Geode DZ

Distributed Seismic Acquisition System

3D Data Acquisition Simplified And Streamlined

Breakthrough Usability for More Efficient Surveys, Higher Quality Data

Unlike other 3D seismic systems that rely on a user interface designed 10 years ago, the new Geometrics Geode DZ system supports today's best practices in seismic surveying. Instead of an assemblage of add-on patches and kluged together software routines, the new Geode DZ system offers an operating interface that is designed from the ground up to be intuitive and easy to learn and use. So intuitive and easy, in fact, it can help you prevent expensive in-field mistakes and drastically reduce processing time and costs. With the new Geode DZ system, operators can better visualize and adjust layout geometry, keep the survey moving efficiently, and focus on data gathering, not complex software.

Standard Ethernet Saves Time and Money

The Geode DZ communicates using standard Ethernet protocol, eliminating the need for expensive custom-designed controllers. Now virtually any computer can control your survey, and you'll save by using lower-cost RAID drives, as well as USB hard disks, printers, and other peripherals. Plus, debugging Ethernet equipment and connections is far more understandable and familiar than proprietary communication protocols.

Flexible, Field-hardened System

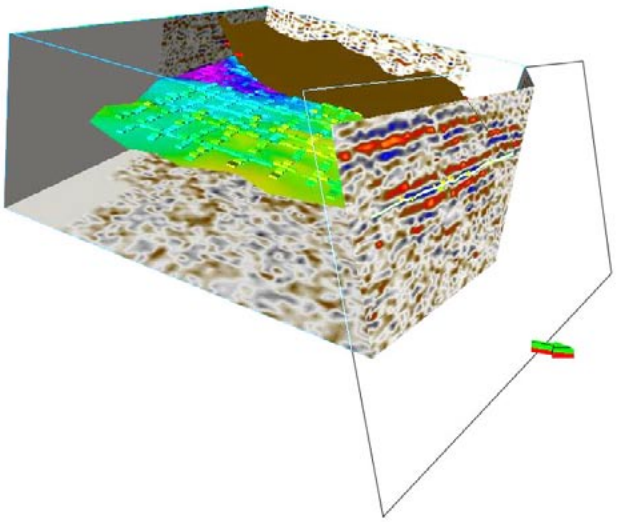
The DZ uses field-hardened technology, already deployed in over 1100 2D systems worldwide and used for every imaginable application. With the ability to continuously record at high sample rates on any number of channels, the Geode DZ gathers high-quality data for 2D and 3D surveys, coal-bed methane studies, reservoir monitoring, steam floods, 3C/3D VSP, tectonic research, and marine surveys. Geode customers include academic institutions, engineering firms, and most major oil companies.

Since 1969

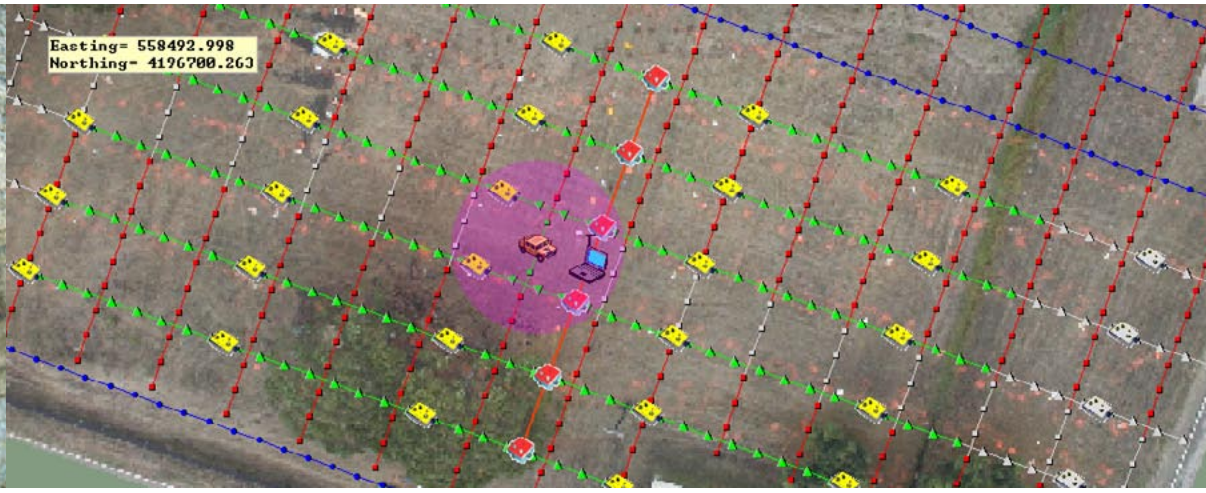
www.geometrics.com

Geode DZ 3-D Distributed Seismic System

Keep Logistics Simple.



