

TSX AE Data

This data has been used by kind permission of:
Atomic Energy Canada Ltd

software@appliedseismology.com



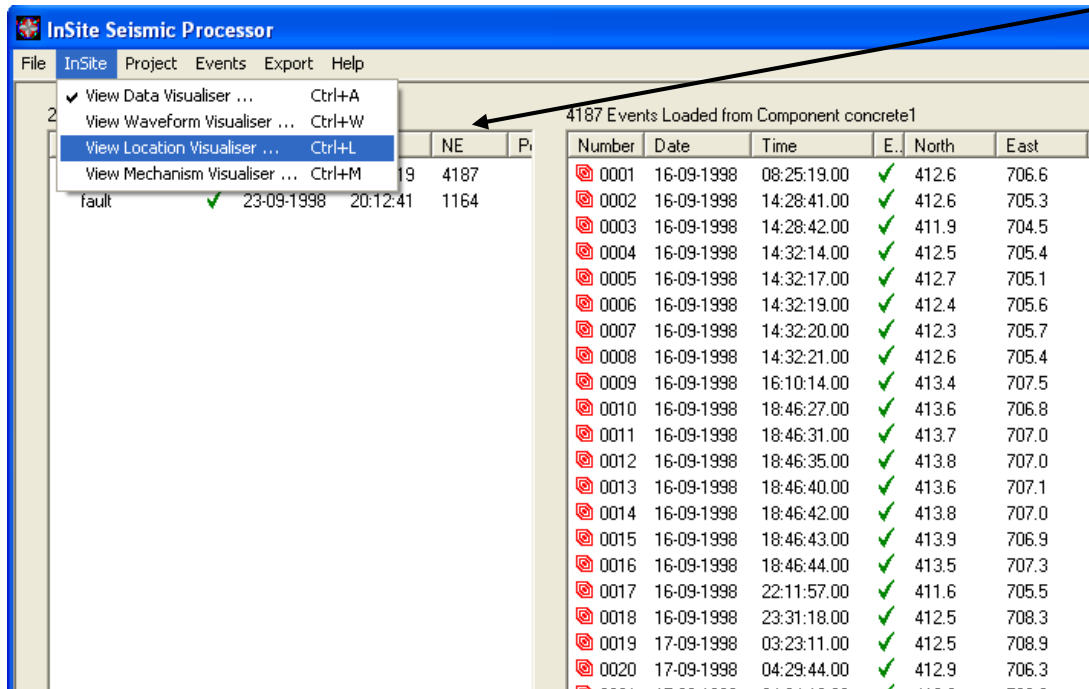
Demo Features

- This demo uses AE data with waveforms. It is designed to give you an overview of the Waveform, Location and Mechanism Visualisers.
- The data is from AECL's Tunnel Sealing Experiment (TSX).
- The following slides give you some options to try in the software.

It's a good idea to ...

... run through the “SKB Prototype” demo presentation first as this gives a more thorough overview of the Location Visualiser.

