

# *Microseismic Monitoring of Hydraulic Fracturing - Waveforms*

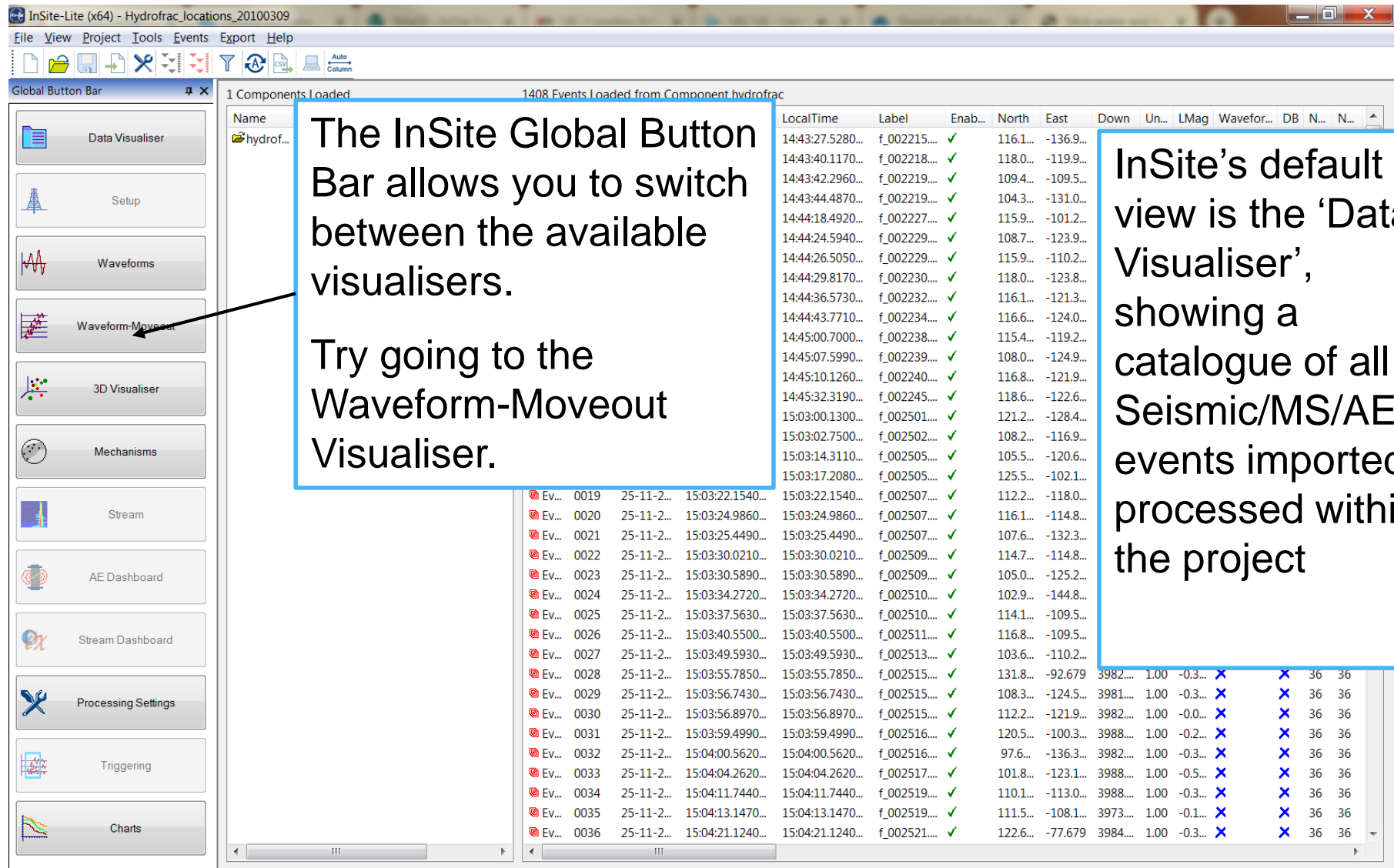


*Microseismic Geomechanics: Increased understanding; reduced risk*

- InSite™ Lite is the free version of Itasca Consulting Ltd.'s InSite Seismic Processing software suite, provided with limited functionality and features.
- The examples shown here are taken from ICL and its partners projects.
- InSite's proprietary project (\*.pcf) files contain all the configuration, event information and links to waveforms necessary to run a project in InSite. Double-clicking on the .pcf project file launches the InSite software application.
- The InSite project waveform data (\*.esf) files include the results from the data processing. These files are imported for the project (.pcf file) through the data import management tool in InSite. Please note that not all of the available example projects are provided with example waveform data.
- For information on the operation of the InSite software, please refer to the product help files.
- For information on purchasing the full version of the InSite software, please contact us at [support@itasca.co.uk](mailto:support@itasca.co.uk)