- Suitable for a broad range of surveys including 2D, 3D, 3C, continuous recording, GPS-synchronized monitoring, and depths requiring wide group spacing
- 8 Hz bandwidth and 24-bit resolution lets you work in a wide range subsurface conditions and acquisition geometries
- Fast deployment with system powering up in under 60 seconds, any number of channels
- Easy troubleshooting with real-time look-ahead line and geophone tests; in-field instrument tests verify specifications for client approval
- Efficient data collection with fast cycle times and high production rates with in-box correlation and stacking
- Wide range of source options including vibrators, pseudo-random (Mini-Sosie), impact, and explosives
- Compatible with Geometrics Geode and StrataVisor NZ hardware that you already own



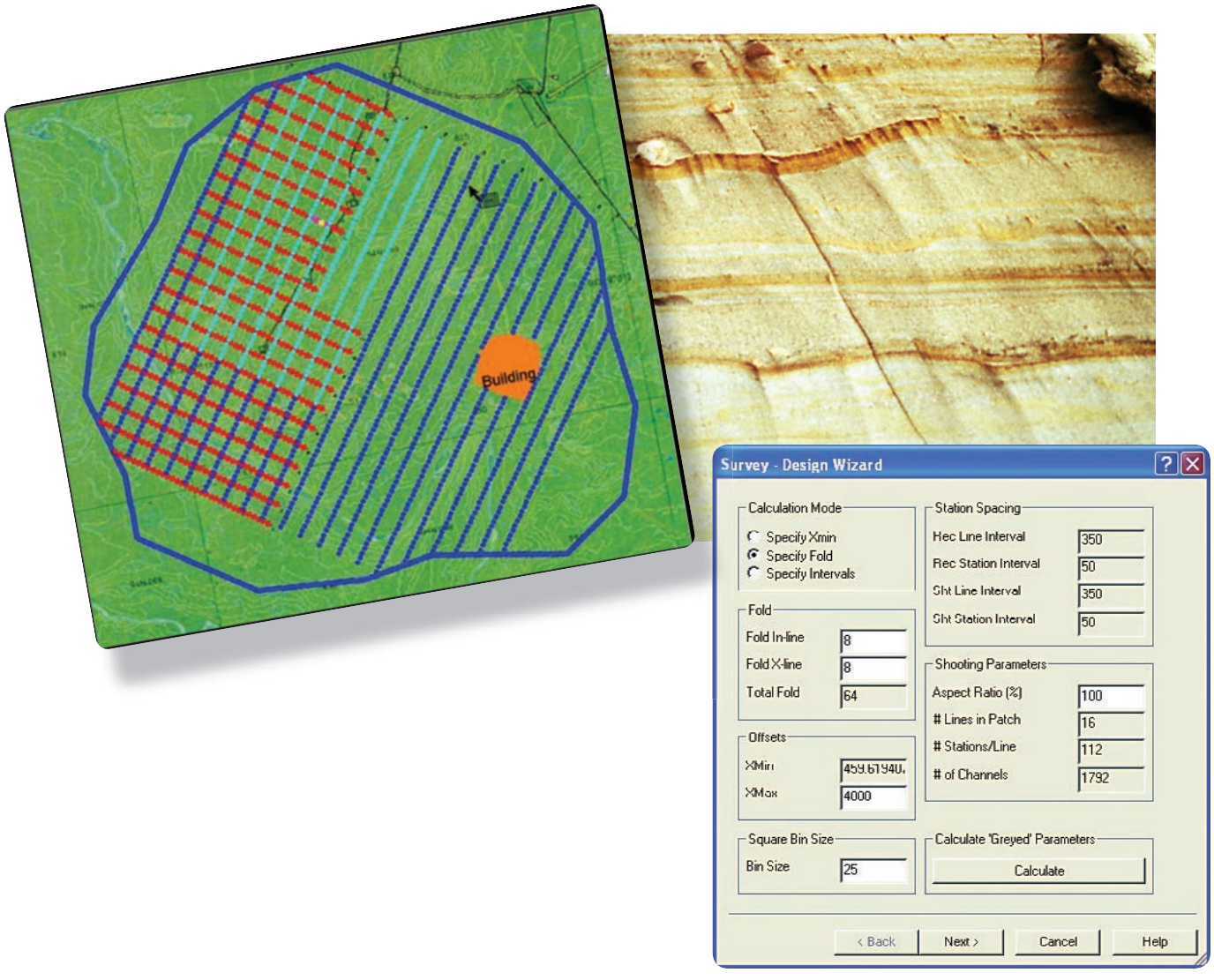
GEOMETRICS

Look Beneath The Surface

Geode DZ 3-D Distributed Seismic System

Integrated Planning Software Speeds Layout and Simulates Your Survey to Minimize Field Time.

- Simulates simple to complex layouts
- Offers wizard-driven, easy-to-use, and easy-to-remember interface
- Calculates and displays many parameters automatically: fold, spider, and offset
- Estimates array response
- Includes convenient Obstacle Manager to adapt to changing field conditions
- Automatically generates SPS files
- Uses same industry-standard survey planning software taught in SEG courses



