events.php?sid=0161722f36211511>

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ZABBIX Monitoring Inventory Reports

Dashboard Overview Web Latest data Triggers **Events** Graphs Screens Maps IT services SEARCH:

History: Dashboard » Overview » Status of Web monitoring » Latest data » Status of triggers

HISTORY OF EVENTS ON 15 May 2013 15:56:23

**EVENTS** Group: USGS GPS Sites Host: all

Displaying 1 to 50 of 261 found

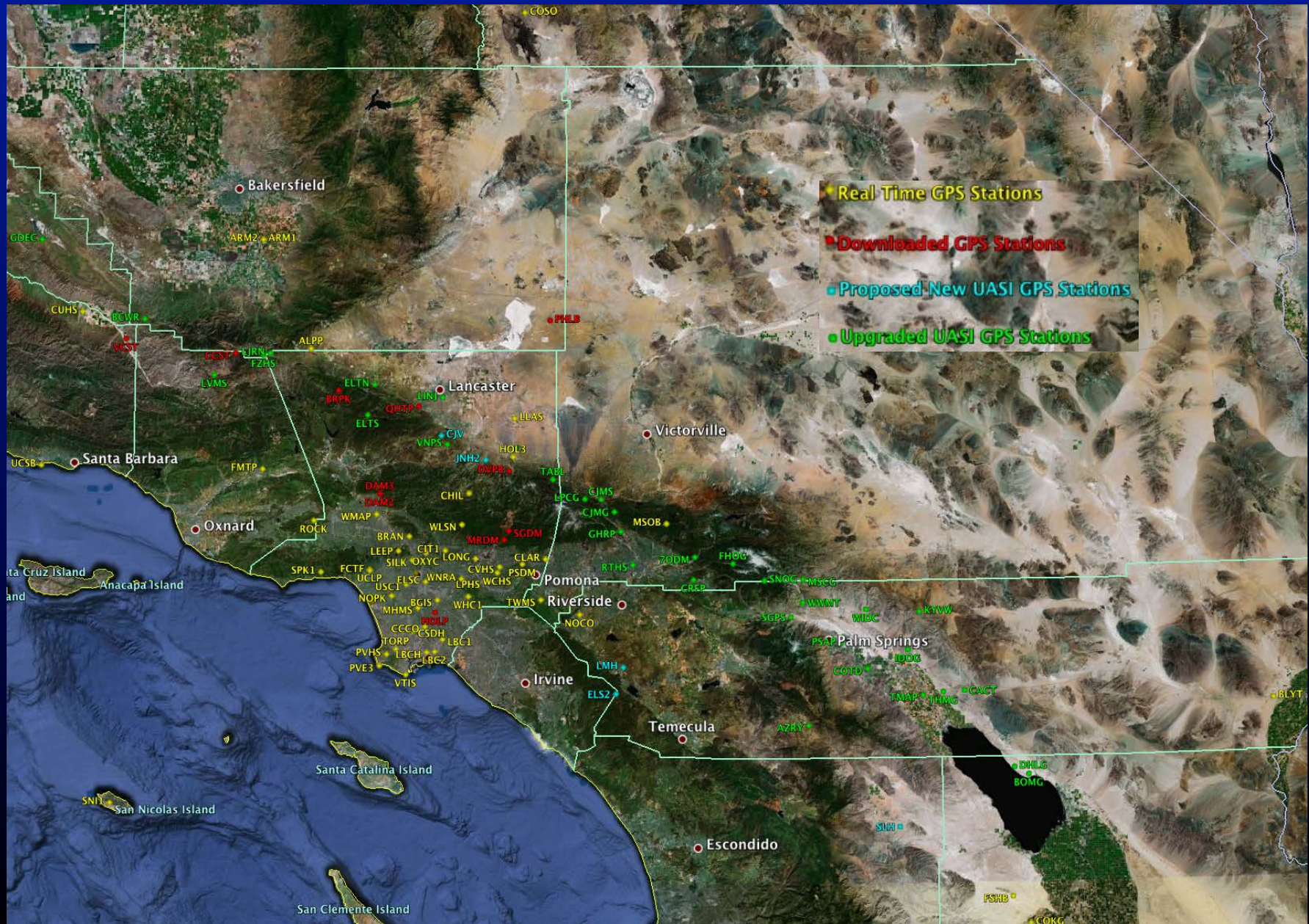
Filter

1 | 2 | 3 | 4 | 5 | 6 | Next >

Time	Host	Description	Status	Severity	Duration	Ack	Actions
2013.May.15 05:14:04	FCTF	<a href="#">WEB (HTTP) server is down on FCTF</a>	PROBLEM	Average	10h 42m 20s	No	-
2013.May.15 05:10:37	FCTF	<a href="#">Trimble Real Time Port on FCTF</a>	PROBLEM	High	10h 45m 47s	No	-
2013.May.15 03:43:55	FCTF	<a href="#">WEB (HTTP) server is down on FCTF</a>	OK	Average	1h 30m 9s	No	-
2013.May.15 03:42:57	FCTF	<a href="#">Trimble Real Time Port on FCTF</a>	OK	High	1h 27m 40s	No	-
2013.May.15 03:07:15	BLYT	<a href="#">Trimble Real Time Port on BLYT</a>	OK	High	12h 49m 9s	No	-
2013.May.15 03:06:56	PSAP	<a href="#">Trimble Real Time Port on PSAP</a>	OK	High	12h 49m 28s	No	-
2013.May.15 03:05:25	BLYT	<a href="#">Trimble Real Time Port on BLYT</a>	PROBLEM	High	1m 50s	No	-
2013.May.15 03:05:03	PSAP	<a href="#">Trimble Real Time Port on PSAP</a>	PROBLEM	High	1m 53s	No	-
2013.May.15 02:59:46	LBCH	<a href="#">Trimble Real Time Port on LBCH</a>	OK	High	12h 56m 38s	No	-
2013.May.15 02:57:56	LBCH	<a href="#">Trimble Real Time Port on LBCH</a>	PROBLEM	High	1m 50s	No	-
2013.May.15 02:48:52	PSAP	<a href="#">Trimble Real Time Port on PSAP</a>	OK	High	16m 11s	No	-
2013.May.15 02:48:03	PSAP	<a href="#">Trimble Real Time Port on PSAP</a>	PROBLEM	High	49s	No	-
