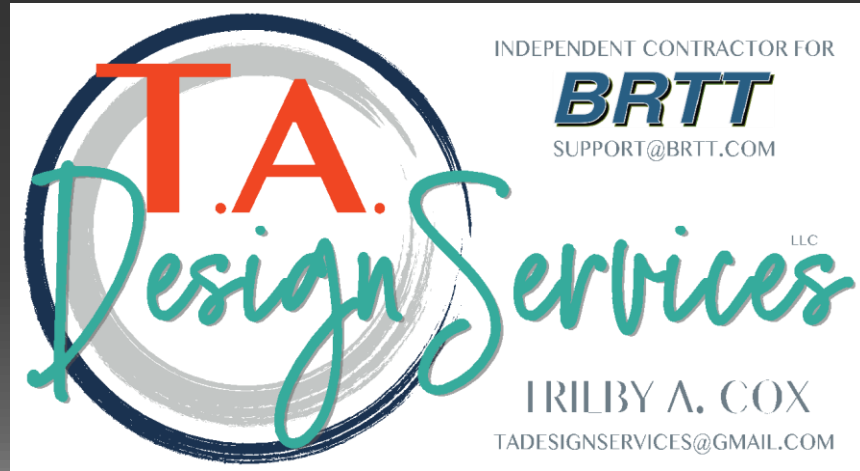


# dbloc

## work-in-progress prototype



# Work-in-progress



# Outline

- Short history
- Design goals
- Current prototype
- Demo
- Feedback welcome on where we're headed

# Short history of dbloc2 and dbloc

- Dan Quinlan and Luda Ratnikova designed initial dbloc2 in the 1990's for small regional networks
- From late 1990's to present, dbloc2/dbpick has worked well (dbpick even earlier)
- Mounting pressure from user community for modernization plus need to switch to modern toolkits for maintainability spurred rewrite
- New effort called 'dbloc' rather than objectionable 'dbloc3' -- history of original 'dbloc' lost to time, we're taking the name back
- Coding efforts begun Summer 2018
  - First glimpse at Victoria AUG 2018
  - First presentable early-prototype May 2019

# Design goals for dbloc

- Reestablish maintainability of software by switching to modern toolkits
- Support enterprise-scale network operations
- Continue supporting small-network operations
- Modernize user-interaction features and capabilities
- Retain main features of existing programs
- Integrate waveform-processing and earthquake-analysis components (dbloc2 vs dbpick) since that is now possible
- Integrate, modernize, and/or re-integrate myriad features such as magnitude calculation, moment tensors etc. to produce a unified analyst experience

# Current prototype -- overview

**dbloc Prototype** Database: demo

File Window Help  
New View

Main Database Analysis

Analysis Time Window

Time Event Waveform  
Previous Unlink  
Show in Traceview Station Location  
Start: 1/13/70 06:53:13.740 UTC  
Width: 600.000 seconds

Leasur Controls  
Setup [dbloc2] [sig9] Options

Maximum Iterations

Main Operators  
Associate  
Save

Leasur Input  
Starting Location  
Lat: 34.629 Lon: -116.295  
Station: JAK  
Fix Depth: 0 km

id	name	lat	lon	revision	depth	operator	auth		
000000	1	32.755	-115.484	2016012117:27:37.538		SOUTHERN CALIFORNIA	2.37	2.31(1)	USG01R
000001	2	32.488	-115.579	2016012109:15:58.9		SOUTHERN CALIFORNIA	6.13	6.1(1)	USG01R
000002	3	32.490	-115.443	2016012109:14:18.494		SOUTHERN CALIFORNIA	11.32	999.0(1)	USG01R
000003	4	32.524	-115.402	2016012106:52:41.1		SOUTHERN CALIFORNIA	9.72	999.0(1)	USG01R
000004	5	31.539	-115.449	2016012104:40:34.6		SOUTHERN CALIFORNIA	9.49	9.4(1)	USG01R
000005	6	32.827	-115.400	2016012103:29:13.0		SOUTHERN CALIFORNIA	16.43	1.0(1)	USG01R
000006	7	31.223	-115.513	2016012103:15:43.0		SOUTHERN CALIFORNIA	4.09	1.4(1)	USG01R
000007	8	31.096	-115.486	2016012103:02:39.0		SOUTHERN CALIFORNIA	9.14	1.0(1)	USG01R
000008	9	31.971	-115.484	2016012102:17:43.330		SOUTHERN CALIFORNIA	1.31	2.1(1)	USG01R
000009	10	34.629	-116.294	2016012102:16:33.780		SOUTHERN CALIFORNIA	1.32	2.0(1)	USG01R
000010	11	34.494	-116.278	2016012102:15:33.070		SOUTHERN CALIFORNIA	2.3	2.0(1)	USG01R
000011	12	34.488	-116.290	2016012102:14:12.740		SOUTHERN CALIFORNIA	2.39	2.0(1)	USG01R
000012	13	34.488	-116.273	2016012102:13:20.070		SOUTHERN CALIFORNIA	2.39	2.0(1)	USG01R
000013	14	34.753	-116.512	2016012102:10:22.143		SOUTHERN CALIFORNIA	13.82	999.0(1)	****
000014	15	32.755	-115.484	2016012102:09:19.787		SOUTHERN CALIFORNIA	2.37	2.3(1)	USG01R
000015	16	32.755	-115.484	2016012102:09:19.787		SOUTHERN CALIFORNIA	2.37	2.3(1)	USG01R
000016	17	32.714	-115.821	2016012102:09:19.000		CALIF.-SANTA CALIF. BORDER REGION	4.46	2.1(1)	USG01R
000018	18	32.472	-115.400	2016012102:07:48.0		SOUTHERN CALIFORNIA	5.47	1.0(1)	USG01R
000019	19	31.938	-115.939	2016012102:07:19.430		SOUTHERN CALIFORNIA	11.32	1.0(1)	USG01R
000020	20	32.639	-115.827	2016012102:07:11.473		SOUTHERN CALIFORNIA	1.42	2.0(1)	USG01R

Leasur Output  
Posterior: 1.32 (39 deg. of freedom)  
Posterior: 5.87 (Normalized sample S.O.)  
Azimuthal weighting: 100  
Effective rate of reject: 3.00  
Maximum azimuthal GAP: 332 deg.

