What's New in Antelope 5.9

Dr. Kent Lindquist
Boulder Real Time Technologies, Inc.

May 2019
Taormina, Sicily

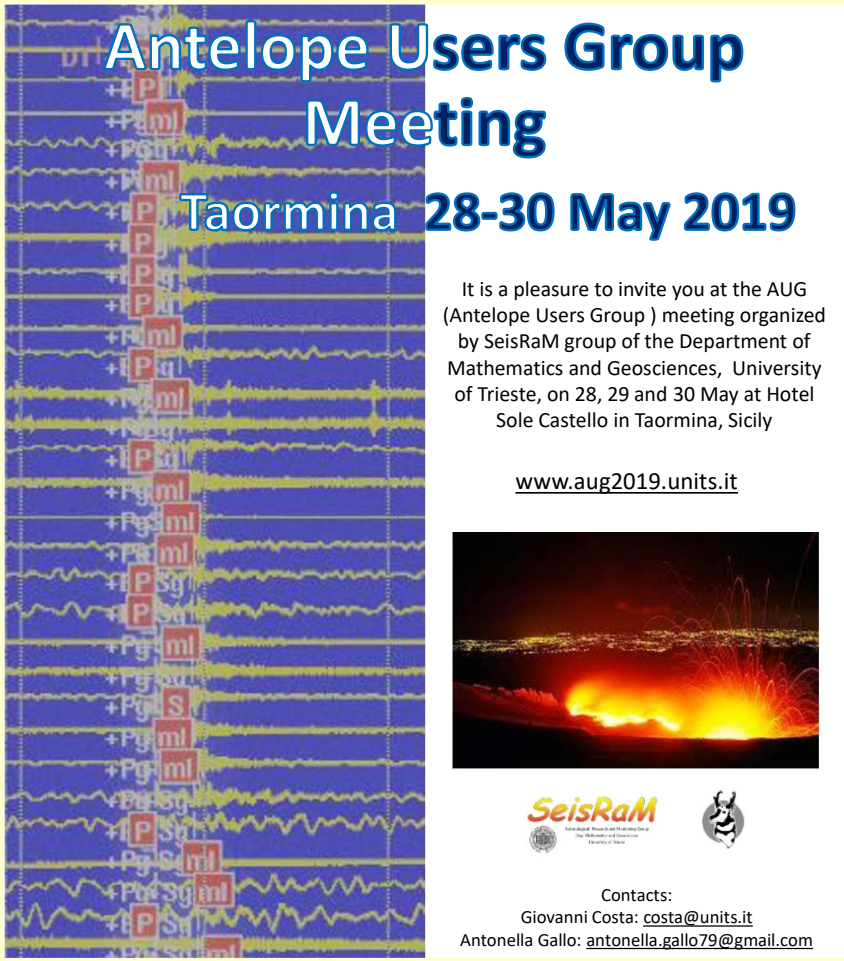
BRTT
BOULDER REAL TIME TECHNOLOGIES, INC.

Kinemetrics

Thanks to our hosts!!

SeisRaM

Thanks on behalf of BRTT and Kinemetrics



Long Line of Successful European AUG Meetings

Slovenia 2018

Vienna 2017

Rome 2016

Baku 2014

Bucharest 2011

Udine 2015
Trieste 2012
Prague 2010
Vienna 2008
Trieste 2007
Ljubljana 2005
Trieste 2004
Rome 2000

BRTT
BOULDER REAL TIME TECHNOLOGIES, INC.

Kinemetrics

What's New In Antelope 5.9

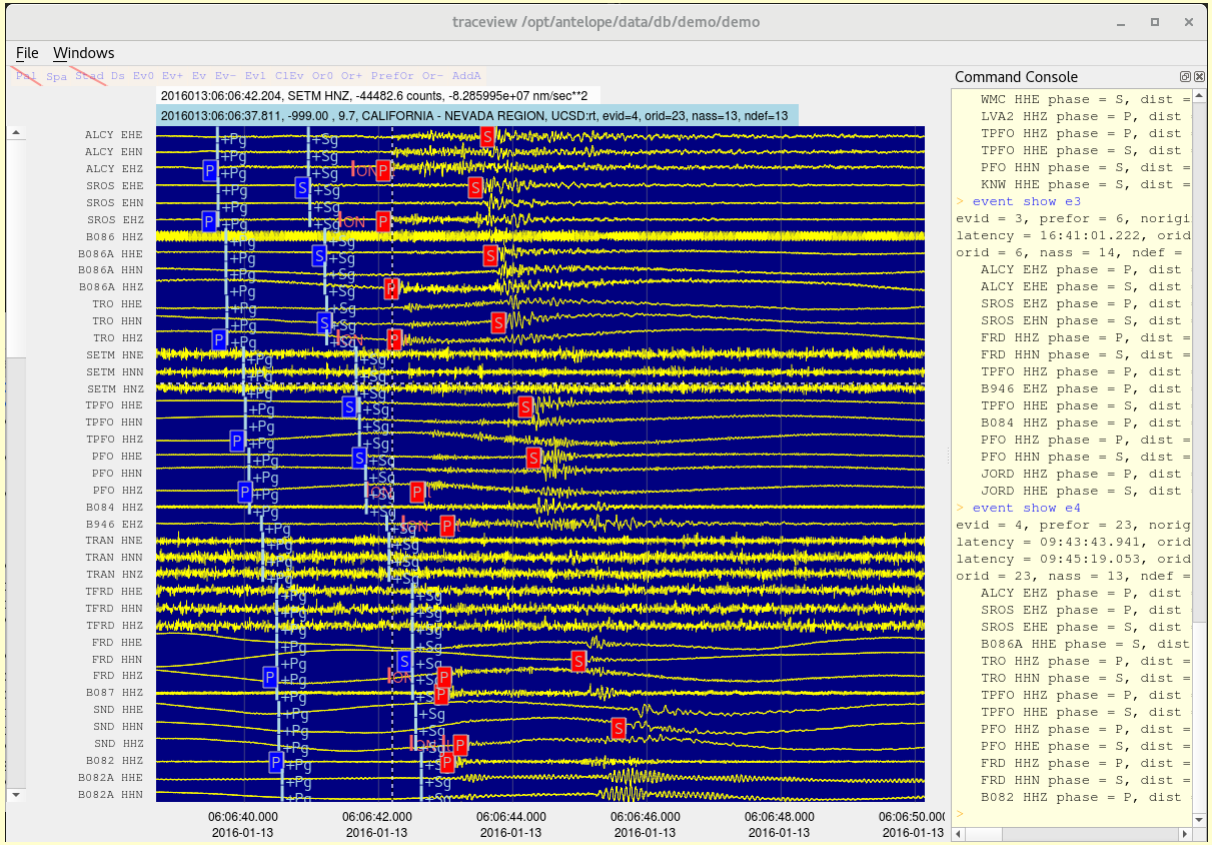
- Major Advances
  - ***traceview***(1)
  - ***dbloc***(1) prototype
- Infrastructure
  - Operating System Support
  - Linux Installation
  - X11 on Mac OSX
  - ***install_boot_scripts****(1) for* ***rtexec****(1),* ***amd****(1),* ***ald_proxy****(1)*
  - *Interpreters – with MATLAB support for R2018a, R2018b, R2019a*
  - *Python 3*
  - ***install_obspy****(1)*
- Variety of noteworthy smaller improvements
    - Qt-based ***inspect_snapshot***(1)
    - Qt-based ***setup_site***(1)
    - Qt-based ***antelope_update***(1)
    - Qt-based ***rtdemo***(1)
    - ***orb2orb***(1) match/reject expressions on output connections
    - Custom map lines and areas
    - ***dbevents***(1) with *traceview* waveform display
- Coming year

