

Microseismic Monitoring of Hydraulic Fracturing - Locations



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

- This example uses Microseismic (MS) location data recorded during the Hydraulic Fracturing of a tight-gas sand reservoir in the Bossier formation in the Dowdy Ranch field
- This example is designed to give an overview of the features and functionalities of InSite's 3D Visualiser.
- The following slides give you some options to try in the software.

Navigation: Data Visualiser

InSite-Lite (x64) - Hydrofrac_locations_20100309

File View Project Tools Events Export Help

Global Button Bar

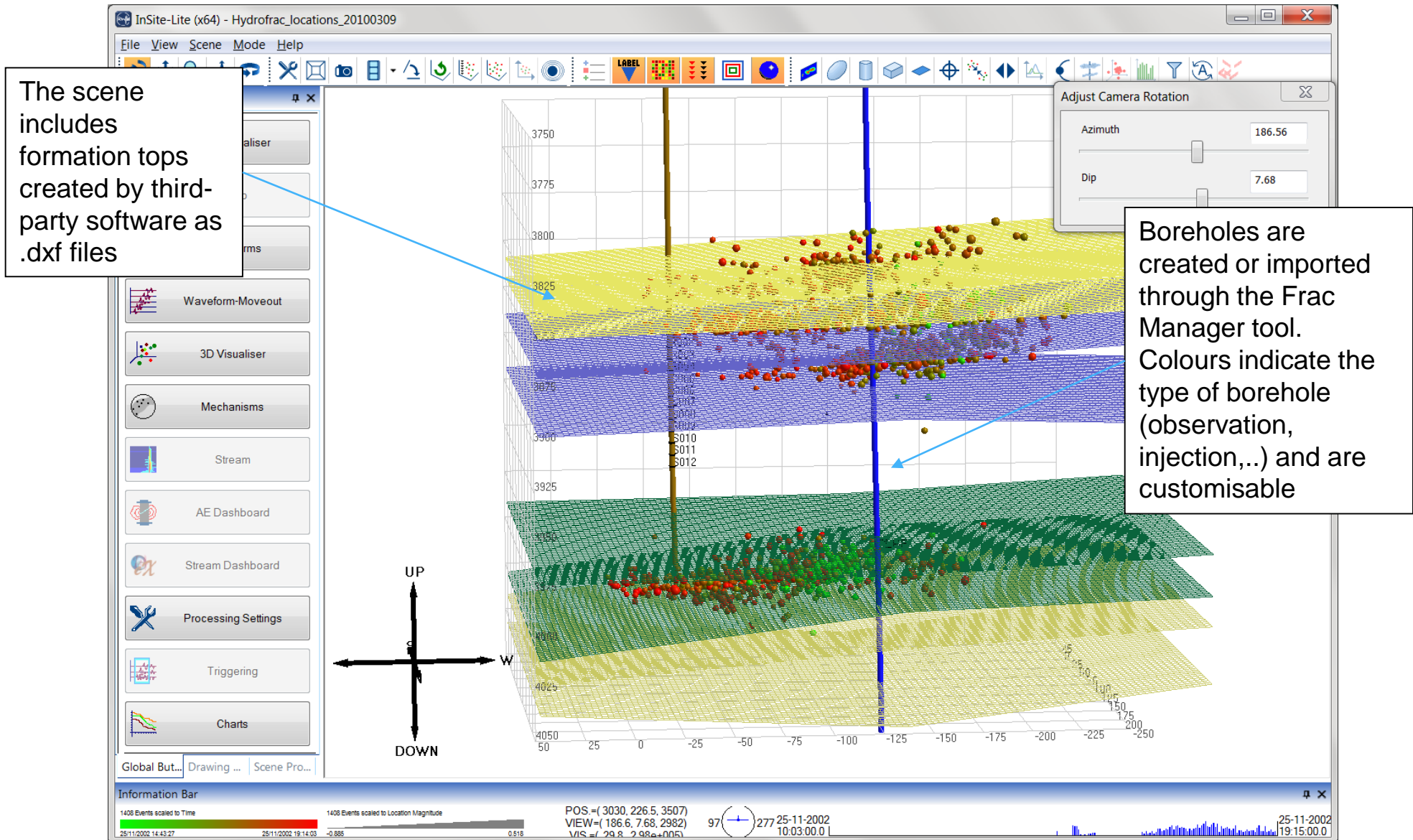
1 Components Loaded 1408 Events Loaded from Component hydrofrac

