

Sharing seismic catalogs: an Antelope bulletin server and incorporation at USArray

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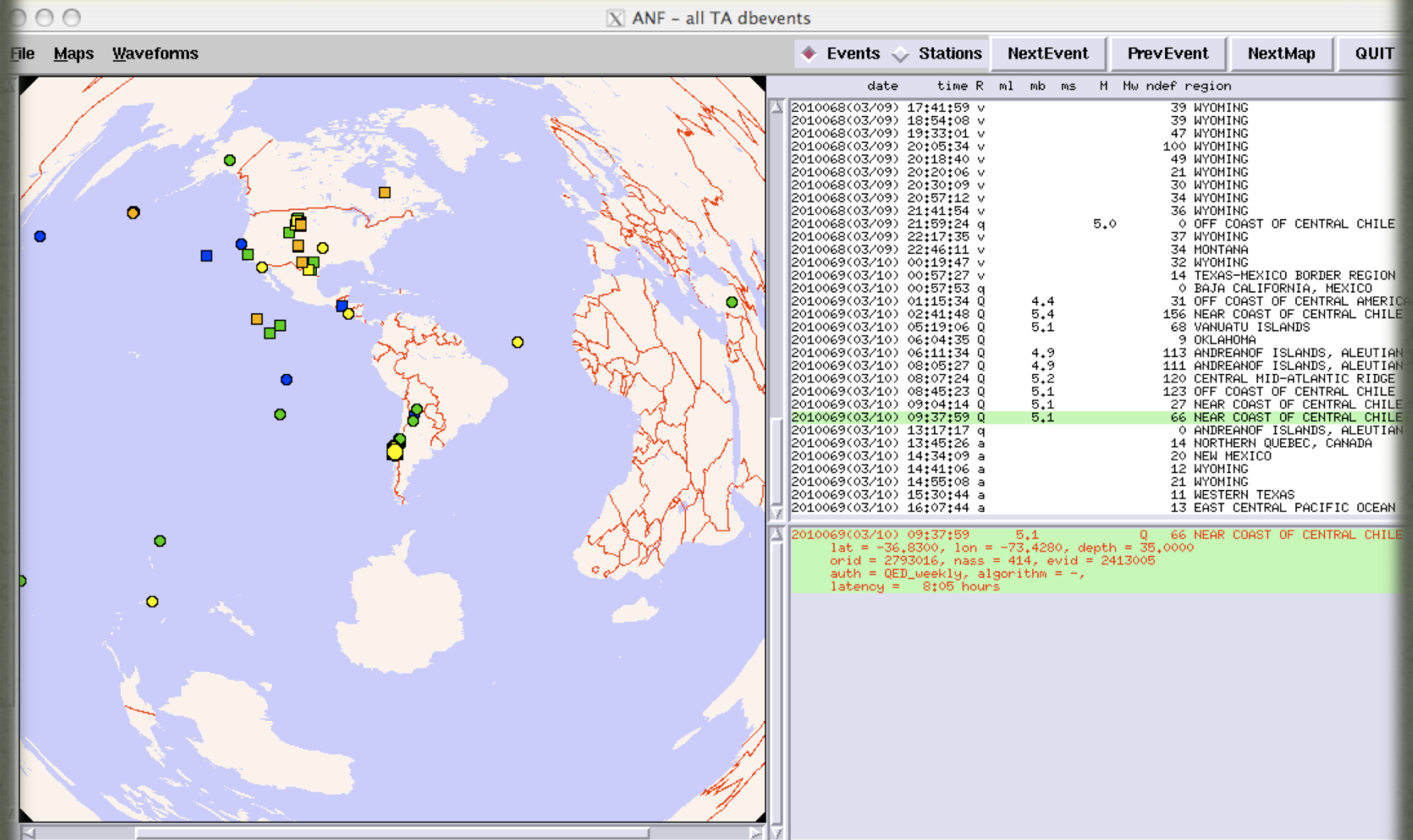
Univ. of California, San Diego

Antelope Users Group Meeting

~~Papagayo, 4-6 Nov 2013~~

Fairbanks, 17-19 Aug 2016

Why external bulletins are needed



Status: Time: 2010069(03/10) 17:59:55 Gmt, 00:04:30 since last update, 01:52:11 since last event

How to get bulletins into css3.0 format?