BRTT
BOULDER REAL TIME TECHNOLOGIES, INC.

Kinemetrics

traceview(1)

- *Qt*-based replacement for ***dbpick***(1)



- *More details in upcoming talks*

BRTT BOULDER REAL TIME TECHNOLOGIES, INC.

Kinemetrics

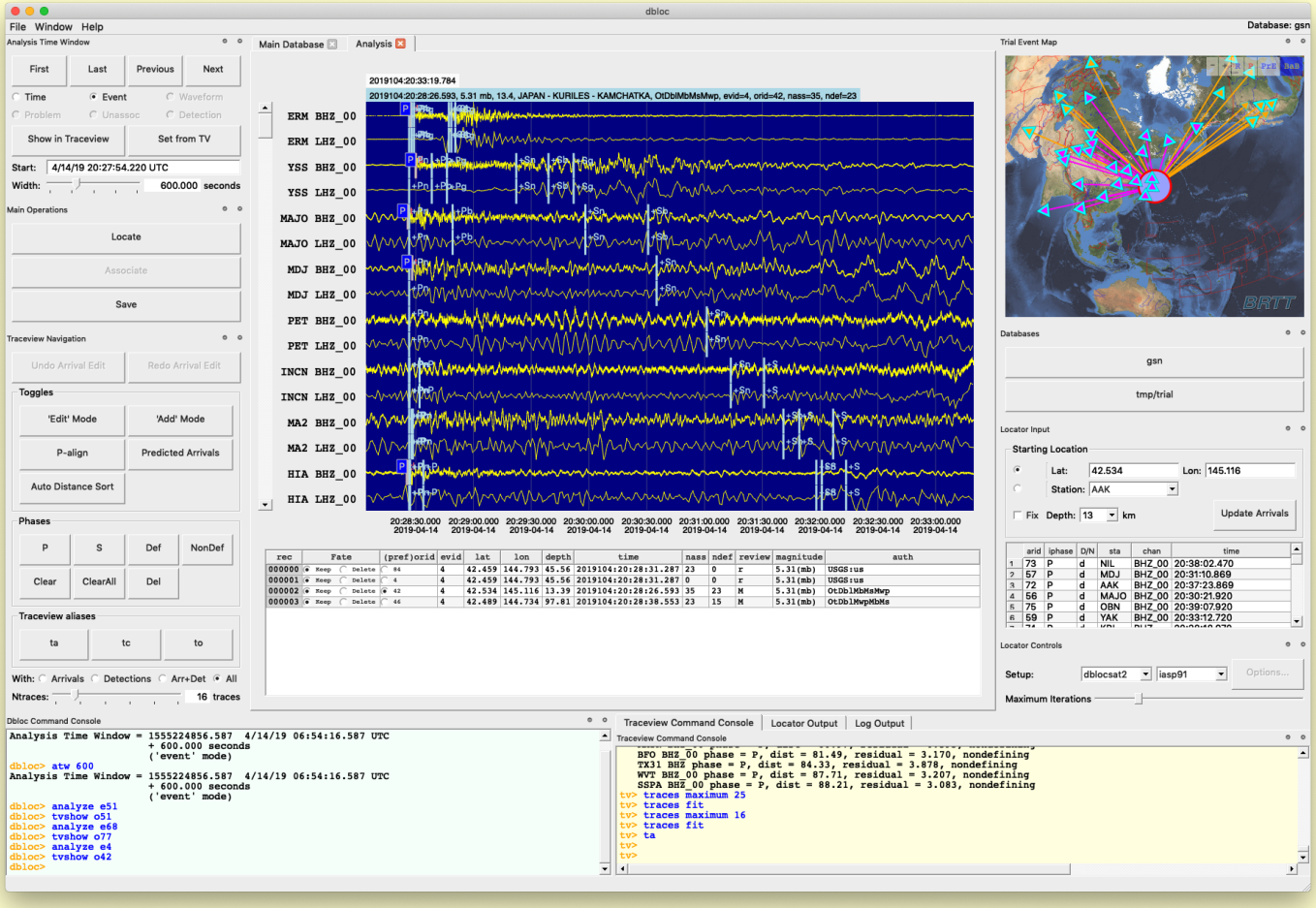
dbloc(1)

- ***dbloc2***(1) has outgrown its original design
- Part of *Qt* graphics Modernization initiative
- Initial design work courtesy of:
  - Taimi Mulder
  - Trilby Cox
- Will likely take several years to stabilize

BRTT
BOULDER REAL TIME TECHNOLOGIES, INC.

Kinemetrics

dbloc(1) Prototype



- *More details in upcoming talk*

BRTT
BOULDER REAL TIME TECHNOLOGIES, INC.

Kinemetrics

Operating-system Support

- *Antelope 5.9* is released on
  - *RedHat/CentOS 7.4*
  - *Mac OS X 10.13* (*High Sierra*)
- Antelope 5.9 is compiled with:
  - Linux:
    - *Clang 6.0.0* compiled on *CentOS Linux 7.4*
    - *GCC 7.2.0 gfortran* compiled on *CentOS Linux 7.4*
  - Darwin:
    - *Clang 5.0.0* compiled on *OSX 10.9.5*
    - *GCC 7.1.0 gfortran* compiled on *OSX 10.9.5*

BRTT
BOULDER REAL TIME TECHNOLOGIES, INC.