Log Output dbloc Command Console

```

dbloc>
dbloc> output a list of 44
dbloc> clear edit_queue
dbloc> edit_queue
dbloc> edit_queue redo [all] [number]
dbloc> edit_queue undo
dbloc> edit_queue status
dbloc> edit_queue stop
dbloc> show/trace_events show [yes|no] [toggle]
dbloc> show/trace_events show [yes|no] [toggle]
dbloc> show/trace_events show [yes|no] [toggle]
dbloc> event show [index] | [incr] | [incr 'e word now']
dbloc> event show [index] | [incr] | [incr 'e word now']
dbloc> trace auto_distance_max yes
dbloc> detection show no
dbloc> arrival edit_toggle
  
```

**dbloc Prototype** Database: demo

File Window Help  
New View

Main Database Analysis

Analysis Time Window

Time Event Waveform  
Previous Unlink  
Show in Traceview Station Location  
Start: 2016103006:54:24.1 GARR HNE 52663 1 counts, 3.908456e-08 mmsec^2  
Width: 600.000 seconds

Leasur Controls  
Setup [dbloc2] [sig9] Options

Maximum Iterations

Main Operators  
Associate  
Save

Leasur Input  
Starting Location  
Lat: 34.629 Lon: -116.295  
Station: JAK  
Fix Depth: 0 km

Traceview Navigation  
Undo Arrival Edit Redo Arrival Edit  
Toggle  
Edit Mode Add Mode  
P-align Predicted Arrivals  
Auto Distance Sort

Phases  
p S Def NonDef  
Clear ClearAll Del

Traceview aliases  
ta to ta to  
With Arrivals Detections ArrDet All  
Nbases: 40 traces

Database  
demo  
Imptrln

Log Output dbloc Command Console

```

dbloc>
dbloc> output a list of 44
dbloc> clear edit_queue
dbloc> edit_queue
dbloc> edit_queue redo [all] [number]
dbloc> edit_queue undo
dbloc> edit_queue status
dbloc> edit_queue stop
dbloc> show/trace_events show [yes|no] [toggle]
dbloc> show/trace_events show [yes|no] [toggle]
dbloc> event show [index] | [incr] | [incr 'e word now']
dbloc> event show [index] | [incr] | [incr 'e word now']
dbloc> trace auto_distance_max yes
dbloc> detection show no
dbloc> arrival edit_toggle
  
```

# Major feature -- Full integration of waveform analysis via traceview

The screenshot displays the dbloc software interface, which is used for seismic waveform analysis. The main window is titled "dbloc: Prototype" and shows a map of California with a red circle indicating the epicenter. The map is labeled "201601306 54.54.241 GARR HNE, 53663.1 counts, 3.98849e+08 mmsec^2" and "201601306 53.54.111 2.31 m, 0.0 CALIFORNIA - NEVADA REGION, UCSD/IRIT, evds=16, orid=07, nass=34, rddf=04".

The main window displays a grid of seismic waveforms from various stations, including KNN HNE, BOB1 HNE, BALD HNE, BOB4 HNE, PFO HNE, GVAR1 HNE, TPFO HNE, RHIL HNE, RRSP HNE, BOB2 HNE, BOB2A HNE, GARR HNE, GARR HNE, BOB6 HNE, and BOB6A HNE. The waveforms are plotted against time, with a scale of 0.5s to 10.0s.

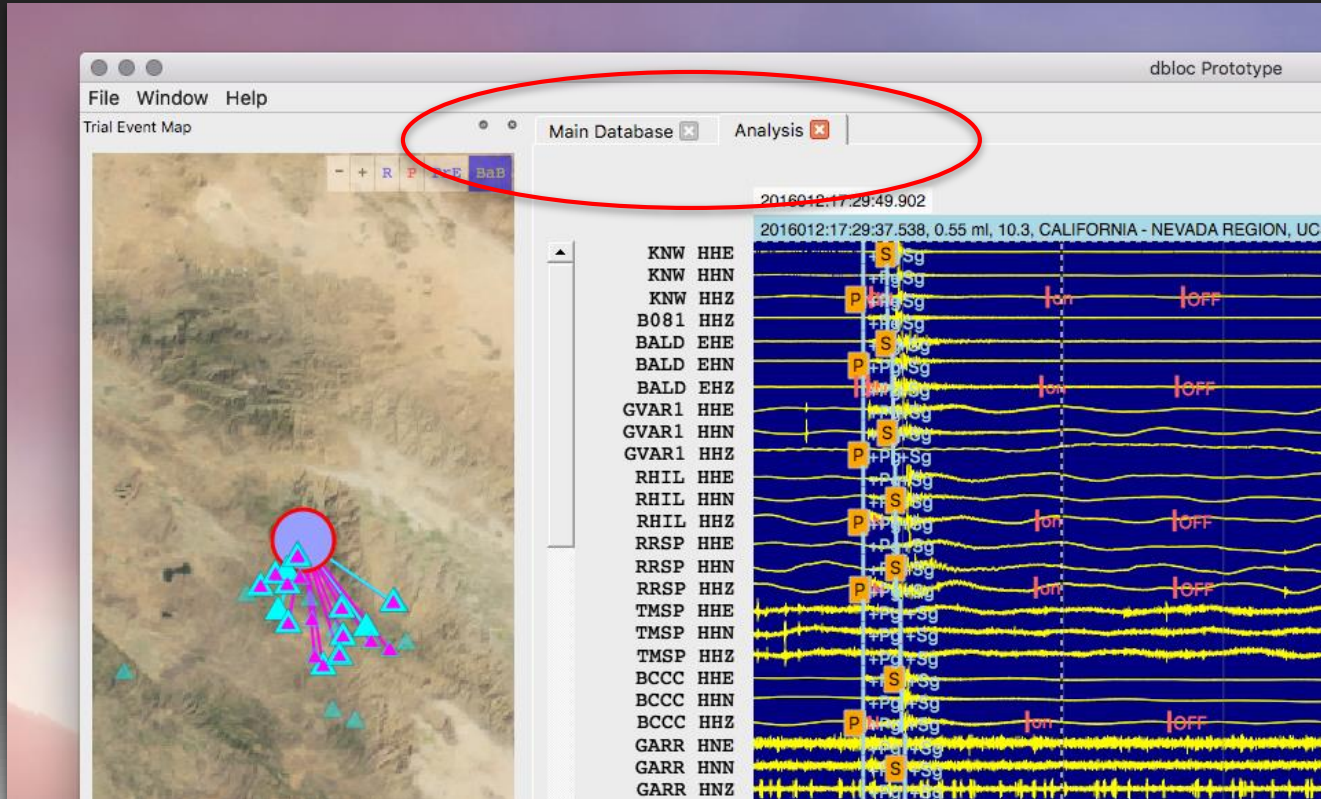
The right panel shows the "Analysis Time Window" and "Database: demo". It includes a table of detected events:

Time	Event	Waveform
1	388 P	g B946 DHZ
2	388 P	g BOB3 HHZ
3	388 P	g SNO2 HHZ
4	388 P	g ALCV ENZ
5	388 P	g TRO2 HHZ
6	388 P	g BOM4 HHZ
7	388 P	g CRY2 HHZ
8	388 P	g WNC2 HHZ
9	388 P	g JORD HHZ
10	388 P	g FRD2 HHZ
11	388 P	g BOB7 HHZ
12	388 P	g BZN2 HHZ
13	388 P	g LVA2 HHZ
14	378 P	g XNW2 HHZ
15	386 P	g BOB8 HHZ
16	378 P	g BOB1 HHZ
17	389 P	g MOUN2 HHZ
18	378 P	g BOB4 HHZ
19	388 P	g SNE2 HHZ
20	378 P	g PFO2 HHZ
21	377 P	g BALD ENZ
22	378 P	g TPFO HHZ
23	378 P	g BRL2 HHZ
24	378 P	g BOB2 HHZ
25	401 S	g TPFO HHZ
26	381 P	g BCOC HHZ
27	400 S	g PFO2 HHZ
28	400 S	g TRSD LLL

The bottom panel shows the "Log Output" and "dbloc Command Console". It includes a list of detected events:

rec	Time	Phase	Depth	Time	NASS	RDDF	Review	Magnitude	ASST			
000000	2016-01-13 06:53:40.000	P	16	34.429	-116.235	0.50	201601306153154.111	34	34	Y	2.31(ML)	UCSD/IRIT
000001	2016-01-13 06:53:40.000	S	16	34.493	-116.243	1.42	201601306153153.289	34	34	Y	2.31(ML)	UCSD/IRIT
000002	2016-01-13 06:54:00.000	P	16	34.436	-116.243	0.50	201601306153153.964	34	34	X	2.31(ML)	****

# Major feature -- Tabbed panels for analyst tasks





# Major feature -- Integrated maps

**dbloc Prototype**

File Window Help  
Main Database Analysis

Time: 1/17/16 06:08:07.762 UTC  
Width: 600.000 seconds

Station: AAK

Starting Location: Lat: -19.199 Lon: -174.901

rec	Phase	Time	Lat	Lon	Depth	Amplitude	SNR	
000000	ANALYZE	1	33.751	-114.484	20146121712973.530	6.27	8.51(e1)	UCSD:TRN
000000	ANALYZE	2	33.490	-114.579	20146121934119.960	6.23	8.51(e1)	UCSD:TRN
000000	ANALYZE	3	33.490	-114.440	20146121835816.894	11.52	-999.0(e1)	UCSD:TRN
000000	ANALYZE	4	33.536	-114.482	2014612184596181.812	6.72	-999.0(e1)	UCSD:TRN
000000	ANALYZE	5	33.535	-114.440	2014612184596181.812	6.89	-8.05(e1)	UCSD:TRN
000000	ANALYZE	6	33.937	-117.440	201461219329256.740	4.07	1.28(e1)	UCSD:TRN
000000	ANALYZE	7	33.223	-114.313	201461218441107.430	4.09	1.40(e1)	UCSD:TRN
000000	ANALYZE	8	33.986	-114.241	201461217124258.460	6.74	1.49(e1)	UCSD:TRN
000000	ANALYZE	9	33.971	-114.444	20146121713724.530	1.71	2.07(e1)	UCSD:TRN
000000	ANALYZE	10	34.465	-114.241	201461218428358.740	1.91	2.38(e1)	UCSD:TRN
000000	ANALYZE	11	34.465	-114.241	201461218428358.740	1.91	2.38(e1)	UCSD:TRN
000000	ANALYZE	12	34.465	-114.241	201461218428358.740	1.91	2.38(e1)	UCSD:TRN
000000	ANALYZE	13	34.465	-114.241	201461218428358.740	1.91	2.38(e1)	UCSD:TRN
000000	ANALYZE	14	34.465	-114.241	201461218428358.740	1.91	2.38(e1)	UCSD:TRN
000000	ANALYZE	15	34.465	-114.241	201461218428358.740	1.91	2.38(e1)	UCSD:TRN
000000	ANALYZE	16	34.465	-114.241	201461218428358.740	1.91	2.38(e1)	UCSD:TRN
000000	ANALYZE	17	34.465	-114.241	201461218428358.740	1.91	2.38(e1)	UCSD:TRN
000000	ANALYZE	18	34.465	-114.241	201461218428358.740	1.91	2.38(e1)	UCSD:TRN
000000	ANALYZE	19	34.465	-114.241	201461218428358.740	1.91	2.38(e1)	UCSD:TRN
000000	ANALYZE	20	34.465	-114.241	201461218428358.740	1.91	2.38(e1)	UCSD:TRN
000000	ANALYZE	21	34.495	-114.237	20146121842611.870	1.83	2.40(e1)	UCSD:TRN