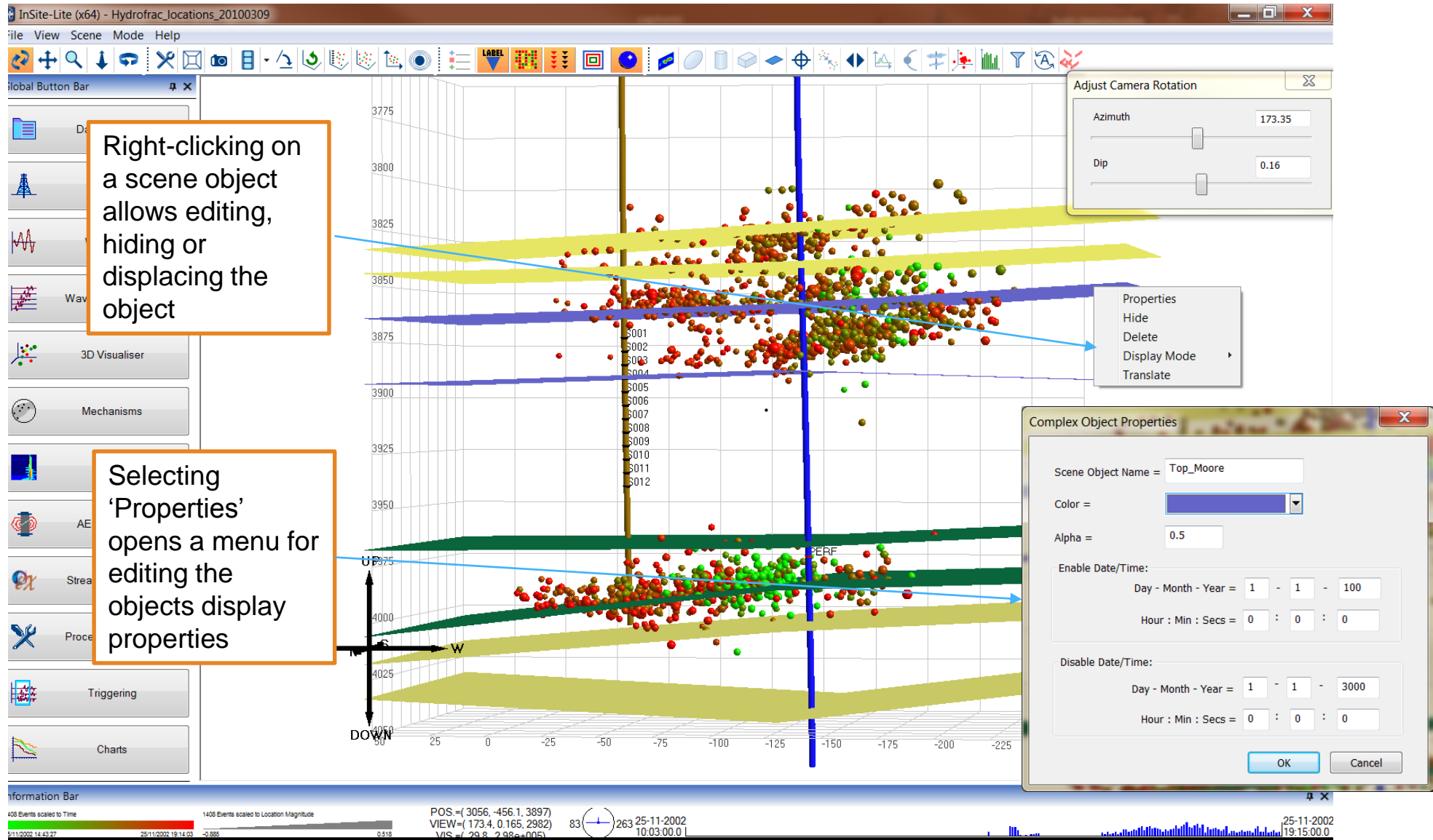
The InSite Global Button Bar allows you to switch between the available visualisers.