- This example uses a small sample of Microseismic (MS) waveform data recorded during the Hydraulic Fracturing of a tight-gas sand reservoir in the Bossier formation in the Dowdy Ranch field
- The full MS record, shown as only locations, can be found in the HydraulicFracture\_locations example
- This example is designed to give an overview of the features and functionalities of InSite's Waveform Visualiser.
- The following slides give you some options to try in the software.

# Navigation: Data Visualiser



The InSite Global Button Bar allows you to switch between the available visualisers.

Try going to the Waveform-Moveout Visualiser.

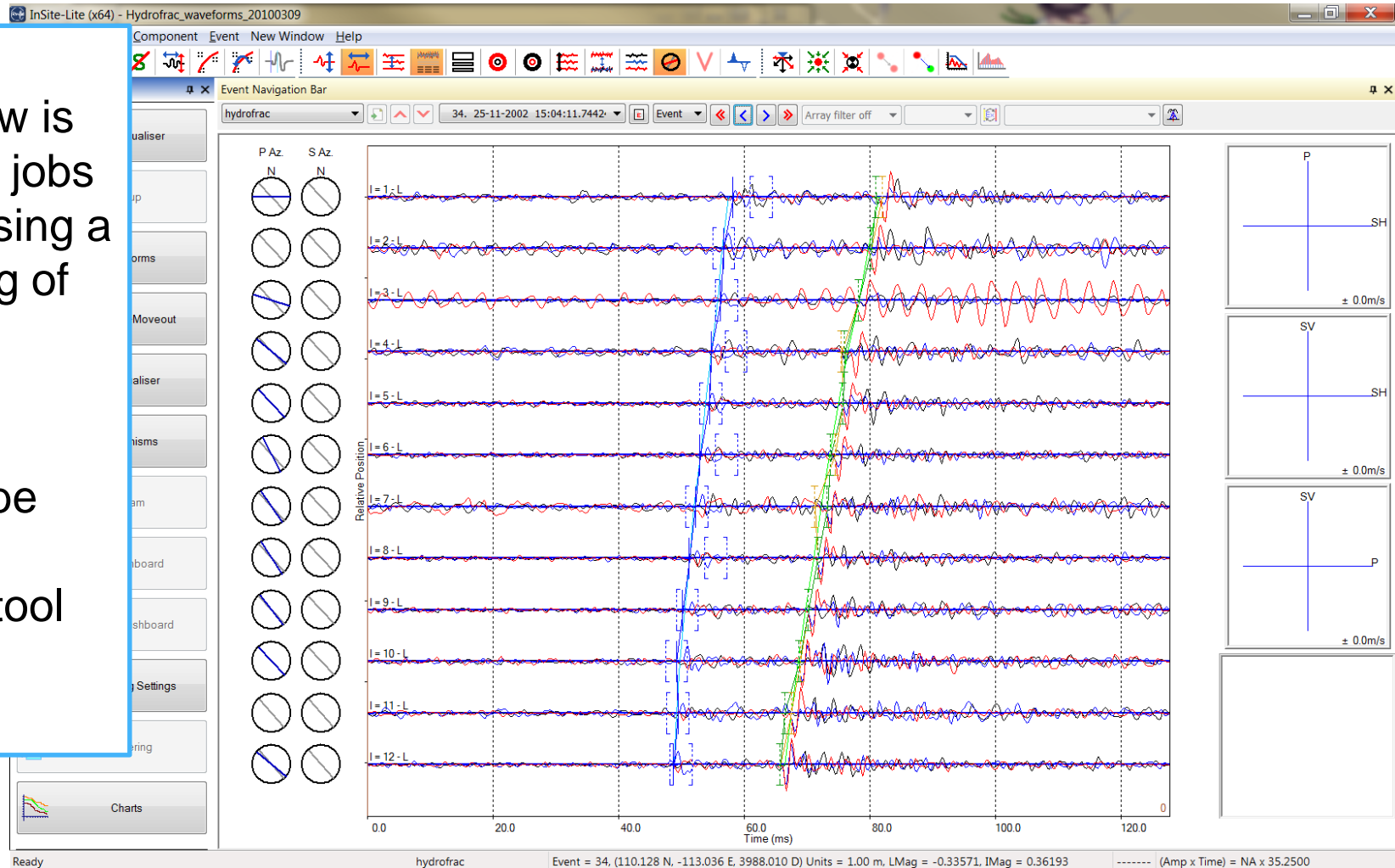
InSite's default view is the 'Data Visualiser', showing a catalogue of all Seismic/MS/AE events imported or processed within the project