Data Visualiser I

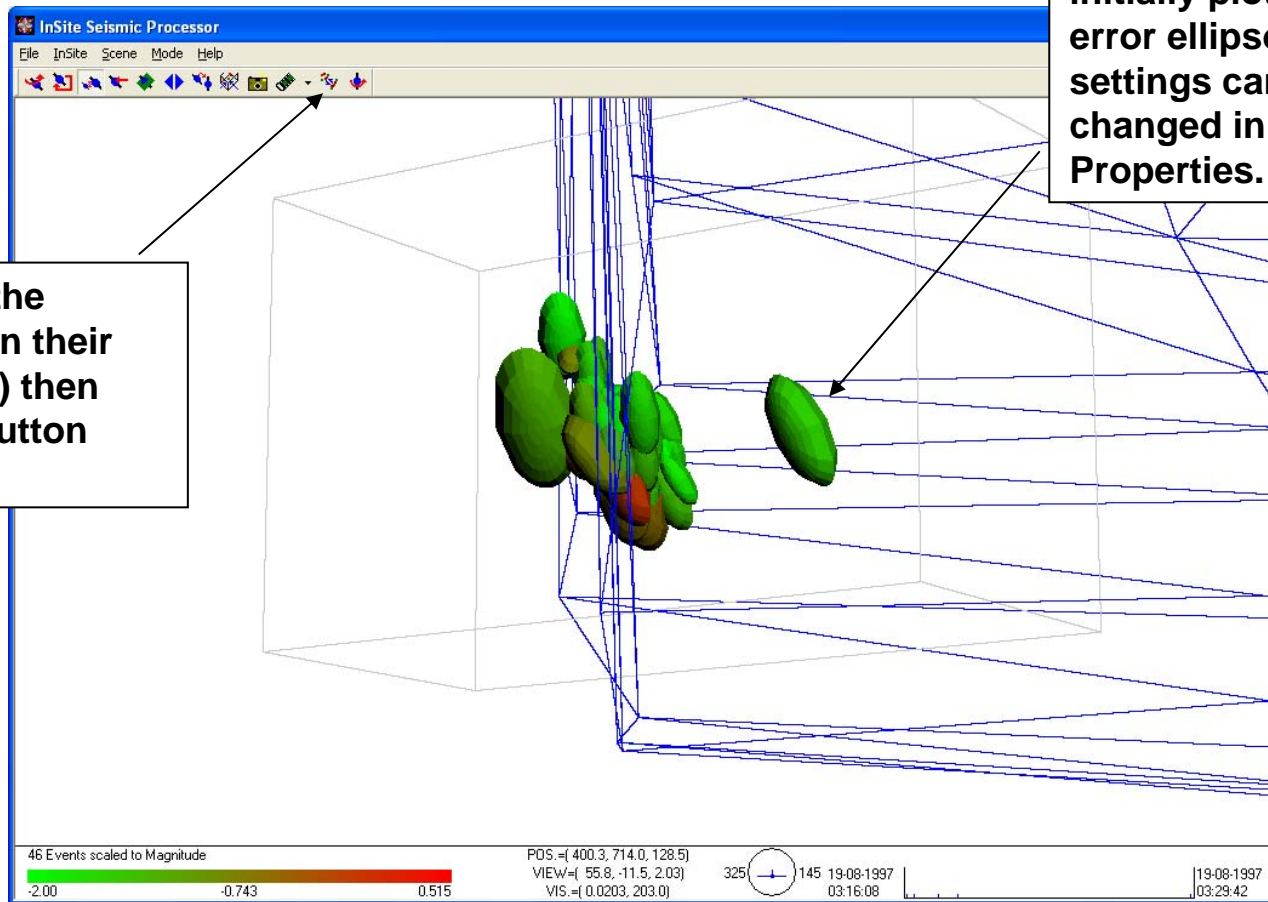


The InSite menu allows you to switch between the available visualisers.

Location Visualiser IX

To collapse the events (within their error spaces) then toggle this button on/off.

The events are initially plotted as error ellipsoids. The settings can be changed in Scene-Properties.