Kinemetrics

Linux Installation

- We recommend installing most complete *Linux* Environment Group (feature set) available
- In *RHEL*:
  - "*Development and Creative Workstation*"
  - (Not "*Minimal Install*")
- Missing dynamic libraries (*libXss.so*, *libnettle.so*, etc.) most common symptom of insufficient install
- Enterprise Class Software:
  - *Antelope* chosen to support mission
  - OS chosen to support Antelope
  - Hardware chosen to support OS
- (Recommendation would be different if we were tailoring for multi-purpose research environments instead of operational missions)
- The fix, per ***notes_linux_setup***(5):
  - % ***yum groupinstall "Development and Creative Workstation"***

BRTT BOULDER REAL TIME TECHNOLOGIES, INC.

Kinemetrics

X11 Support on Macs

- Last *Xquartz* update October, 2016
  - "For OSX 10.6.3 or later" [not reassuring]
  - *http://www.xquartz.org*
- *X11*-forwarding of *Qt* apps on *OSX*
  - Constant battle
  - May disappear with *Qt5.12 / Antelope 5.10*
- Several key apps left to port:
  - ***orbrtd, dbbuild, dlmon, rtm***

BRTT
BOULDER REAL TIME TECHNOLOGIES, INC.

Kinemetrics

New ***install_boot_scripts***(1)

- Script to install turnkey (startup-on-boot) mechanisms for
  - ***rtexec***(1)
  - ***amd***(1)
    - (Licensing daemon for serial #'s or dongles on *Linux*)
  - ***ald_proxy***(1)
- One script can install all programs
  - ***rtexec***(1) may require ***amd***(1)
- Based on
  - ***launchctl***(1), ***launchd***(8) (*OS X*)
  - ***systemctl***(1), ***systemd***(1) (*Linux*)
- Replaces ***install_turnkey_boot_script***(8), ***install_amd_daemon_script***(8), ***S99antelope***(8), ***S99amdd***(8)
- The ***install_boot_scripts***(1) executable is now in $ANTELOPE/*bin* directory
- All raw materials in *$ANTELOPE/data/system*
- *Must be run as root, e.g. with* ***sudo****(8)* command
- Added Stefan Radman's suggestions for multi-system support

BRTT
BOULDER REAL TIME TECHNOLOGIES, INC.

Kinemetrics

Antelope 5.9 Interpreters

- *Qt -> Qt5.11.0*
- *MATLAB* support:
  - *R2018a, R2018b, R2019a*
- *Perl*: Still *Perl 5.26.1*
- *TCL/Tk*: Same as previous few years
- *Python*: *Python3!*
  - *Python 3.6.5*

Antelope Port to *Python 3*

- The Port
  - Antelope use of *Python* is extensive—very complicated job
  - Initiated by Kent Lindquist and Danny Harvey June ‘17
  - Final big push by Rohan Ambli of Ambli, LLC
- Drivers
  - *Python 2* End-Of-Life 2020
  - Availability of programming talent
  - Community interest in *ObsPy* (*http://www.obspy.org*)
  - Support for new capabilities e.g. FDSN Web Services
- Advances
  - *pip3* install of almost all modules
    - */opt/antelope/python3.6.5/bin/pip3*
  - Pre-install of all modules needed by *ObsPy* as of April 2019
  - Updated *matplotlib*
  - Added *scipy*

BRTT
BOULDER REAL TIME TECHNOLOGIES, INC.

Kinemetrics

Antelope *Python 3*

- Pre-built *Python* interpreter
- Comprehensive *Antelope* APIs for data handling, analysis, sophisticated plotting
- More than 80 standard third-party modules pre-built and ready to go



install_obspy(1)

- New contributed-code utility ***install_obspy***(1)
- All supporting *Python* modules already in *Antelope Python*
- N.B. Needs compilers for the *ObsPy* installer

```
[/opt/antelope][5.9] kent% install_obspy
Collecting obspy
  Downloading https://files.pythonhosted.org/packages/b4/fa/87a6b3612d7060c585cb0aec518ede6a75fc5b002897d3991633d857fc19/obspy-1.1.1.zip (23.9MB)
    100% |################################| 23.9MB 1.2MB/s
Requirement already satisfied: future>=0.12.4 in ./python3.6.5/lib/python3.6/site-packages (from obspy) (0.17.1)
Requirement already satisfied: numpy>=1.6.1 in ./python3.6.5/lib/python3.6/site-packages (from obspy) (1.16.2)
Requirement already satisfied: scipy>=0.9.0 in ./python3.6.5/lib/python3.6/site-packages (from obspy) (1.2.1)
Requirement already satisfied: matplotlib>=1.1.0 in ./python3.6.5/lib/python3.6/site-packages/matplotlib-3.0.3-py3.6-macosx-10.13-x86_64.egg (from obspy) (3.0.3)
Requirement already satisfied: lxml in ./python3.6.5/lib/python3.6/site-packages (from obspy) (4.3.2)
Requirement already satisfied: setuptools in ./python3.6.5/lib/python3.6/site-packages/setuptools-39.2.0-py3.6.egg (from obspy) (39.2.0)
Requirement already satisfied: sqlalchemy in ./python3.6.5/lib/python3.6/site-packages (from obspy) (1.3.1)
Requirement already satisfied: decorator in ./python3.6.5/lib/python3.6/site-packages (from obspy) (4.3.0)
Requirement already satisfied: requests in ./python3.6.5/lib/python3.6/site-packages (from obspy) (2.18.4)
Requirement already satisfied: cycler>=0.10 in ./python3.6.5/lib/python3.6/site-packages (from matplotlib>=1.1.0->obspy) (0.10.0)
Requirement already satisfied: kiwisolver>=1.0.1 in ./python3.6.5/lib/python3.6/site-packages (from matplotlib>=1.1.0->obspy) (1.0.1)
Requirement already satisfied: pyparsing!=2.0.4,!=2.1.2,!=2.1.6,>=2.0.1 in ./python3.6.5/lib/python3.6/site-packages (from matplotlib>=1.1.0->obspy) (2.2.0)
Requirement already satisfied: python-dateutil>=2.1 in ./python3.6.5/lib/python3.6/site-packages (from matplotlib>=1.1.0->obspy) (2.6.1)
Requirement already satisfied: urllib3<1.23,>=1.21.1 in ./python3.6.5/lib/python3.6/site-packages (from requests->obspy) (1.22)
Requirement already satisfied: chardet<3.1.0,>=3.0.2 in ./python3.6.5/lib/python3.6/site-packages (from requests->obspy) (3.0.4)
Requirement already satisfied: certifi>=2017.4.17 in ./python3.6.5/lib/python3.6/site-packages (from requests->obspy) (2018.4.16)
Requirement already satisfied: idna<2.7,>=2.5 in ./python3.6.5/lib/python3.6/site-packages (from requests->obspy) (2.6)
Requirement already satisfied: six in ./python3.6.5/lib/python3.6/site-packages (from cycler>=0.10->matplotlib>=1.1.0->obspy) (1.11.0)
Building wheels for collected packages: obspy
  Building wheel for obspy (setup.py) ... done
  Stored in directory: /Users/kent/Library/Caches/pip/wheels/11/d6/40/c448464ae42229b2f9fb46b71be0213e10e9628346b7f1198f
Successfully built obspy
Installing collected packages: obspy
Successfully installed obspy-1.1.1
```