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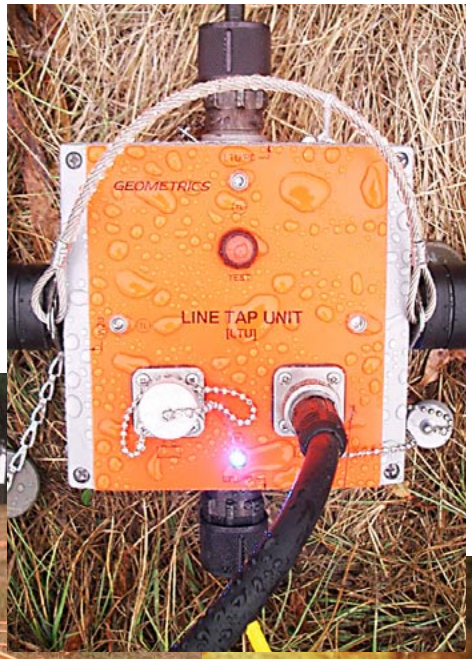
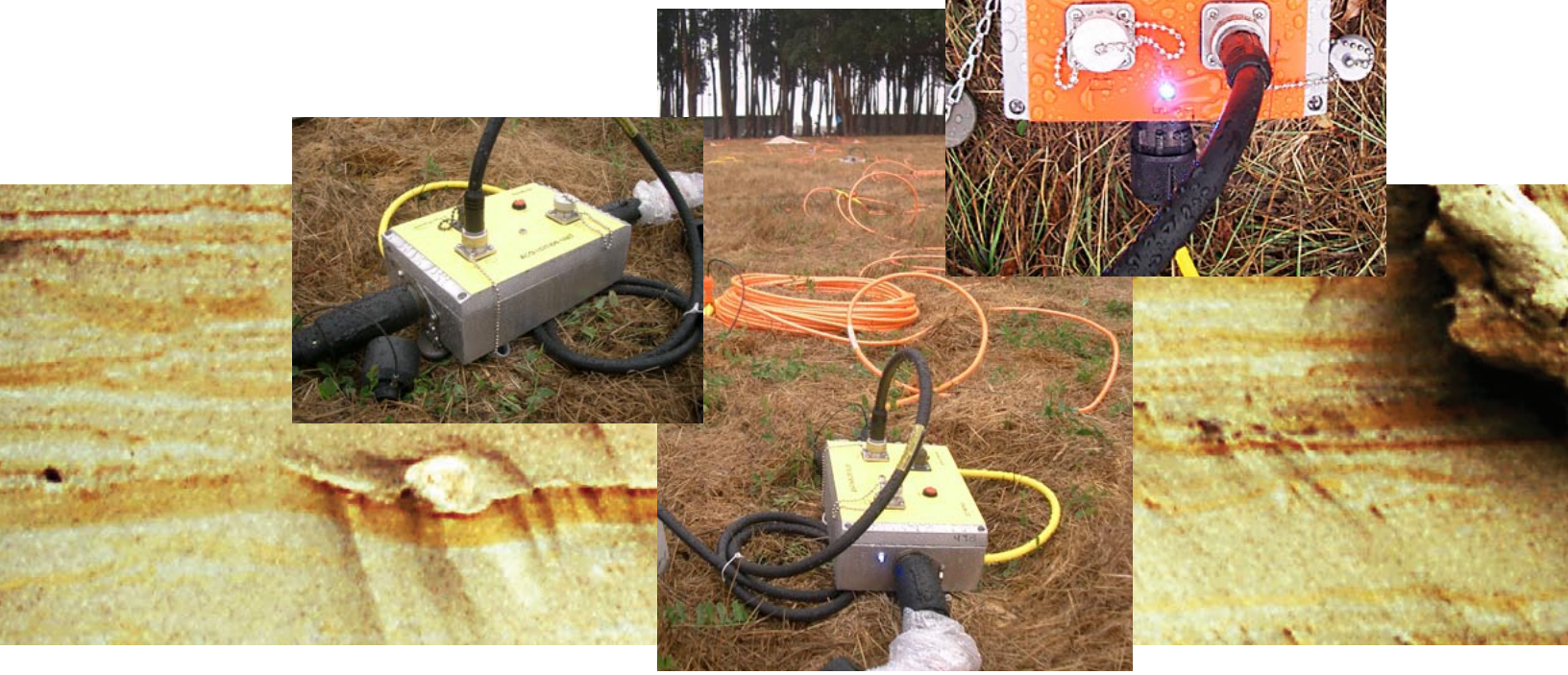
Geode DZ 3-D Distributed Seismic System

Rely on Simple, Flexible Hardware.

- Software configurable 2 to 8 channel A/D modules
- Continuous or trigger-based recording
- Trigger can be directly connected to any acquisition unit in areas of poor radio reception
- Omni-directional data transfer
- Hot-swap battery connections
- Either in-box stacking and correlation or full data transfer on high-speed trunkline
- Machine, survey, and real-world coordinates tied together in one step
- Orientation insensitive
- 16 lines, 480-channels per line