Data Visualiser III

InSite Seismic Processor

File InSite Project Events Export Help

1 Components Loaded

50 Events Loaded from Component tsxcluster3

Name	E	Date	Time	NE	Position	E	North	East	Down	Units	LMag	W	NPT	NST	NLT	NIT	LResid	LError	S	NA	%SO	%DC
tsxcluster3	✓	19-08-1997	03:16:08	0050		✓	401.5	715.6	128.1	1.00	-1.55	✓	13	9	22	13	5.32	0.0245	X	-	-	-
						✓	401.5	715.6	128.1	1.00	-0.642	✓	15	10	25	15	11.3	0.0519	X	-	-	-
						✓	401.5	715.6	128.1	1.00	-1.78	✓	13	10	23	13	7.51	0.0328	X	-	-	-
						✓	401.5	715.6	128.0	1.00	-1.39	✓	13	10	23	13	4.82	0.0213	X	-	-	-
						✓	401.5	715.6	128.1	1.00	-1.62	✓	13	10	23	13	8.46	0.0347	X	-	-	-
						✓	401.5	715.6	128.1	1.00	-1.25	✓	14	9	14	14	7.17	0.0424	X	12	-18.3	-64.3
						✓	401.5	715.6	128.1	1.00	-1.76	✓	13	10	23	13	6.58	0.0299	X	-	-	-
						✓	401.5	715.6	128.1	1.00	-1.01	✓	13	9	22	13	5.35	0.0248	X	-	-	-
						✓	401.5	715.6	128.1	1.00	-1.98	✓	12	8	19	11	6.78	0.0319	X	-	-	-
						✓	401.4	715.6	128.1	1.00	-1.39	✓	13	9	21	12	6.86	0.0302	X	-	-	-
						✓	401.5	715.6	128.1	1.00	-1.22	✓	14	10	24	14	6.88	0.0322	X	12	-16.6	82.5
						✓	401.5	715.6	128.1	1.00	-1.33	✓	14	10	24	14	8.38	0.0393	X	-	-	-
						✓	401.5	715.6	128.1	1.00	-1.11	✓	15	10	25	15	5.56	0.0260	X	13	-31.5	59.9
						✓	401.5	715.6	128.1	1.00	-1.85	✓	13	10	23	13	6.41	0.0290	X	-	-	-
						✓	401.5	715.6	128.1	1.00	-1.83	✓	13	11	24	13	6.44	0.0301	X	-	-	-
						✓	401.5	715.6	128.0	1.00	-0.844	✓	12	10	23	12	10.31	0.0137	X	12	-2.83	-61.3
						✓	401.5	715.6	128.0	1.00	-1.58	✓	13	10	23	13	8.33	0.0284	X	6	11.4	87.5
						✓	401.5	715.6	128.1	1.00	-1.42	✓	13	10	23	13	6.83	0.0382	X	-	-	-
						✓	401.4	715.6	128.1	1.00	-1.95	✓	12	10	23	12	6.83	0.0328	X	-	-	-
						✓	401.4	715.6	128.1	1.00	-1.78	✓	13	10	23	13	6.83	0.0199	X	-	-	-
						✓	401.5	715.6	128.0	1.00	-1.88	✓	13	10	23	13	6.83	0.0238	X	-	-	-
						✓	401.5	715.6	128.1	1.00	-0.949	✓	14	10	24	14	6.83	0.0303	X	-	-	-
						✓	401.5	715.6	128.1	1.00	-1.72	✓	13	10	23	13	6.83	0.0277	X	-	-	-
						✓	401.5	715.6	128.1	1.00	-0.257	✓	15	10	25	15	10.2	0.0348	X	-	-	-
						✓	401.5	715.6	128.1	1.00	-1.64	✓	13	8	21	13	5.51	0.0258	X	-	-	-
						✓	401.5	715.6	128.1	1.00	-1.71	✓	13	10	23	13	6.83	0.0312	X	-	-	-
						✓	401.5	715.6	128.1	1.00	-1.87	✓	13	9	22	13	5.34	0.0251	X	-	-	-
						✓	401.4	715.6	128.1	1.00	-1.82	✓	13	10	23	13	7.07	0.0333	X	-	-	-
						✓	401.5	715.6	128.1	1.00	-1.04	✓	14	10	24	14	9.83	0.0428	X	-	-	-
						✓	401.5	715.6	128.1	1.00	-0.599	✓	15	10	25	15	10.2	0.0467	X	-	-	-

Columns give event information.

Event Location North, East, Down.

Right clicking on the event gives some options.
From here you can immediately link into an event's waveforms or its source mechanism

- Edit Properties
- View Waveforms
- View Mechanism
- Type ...
- Enable
- Disable
- Delete
- Extract

Source mechanism information.
The symbol type represents whether the event has a shear or complex mechanism.

Mechanism Visualiser I

Swap between different types of plots.

Navigate around other events with mechanisms.

Information Pane.

Configuration of the plot can be changed under Mechanism-Properties.

Mechanism Pane.
(Focal Sphere Plot)

Right clicking in the plot allows you to link to its waveforms.