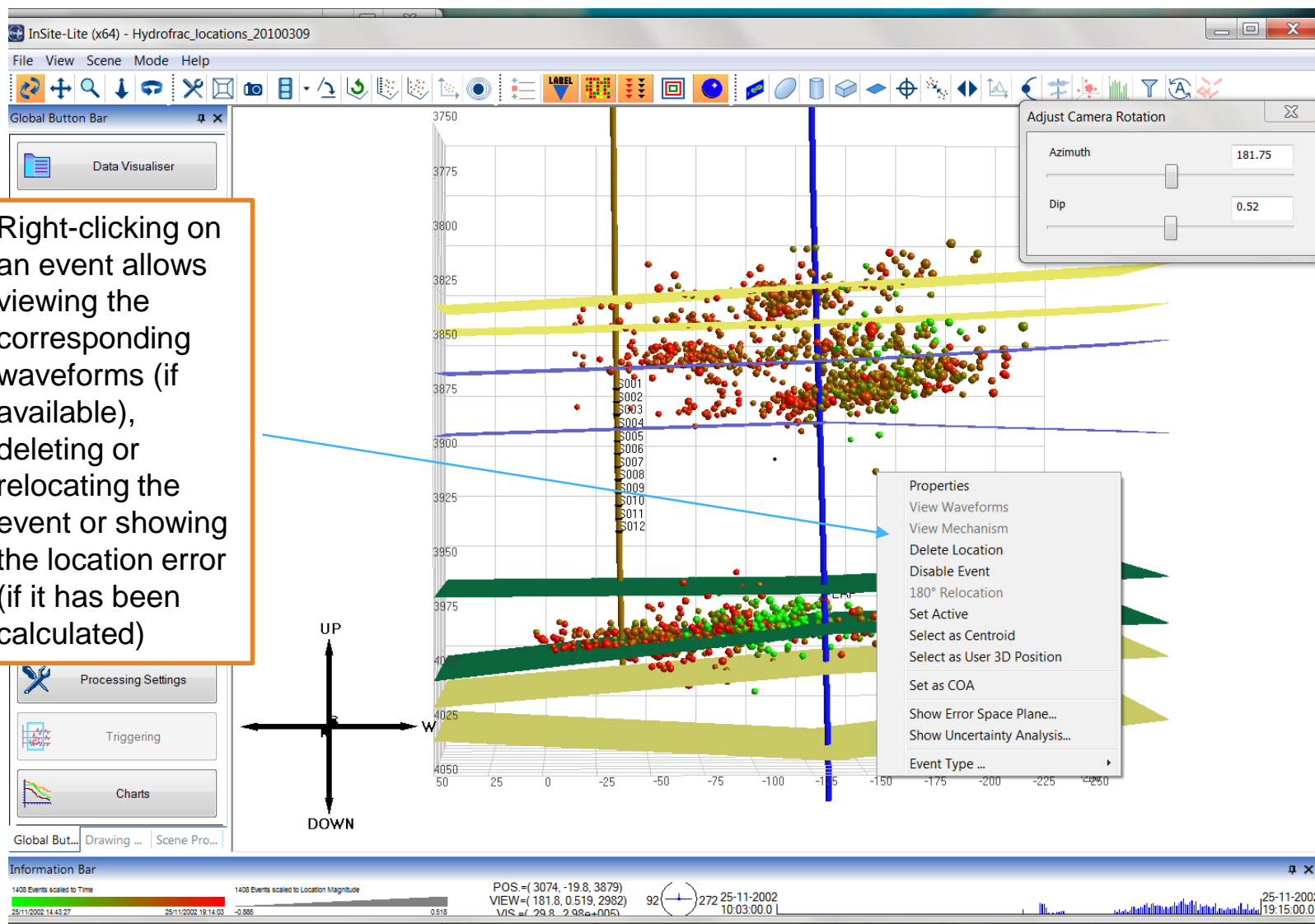
Try going to the 3D Visualiser.