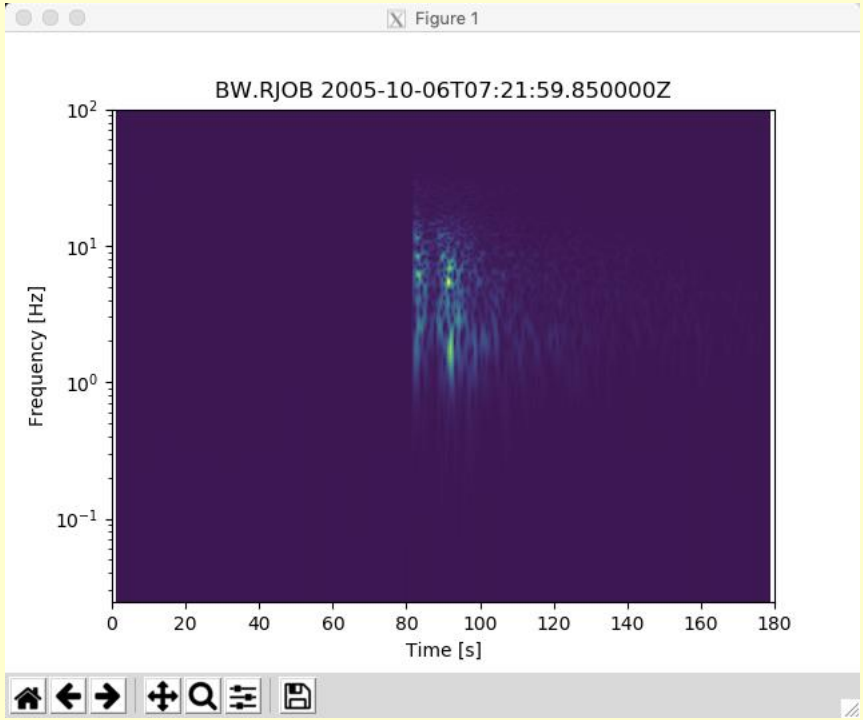
BRTT
BOULDER REAL TIME TECHNOLOGIES, INC.

Kinemetrics

ObsPy in Antelope

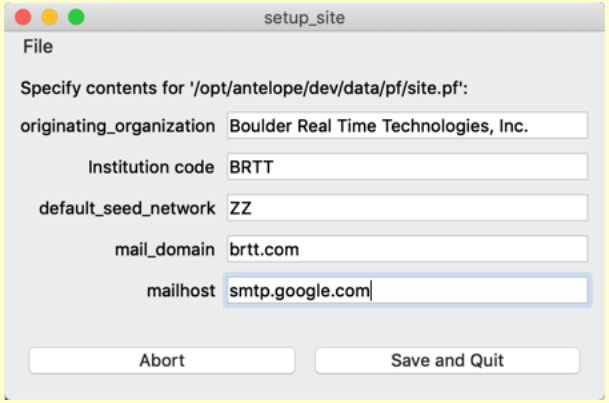
```
[nyas:/opt/antelope][5.9] kent% python
Python 3.6.5 (default, Mar 22 2019, 21:04:14)
[GCC 4.2.1 Compatible Clang 5.0.0 (trunk 306208)] on darwin
Type "help", "copyright", "credits" or "license" for more information.
>>> import obspy
>>> st = obspy.read("https://examples.obspy.org/RJOB_061005_072159.ehz.new")
>>> st.spectrogram(log=True, title='BW.RJOB ' + str(st[0].stats.starttime))
```

ObsPy
A Python Framework for Seismology



New ***setup_site***(1)

- Straight replacement for old ***setup_site***(1)
- Part of *Qt* modernization and installer modernization

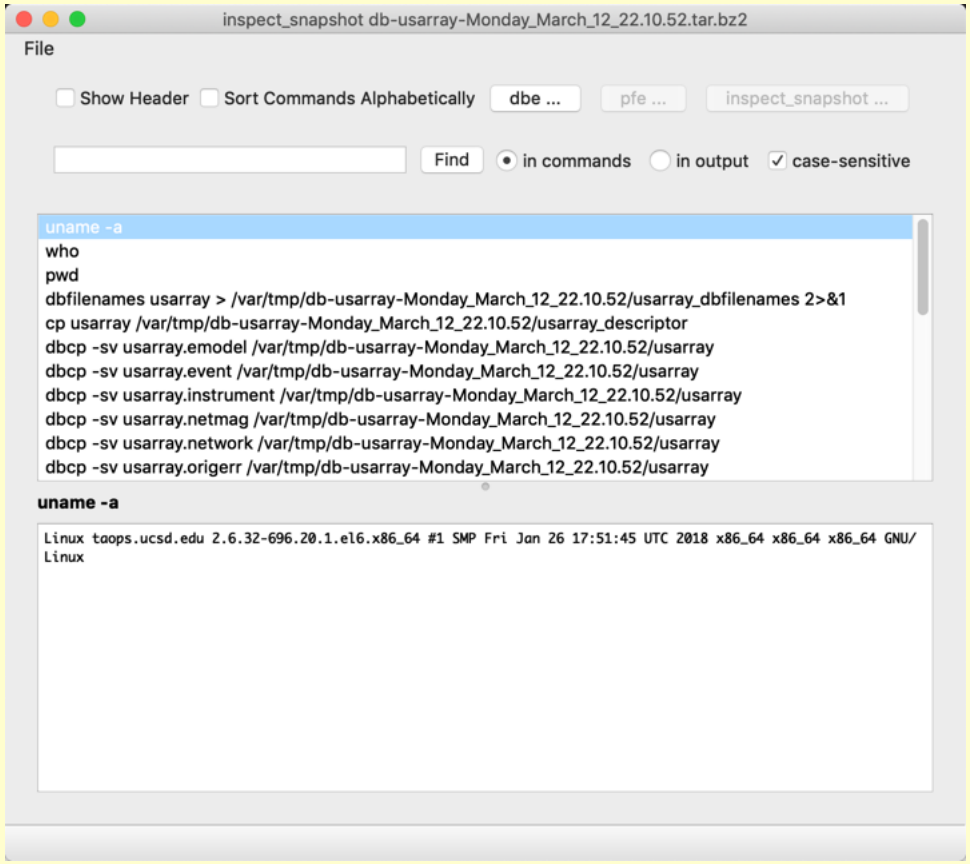


Written by:
Sue Simoncic
Pitch, Roll, & Yaw LLC

New ***inspect_snapshot***(1)