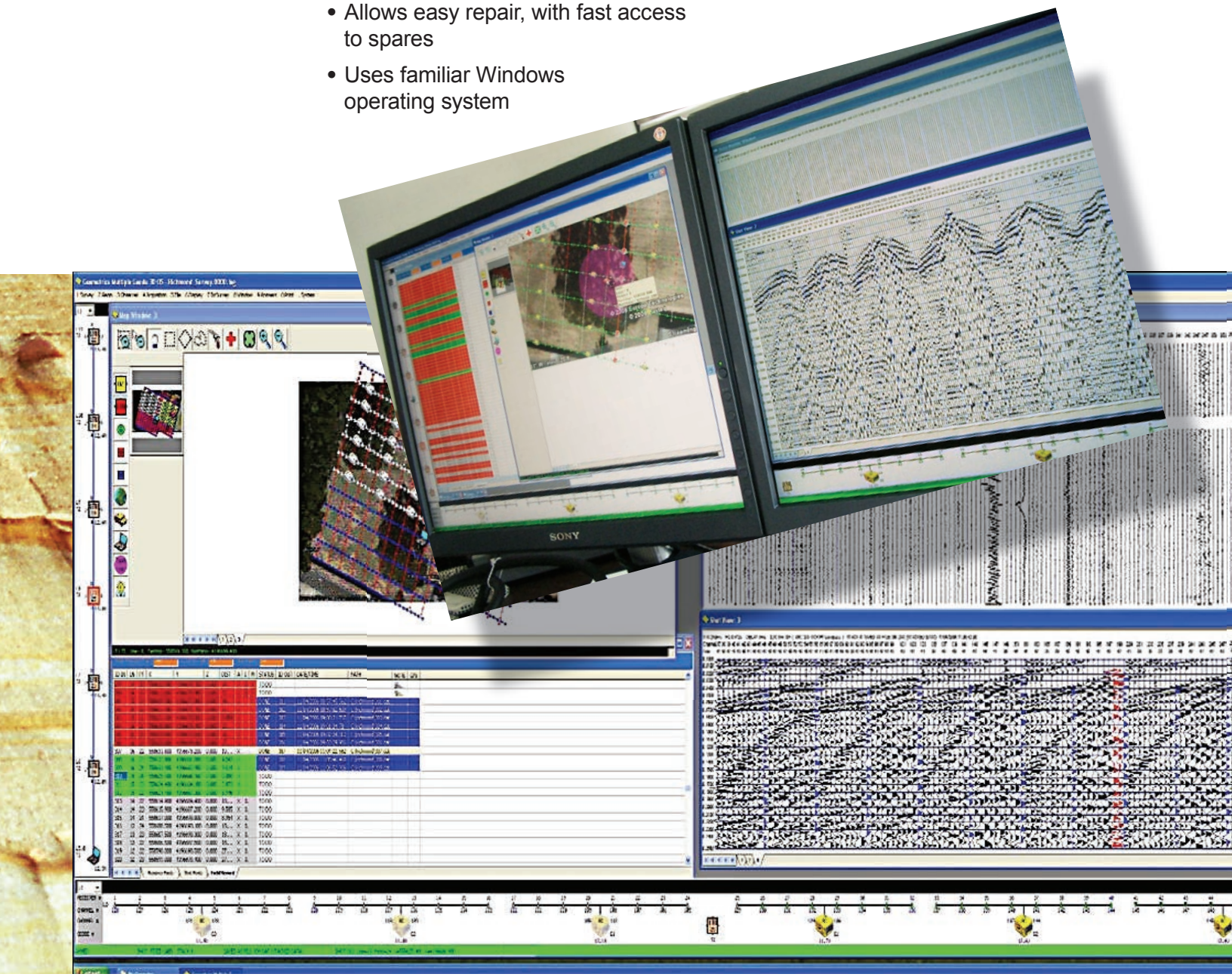
GEOMETRICS

Look Beneath The Surface

Geode DZ 3-D Distributed Seismic System

Simplify Your Recording Vehicle With a PC-Based Controller.

- Communicates with acquisition system using standard Ethernet protocol
- Supports low-cost peripherals
- Allows easy repair, with fast access to spares
- Uses familiar Windows operating system



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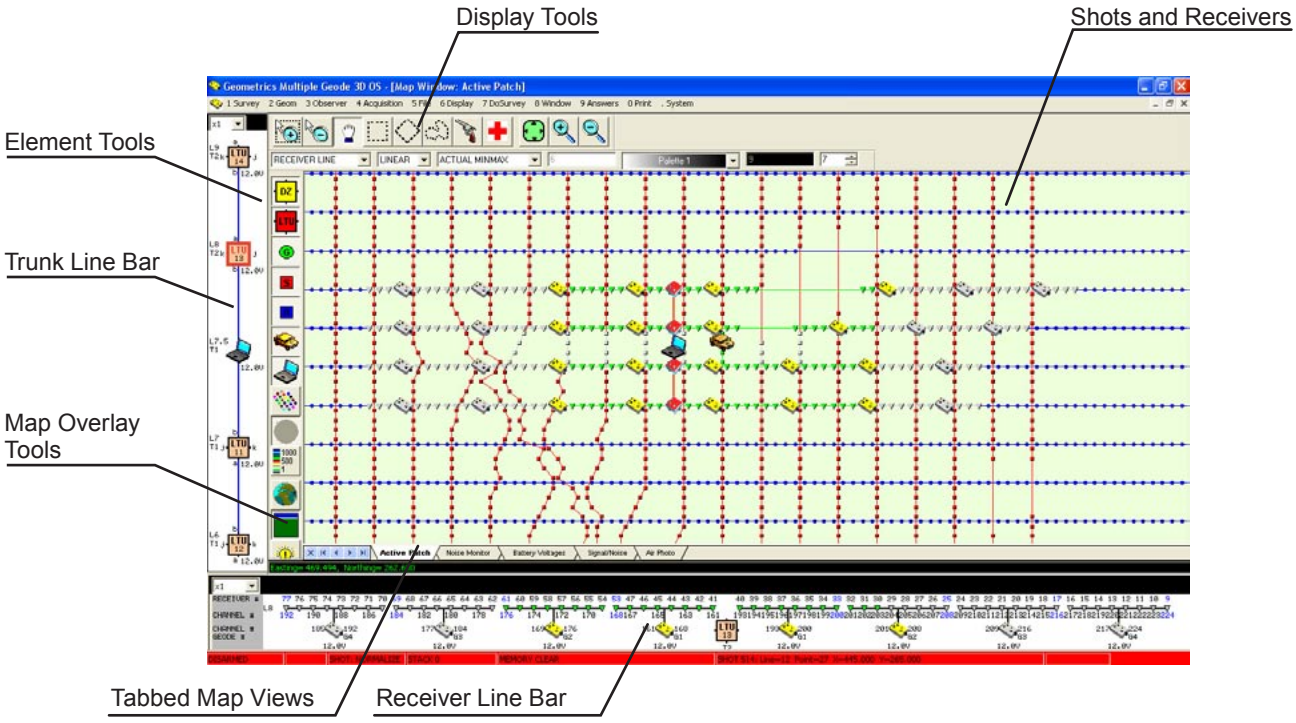
Move Faster With Familiar, Easy-To-Remember Windows Paradigm.