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

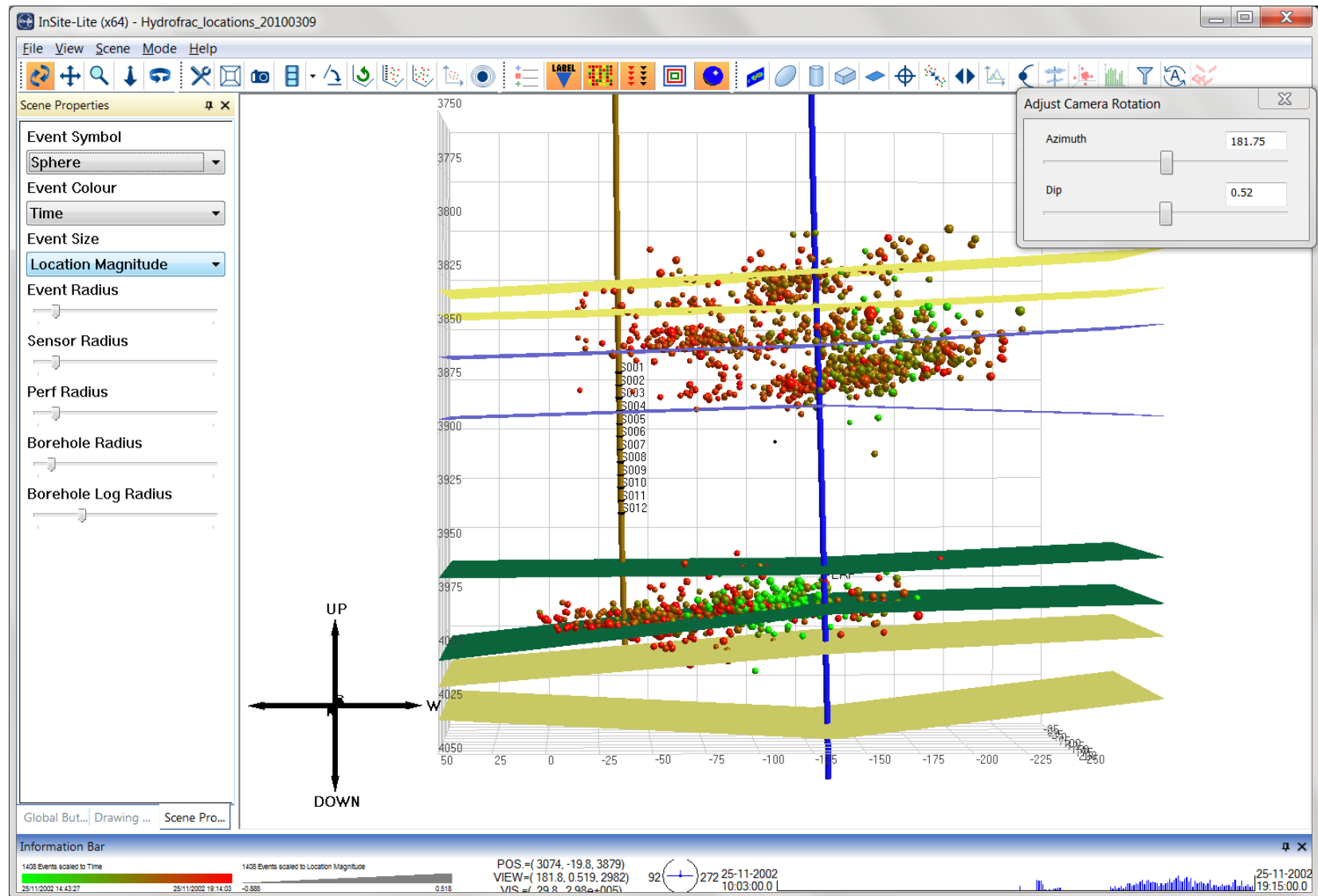
Name	LocalTime	Label	Enab...	North	East	Down	Un...	LMag	Wavefor...	DB	N...	N...
hydrof...	14:43:27.5280...	f_002215....	✓	116.1...	-136.9...							
	14:43:40.1170...	f_002218....	✓	118.0...	-119.9...							
	14:43:42.2960...	f_002219....	✓	109.4...	-109.5...							
	14:43:44.4870...	f_002219....	✓	104.3...	-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...							
Ev... 0017	25-11-2... 15:03:14.3110...	15:03:14.3110...	✓	105.5...	-120.6...							
Ev... 0018	25-11-2... 15:03:17.2080...	15:03:17.2080...	✓	125.5...	-102.1...							
Ev... 0019	25-11-2... 15:03:22.1540...	15:03:22.1540...	✓	112.2...	-118.0...							
Ev... 0020	25-11-2... 15:03:24.9860...	15:03:24.9860...	✓	116.1...	-114.8...							
Ev... 0021	25-11-2... 15:03:25.4490...	15:03:25.4490...	✓	107.6...	-132.3...							
Ev... 0022	25-11-2... 15:03:30.0210...	15:03:30.0210...	✓	114.7...	-114.8...							
Ev... 0023	25-11-2... 15:03:30.5890...	15:03:30.5890...	✓	105.0...	-125.2...							
Ev... 0024	25-11-2... 15:03:34.2720...	15:03:34.2720...	✓	102.9...	-144.8...							
Ev... 0025	25-11-2... 15:03:37.5630...	15:03:37.5630...	✓	114.1...	-109.5...							
Ev... 0026	25-11-2... 15:03:40.5500...	15:03:40.5500...	✓	116.8...	-109.5...							
Ev... 0027	25-11-2... 15:03:49.5930...	15:03:49.5930...	✓	103.6...	-110.2...							
Ev... 0028	25-11-2... 15:03:55.7850...	15:03:55.7850...	✓	131.8...	-92.679	3982...	1.00	-0.3...	×	×	36	36
Ev... 0029	25-11-2... 15:03:56.7430...	15:03:56.7430...	✓	108.3...	-124.5...	3981...	1.00	-0.3...	×	×	36	36
Ev... 0030	25-11-2... 15:03:56.8970...	15:03:56.8970...	✓	112.2...	-121.9...	3982...	1.00	-0.0...	×	×	36	36
Ev... 0031	25-11-2... 15:03:59.4990...	15:03:59.4990...	✓	120.5...	-100.3...	3988...	1.00	-0.2...	×	×	36	36
Ev... 0032	25-11-2... 15:04:00.5620...	15:04:00.5620...	✓	97.6...	-136.3...	3982...	1.00	-0.3...	×	×	36	36
Ev... 0033	25-11-2... 15:04:04.2620...	15:04:04.2620...	✓	101.8...	-123.1...	3988...	1.00	-0.5...	×	×	36	36
Ev... 0034	25-11-2... 15:04:11.7440...	15:04:11.7440...	✓	110.1...	-113.0...	3988...	1.00	-0.3...	×	×	36	36
Ev... 0035	25-11-2... 15:04:13.1470...	15:04:13.1470...	✓	111.5...	-108.1...	3973...	1.00	-0.1...	×	×	36	36
Ev... 0036	25-11-2... 15:04:21.1240...	15:04:21.1240...	✓	122.6...	-77.679	3984...	1.00	-0.3...	×	×	36	36