Name	LocalTime	Label	Enab...	North	East	Down	Un...	LMag	Wavefor...	DB	N...	N...
hydrof...	14:43:27.5280...	f_002215....	✓	116.1...	-136.9...							
	14:43:40.1170...	f_002218....	✓	118.0...	-119.9...							
	14:43:42.2960...	f_002219....	✓	109.4...	-109.5...							
	14:43:44.4870...	f_002219....	✓	104.3...	-131.0...							
	14:44:18.4920...	f_002227....	✓	115.9...	-101.2...							
	14:44:24.5940...	f_002229....	✓	108.7...	-123.9...							
	14:44:26.5050...	f_002229....	✓	115.9...	-110.2...							
	14:44:29.8170...	f_002230....	✓	118.0...	-123.8...							
	14:44:36.5730...	f_002232....	✓	116.1...	-121.3...							
	14:44:43.7710...	f_002234....	✓	116.6...	-124.0...							
	14:45:00.7000...	f_002238....	✓	115.4...	-119.2...							
	14:45:07.5990...	f_002239....	✓	108.0...	-124.9...							
	14:45:10.1260...	f_002240....	✓	116.8...	-121.9...							
	14:45:32.3190...	f_002245....	✓	118.6...	-122.6...							
	15:03:00.1300...	f_002501....	✓	121.2...	-128.4...							
	15:03:02.7500...	f_002502....	✓	108.2...	-116.9...							
	15:03:14.3110...	f_002505....	✓	105.5...	-120.6...							
	15:03:17.2080...	f_002505....	✓	125.5...	-102.1...							
Ev... 0019	25-11-2... 15:03:22.1540...	15:03:22.1540...	f_002507....	✓	112.2...	-118.0...						
Ev... 0020	25-11-2... 15:03:24.9860...	15:03:24.9860...	f_002507....	✓	116.1...	-114.8...						
Ev... 0021	25-11-2... 15:03:25.4490...	15:03:25.4490...	f_002507....	✓	107.6...	-132.3...						
Ev... 0022	25-11-2... 15:03:30.0210...	15:03:30.0210...	f_002509....	✓	114.7...	-114.8...						
Ev... 0023	25-11-2... 15:03:30.5890...	15:03:30.5890...	f_002509....	✓	105.0...	-125.2...						
Ev... 0024	25-11-2... 15:03:34.2720...	15:03:34.2720...	f_002510....	✓	102.9...	-144.8...						
Ev... 0025	25-11-2... 15:03:37.5630...	15:03:37.5630...	f_002510....	✓	114.1...	-109.5...						
Ev... 0026	25-11-2... 15:03:40.5500...	15:03:40.5500...	f_002511....	✓	116.8...	-109.5...						
Ev... 0027	25-11-2... 15:03:49.5930...	15:03:49.5930...	f_002513....	✓	103.6...	-110.2...						
Ev... 0028	25-11-2... 15:03:55.7850...	15:03:55.7850...	f_002515....	✓	131.8...	-92.679	3982...	1.00	-0.3...	×	×	36 36
Ev... 0029	25-11-2... 15:03:56.7430...	15:03:56.7430...	f_002515....	✓	108.3...	-124.5...	3981...	1.00	-0.3...	×	×	36 36
Ev... 0030	25-11-2... 15:03:56.8970...	15:03:56.8970...	f_002515....	✓	112.2...	-121.9...	3982...	1.00	-0.0...	×	×	36 36
Ev... 0031	25-11-2... 15:03:59.4990...	15:03:59.4990...	f_002516....	✓	120.5...	-100.3...	3988...	1.00	-0.2...	×	×	36 36
Ev... 0032	25-11-2... 15:04:00.5620...	15:04:00.5620...	f_002516....	✓	97.6...	-136.3...	3982...	1.00	-0.3...	×	×	36 36
Ev... 0033	25-11-2... 15:04:04.2620...	15:04:04.2620...	f_002517....	✓	101.8...	-123.1...	3988...	1.00	-0.5...	×	×	36 36
Ev... 0034	25-11-2... 15:04:11.7440...	15:04:11.7440...	f_002519....	✓	110.1...	-113.0...	3988...	1.00	-0.3...	×	×	36 36
Ev... 0035	25-11-2... 15:04:13.1470...	15:04:13.1470...	f_002519....	✓	111.5...	-108.1...	3973...	1.00	-0.1...	×	×	36 36
Ev... 0036	25-11-2... 15:04:21.1240...	15:04:21.1240...	f_002521....	✓	122.6...	-77.679	3984...	1.00	-0.3...	×	×	36 36