2013.May.15 02:39:05	FCTF	<a href="#">WEB (HTTP) server is down on FCTF</a>	PROBLEM	Average	1h 4m 50s	No	-
2013.May.15 02:38:06	FCTF	<a href="#">Trimble Real Time Port on FCTF</a>	PROBLEM	High	1h 4m 51s	No	-
2013.May.15 02:35:16	BLYT	<a href="#">Trimble Real Time Port on BLYT</a>	OK	High	30m 9s	No	-
2013.May.15 02:34:55	BLYT	<a href="#">Trimble Real Time Port on BLYT</a>	PROBLEM	High	21s	No	-
2013.May.15 02:18:54	FCTF	<a href="#">WEB (HTTP) server is down on FCTF</a>	OK	Average	20m 11s	No	-
2013.May.15 02:15:30	FCTF	<a href="#">Trimble Real Time Port on FCTF</a>	OK	High	22m 36s	No	-
2013.May.15 02:05:07	FCTF	<a href="#">Trimble Real Time Port on FCTF</a>	PROBLEM	High	10m 23s	No	-
2013.May.15 02:04:27	FCTF	<a href="#">Trimble Real Time Port on FCTF</a>	OK	High	40s	No	-
2013.May.15 02:03:37	FCTF	<a href="#">Trimble Real Time Port on FCTF</a>	PROBLEM	High	50s	No	-
2013.May.15 02:02:27	FCTF	<a href="#">Trimble Real Time Port on FCTF</a>	OK	High	1m 10s	No	-
2013.May.15 01:49:04	FCTF	<a href="#">WEB (HTTP) server is down on FCTF</a>	PROBLEM	Average	29m 50s	No	-
2013.May.15 01:46:07	FCTF	<a href="#">Trimble Real Time Port on FCTF</a>	PROBLEM	High	16m 20s	No	-
2013.May.15 01:18:55	FCTF	<a href="#">WEB (HTTP) server is down on FCTF</a>	OK	Average	30m 9s	No	-
2013.May.15 01:17:04	FCTF	<a href="#">Trimble Real Time Port on FCTF</a>	OK	High	29m 3s	No	-
2013.May.14 23:48:49	WMAP	<a href="#">Trimble Real Time Port on WMAP</a>	OK	High	16h 7m 35s	No	-
2013.May.14 23:48:29	WMAP	<a href="#">Trimble Real Time Port on WMAP</a>	PROBLEM	High	20s	No	-
2013.May.14 23:33:43	BLYT	<a href="#">WEB (HTTP) server is down on BLYT</a>	OK	Average	16h 22m 41s	No	-
2013.May.14 23:28:46	BLYT	<a href="#">Trimble Real Time Port on BLYT</a>	OK	High	2h 5m 9s	No	-