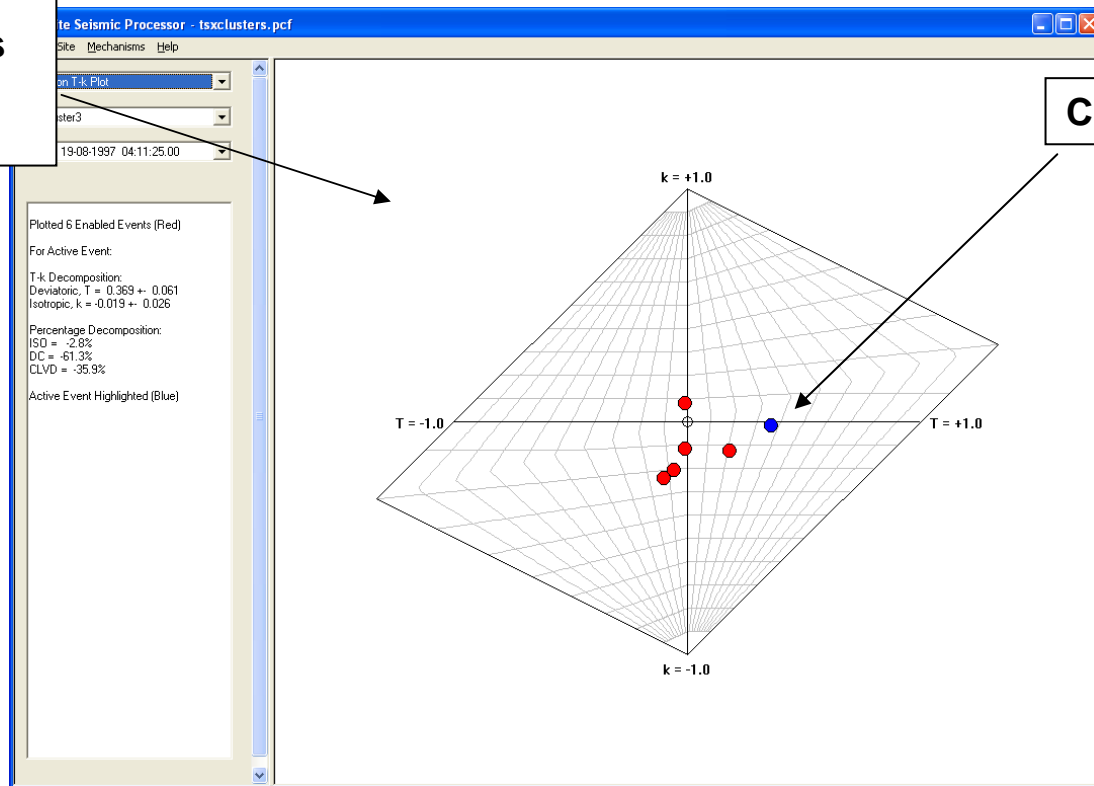
The screenshot displays the 'InSite Seismic Processor' interface. The main window shows a focal sphere plot for event 'tsxcluster3' on 16. 19-08-1997 04:11:25.00. The plot includes nodal planes (N, P, B, T, W, E, S) and station markers (black circles and crosses). A 'Visualiser Properties' dialog box is open, showing options for 'Focal Plot' and 'Hudson T-4 Plot'. The 'Information Pane' on the left provides detailed data for the event, including seismic moment, moment tensor, and MT decomposition results.

Information Pane Data:

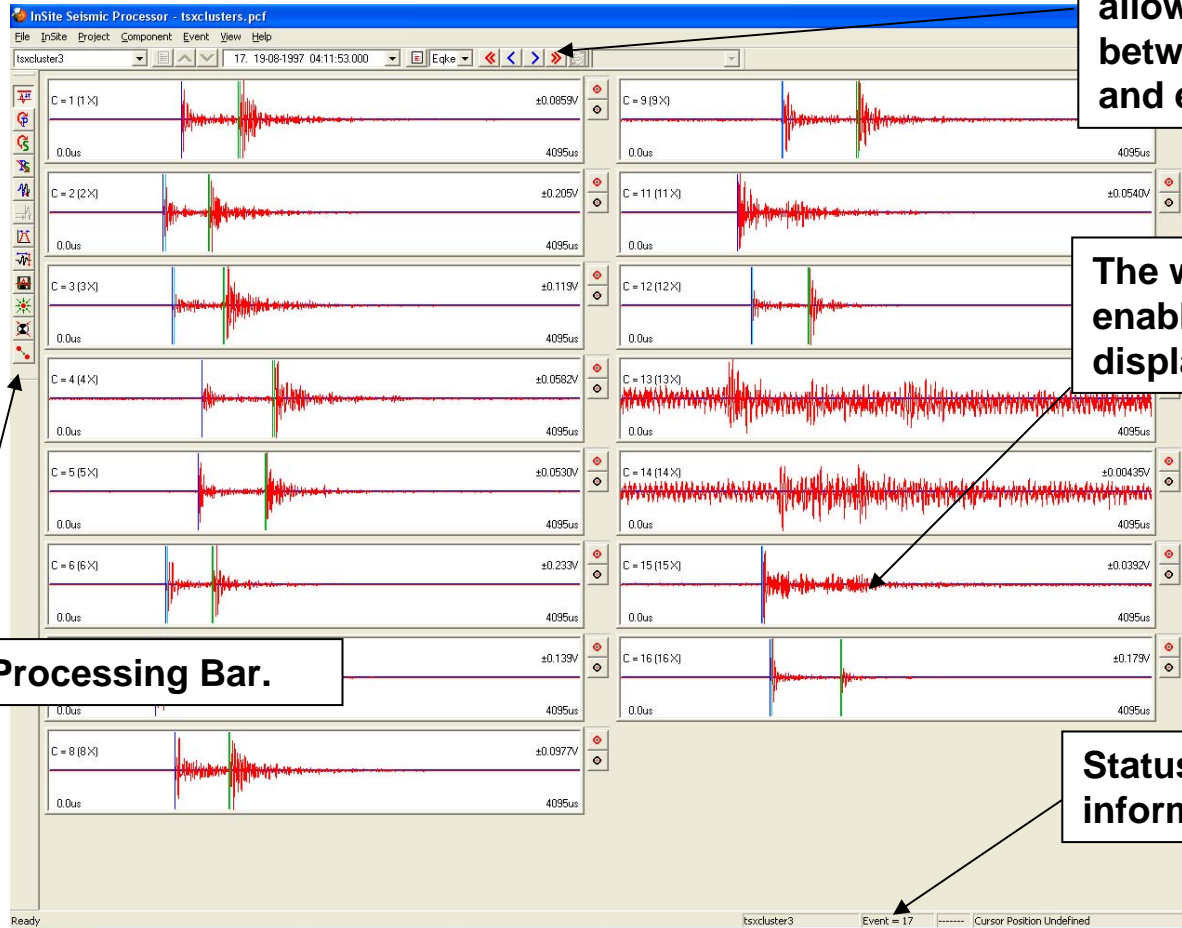
Event: tsxcluster3
 Date/Time: 16. 19-08-1997 04:11:25.00
 Seismic Moment = 4.249e+000 N.m
 Moment Tensor (Euclidean):
 M11: 0.58, M12: -0.3519, M13: -0.2718
 M21: 0.1323, M22: 0.1346, M23: 0.4288
 M31: 0.0302, M32: 0.0235, M33: 0.0325
 Estimated Uncertainties:
 M11: 0.59, M12: 0.0255, M13: 0.0432
 M21: 0.0302, M22: 0.0235, M23: 0.0325
 Condition Number: 2.52
 Mean Amplitude Residual: 0.168
 Mean Error Factor: 47.4
 Inversion Quality Index: 2.23
 MT Decomposition Results:
 Eigenvalues:
 P: 0.8, N: 0.13, T: 0.61
 Pective Eigenvectors:
 P1: 0.8, P2: -0.194, P3: -0.319
 P4: -0.332, P5: 0.820, P6: 0.467
 P7: -0.171, P8: -0.539, P9: 0.824
 Axis Azimuth: 19.7, 283.3, 124.4
 Axis Plunge: 3.9, 32.6, 55.5
 Model Components:
 ISO: -0.01
 DC: -0.48
 CLVD: -0.28

Mechanism Visualiser II

The Hudson T-k plot allows numerous source mechanisms to be plotted together.



Waveform Visualiser I



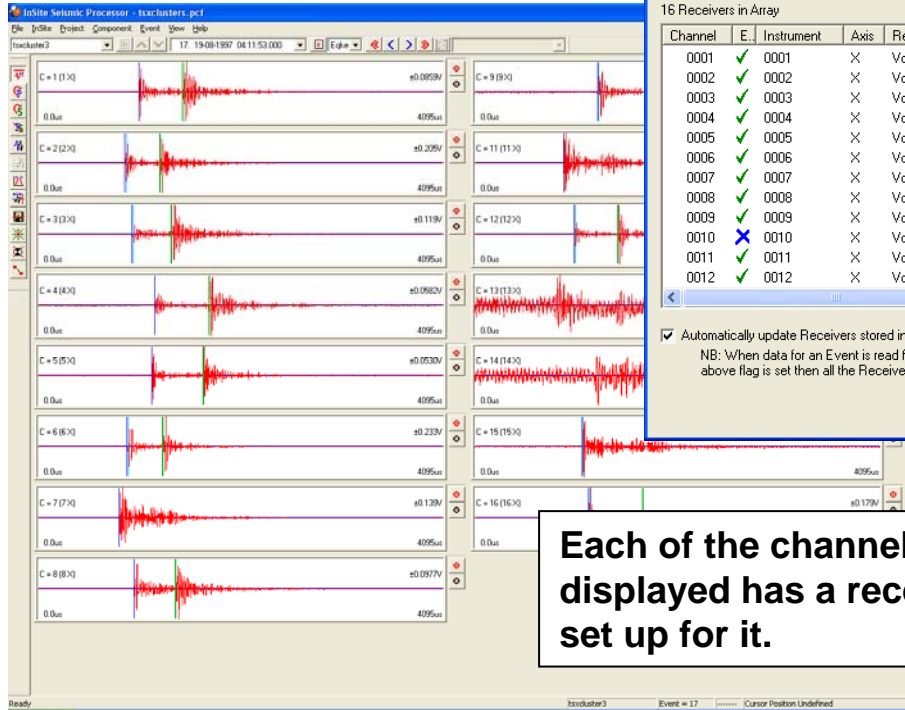
The navigation bar allows the user to switch between components and events.