% ***inspect_snapshot*** db-usarray-Monday_March_12_22.10.52.tar.bz2

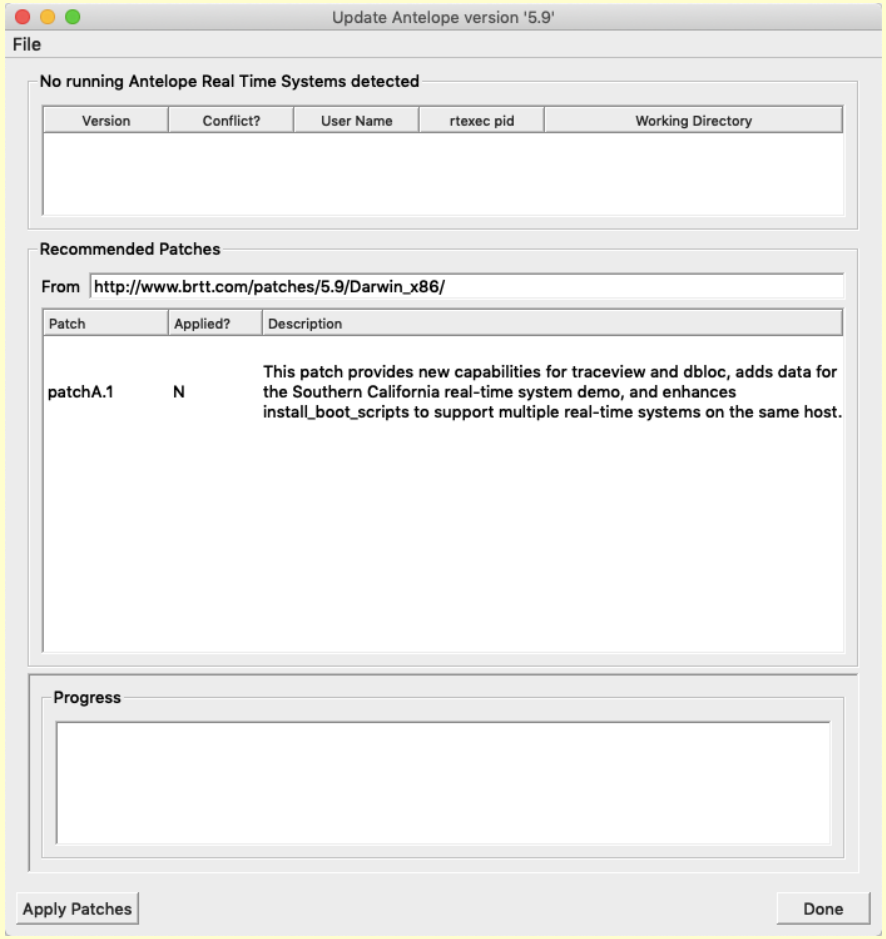
- Various snapshot generators available:
  - ***licsnapshot***(1)
  - ***rtsnapshot***(1)
  - ***dbsnapshot***(1)
  - ***dbloc_snapshot***(1)
- Snapshots are frequently requested by support@brtt.com
- Feel free to look at these snapshots if so inclined -- perhaps you will see the problem quickly



Written by:
Sue Simoncic
Pitch, Roll, & Yaw LLC

New *antelope_update*(1)

- Modern *Qt* interface
- Auto-detection of running real-time systems under updating version
- Override capability for updating running systems (not recommended)



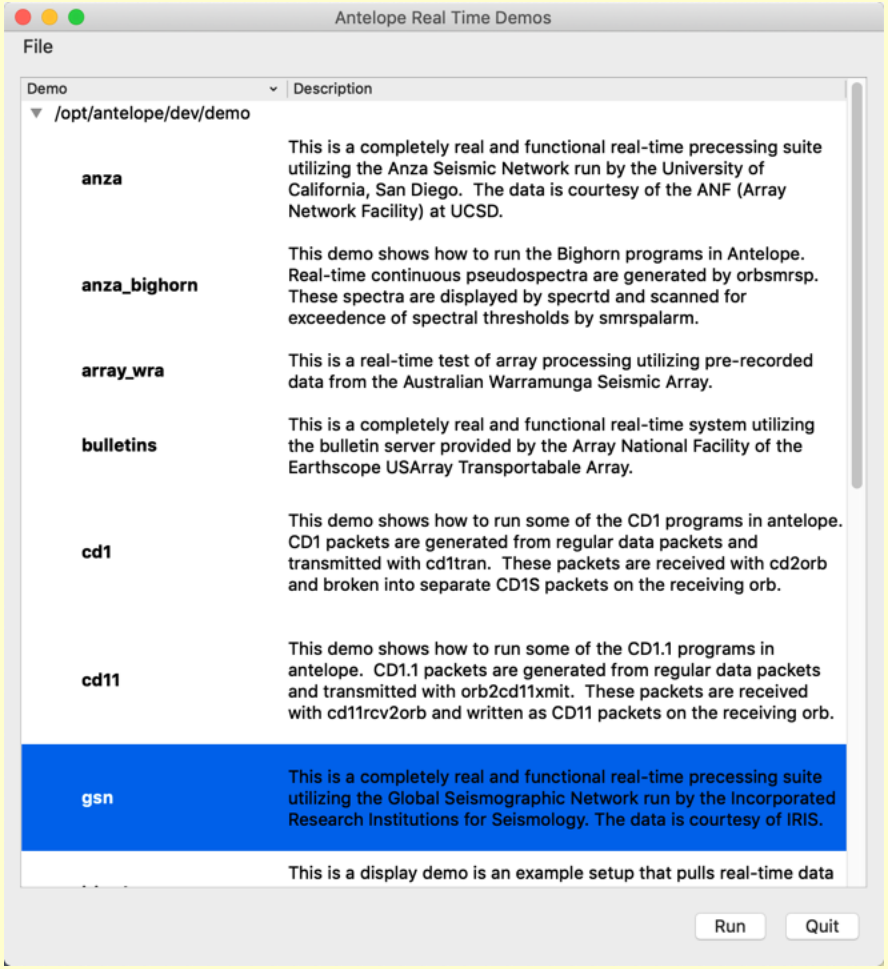
New *rtdemo*(1)