# Waveform-Moveout Visualiser I

Waveform-Moveout view is indicated for jobs monitored using a vertical string of tools.

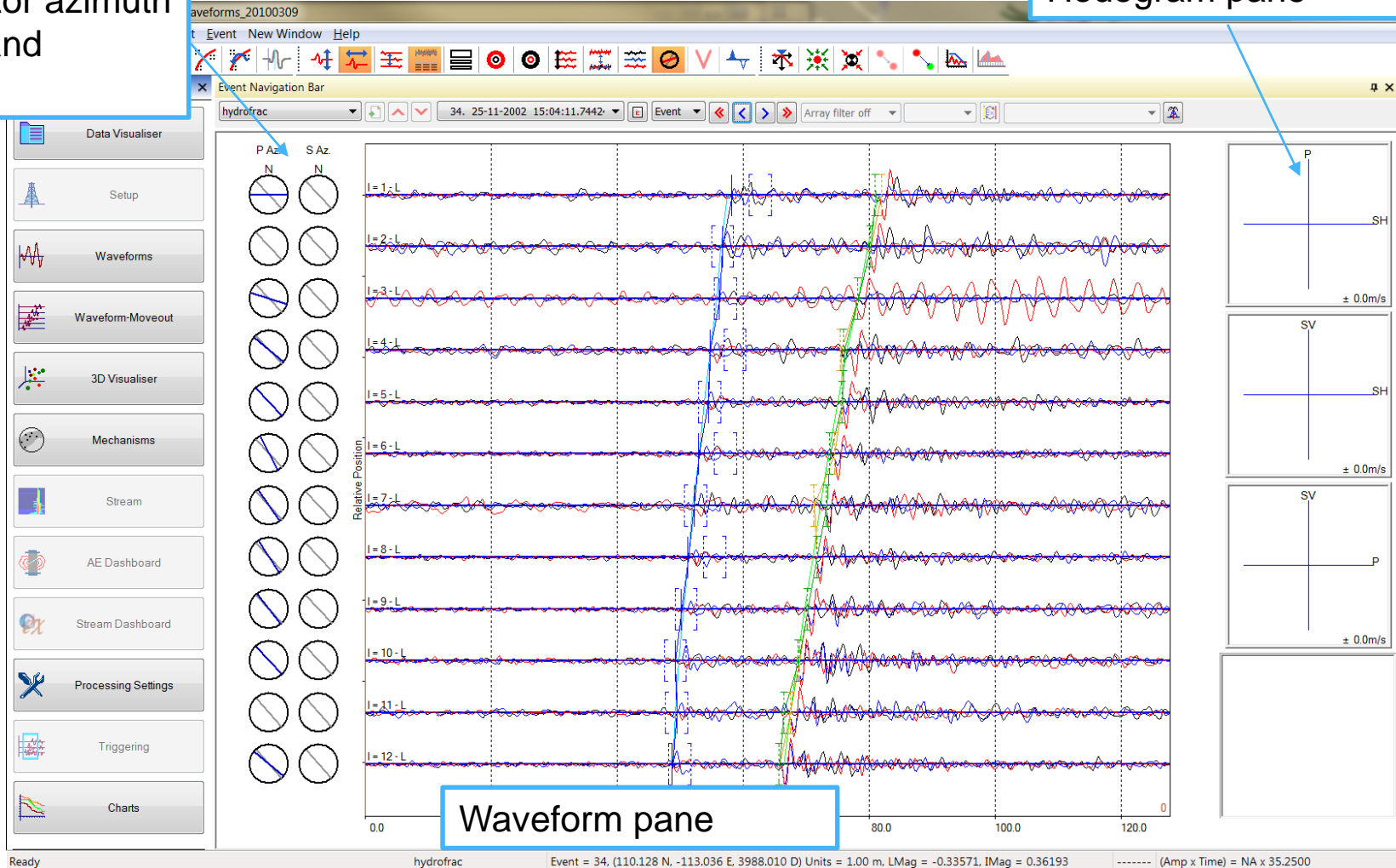
Traces can be displayed grouped by tool or split into channels