- No one (except AEC or ANF if you ask nicely) publishes/distributes real-time css3.0 origin information.
- Need to collect information from:
 - Screen scrapes (parsing of tagged HTML)
 - http available text files or xml files
 - ftp
 - Twitter
 - RSS (not so much any longer)
 - XML/JSON

Formats of distributed information and locations for bulletin collection can change with no warning!

Previous methods of bulletin collection in Antelope

- In-house developed scripts
- contrib script(s)
 - `update_weekly_qed`, `scec2db`, `mchedr2db`, etc.

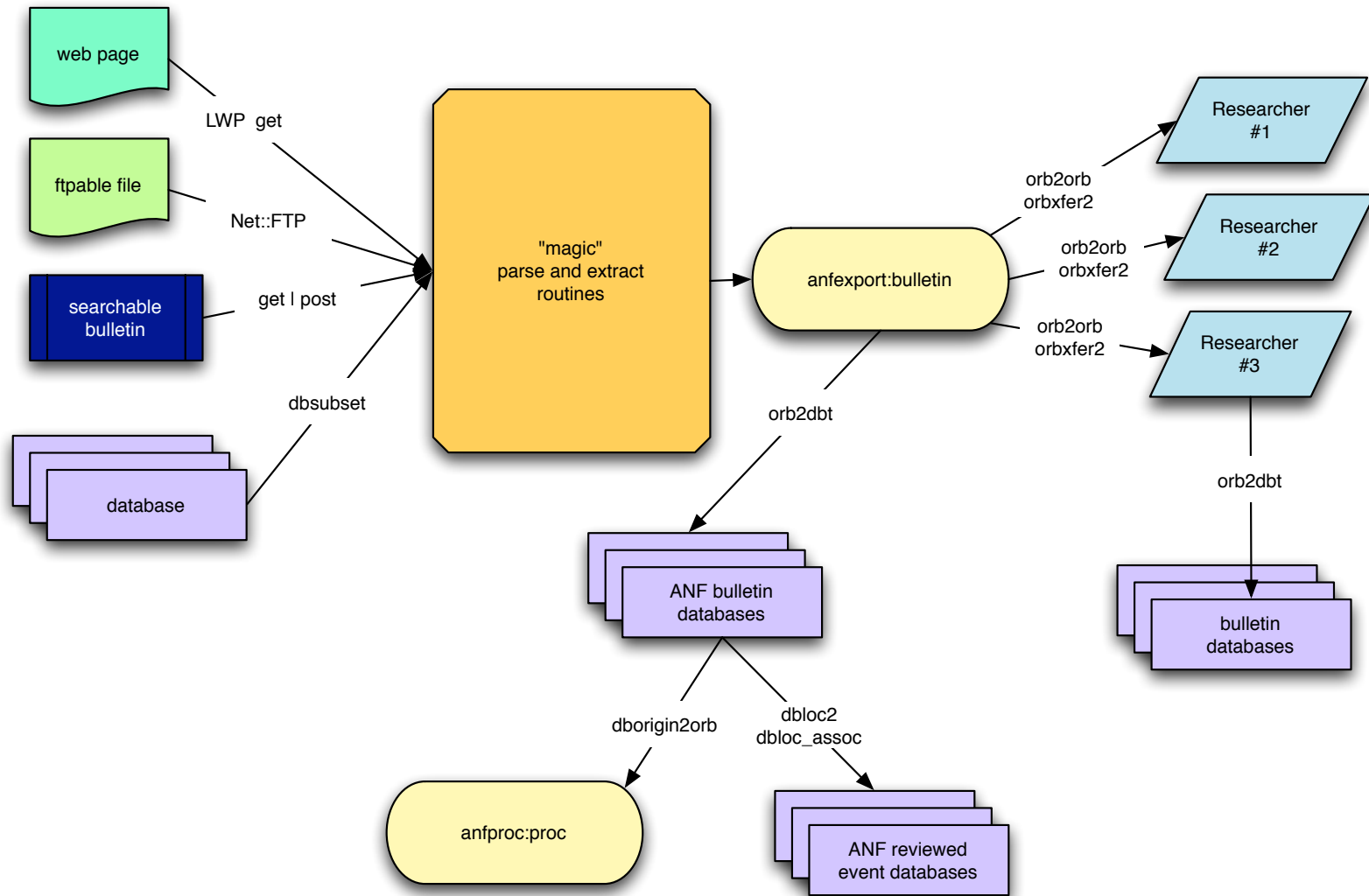
Drawbacks:

- Repetition of coding
- Lack of maintainability

What catalog hypocenters are needed?