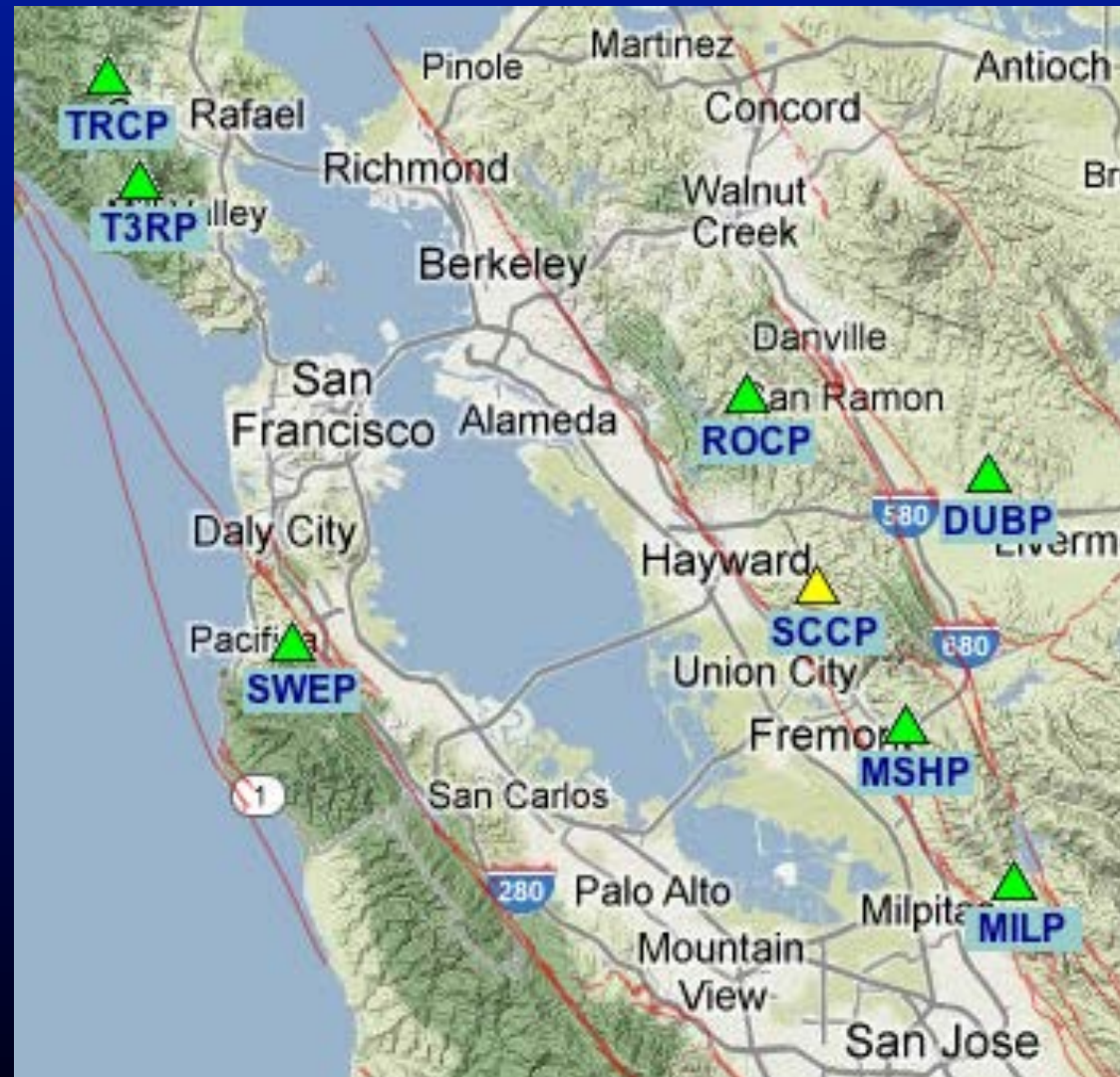


# Proposed UASI Upgrades





# USGS Menlo Park GPS Network



<http://escweb.wr.usgs.gov/share/highrate-gps/>