- Command-line version works same as before:

  % ***rtdemo gsn***

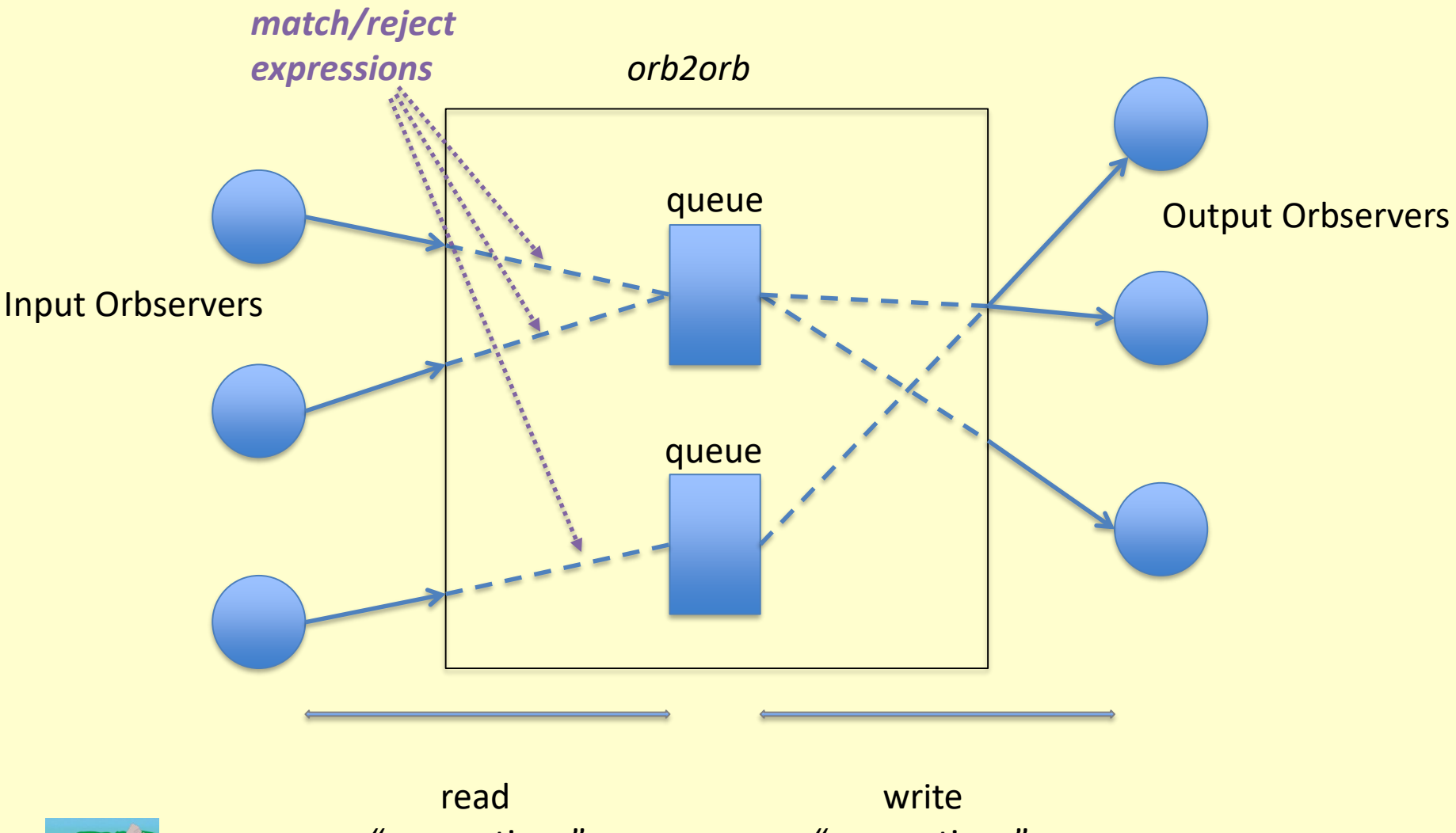
- New Qt-based graphical version:

  % ***rtdemo***

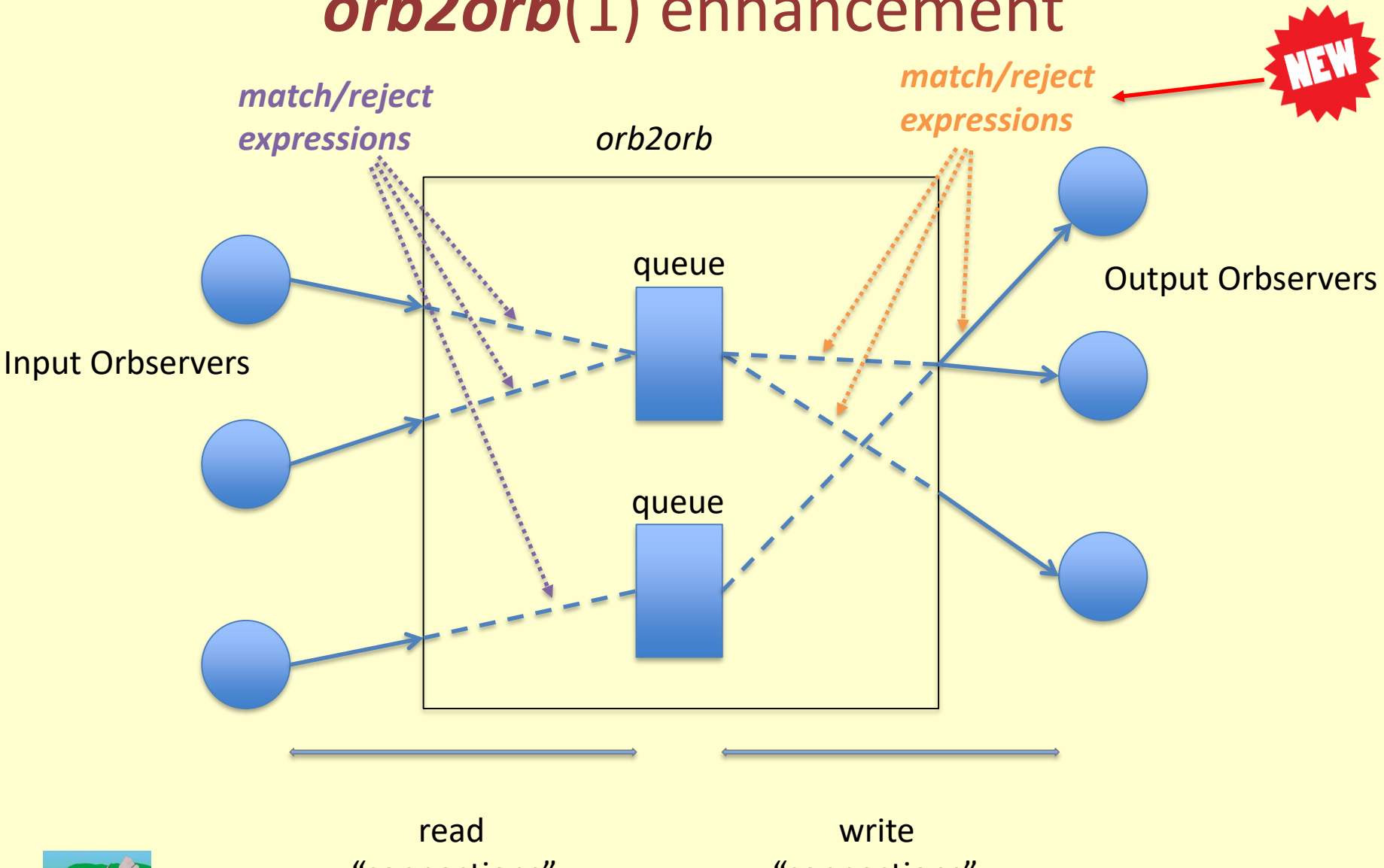


Written by:
Sue Simoncic
Pitch, Roll, & Yaw LLC

orb2orb(1) enhancement



orb2orb(1) enhancement



Custom map lines and areas

- New parameter-file *map_features.pf*
- Add your own lines
- Add your own areas
- Currently supported in ***dbevents***(1) and ***dbloc***(1)
- Straightforward text format – could create from *KML* etc.

Custom map lines and areas

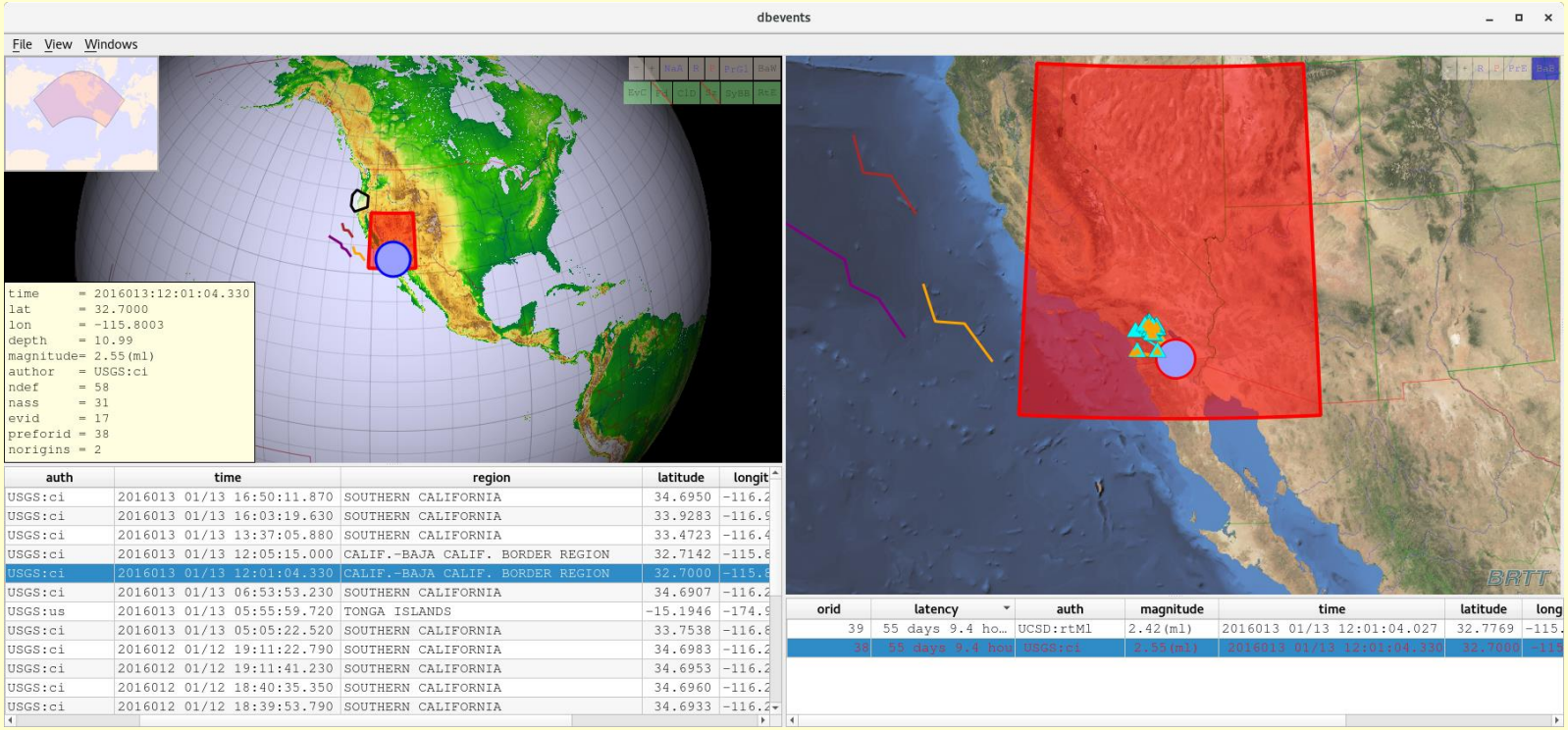
```
map_linear_features &Arr{
    testlinfeature &Arr{
        maps &Tbl{
            dbevents_events
            dbevents_event
            dbevents_origins
            dbloc_maindb_events
            dbloc_trialdb_event
        }
        color_outline   purple
        linewidth       3
        lonlat_points_sequence &Tbl{
            -125    33
            -126    34
            -127    34.3
            -127.3  35
            -130    36
        }
    }
}
```

```
map_area_features &Arr{
    testarfeature &Arr{
        maps &Tbl{
            dbevents_events
            dbevents_event
            dbevents_origins
            dbloc_maindb_events
            dbloc_trialdb_event
        }
        color_outline   red
        color_fill      \#88ff0000
        linewidth       4
        lonlat_points_sequence &Tbl{
            -121    31
            -121    41
            -111    41
            -111    31
            -121    31
        }
    }
}
```