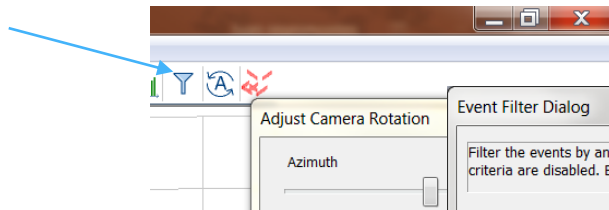






Scene Properties tab includes quick-editing shortcuts for scene and scene objects





Event Filter:

This allows enabling or disabling events according to different parameters.

A disabled event is not displayed and is not processed in auto-processing but does not delete it from the database

Event Filter Dialog

Filter the events by any of the parameters specified below. Only enabled components are filtered. Events are enabled/disabled depending on whether they fit the criteria. By default, events outside the specified criteria are disabled. By selecting 'Invert' on each option, events inside the specified criteria are disabled.

Date and Time

☐ Date and Time

☐ Invert Filter

Minimum

hour : min : secs 0 : 0 : 0

day - month - year 1 - 1 - 100

Maximum

hour : min : secs 0 : 0 : 0

day - month - year 1 - 1 - 3000

Volume

☐ Location Volume

☐ Invert Filter

Minimum

(N, E, D) = (75 , -1000 , 3800)

Maximum

(N, E, D) = (150 , 0 , 4050)

☐ DOF Volume

☒ Inside Volume

☐ Outside Volume

Outside Position

(N, E, D) = (0 , 0 , 0)

3D Visualiser Objects

☐ Ellipsoid ☐ Cylinder ☐ Cuboid

☐ Invert ☐ Invert ☐ Invert

Parameters

☐ Inst.Magnitude Minimum = 0 Maximum = 5 ☐ Invert Filter

☐ Loc.Magnitude Minimum = 0 Maximum = 5 ☐ Invert Filter

☐ Mom.Magnitude Minimum = 0 Maximum = 5 ☐ Invert Filter

☐ Location Error Minimum = 0 Maximum = 1 ☐ Invert Filter

☒ Independent Instruments Minimum = 1 ☐ Invert Filter

☐ Cluster Index Minimum = 1 ☐ Invert Filter

☐ Interacting Neighbours Minimum = 1 ☐ Invert Filter

☐ P Picks Minimum = 5 ☐ Invert Filter

☐ S Picks Minimum = 5 ☐ Invert Filter

☐ Angular Residual Minimum = 0 Maximum = 30 ☐ Invert Filter

☐ Source Vectors Minimum = 0 Maximum = 5 ☐ Invert Filter

☐ Confidence number Minimum = 2 ☐ Invert Filter

☐ P-wave SNR Minimum = 1 ☐ Invert Filter

☐ S-wave SNR Minimum = 1 ☐ Invert Filter

Select parameters...

Filter **Close**

3D Visualiser VI: density planes

Density planes:

Up to three orthogonal event or energy density planes can be displayed within the scene, with customisable resolution