**dbloc Prototype**

File Window Help  
Main Database Analysis

Time: 1/17/16 12:00:38.165

Station: AAK

Starting Location: Lat: -19.199 Lon: -174.901

rec	Phase	Time	Lat	Lon	Depth	Amplitude	SNR	
000000	ANALYZE	1	33.751	-114.484	20146121712973.530	6.27	8.51(e1)	UCSD:TRN
000000	ANALYZE	2	33.490	-114.579	20146121934119.960	6.23	8.51(e1)	UCSD:TRN
000000	ANALYZE	3	33.490	-114.440	20146121835816.894	11.52	-999.0(e1)	UCSD:TRN
000000	ANALYZE	4	33.536	-114.482	2014612184596181.812	6.72	-999.0(e1)	UCSD:TRN
000000	ANALYZE	5	33.535	-114.440	2014612184596181.812	6.89	-8.05(e1)	UCSD:TRN
000000	ANALYZE	6	33.937	-117.440	201461219329256.740	4.07	1.28(e1)	UCSD:TRN
000000	ANALYZE	7	33.223	-114.313	201461218441107.430	4.09	1.40(e1)	UCSD:TRN
000000	ANALYZE	8	33.986	-114.241	201461217124258.460	6.74	1.49(e1)	UCSD:TRN
000000	ANALYZE	9	33.971	-114.444	20146121713724.530	1.71	2.07(e1)	UCSD:TRN
000000	ANALYZE	10	34.465	-114.241	201461218428358.740	1.91	2.38(e1)	UCSD:TRN
000000	ANALYZE	11	34.465	-114.241	201461218428358.740	1.91	2.38(e1)	UCSD:TRN
000000	ANALYZE	12	34.465	-114.241	201461218428358.740	1.91	2.38(e1)	UCSD:TRN
000000	ANALYZE	13	34.465	-114.241	201461218428358.740	1.91	2.38(e1)	UCSD:TRN
000000	ANALYZE	14	34.465	-114.241	201461218428358.740	1.91	2.38(e1)	UCSD:TRN
000000	ANALYZE	15	34.465	-114.241	201461218428358.740	1.91	2.38(e1)	UCSD:TRN
000000	ANALYZE	16	34.465	-114.241	201461218428358.740	1.91	2.38(e1)	UCSD:TRN
000000	ANALYZE	17	34.465	-114.241	201461218428358.740	1.91	2.38(e1)	UCSD:TRN
000000	ANALYZE	18	34.465	-114.241	201461218428358.740	1.91	2.38(e1)	UCSD:TRN
000000	ANALYZE	19	34.465	-114.241	201461218428358.740	1.91	2.38(e1)	UCSD:TRN
000000	ANALYZE	20	34.465	-114.241	201461218428358.740	1.91	2.38(e1)	UCSD:TRN
000000	ANALYZE	21	34.495	-114.237	20146121842611.870	1.83	2.40(e1)	UCSD:TRN

# Major feature -- Built-in command consoles for command-driven interaction

```
Traceview Command Console
B087 MHz phase = P, dist = 1.17, residual = 0.446, defining
F10 MHz phase = P, dist = 1.17, residual = -0.351, defining
B2N MHz phase = P, dist = 1.19, residual = -0.186, defining
J08D MHz phase = P, dist = 1.29, residual = -0.464, defining
B088 MHz phase = P, dist = 1.29, residual = -0.918, defining
L0R2 MHz phase = P, dist = 1.40, residual = 0.124, defining
SMER MHz phase = P, dist = 1.40, residual = -1.391, defining
M0N92 MHz phase = P, dist = 1.74, residual = 1.750, defining
>>> arrivals tag clear
>>> arrivals tag associated
>>> arrivals tag D
>>> help
?
help
echo
alias name [substitution_string]
unalias name
aliases
hotkey name [substitution_string]
unhotkey name
hotkeys
main import file_name
main export file_name
display time_start [time_string] [time_string]
display time_window time_string
display time_zoom factor [time_anchor]
display paligo [(yes|no|toggle)]
display show_pred [(yes|no|toggle)]
display batch [(yes|no|toggle)]
traces maximum number
traces minimum_pixels number
traces fit [(auto|toggle)] (yes|no)
traces sta [(yes|no|toggle)]
traces std [(yes|no|toggle)]
traces stat [(yes|no)]
traces auto_distance expr [(yes|no|toggle)]
traces gain [gain] [gain_factor] [gain_factor]
traces {trace_exprs} select [(yes|no|toggle)]
traces {trace_exprs} configure key value
traces {trace_exprs} dup
traces {trace_exprs} show [(yes|no|toggle)]
traces {trace_exprs} order
traces {trace_exprs} zoom [(first_index number|factor {first_y})]
traces {trace_exprs} start [first_index]
traces {trace_exprs} stretch factor
traces {trace_exprs} color [color_string]
traces {trace_exprs} color_background [color_string]
traces {trace_exprs} linewidth [linewidth]
traces {trace_exprs} filter ["PAD" time_pad [filter_string] [%] filter_label]
traces {trace_exprs} units [{"source" | "count" | "m"}]
traces {trace_exprs} scale [{"fixed" | "bottom stop" | "auto"}]
arrivals edit_mode [(yes|no|toggle)]
arrivals select ['clear' | 'arid' | 'yes' | 'no' | 'toggle']
arrivals add_mode [(yes|no|toggle)]
arrivals copy ['clear']
arrivals paste ['dont_paste_tags'] time_string
arrivals phase phase_string
arrivals tag ['clear' | 'clear_all' | 'associated' | 'tag_string']
arrivals output ['tags' | 'selected']
arrivals edit_queue clear
arrivals edit_queue undo ['all' | number]
arrivals edit_queue redo ['all' | number]
arrivals edit_queue setstate name
arrivals edit_queue opstate name
arrivals {trace_exprs} show [(yes|no|toggle)]
detections {trace_exprs} show [(yes|no|toggle)]
event show [index] [+incr|-incr] ['evid' | 'noev']
origin show [index] [+incr|-incr] ['o' | 'oid' | 'pref']
traces auto_distance_sort yes
>>> detections show no
>>> arrivals edit_mode toggle
>>>
```

```
Dblloc Command Console
dbloc> atw first
Analysis Time Window = 1452569280.730 1/12/16 03:28:00.730 UTC
+ 600.000 seconds
('event' mode)

dbloc> atw 600
Analysis Time Window = 1452569280.730 1/12/16 03:28:00.730 UTC
+ 600.000 seconds
('event' mode)

dbloc> analyze e12
dbloc> tvshow o18
dbloc> analyze e13
dbloc> tvshow o16
dbloc> analyze e16
dbloc> tvshow o36
dbloc> tvshow o37
dbloc> locate
Starting solver...
location_solution: new origin 46

dbloc> analyze e15
dbloc> tvshow o22
dbloc> tvshow o26
dbloc> locate
Starting solver...
location_solution: new origin 47

dbloc> locate
Starting solver...
location_solution: new origin 48

dbloc> atw next
Analysis Time Window = 1452667973.230 1/13/16 06:52:53.230 UTC
+ 600.000 seconds
('event' mode)

dbloc> window analysis
dbloc> tvshow o37
dbloc> locate
Starting solver...
location_solution: new origin 49

dbloc> atw next
Analysis Time Window = 1452686404.330 1/13/16 12:00:04.330 UTC
+ 600.000 seconds
('event' mode)

dbloc> window analysis
dbloc> |
```