- Each map window shows survey area and system status at a glance
- Zoom and pan in multiple windows for views of different areas
- Color coded icons show real-time survey properties:
  - Real-time noise
  - Battery voltage
  - Active patch
  - Signal-to-noise
  - Topography
- Tool boxes and multiple tabbed views quickly display needed information
- Color-coded shots and receivers display availability
- Hover feature displays tool tips, element characteristics
- Side bars show trunk and receiver line properties
- Icons show clear indication of next shot, past shots, available shots
- Operator can audibly ping modules to alert crew
- Shot order revisions easily accomplished with drag-and-drop shot location



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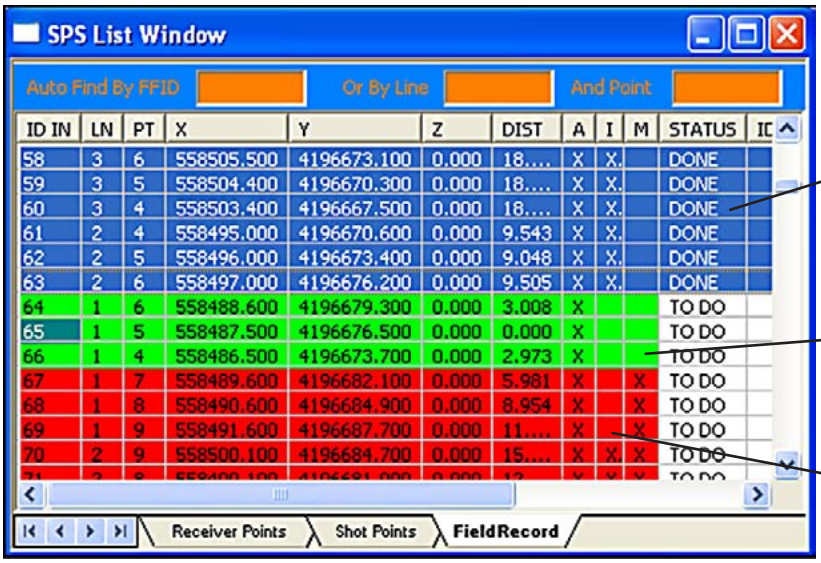
Look Beneath The Surface

Geode DZ 3-D Distributed Seismic System

Get Immediate Visual Access To Your SPS Files.

Sortable and searchable color-coded list windows show availability and status:

- Available receivers with instrumentation
- Phones in current patch
- QC status
- Shots acquired, yet to be taken, completed and remaining Shots
- Patch ready to move for the next shot



Blue highlights the completed shots

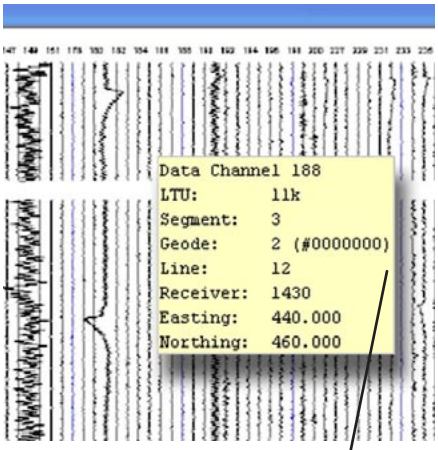
Green highlights the shots to be acquired with the current live patch

Red highlights the shots that need additional geophones to be deployed

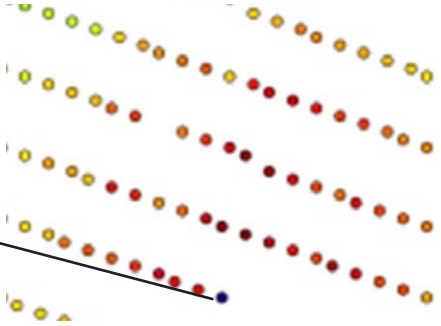
Geode DZ 3-D Distributed Seismic System

Control Quality At A Glance With Real-Time Geometry And QC Tools.