# USGS Menlo Park GPS Network

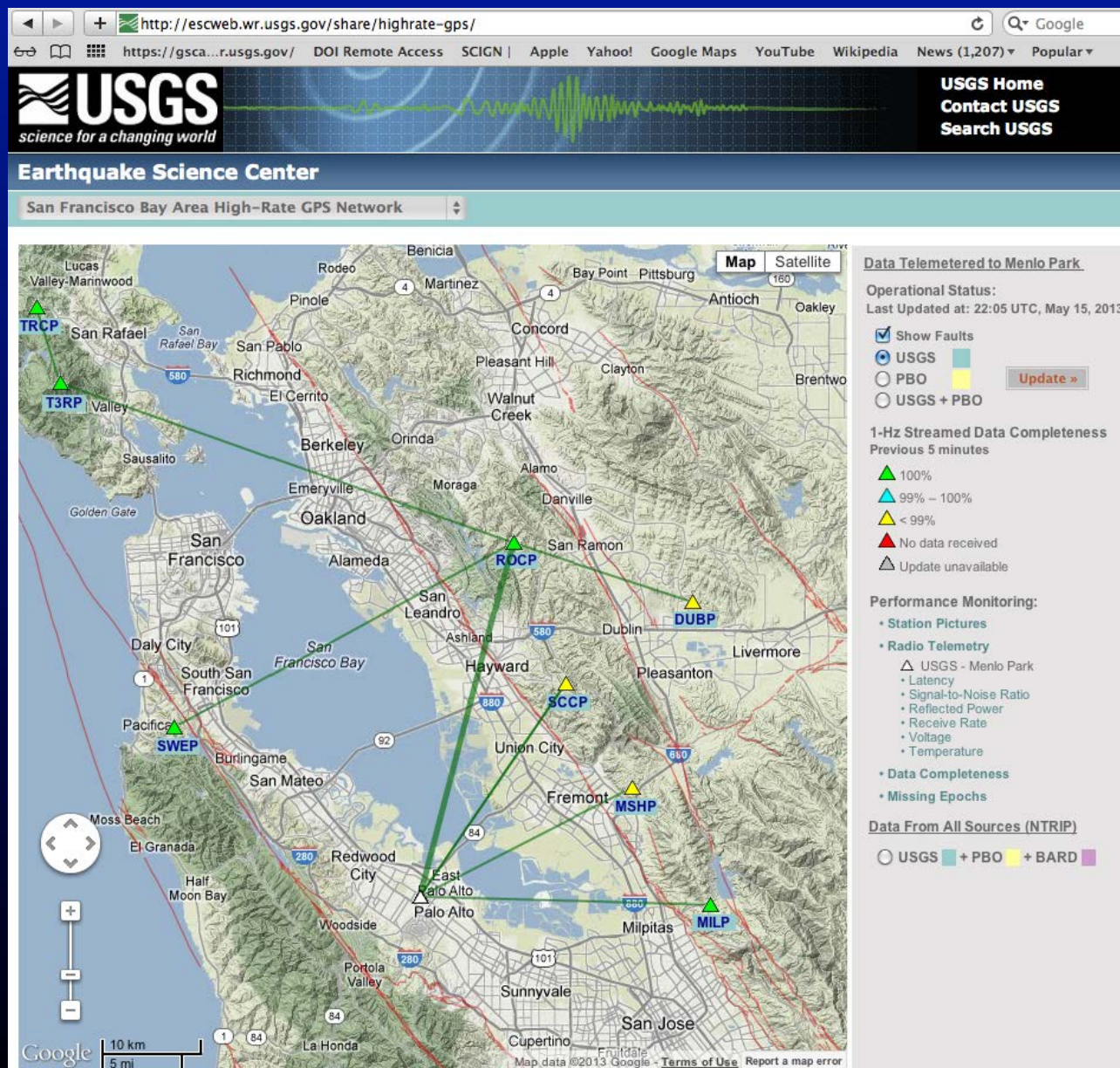


<http://escweb.wr.usgs.gov/share/highrate-gps/>





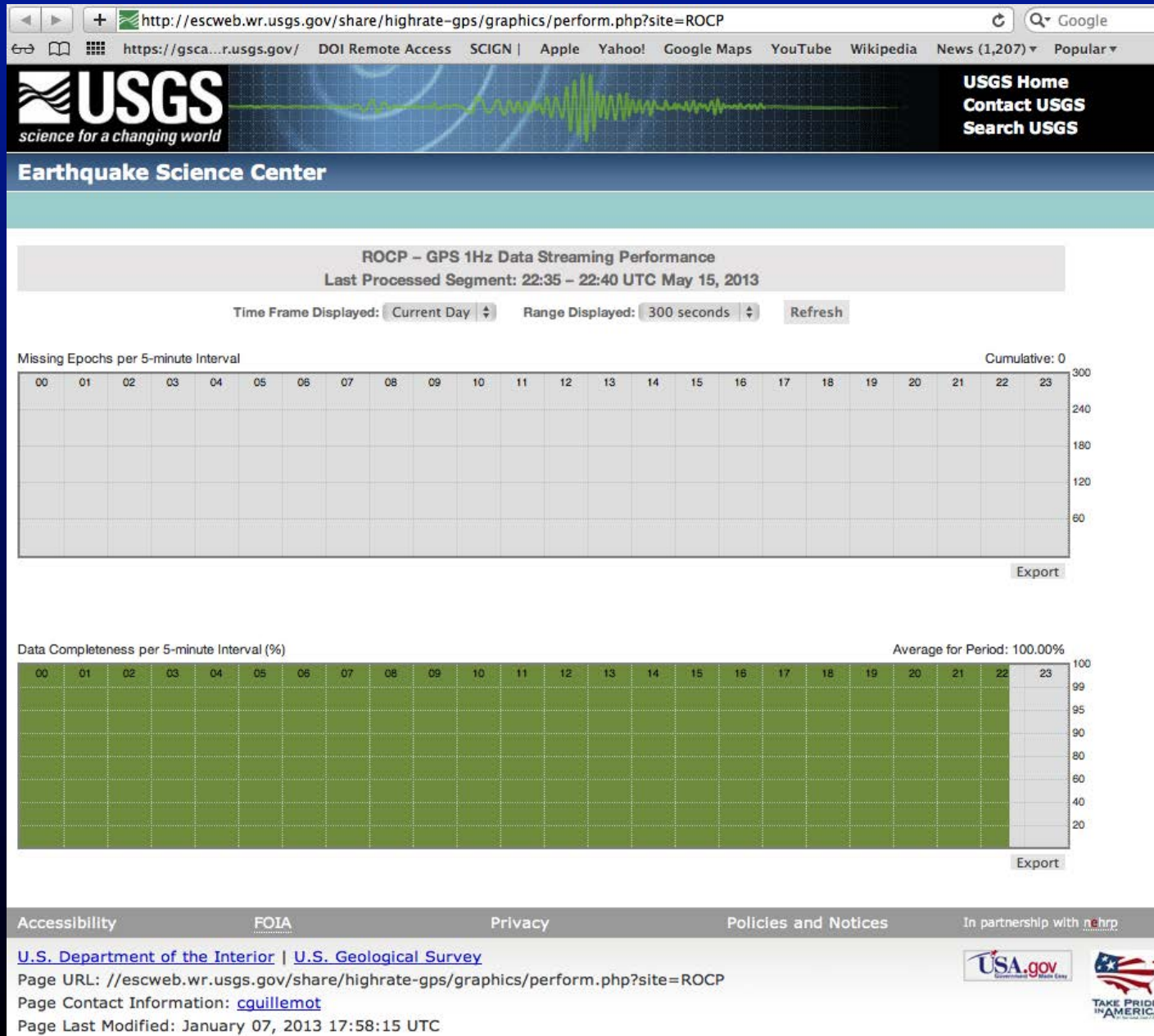