# Waveform-Moveout Visualiser II

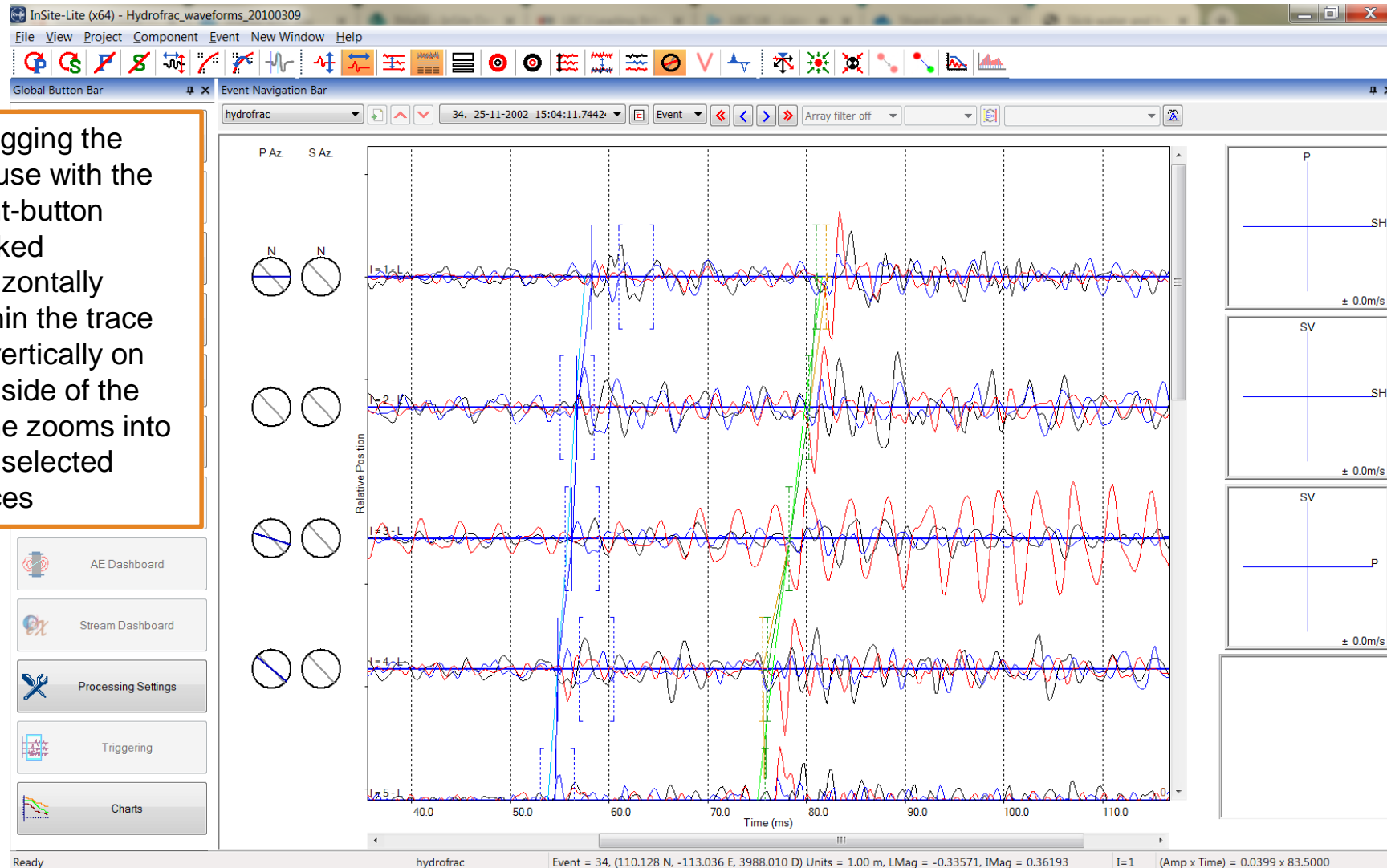
Source vector azimuth  
(observed and  
theoretical)

Hodogram pane



# Waveform-Moveout Visualiser III

Dragging the mouse with the right-button clicked horizontally within the trace or vertically on the side of the pane zooms into the selected traces



# Waveform-Moveout Visualiser IV: Triaxial view

Right-click on an instrument brings out the Instrument triaxial view