- Real-time full-waveform noise monitor quickly identifies dynamic sources, moving vehicles, pumps, and aircraft
- Hover tooltip provides x, y, line, and station
- Bidirectional signaling between controller and boxes help crew and doghouse coordinate problem solving
- Real-Time Geometry and QC Tools
  - Trace RMS
  - Noise
  - Geophone Resistance
- Attributes displayed in color with A/D module and geophone locations so that problems can be quickly located

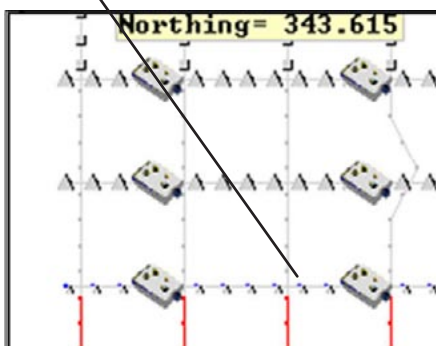


Tool tips appear as you hover over a trace

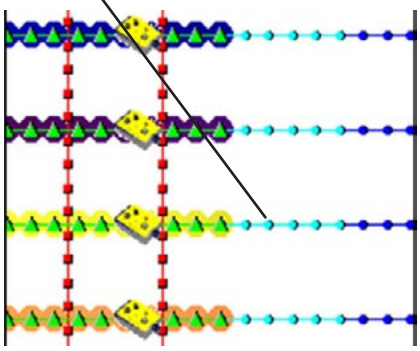


Dead traces show up clearly on this RMS trace amplitude plot

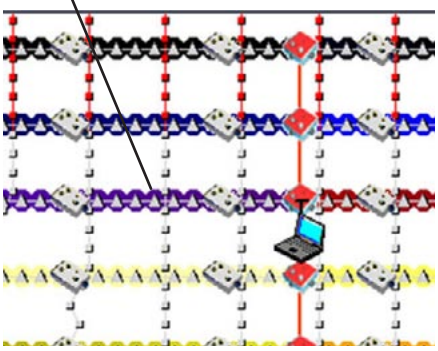
Different sized elements show which shots are completed and which geophones can be picked up



Map View color coding highlights receiver positions needed for any shot but not yet installed



Geometry parameters like line number, distance from next shot, and trace number can be color coded to look for errors and inconsistencies



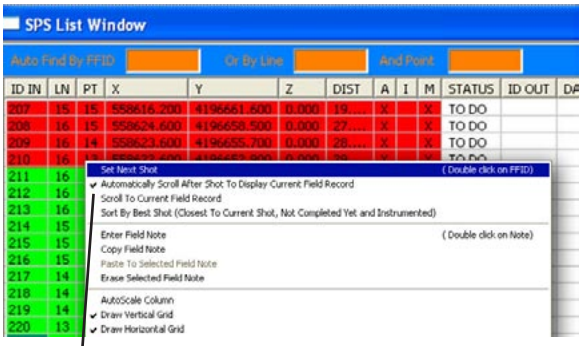
GEOMETRICS

Look Beneath The Surface

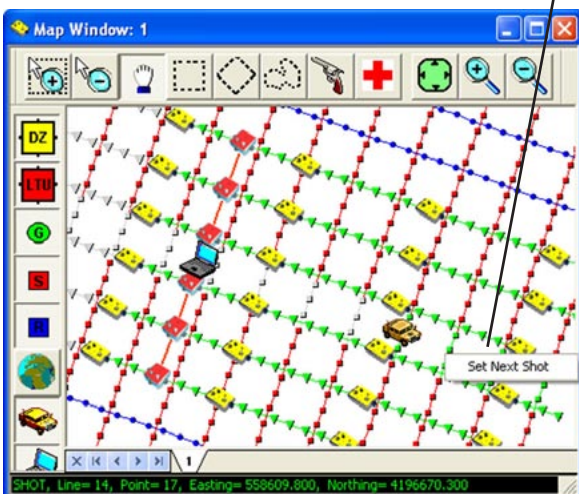
Geode DZ 3-D Distributed Seismic System

Find Relationships Between All Variables Fast With Dynamically Linked Windows.

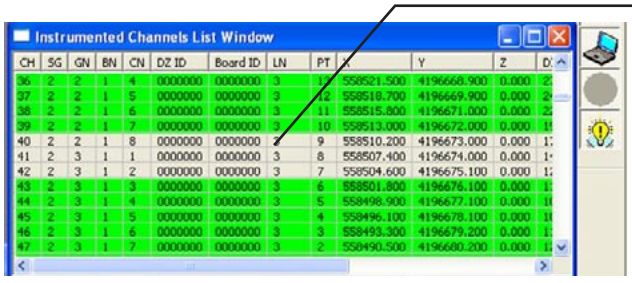
- Selected elements automatically highlighted in multiple windows
- Problems displayed in windows best suited for identifying and addressing issues
- Test results summarized in one-click, sortable spreadsheet displays for quick scanning
- Associations between variables saved to files for QA purposes
- Out-of-spec geophone groups can be easily identified in the map view

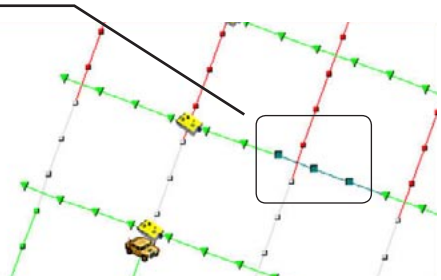


Setting the next shot can be done by right clicking in either the map or list windows