1. Collect solutions only for events over magnitude threshold
 - Good for fully tuned network and/or group with no additional projects and no post-processing or review
2. Collect only published solutions with user specified interest criteria
 - Good for significant global events, and local/regional
3. Collect all published solutions
 - Useful for research purposes, detection tuning, analyst re-review of events, and any future reprocessing

Central bulletin server via Antelope



Central bulletin server via Antelope

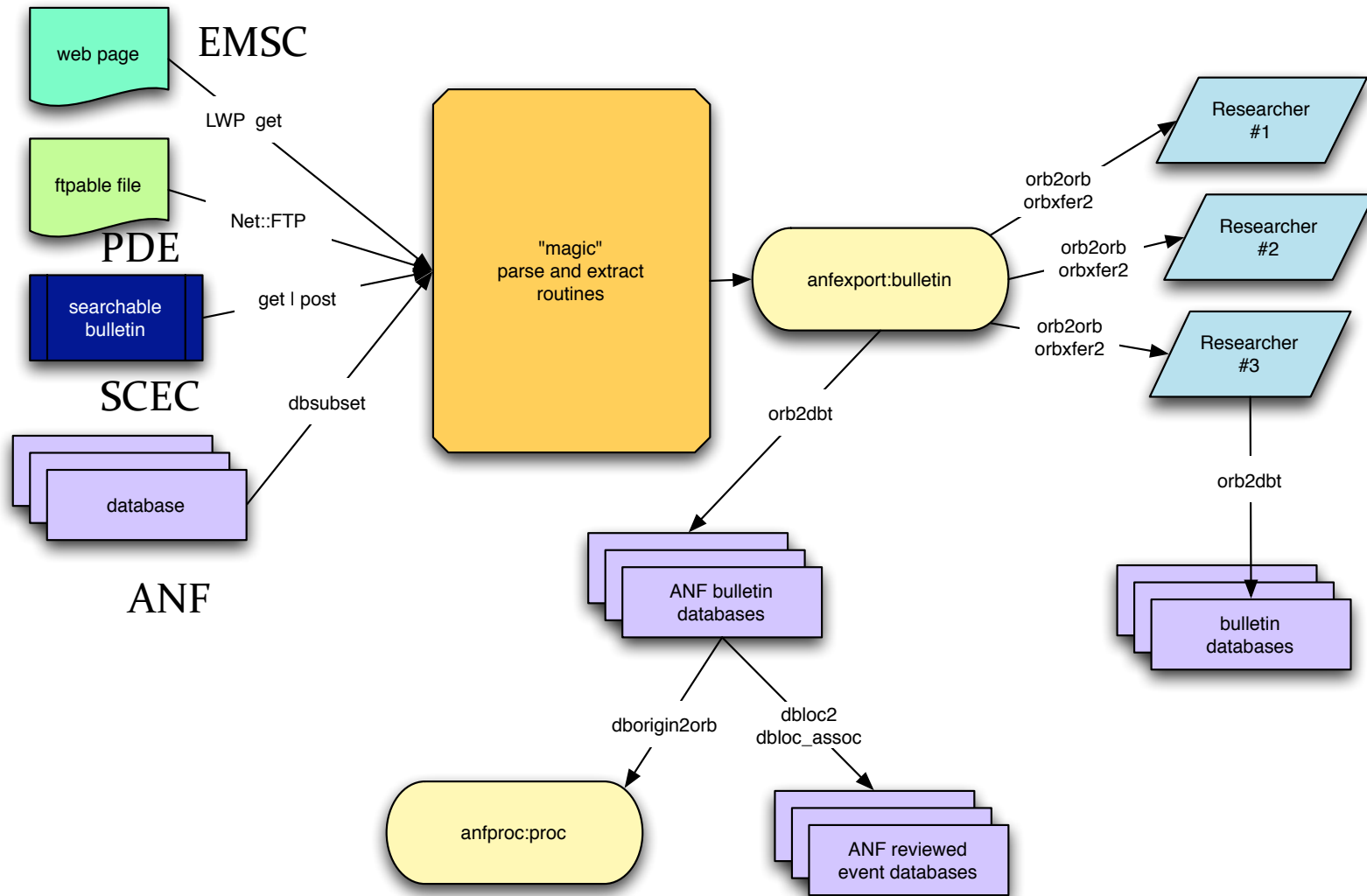
- Single institution maintains codes for parsing known bulletin distribution points
- Open access point for orb2orb connections of origin information
- Customizable on receiver side for what bulletins to collect