# Major feature -- Multi-window design with detachable docking widgets

The image displays the dbloc Prototype software interface, which is designed for multi-window and detachable docking. A red circle highlights the menu bar (File, Window, Help) in the top window, with a red arrow pointing to a menu bar in a separate, docked window on the left. This docked window contains a list of menu items:

- File
- Window
- Help
- Trial E
- ✓ Main Database
- ✓ Analysis
- Mags
- Test
- ✓ Analysis Time Window
- Databases
- ✓ Dbloc Command Console
- ✓ Locator Controls
- ✓ Locator Output
- Log Output
- ✓ Main Operations
- ✓ Locator Input
- ✓ Trial Event Map
- ✓ Traceview Command Console
- ✓ Traceview Navigation

The main interface window, titled "dbloc Prototype", shows a map of California with a trial event map overlay. Below the map is a "Traceview Navigation" panel with "Undo Arrival Edit" and "Redo Arrival Edit" buttons, and a "Toggles" section with "Edit Mode" and "Add Mode" buttons. The "Phases" section includes "P", "S", "Def", and "NonDef" buttons. The "Traceview aliases" section has "ta" and "tc" buttons. The "With:" section includes "Arrivals", "Detections", "Arr-Det", and "All" buttons. The "Databases" section includes "demo" and "tmp/trial" buttons. The "Locator Output" section is empty. The "Traceview Command Console" shows the following commands and results:

```
dbloc ERI phase = P, dlist = 1.19, residual = -0.094, defining
dbloc HRI phase = S, dlist = 1.20, residual = -0.191, defining
dbloc LRI phase = S, dlist = 1.20, residual = -0.011, defining
dbloc SRI phase = P, dlist = 1.20, residual = -0.051, defining
dbloc BSI phase = S, dlist = 1.20, residual = 0.346, defining
dbloc ARRivals tag cleared
dbloc ARRivals tag associated
```

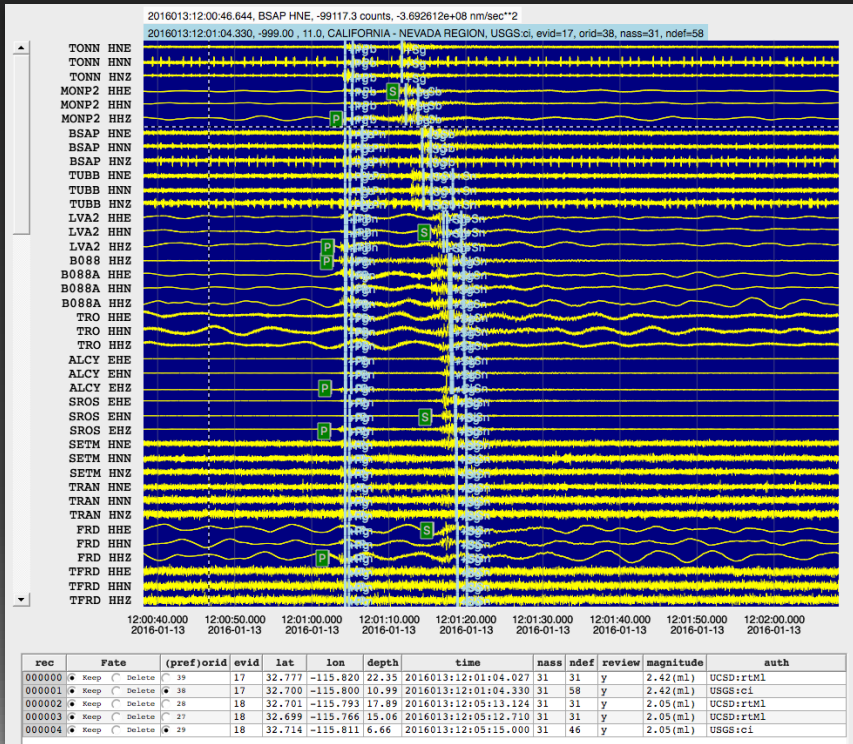
The "Dbloc Command Console" shows the following commands and results:

```
dbloc analyze 01
dbloc tview 00
dbloc analyze 01
dbloc tview 01
dbloc analyze 01
dbloc tview 01
dbloc analyze 01
dbloc tview 01
dbloc analyze 01
dbloc tview 01
```

The main window also displays a "Locator Controls" panel with "Setup" and "Options" buttons, and a "Main Operations" panel with "Locate", "Associate", and "Save" buttons. The "Locator Input" panel shows "Starting Location" with "Lat: 32.777" and "Lon: -115.820", and "Station: AAK". The "Fix Depth: 22 km" is also shown. The "Locator Output" panel shows a table of data:

arr	phase	CHI	sta	chan	time
1	430	S	GRIP	DIAN	12:01:35.433
2	425	P	BRSP	HHZ	12:01:25.276
3	424	P	CPE	HHZ	12:01:34.818
4	407	P	LVAZ	HHZ	12:01:20.433
5	427	P	BOB1	HHZ	12:01:26.430
6	406	P	MONP2	HHZ	12:01:14.778
7	426	P	BALB	HHZ	12:01:25.406
8	436	S	SOL	HHN	12:01:42.334
9	413	P	BOB2	HHZ	12:01:22.290
10	433	S	CPSE	HHN	12:01:38.260
11	412	P	PHD	HHZ	12:01:22.368
12	432	S	TPPO	HHZ	12:01:36.032
13	415	P	GRIP	HHZ	12:01:22.630
14	434	S	BALC	HHZ	12:01:42.056
15	414	P	TPPO	HHZ	12:01:22.288
16	408	P	ALCY	HHZ	12:01:21.280
17	409	P	BOB3	HHZ	12:01:21.280
18	411	S	MONP2	HHZ	12:01:22.140
19	410	P	GRIP	HHZ	12:01:22.025
20	421	P	BOB2	HHZ	12:01:23.035
21	413	P	GRIP	HHZ	12:01:22.198
22	423	P	GRIP	HHZ	12:01:24.178
23	422	P	WAK	HHZ	12:01:23.888
24	417	P	PFO	HHZ	12:01:22.838
25	416	P	BOB4	HHZ	12:01:22.480
26	419	P	BZN	HHZ	12:01:22.018
27	418	P	GRIP	HHZ	12:01:22.018