Geophones Highlighted in map view are also highlighted in the list window





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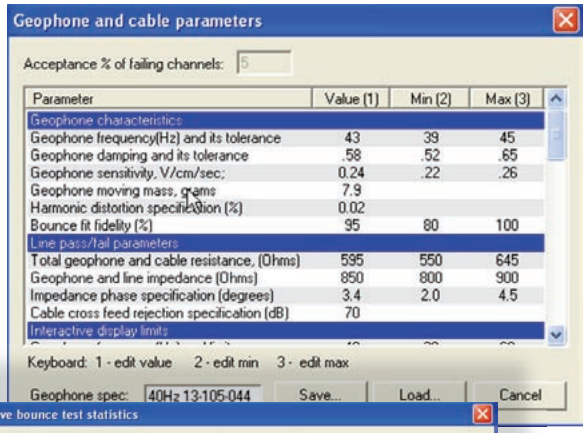
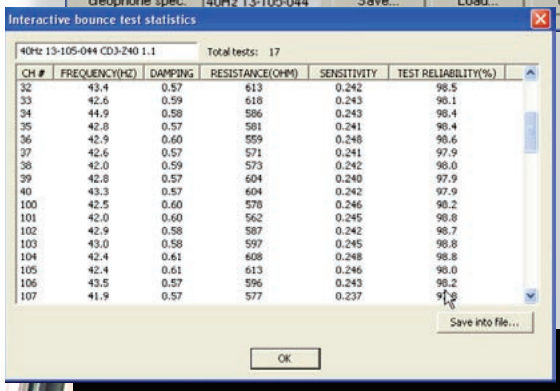
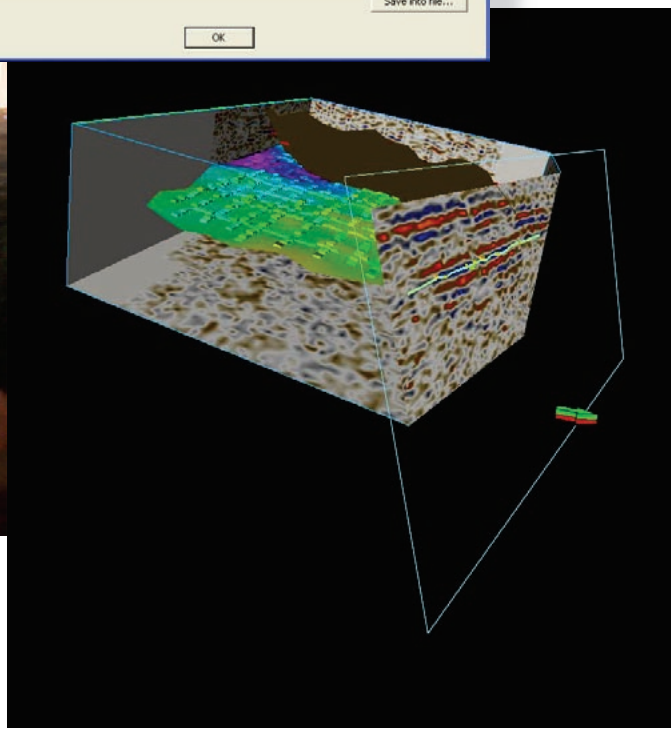
Verify Hardware With Industry-Standard Tests.

- **Geophone Line Tests**
  - Resistance
  - Natural Frequency
  - Damping
- **Instrument Tests**
  - Noise
  - Gain Similarity
  - Bandwidth
  - Cross Talk
  - Phase Similarity
  - DC Offset
  - Distortion
  - Common Mode Rejection







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Look Beneath The Surface

Geode DZ 3-D Distributed Seismic System

Specifications

Configurations

A/D Module: 2, 4, 6 or 8 channels per box, software selectable

Line Tap Unit (LTU): interfaces to 1 or 2 DZ line segments and to trunk line

System

- Up to 16 lines
- Up to 2048 channels
- 480 channels per line (240 channels per line segment)
- Separate trunk line controls AUX and VIB channels
- PC based controller with gigabit Ethernet
- Ruggedized NZ controller for in-field look-ahead test

Electronics

A/D Conversion: 24-bit

Dynamic Range: 115 dB at 2 ms, 24 dB

Distortion: 0.0005% @ 2 ms, 1.75 to 208 Hz

Bandwidth: 1.75 Hz to 8 kHz. Low frequency option available

Common Mode Rejection: > 100dB at <= 100 Hz, 36 dB

Cross Talk: -125 dB at 23.5 Hz, 24 dB, 2 ms

Noise Floor: 0.20 µV, RFI at 2 ms, 36 dB, 1.75 to 208 Hz

Stacking Trigger Accuracy: 1/32 of sample interval

Maximum Input Signal: 2.8V PP, 0 dB, 177 mV PP, 24 dB

Input Impedance: 20 kOhm, 0.02 mf

Preamplifier Gains: 0, 12, 24 or 36 dB

Anti-alias Filters: -3 dB at 83% of Nyquist down 90 dB

Acquisition Filters:

- Low Cut: OUT, 10, 15, 25, 35, 50, 70, 100, 140, 200, 280, 400 Hz
- Notch: 50, 60, 150, 180 Hz and OUT
- High Cut: OUT, 250, 500 or 1000 Hz

Display filters: Any user-defined corner frequency.