Drawback: Currently no available filtering based on magnitude or location – you get everything!

Bulletins supported

- USGS/NEIC (world): Comcat, CUBE, ~~QED~~, QED_weekly, mines, PDE
- ~~EMSC (Europe)~~
- NRCAN (Canada): PGC and GSC
- US Regional networks: NESN, ~~CERI-NMSN~~, Montana Tech-MBMG, ~~US-PNSN~~, UNR-NBE, ~~UJSS-Utah~~, ~~UJSS-Yellowstone~~, UCSD-Anza, Berkeley-NCSN, Caltech-SCSN, UAF-AEIC
- ANF (US)

Central bulletin server via Antelope



Contents of taexport.ucsd.edu:bulletin

rt@taexport:~ — ssh — 149x37

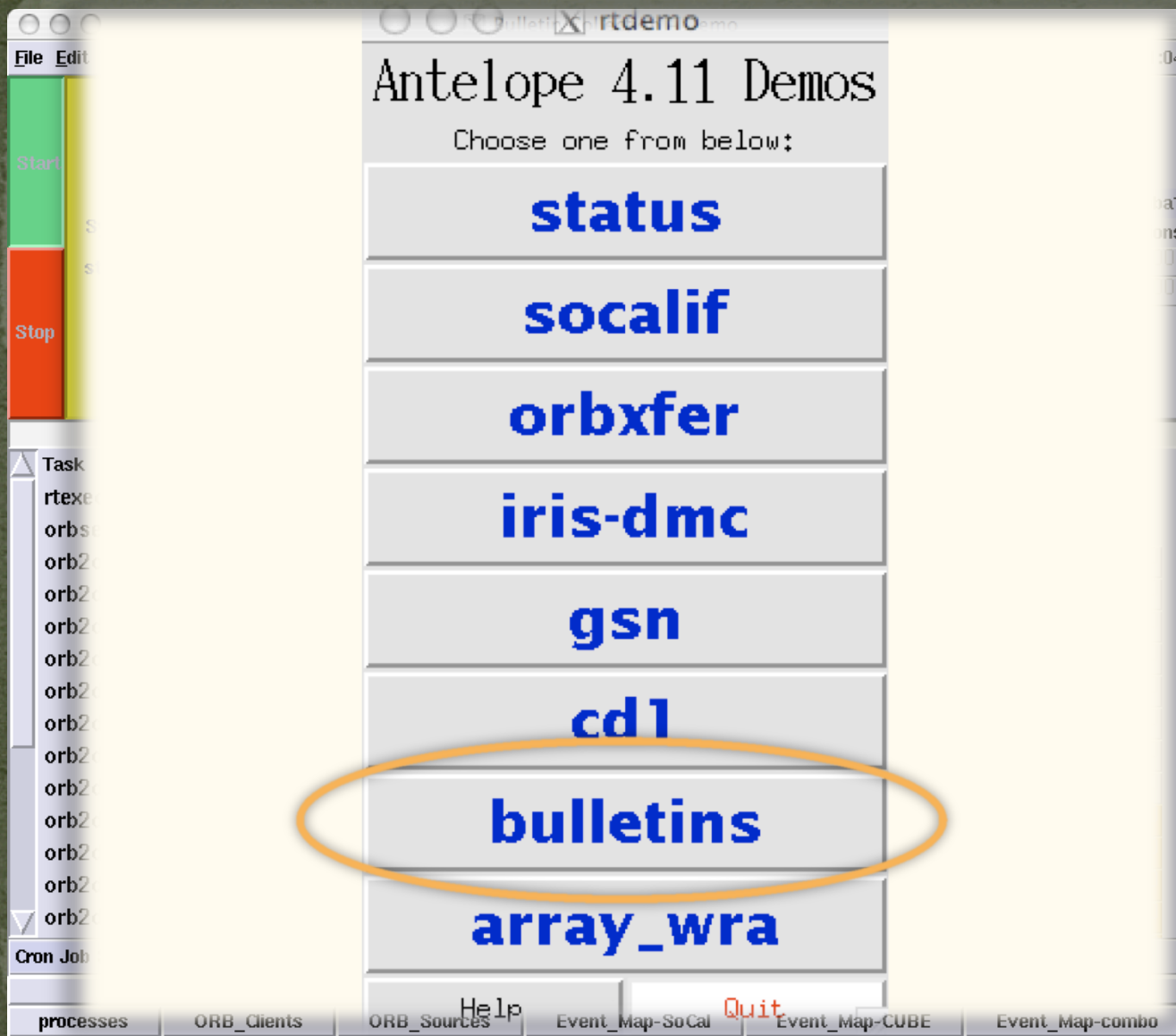
```
taexport.ucsd.edu{rt}94% orbstat -s :bulletin
orbserver 8/17/2016 (230) 17:04:20.158
  Version 'Release 5.6 Linux 2.6.32-220.el6.x86_64 2016-04-29 '
  Pid 2827 @ taexport.ucsd.edu:/export/home/rt/rtsystems/exchange (169.228.44.56), port #6707
  Started Tue 2016-222 Aug 09 20:17:55 by rt, running 7 days 20.7 hours
  ring buffer last initialized Fri 2016-134 May 13 13:52:28
  Maximum 1000.0 Mbytes packet data
  Maximum 3333343 packets
  Maximum 100 sources
  13 clients
  10 sources
  106665 opens 106652 closes 0 errors 0 rejections
  utilization = 0.00
  packets input = 0.000 output = 0.000 (kpkts/sec)
  bytes input = 0.000 output = 0.000 (Mbytes/sec)
  stash input = 0 output = 0 (packets/sec)
  maximum lag = 1.00 delay = 18.735 seconds
  Throttling not enabled
```