The waveform from each enabled channel is displayed for this data.

Event Processing Bar.

Status bar supplying information to the user.

Waveform Visualiser II



Edit Default Receiver Array

The Default Receiver Array is used to map Receiver information to Channels when importing data.

Would you like to import a Receiver Array from a text file?

16 Receivers in Array

Channel	E.	Instrument	Axis	Resp.	Label	North	East
0001	✓	0001	X	Volts	R1	398.2	717.
0002	✓	0002	X	Volts	R2	399.2	715.
0003	✓	0003	X	Volts	R3	400.1	713.
0004	✓	0004	X	Volts	R4	401.0	712.
0005	✓	0005	X	Volts	R5	399.0	719.
0006	✓	0006	X	Volts	R6	400.2	717.
0007	✓	0007	X	Volts	R7	401.4	716.
0008	✓	0008	X	Volts	R8	402.6	714.
0009	✓	0009	X	Volts	R9	400.1	720.
0010	✗	0010	X	Volts	R10	401.6	719.
0011	✗	0011	X	Volts	R11	403.1	717.
0012	✓	0012	X	Volts	R12	404.6	716.

Automatically update Receivers stored in ESFs from the Default Receiver Array
 NB: When data for an Event is read from its ESF the default is to use the above flag is set then all the Receiver information for the Event is updated

Sensor Properties

Sensor corresponds to waveforms recorded on channel

Configuration

Instrument Number = Label =

Channel Active

Display Label

Enable Date, day - month - year = - -

Disable Date, day - month - year = - -

Location and Orientation

Location (N, E, D) = (, ,)

Distance Units (x1m) = Sensor Diameter =

Axis Orientation (i, j, k) = (, ,)