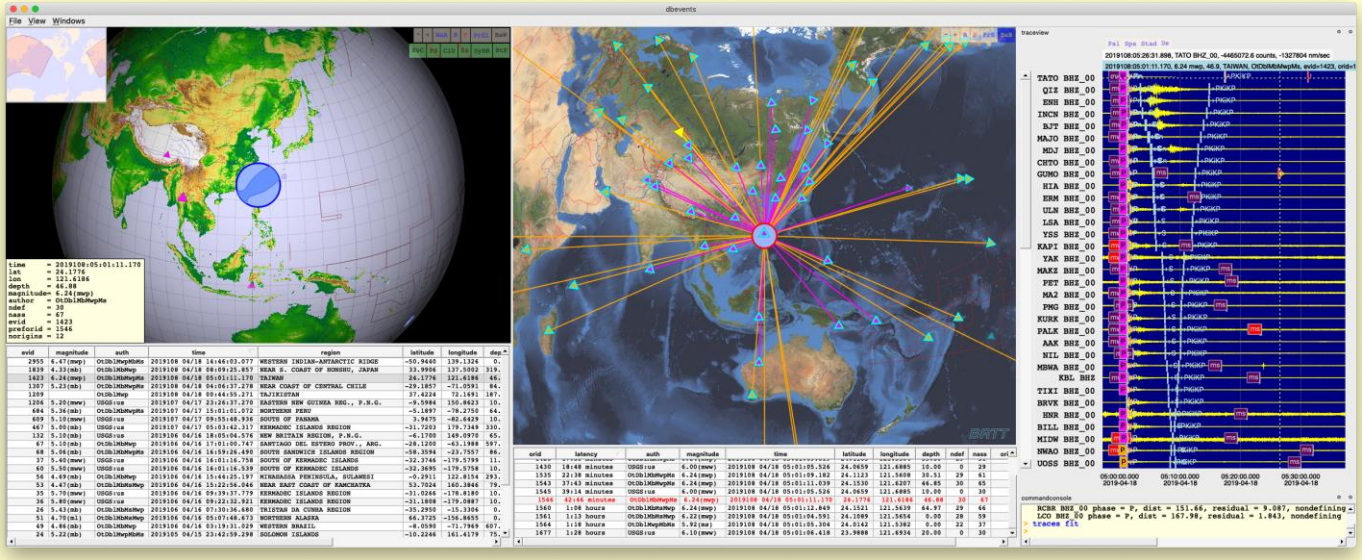
BRTT
BOULDER REAL TIME TECHNOLOGIES, INC.

Kinemetrics

Custom map lines and areas



dbevents(1) with *traceview*



- *traceview* display in ***dbevents***(1)
- Replaces separate launch of ***dbpick***(1)
- *BQTraceview*(3) plus *Python* widget wrapper underneath
- Right-click launch of external commands (from *dbevents.pf*) re-instated

Plans for Coming Development Year

- FDSN Web Services support
  - in progress
  - More detail in upcoming talk
- *Qt 5.12 (Long-term release)*
- Operationalizing ***dbloc***
- ***orbrtd*** in *Qt*
- Further:
  - *Comments ?*
  - *Suggestions ?*
  - *Requests ?*

BRTT
BOULDER REAL TIME TECHNOLOGIES, INC.

Kinemetrics

Thank You!

Questions?

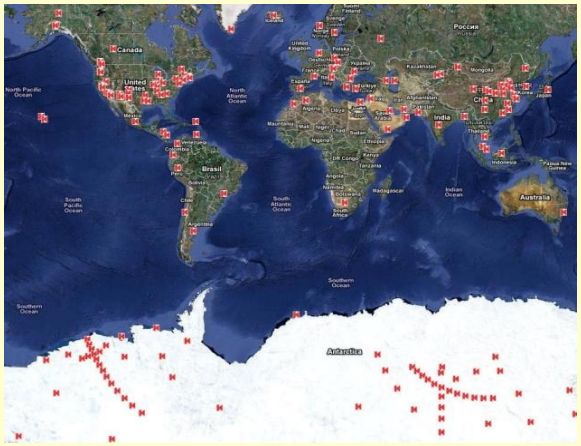
BRTT
BOULDER REAL TIME TECHNOLOGIES, INC.

Kinemetrics

Introduction - KMI

Kinemetrics, Inc.

- Founded in 1969
- OYO Corp owned in 1991
- ISO9001 since 1999
- $35M FY2012 revenue (mostly international)



HQ's in Pasadena CA with Sales and Project offices in Switzerland & Abu Dhabi

Introduction – KMI Team

KINEMETRICS

Designs and manufactures sensors and digitizers – Provides complete systems design, installation and operations

QUANTERRA®

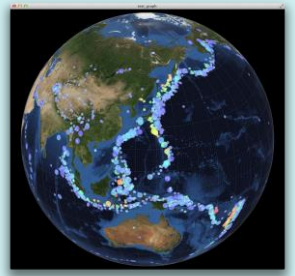
Designs High-End Digitizers

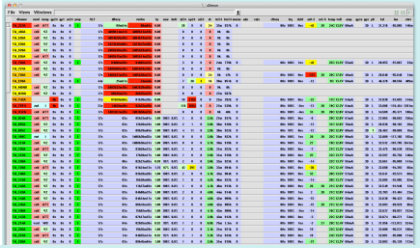
metrozet

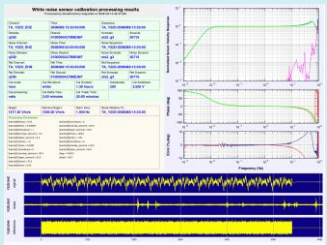
Designs High-End Sensors

BRTT

Antelope Software







Kinemetrics / BRTT
Comprehensive Hardware, Software, and Services

Kinemetrics Systems Solutions

- Turnkey complete systems including enterprise-class computing centers and full communications

Kinemetrics Hardware Manufacturer

- World class Kinemetrics and Quanterra dataloggers
- World class Kinemetrics, Metrozet and Streckeisen sensors

BRTT Software Developer

- World class acquisition software for all Kinemetrics hardware products
- Proven track record for large networks with difficult remote deployments (USArray)
- World class, comprehensive automated and interactive seismic processing software
- Data neutral architecture for support of non-seismic environmental monitoring networks
- Extraordinary Command & Control capabilities with SOH displaying

Kinemetrics Services

- Complete systems procurement, installation and training including all aspects of both hardware and software
- Network operations

BRTT
BOULDER REAL TIME TECHNOLOGIES, INC.

Kinemetrics