Sources

Srcname	Thread	#pkts	Oldest			Latest			Average	
			Mbytes	pktid	time	pktid	time	kbps	latency	
/pf/LCSN/orb2dbt	106602	4404	1.869	1397085	224 16:17:39	99272	230 16:56:37	0.0	7:43 minutes	
/pf/MTECH/A/orb2dbt	106602	464292	197.092	1376599	224 15:56:48	101978	230 16:56:49	3.0	7:31 minutes	
/pf/MTECH/R/orb2dbt	106602	59168	25.117	1378165	224 15:56:59	102322	230 16:56:59	0.4	7:20 minutes	
/pf/NBE/orb2dbt	106602	228252	96.893	1394669	224 16:16:01	98227	230 16:56:02	1.5	8:18 minutes	
/pf/NCSN/orb2dbt	106086	89238	37.882	1384726	224 16:02:18	79878	230 16:02:24	0.6	1:02 hours	
/pf/NEIC	92779	1002781	551.530	1378665	224 16:00:11	102466	230 17:00:09	8.5	4:10 minutes	
/pf/NEIC/CUBE/orb2dbt	106602	26540	11.266	1378509	224 15:57:09	102464	230 16:57:10	0.2	7:10 minutes	
/pf/NESN/orb2dbt	103963	282	0.135	1441129	224 18:13:02	3318340	230 12:13:02	0.0	4:51 hours	
/pf/NRCAN/GSC/orb2dbt	106602	184016	78.115	1395961	224 16:17:28	99244	230 16:56:26	1.2	7:53 minutes	
/pf/SCSN/orb2dbt	106086	238	0.101	1394644	224 16:05:03	79898	230 16:05:03	0.0	59:17 minutes	

```
ringbuffer has 6 days 1.0 hours of data
1000.000 Mbytes data in 2059211 packets
average packet size = 486 bytes
```

```
taexport.ucsd.edu{rt}95%
```