Amplitude-Frequency Response

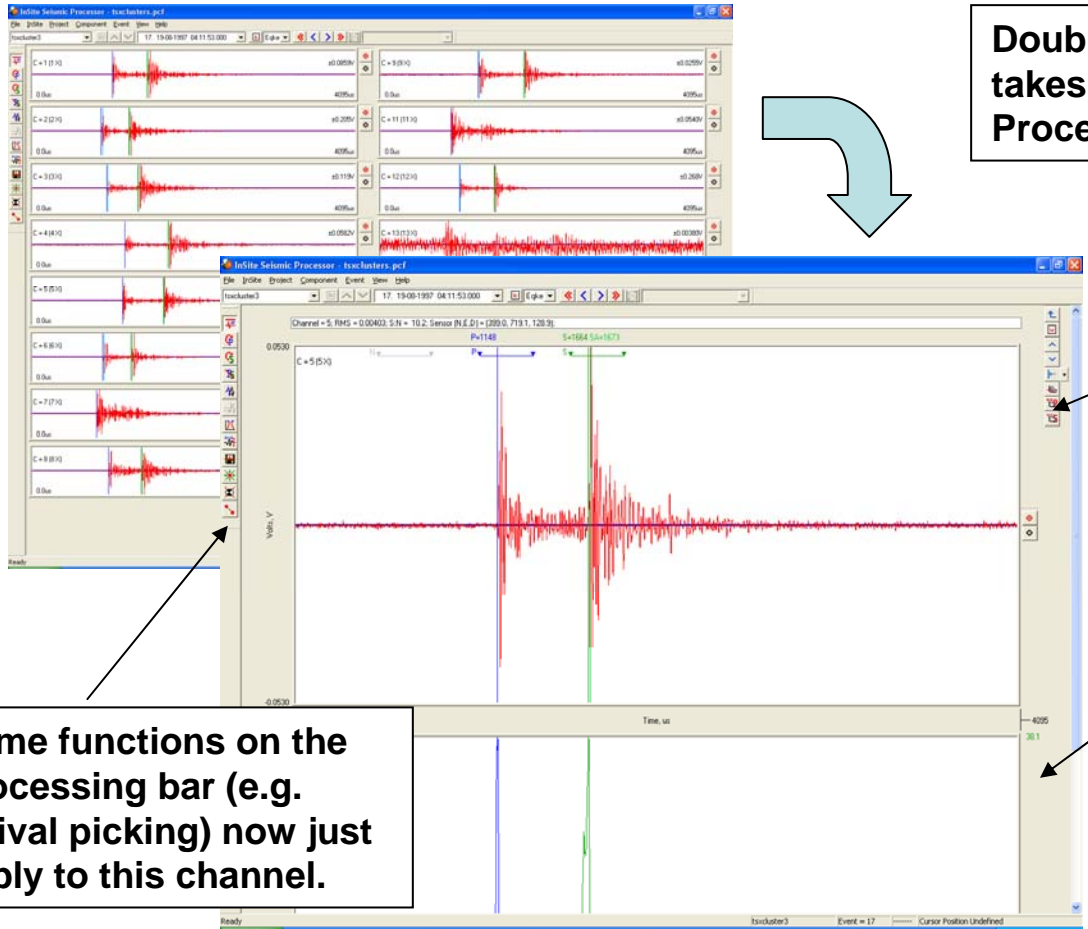
Polarisation = Gain =

Sensitivity = Voltage Scale =

Low Frequency (Hz) = High Frequency (Hz) =

Dominant Frequency (Hz) =

Waveform Visualiser III



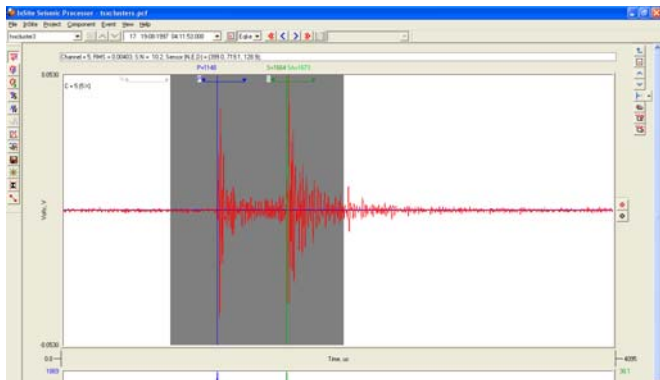
Double clicking on a waveform takes the user into the Channel Processing view.

Channel processing bar gives additional features used in this view (e.g. switching between channels).

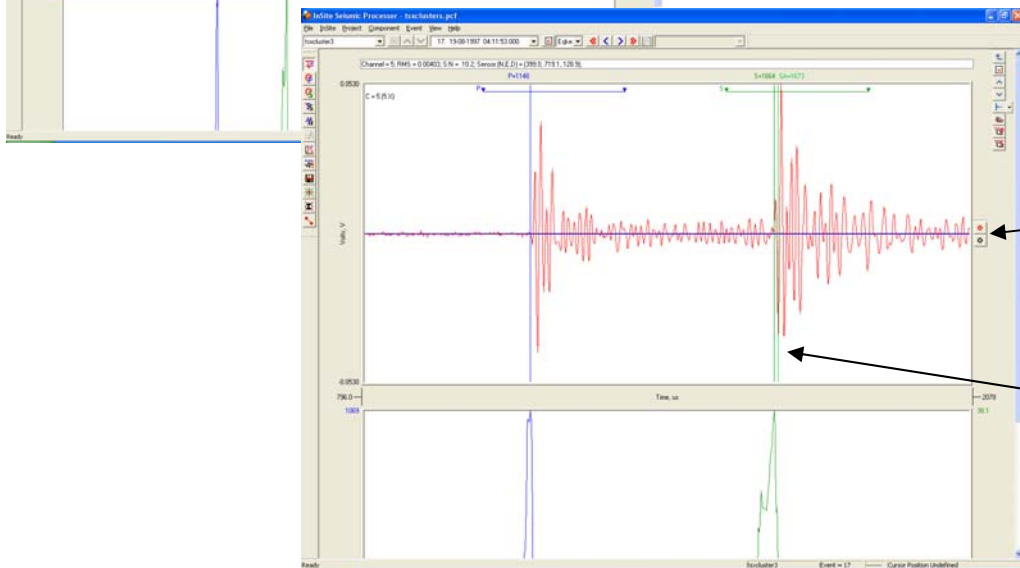
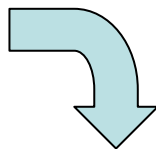
Some functions on the Processing bar (e.g. arrival picking) now just apply to this channel.