# USGS Menlo Park GPS Network



<http://escweb.wr.usgs.gov/share/highrate-gps/>



# USGS Menlo Park GPS Network



<http://escweb.wr.usgs.gov/share/highrate-gps/>

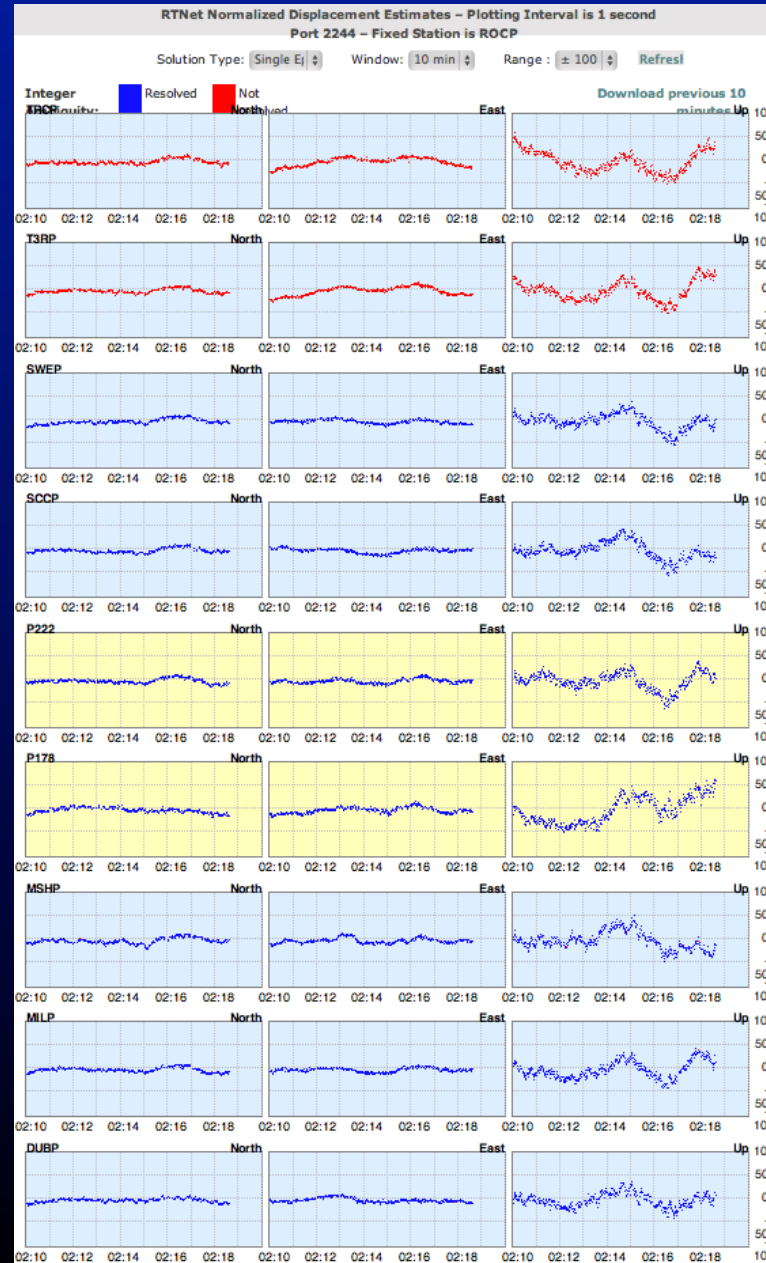


# USGS Menlo Park GPS Network



<http://escweb.wr.usgs.gov/share/highrate-gps/>

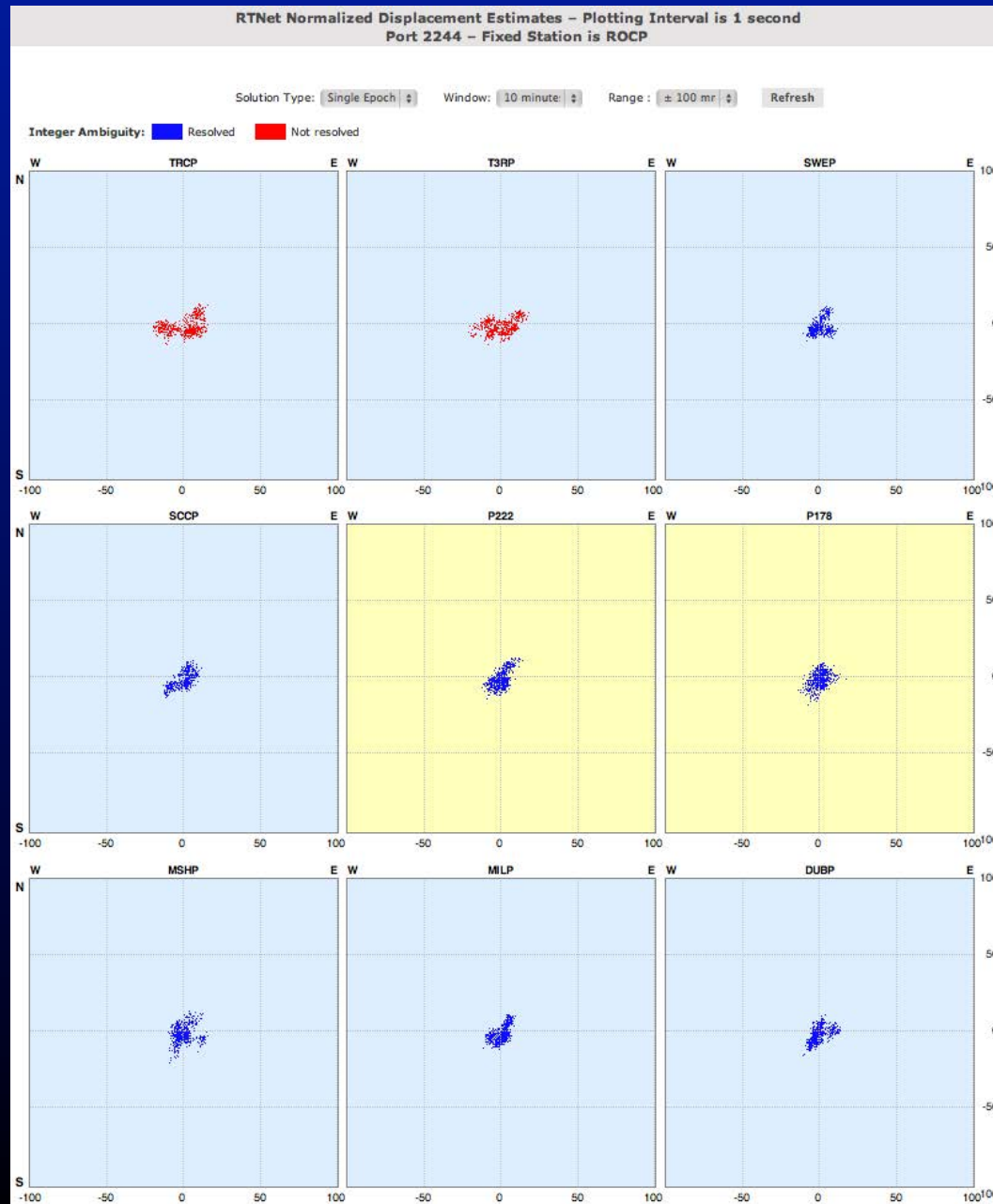