# Major feature -- Clear primacy of “Analysis Time Window” concept



### Analysis Time Window

First
Last
Previous
Next

Time
 Event
 Waveform

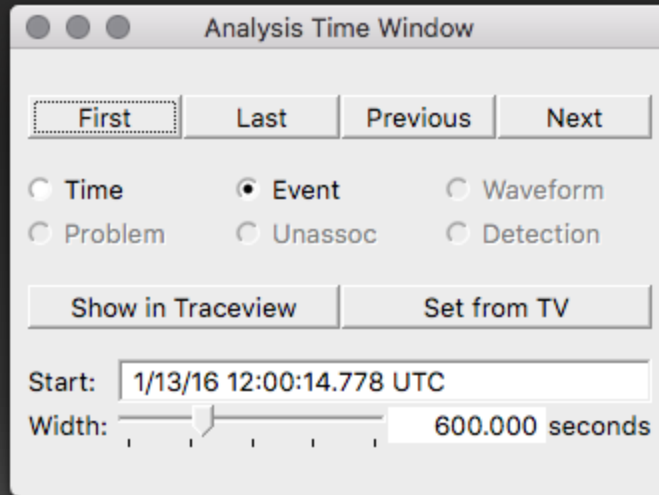
Problem
 Unassoc
 Detection

Show in Traceview
Set from TV

Start:

Width:  seconds

Minor feature -- Multiple hop modes (time-based, event-based, etc.) to advance Analysis Time Window



# Minor feature -- Built in widgets to show log and locator output

```
Log Output

dbloc: Focusing to first Analysis Time Window
dbloc: Analysis Time Window changed: now 1/12/16 03:28:00.730 UTC + 600.000 seconds
dbloc: Found 1 events in main database for time window 1/12/16 03:28:00.730 UTC + 600.000 seconds
dbloc: Rebuilding trial database 'tmp/trial' with 1 events
dbloc: Analysis Time Window unchanged: still 1/12/16 03:28:00.730 UTC + 600.000 seconds
dbloc: Analysis Time Window changed: now 1/12/16 19:11:01.688 UTC + 600.000 seconds
dbloc: Found 2 events in main database for time window 1/12/16 19:11:01.688 UTC + 600.000 seconds
dbloc: Rebuilding trial database 'tmp/trial' with 2 events
dbloc: Analysis Time Window changed: now 1/12/16 19:10:43.087 UTC + 600.000 seconds
dbloc: Found 2 events in main database for time window 1/12/16 19:10:43.087 UTC + 600.000 seconds
dbloc: Rebuilding trial database 'tmp/trial' with 2 events
dbloc: Analysis Time Window changed: now 1/13/16 06:53:13.740 UTC + 600.000 seconds
dbloc: Found 1 events in main database for time window 1/13/16 06:53:13.740 UTC + 600.000 seconds
dbloc: Rebuilding trial database 'tmp/trial' with 1 events
dbloc: Locating event
dbloc: Starting dblocsat2
dblocsat2: File /opt/antelope/5.9/data/tables/dblocsat/iasp91.LQ will not open!
dblocsat2: File /opt/antelope/5.9/data/tables/dblocsat/iasp91.LR will not open!
dblocsat2: File /opt/antelope/5.9/data/tables/dblocsat/iasp91.Rg will not open!
dblocsat2: File /opt/antelope/5.9/data/tables/dblocsat/iasp91.SS will not open!
dblocsat2: Warning locate_event: No observations to process
dblocsat2: Starting solver...
dblocsat2: location_solution: new origin 46
dbloc: Assigning orid 46 to existing evid 16
dbloc: can't staffs tmp/trial.mt
dbloc: No such file or directory
dbloc: dbloc: can't staffs tmp/trial.wfmeas
dbloc: No such file or directory
```

```
Locator Output

B082 P t 0.88 1.03 -0.15 -1.47 1.08
TFPO S t 14.58 16.05 -0.47 -4.67 1.04
BCCC P t 1.41 1.30 0.12 1.18 1.10
PFO S t 14.38 14.88 -0.51 -5.06 1.04
TMSP P t 1.32 1.12 0.20 1.97 1.08
BALD S t 15.14 14.95 -0.19 1.86 1.04
B086 P t 1.62 1.54 -0.02 -0.16 1.10
KNW S t 14.91 13.62 1.29 12.95 1.00
B086A P t 1.48 1.54 -0.06 -0.60 1.10
B086A S t 17.27 17.05 0.22 2.17 1.10
BCCC S t 16.00 16.62 -0.63 -6.25 1.10

> Slight: 5.341 NSSD: 5.866 dLat: -0.039 dLon: 0.005 dZ: 0.000
> True Cond. Num.: 9.58 Effective Cond. Num.: 9.58

Location ran for 10 iterations ... Converged!

-----
Final location estimate (+/- S.D.):
Latitude: 34.636 deg. N +/- 0.403 km.
Longitude: 116.243 deg. W +/- 0.784 km.
Depth: 0.000 km. +/- 0.000 km.
Relative O.T.: -19.776 sec. +/- 0.067 sec.
Absolute O.T.: -19.776 sec. +/- 0.067 sec.

Confidence region at 0.90 level:
Semi-major axis: 9.3 km. +/- 0.08 deg.
Semi-minor axis: 4.0 km. +/- 0.04 deg.
Major-axis strike: 107.7 deg. clockwise from North
Depth error: 0.0 km.
Orig. time error: 0.6 sec.

Standard errors (sigma):
Prior: 2.40 ( 8 deg. of freedom)
Posterior: 5.34 ( 39 deg. of freedom)
Posterior: 5.87 (Normalized sample S.D.)

Azimuthal weighting: 1.00
Effective rank of matrix: 3.00
Maximum azimuthal GAP: 332 deg.

-----
Data Residuals Distance Azimuth Data
Ariv ID Statn Phase Type at True Normalized (deg.) (deg.) Import Err
373 KNW P t d 0.631 6.315 1.000 202.94 0.054 0
402 KNW S t d 1.298 12.980 1.000 202.94 0.214 0
372 B081 P t d 0.392 3.917 1.003 202.98 0.054 0
376 B084 P t d 0.145 1.452 1.039 189.83 0.062 0
374 PFO P t d -0.055 -0.547 1.040 189.97 0.061 0
400 PFO S t d -0.502 -5.016 1.040 189.97 0.244 0
377 BALD P t d 0.272 2.786 1.040 203.50 0.057 0
403 BALD S t d 0.189 1.888 1.040 203.50 0.224 0
376 TFPO P t d 0.114 1.139 1.045 189.69 0.063 0
401 TFPO S t d -0.463 -4.631 1.045 189.69 0.251 0
379 RHIL P t d 0.265 2.646 1.057 204.56 0.066 0
378 B082 P t d -0.148 -1.481 1.078 195.81 0.034 0
380 TMSP P t d 0.198 1.964 1.079 199.73 0.038 0
381 BCCC P t d 0.117 1.165 1.095 205.56 0.075 0
404 BCCC S t d -0.623 -6.226 1.095 205.56 0.271 0
383 B086 P t d -0.017 -0.168 1.104 192.54 0.044 0
382 B086A P t d -0.060 -0.603 1.104 192.54 0.044 0
405 B086A S t d 0.221 2.208 1.104 192.54 0.198 0
390 WMC P t d 0.250 2.496 1.121 198.70 0.035 0
389 TRC P t d 0.069 0.632 1.128 187.78 0.080 0
388 ROM P t d 0.099 0.994 1.123 206.82 0.086 0
387 SND P t d -0.022 -0.223 1.126 195.87 0.034 0
384 B093 P t d -0.290 -2.900 1.128 202.62 0.051 0
385 B946 P t d -0.377 -3.768 1.136 194.84 0.036 0
386 ALCY P t d -0.415 -4.150 1.144 189.45 0.065 0
391 CRY P t d -0.061 -0.605 1.146 201.05 0.043 0
395 B087 P t d 0.416 4.161 1.179 194.73 0.036 0
392 FRD P t d -0.381 -3.809 1.179 194.70 0.036 0
394 BZN P t d -0.222 -2.215 1.197 197.17 0.033 0
393 JORD P t d -0.497 -4.974 1.210 196.07 0.034 0
396 B088 P t d -0.946 -9.458 1.299 194.03 0.038 0
397 LVA2 P t d 0.105 1.048 1.311 191.70 0.050 0
398 SMER P t d -1.434 -14.339 1.407 213.37 0.167 0
399 MONPZ P t d 1.790 17.895 1.750 184.93 0.124 0

-----
= 0, No problem, normal interpolation
```