How to collect
css3.0 bulletin
from orb?

rtdemo example
available in
Antelope

Collected bulletins

- Using rtdemo, bulletins will be collected to “catalogs/”

```
rt@anfalist:/export/home/rt/rtsystems/rtdemo/rtdemo_bulletins/catalogs
anfalist{rt}63% pwd
/export/home/rt/rtsystems/rtdemo/rtdemo_bulletins/catalogs
anfalist{rt}64% ls *origin *netmag
aeic.netmag          mtech.netmag        nmsn.origin         scsn.netmag
aeic.origin          mtech.origin        nrcan.netmag        scsn.origin
anf.origin           nbe.netmag          nrcan.origin        uuss.netmag
combined.netmag     nbe.origin          pnsn.netmag         uuss.origin
combined.origin     ncsn.netmag         pnsn.origin         yellowstone.netmag
emsc.netmag         ncsn.origin         qed.netmag          yellowstone.origin
emsc.origin         nesn.netmag         qed.origin
lcsn.netmag         nesn.origin         qed_weekly.netmag
lcsn.origin         nmsn.netmag         qed_weekly.origin
anfalist{rt}65% █
```

- Change \$CATALOGS in rtdemo rtextec.pf to local save location

USGS2orb replaces USGScube2orb

NAME

USGS2orb - read event catalogs from USGS/NEIC web site and put them in an orb

SYNOPSIS

```
USGS2orb [-v] [-vv] [-vvv] [-start start_time] [-mag_cutoff_process mag_cutoff_process]
[-mag_cutoff_archive mag_cutoff_archive] [-replay_interval replay_hours]
orbname
```

DESCRIPTION

USGS2orb is a script that polls a set of web URLs hosted by the USGS/NEIC, reads earthquake event locations from these URLs and writes these events, as they appear, into an output ORB as special parameter file packets that can be processed by orb2dbt(1) in its "association" processing mode. This script can be used to automatically associate events from USGS/NEIC with event associated picks from a seismic network.

Analyst use of bulletins at ANF/USArray

dbloc2

File View Help

4/01/2016 Next group from 4/01/2016 12:47:49.388 unassociated only 4/30/2016

Next Previous Regroup From first unassoc After last assoc Time-window 1500 orid # Find

4/01/2016 (092) 12:47:00.972

order predicted

Select All Ignore All Ignore associated Mark associated Unmark Zoom out Original zoom Show Map with reporting stations

Origins: Mark reviewed Leave as-is Mark NOT reviewed

orid	Keep	Prefor	Etype	evid	lat	lon	time	depth	dtype	sdobs	auth	nass	ndef	ml	mb	algorithm
213110	Keep	◆	-	108323	38.4705	-118.3779	4/01/2016 (092) 12:46:44.00000	4.3000		0.5682	NBE:Update	13	0	3.40		3
213109	Keep	◇	-	108323	38.4907	-118.3987	4/01/2016 (092) 12:46:43.14042	4.0000	g	0.5974	ANF:tcx	13	13			locsat:iasp91
213111	Keep	◇	-	108323	38.4705	-118.3779	4/01/2016 (092) 12:46:43.37400	4.3000		0.2946	USGS:nn	13	26	3.20		

Locate dblocs2 iasp91 Starting location: Depth 10 Fix Depth Maximum Iterations 40 View results

options Station Latitude 36.4399 Longitude -118.0802 View magnitude results

Waveforms Arrivals Detections Predicted Synchronize Closer 1 12 Further All channels Show waveforms Hide waveforms

busy: rearranging arrivals to show residuals for 213110

Next Locate Magnitudes Associate Save Waveforms Map Database

Future directions

- Uncertain... fewer bulletins are openly available with precision we would prefer. Switch from regional networks to only COMCAT?
- Additional parsers (unlikely)
- Resend “old” bulletins previously collected at ANF
- Client-side customization examples – criteria based subset/removal of events that are not of interest?

Try it -

Collect from taexport.ucsd.edu:bulletin