Double clicking on the background, or clicking on the "Return" button on the Channel Processing bar, returns the user to the previous view..

Waveform Visualiser IV

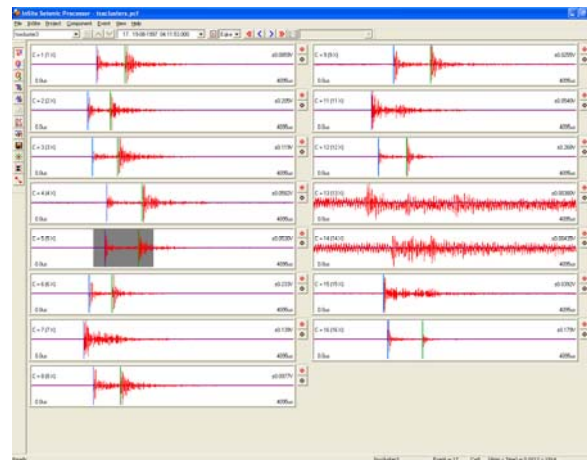


Expand a waveform in time by left-click and drag.



Expand a waveform in amplitude.

Click and drag any of the arrival picks.



Waveform Visualiser V

Event Scaling on/off.

P and S wave autopicking.

Pick cancelling.

Locate Event.

Calculate the source mechanism.

Try changing some picks and re-locating and/or getting a new source mechanism.

P wave picks. Dark – Arrival Time. Light - Amplitude

S wave picks.

The screenshot displays the 'InSite Seismic Processor' interface with four stacked seismic waveforms labeled C = 1 (1 X), C = 2 (2 X), C = 3 (3 X), and C = 4 (4 X). Each waveform shows a red trace with vertical blue and green lines indicating P and S wave picks. The interface includes a menu bar (File, InSite, Project, Component, Event, View, Help), a toolbar, and a status bar showing 'tsxcluster3' and a timestamp '17. 19-08-1997 04:11:53.000'. The waveforms show varying amplitudes and time scales, with the top trace having a scale of ±0.0859V and the bottom trace ±0.0582V.

Waveform Visualiser VI

The screenshot displays the InSite Seismic Processor interface. The main window shows a seismic waveform with a red trace and a blue trace. A context menu is open over the waveform, with 'Processing Properties ...' selected. Two dialog boxes are overlaid on the main window:

- Processing Properties**: This dialog has tabs for 'Event Initialisation', 'Auto-picking', 'Cross-correlation', 'Filtering', 'Locator', and 'Mechanisms'. The 'Auto-picking' tab is active, showing settings for P-wave and S-wave autopicking.
 - P-wave**:
 - Allow P-wave Autopicking (dropdown: Use max. peak in the autopick function)
 - Back-window Length = 100, Front-window Length = 30
 - Picking Threshold = 10, Min. Peak-to-Peak Amp = 0.025
 - S-wave**:
 - Allow S-wave Autopicking (dropdown: Use first peak in the autopick function)
 - Back-window Length = 100, Front-window Length = 50
 - Picking Threshold = 10, Min. Peak-to-Peak Amp = 0.025
 - Allow Automatic Amplitude Picking, Use Velocity-Window Picking
 - Velocity-Window Picking Parameters**:
 - P-wave Min. Velocity = 4500, P-wave Max. Velocity = 6500
 - S-wave Min. Velocity = 2500, S-wave Max. Velocity = 3500
- Cross-correlation**: This dialog is partially visible, showing tabs for 'Cross-correlation', 'Filtering', 'Locator', and 'Mechanisms'. It includes settings for 'Working Time Units (x 1s) = 1e-006', 'Minimum S-wave Arrivals = 0', and 'Maximum Residual = 50'. It also has 'Settings' buttons and a 'Browse' button.

The processing properties can be easily changed and the event(s) reprocessed.