# Minor feature -- Specification of custom shade areas, linear features via map\_features.pf

The screenshot shows the dbloc software interface. On the left, there's a navigation pane with 'Edit Mode' and 'Add Mode' buttons. The main window displays a map of California with a red shaded area. Below the map is a table with columns: row, Analyze#, evId, lat, lon, time, review, region, depth, magnitude, and mch. The table contains 21 rows of data, with the 12th row highlighted in red.

row	Analyze#	evId	lat	lon	time	review	region	depth	magnitude	mch
000000	1	32.751	-114.488	20.040211912913	7:58 Y		SOUTHERN CALIFORNIA	6.71	5.3(1)	USGS-its
000001	2	33.480	-114.579	20.04021054119.955 Y			SOUTHERN CALIFORNIA	6.17	5.0(1)	USGS-its
000002	3	33.480	-114.482	20.04021054119.956 Y			SOUTHERN CALIFORNIA	11.59	9.9(1)	USGS-its
000003	4	33.538	-114.482	20.04021054119.956 Y			SOUTHERN CALIFORNIA	9.32	9.9(1)	USGS-its
000004	5	33.535	-114.482	20.04021054119.956 Y			SOUTHERN CALIFORNIA	6.88	5.0(1)	USGS-its
000005	6	33.937	-114.589	20.04021054119.956 Y			SOUTHERN CALIFORNIA	14.57	10.9(1)	USGS-its
000006	7	33.971	-114.488	20.04021054119.956 Y			SOUTHERN CALIFORNIA	4.89	1.0(1)	USGS-its
000007	8	33.386	-114.386	20.04021054119.956 Y			SOUTHERN CALIFORNIA	6.74	1.49(1)	USGS-its
000008	9	33.971	-114.488	20.04021054119.956 Y			SOUTHERN CALIFORNIA	1.72	0.57(1)	USGS-its
000009	10	34.493	-114.241	20.04021054119.956 Y			SOUTHERN CALIFORNIA	1.91	0.59(1)	USGS-its
000010	11	34.488	-114.386	20.04021054119.956 Y			SOUTHERN CALIFORNIA	2.27	0.75(1)	USGS-its
000011	12	34.633	-114.241	20.04021054119.956 Y			SOUTHERN CALIFORNIA	2.38	0.81(1)	USGS-its
000012	13	34.488	-114.386	20.04021054119.956 Y			SOUTHERN CALIFORNIA	2.39	0.81(1)	USGS-its
000013	14	33.753	-114.433	20.04021054119.956 Y			SOUTHERN CALIFORNIA	13.82	9.99(1)	****
000014	15	-1.18	-114.482	20.04021054119.956 Y			TONGA TISLAND	233.39	9.9(1)	USGS-its
000015	16	34.481	-114.241	20.04021054119.956 Y			SOUTHERN CALIFORNIA	1.42	0.51(1)	USGS-its
000016	17	32.705	-114.488	20.04021054119.956 Y			CALIF., BAKA CALIF., BORDER REGION	5.39	5.3(1)	USGS-its
000017	18	32.712	-114.488	20.04021054119.956 Y			CALIF., BAKA CALIF., BORDER REGION	6.46	5.1(1)	USGS-its
000018	19	33.972	-114.488	20.04021054119.956 Y			SOUTHERN CALIFORNIA	5.47	1.1(1)	USGS-its
000019	20	33.928	-114.438	20.04021054119.956 Y			SOUTHERN CALIFORNIA	13.12	12.4(1)	USGS-its
000020	21	34.493	-114.237	20.04021054119.956 Y			SOUTHERN CALIFORNIA	1.83	0.61(1)	USGS-its

```

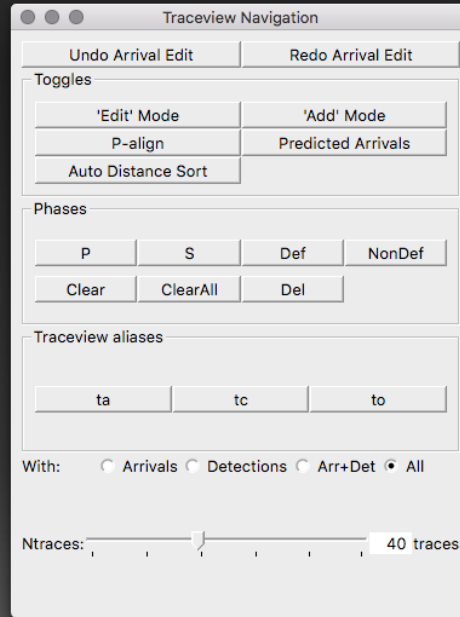
@_linear_features $br{
  testlinefeature1 $br{
    maps $tbl{
      dbevents_events
      dbevents_event
      dbevents_origins
      dbloc_mairb_events
      dbloc_trialcb_event
    }
    color_outline purple
    linewidth 3
    lonlat_points_sequence $tbl{
      -126 31
      -126 34
      -127 34.5
      -127.3 35
      -130 36
    }
  }