Diversity stack and spiking filters for MiniSosie

Sample Interval: 0.02, 0.03125, 0.0625, 0.125, 0.25, 0.5, 1.0, 2.0, 4.0, 8.0, 16.0 ms

Correlation: Built-in high-speed hardware correlator in each DZ module, before or after stack. Additional s/w correlation in controller for QC display when recording uncorrelated. .

Record Length: 65,536 samples per channel, may be limited by configuration.

Intelligent Event Self-Trigger: Available for micro-seismic, earthquake and vibration monitoring.

Continuous Recording: GPS synchronized for injection monitoring micro-seismic or earthquake studies

Testing

Instrument Tests: Noise, DC offset, gain and phase similarity, distortion,bandwidth, timing accuracy, cross feed, CMRR.

Line and Geophone Tests: natural frequency, damping, line resistance. Real-time full waveform in waterfall-style noise monitor and/or dynamic color map displays.

Power:

DZ Module: 12V external battery, 0.5W/ch during acquisition, low power modes available when inactive.

LTU Module: 12 V external, 3.0W.

Environmental: LTU and DZ: - 40C to +75 C. Submersible.

Physical:

DZ A/D Module: 16.5 x 24 x 8.25 cm, 2.3 kg.

LTU Module:16.5 x 16.5 x 8.25, 1.8 kg.

PC controller: contact factory.

NZ Look-Ahead Ruggedized Field Controller: see data sheet

Software

Omni-Lite Layout by Gedco: Design, edit, verify, import, export, compare and plot land 3D-survey geometry.

Create scripts using new powerful algorithms. Easy to use Wizard allows users to create simple and complex shooting schemes. Integration of DXF, TIFF and Shape files for multi-layered projects. Creates SPS files to be read directly by Geometrics Survey Control Software.

Survey Control Software: Controls initial layout, testing and collection of 2 and 3D seismic data. 'Smart' SPS file system matches instrument to survey coordinate system, alerting operator when hardware mismatches occur. Map window displays shot/un-shot status. Non-sequential source-driven shooting supported with multiple vibes/shooters. Integrated QC tools for signal to noise, first break, and RMS amplitude analysis. Flexible displays allow in-field analysis of data frequency content and signal strength.

System

Data Formats: SEG-2, SEG-D and SEG-Y. Communication Protocol: 10/100/1000 bit Ethernet depending on module and system requirements.

Wake-Up Time: Approximately 30 s

Operating System: Windows XP.

Plotters: Drives any XP compatible printer/ plotter.

Warranty: Three year parts and labor on Geometrics-built components.

Extended warranty available

Support

Geometrics has service centers located in London, Beijing, Chennai (India), Sydney, Milan and our main facility in San Jose, California.

For logistics support, Geometrics has over 30 representative offices around the world. Crew start-up and operation services are also available.

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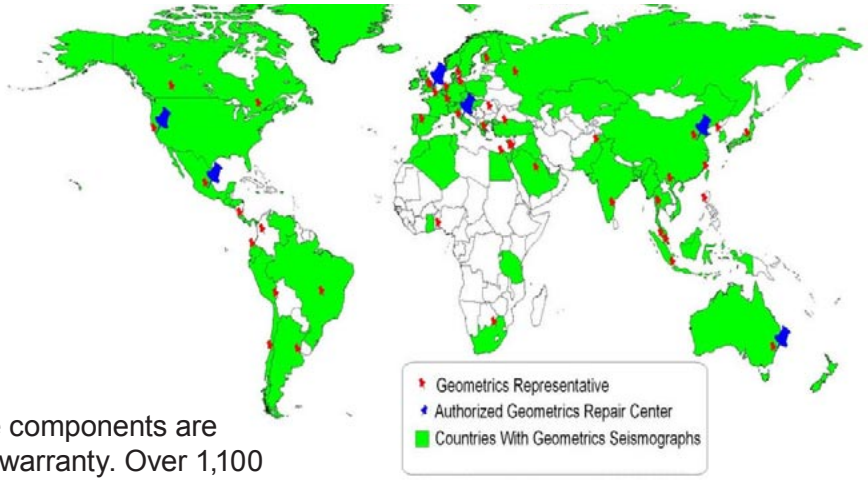

All Geode hardware components are backed by a 3-year warranty. Over 1,100 Geode systems are in active use. Our customers include:

- Shell Exploration and Production
- Schlumberger
- Compagnie Générale de Géophysique (CGG)
- Bureau of Geophysical Prospecting (BGP)
- Kansas Geological Survey
- Stanford University
- University of California at Berkeley
- United States Geological Survey
- U.S. Army Corps of Engineers
- Geological Survey of Japan
- WesternGeco
- Geological Survey of Canada
- National Geophysical Research Institute, India
- University of Calgary
- University of Alberta
- University of Texas
- Anatolian Geophysics (Oz Yilmaz)

For a full list of customers or to arrange a demonstration of the Geode DZ, please contact us at one of our offices listed below.

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