# USGS Menlo Park GPS Network



<http://escweb.wr.usgs.gov/share/highrate-gps/>

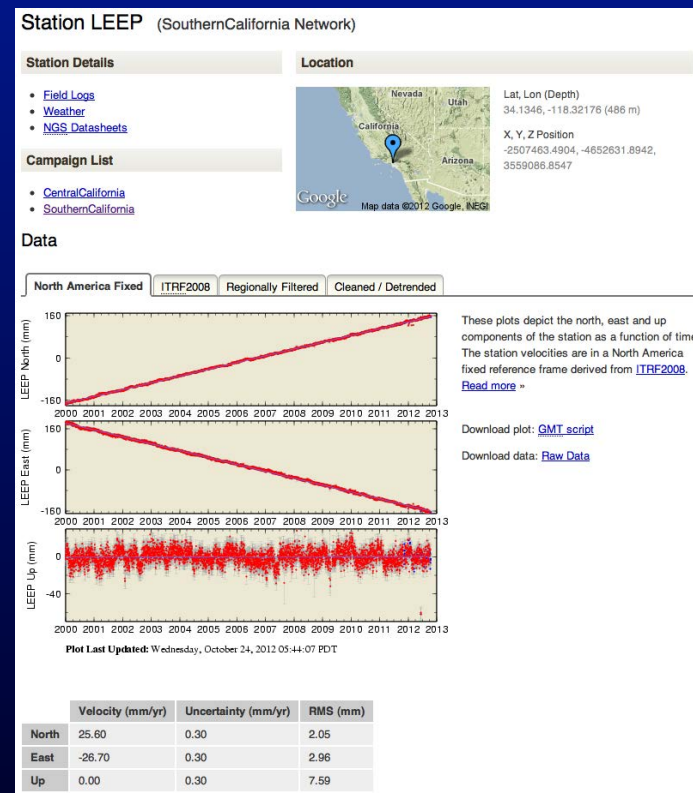
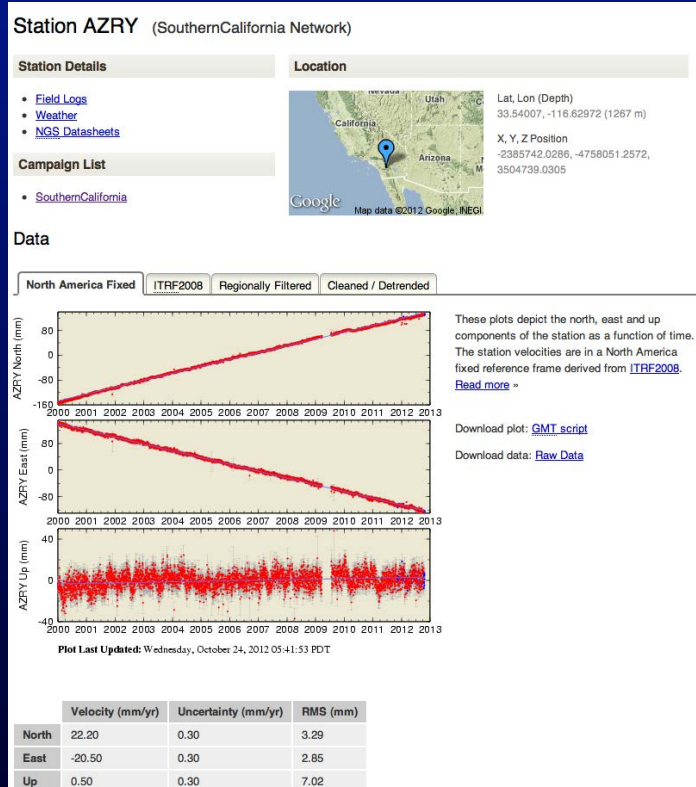