  testlinefeature2 $br{
    maps $tbl{
      dbevents_events
      dbevents_event
      dbevents_origins
      dbloc_mairb_events
      dbloc_trialcb_event
    }
    color_outline orange
    linewidth 3
    lonlat_points_sequence $tbl{
      -122 32.5
      -122.5 33.5
      -124 33.5
      -124.5 34.5
    }
  }
  testlinefeature3 $br{
    maps $tbl{
      dbevents_events
      dbevents_event
      dbevents_origins
      dbloc_mairb_events
      dbloc_trialcb_event
    }
    color_outline brown
    linewidth 3
    lonlat_points_sequence $tbl{
      -126 31
      -126 33
      -126 37.5
      -127 37.5
      -127.5 38.5
    }
  }
}

map_area_features $br{
  testareafeature1 $br{
    maps $tbl{
      dbevents_events
      dbevents_event
      dbevents_origins
      dbloc_mairb_events
      dbloc_trialcb_event
    }
    color_fill #8B4513
    linewidth 4
    lonlat_points_sequence $tbl{
      -126 31
      -121 41
      -111 41
      -111 31
      -121 31
    }
  }
  testareafeature2 $br{
    maps $tbl{
      dbevents_events
      dbevents_event
      dbevents_origins
      dbloc_mairb_events
      dbloc_trialcb_event
    }
    color_outline black
    color_fill #8B4513
    linewidth 2
    lonlat_points_sequence $tbl{
      -126 42
      -126 44
      -122 42
      -122 44
      -126 42
    }
  }
}
}

pf_revision_time 159570330

```

## Minor feature -- Built-in Smartpick-style traceview control buttons





# Minor feature -- Spreadsheet table for list of arrivals going into the location

Locator Input

Starting Location

Lat: 34.691 Lon: -116.241

Station: AAK

Fix Depth: 1 km

	arid	lphase	D/N	sta	chan	time
1	393	P	d	JORD	HHZ	06:54:16.795
2	392	P	d	FRD	HHZ	06:54:16.308
3	395	P	d	B087	HHZ	06:54:17.090
4	394	P	d	BZN	HHZ	06:54:16.821
5	397	P	d	LVA2	HHZ	06:54:19.353
6	396	P	d	B088	HHZ	06:54:18.066
7	399	P	d	MONP2	HHZ	06:54:27.639
8	377	P	d	BALD	EHZ	06:54:14.280
9	398	P	d	SMER	HHZ	06:54:19.451
10	376	P	d	TPFO	HHZ	06:54:14.233
11	385	P	d	B946	EHZ	06:54:15.510
12	379	P	d	RHIL	HHZ	06:54:14.653
13	384	P	d	B093	HHZ	06:54:15.420
14	378	P	d	B082	HHZ	06:54:14.621
15	381	P	d	BCCC	HHZ	06:54:15.155
16	387	P	d	SND	HHZ	06:54:15.672
17	380	P	d	TMSP	HHZ	06:54:15.061
18	386	P	d	ALCY	EHZ	06:54:15.655
19	383	P	d	B086	HHZ	06:54:15.260
20	389	P	d	TRO	HHZ	06:54:15.816
21	382	P	d	B086A	HHZ	06:54:15.217
22	388	P	d	RDM	HHZ	06:54:15.739
23	391	P	d	CRY	HHZ	06:54:15.987
24	390	P	d	WMC	HHZ	06:54:15.827
25	373	P	d	KNW	HHZ	06:54:13.919
26	372	P	d	B081	HHZ	06:54:13.740
27	375	P	d	B084	HHZ	06:54:14.163
28	374	P	d	PFO	HHZ	06:54:13.968
29	401	S	d	TPFO	HHE	06:54:28.321
30	400	S	d	PFO	HHE	06:54:28.116
31	403	S	d	BALD	EHE	06:54:28.878
32	402	S	d	KNW	HHN	06:54:28.651
33	405	S	d	B086A	HHE	06:54:31.006
34	404	S	d	BCCC	HHN	06:54:29.738

I could go on for days...

Demonstration!

Thank you -- Questions?

Feedback: [support@brtt.com](mailto:support@brtt.com)