# USGS Menlo Park GPS Network



<http://escweb.wr.usgs.gov/share/highrate-gps/>

# Daily Time Series

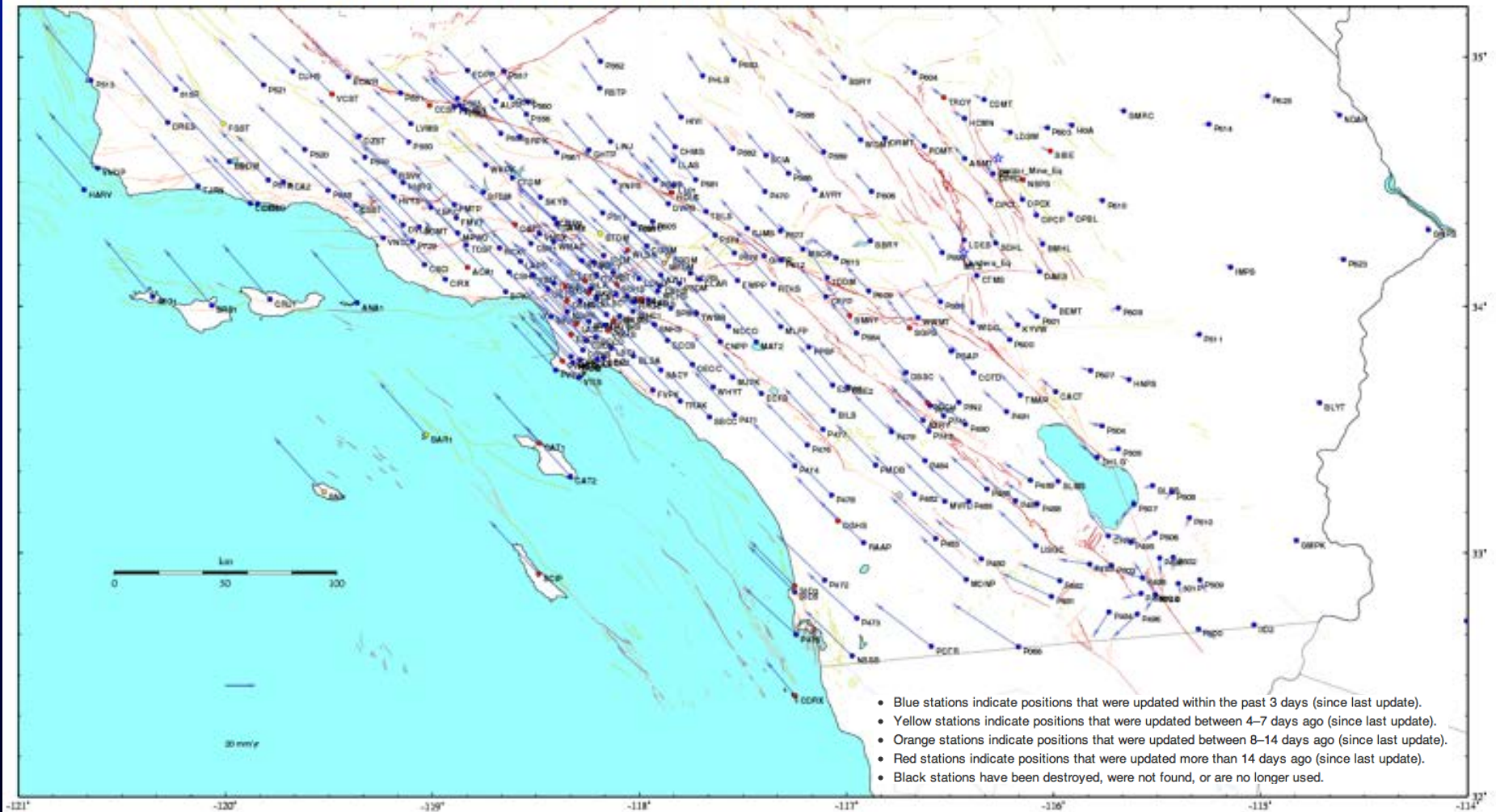


<http://earthquake.usgs.gov/monitoring/gps/>



# Station Velocities

## GPS Velocities for Southern California



# Current Developments and Issues



- Testing and Evaluating real-time GPS processing/plotting software. All software has issues: gross outliers, 'convergence' delays, higher RMS, smoothing, gaps during high PDOP, etc. Trade-offs exist between best features of each main approach to processing GPS data in real-time. Latest software allows PPP(AR), a hybrid approach to processing with the best features of both RTK and PPP algorithms
- Testing and Evaluating GPS equipment monitoring software
- Improving quality and reliability of GPS data telemetry
- Creating telemetry maps and data flowcharts
- Earthquake Early Warning (EEW)
- Incorporating GPS Metadata into Southern California Earthquake Data Center (SCEDC) Station Information System (SIS)
- Increasing cooperation with utility providers (LADWP and MWD) to monitor fault crossings of critical infrastructure
- Increasing cooperation between USGS groups in Pasadena and Menlo Park to develop similar systems for data acquisition, processing, data dissemination, and Quality Control, so one can backup the other.



# Data Availability

\*All USGS GPS data and results are freely and openly available to all.\*

-- Daily Rinex files are archived at:

<ftp://data-out.unavco.org/pub/rinex/obs/>

-- Daily time series are online at:

<http://earthquake.usgs.gov/monitoring/gps/>

-- Pasadena Real Time data may be accessed from:

<http://www.scign.org/realtime/>

-- Menlo Park Real Time data may be accessed from:

<http://escweb.wr.usgs.gov/share/highrate-gps/>