GeoProbe®

Geophysical Interpretation Software

OVERVIEW
GeoProbe® software is the industry-leading 3D multi-volume interpretation and visualization solution. The software is designed to accelerate interpretation workflows from basin scale through detailed prospect and reservoir analysis. GeoProbe software delivers breakthrough speed whether evaluating a reservoir-scale data volume on the desktop or analyzing basin-scale volumes with an asset team in the largest immersive visualization environment. Interpreters can simultaneously analyze multiple attributes, multi-volume seismic, well and cultural data, and sealed structural frameworks. GeoProbe volume interpretation workflows are tightly integrated with DecisionSpace® workflows, SeisWorks® software, and the OpenWorks® database.

BENEFITS

Interpretation at the Speed of Thought
GeoProbe software offers parallel processing algorithms that deliver high performance on compute-intensive tasks, such as tracking, attribute computations and interactive volume visualization. The dynamic 3D volume visualization environment allows geoscientists to see their data in ways that were not possible in the past. The result is faster interpretation cycle time compared to traditional “line-by-line” interpretation methodologies.

Interpretation Accuracy
Volume co-rendering technology improves fault and stratigraphic imaging. Powerful volume visualization techniques enhance visual pattern recognition making identification of geologic structures and potential reservoir attributes obvious and intuitive. Interactive auto-trackers enable precise interpretation. The result is quickly defined, more accurate, optimized reservoir targets.

Scalable to Any Dataset Size
GeoProbe software technology is designed to support efficient workflows on “real world” data volumes. Geoscientists have interactively viewed and interpreted 3D volumes covering areas as large as 45,000 square kilometers. This capability enables interpreters to work at the prospect level in context with the regional framework. Interpreters also have flexibility to scale the computing environment from large-server-based graphics systems to PC workstations.

Advanced Deepwater Workflows Lower Risk for Salt, Subsalt, Presalt Geology
GeoProbe software features GeoShell technology that provides interpreters the ability to quickly interpret salt body geometries and boundaries with unprecedented flexibility and accuracy. The ability to leverage all relevant information into a dynamically updateable multi-Z subsurface model ensures that in areas of complex structure, delineation of reservoir makeup can be mapped with better precision.
GeoProbe Software Native Integration with the DecisionSpace® Environment

In addition to superior volume interpretation capacity, GeoProbe software enjoys tight integration with the DecisionSpace Geosciences suite. From iterative salt imaging and velocity modeling workflows to advanced multi-well planning, both GeoProbe data and interpretation can easily be accessed from the DecisionSpace Geosciences suite to enhance interpretation workflows.

FEATURES

Full 3D Visualization

GeoProbe software provides seismic volume visualization features designed to enhance interpretation productivity and geophysical analysis capabilities.

• Real-time scanning through massive seismic datasets using probes, planes, random lines and opacity volumes in memory
• Data-on-demand scanning through seismic datasets of unlimited sizes by streaming data directly from disk
• Data-on-demand supports user selectable data streaming for optimal amplitude and scaling parameterization
• Load and display ZGF, Esri Shapefile, and GeoTiff culture data
• Seismic data display capabilities including:
  • Wiggle traces on probes and 2D lines
  • Multi-attribute blending
  • Illumination lighting technique on volume rendered probes
• Interactive Well Section display with horizon and fault intersections
• Geobody and volume rendering
• Simultaneous multiple volume viewing
• Interactive well path builder and dynamic links to Wellbore Planner™ and DecisionSpace TracPlanner™ applications
• Well, curves, and picks data display
• Volume sequencer
• Vertical or Horizontal Image file display
• Real-time shading and lighting

Multi-Survey Interpretation
• 2D, 2D/3D, 3D – Interpret faults and horizons on 2D lines and multiple 3D surveys seamlessly
• One button gridding for 2D, 2D/3D and 3D horizons
• Visually shift 2D data by vintage or line-by-line
• Display or hide 2D data using one button click
• Touch-sensitive 2D-basemap
• Generate 3D survey/volumes from 2D data

Automated Body Detection (GeoAnomalies)
GeoAnomalies uses the power of the CPU and GPU to extract features or bodies of interest from a data volume.
• Automated volume isolation using amplitude, connectivity and size criteria
• Multi-volume Boolean operations for body detection
• Multiple horizons can be used as additional constraints
• Powerful post-processing tools to analyze isolated bodies
• Spreadsheet user interface to isolate bodies of interest
• Operate on cells within GeoAnomalies
**GeoShell Salt Body Interpretation**

GeoShell technology generates a sealed body for representing complex, multi-Z, and three-dimensional objects. The technology allows the geophysicist to interpret in three dimensions by creating objects that represent the most complex and largest of geological bodies quickly and easily. This technology is particularly valuable in salt body imaging and interpretation workflows.

Interpreters can use the GeoShell body reconstruction algorithm to “wrap” multiple input surfaces, such as a top and base of salt, to create a body. Any number of surfaces can be put into the algorithm to build a final sealed salt body. Surface tension properties can also be input to yield the most geologically meaningful and accurate output.

A sealed salt body can also be constructed from extracted seismic attribute volumes generated with the patented GeoProbe GeoAnomalies feature. GeoShell technology looks for connectivity within seismic attributes then “wraps” these attributes to create the GeoShell object. Additionally, a GeoShell object can be created directly from TSurf objects. GeoShell objects can be consumed by the ezModel™ application for inclusion into a sealed structural model.

To enable the interpreter to edit complex bodies without the overhead of reinterpretation steps, the GeoShell functionality also includes an interactive deformation feature. Interpreters can selectively edit GeoShell bodies by selecting the precise area they want to modify and “push” or “pull” the surface of the GeoShell body until the desired effect is achieved. This localized interpretation leaves the rest of the project undisturbed.

GeoProbe GeoShell body can be accessed and viewed from the DecisionSpace Geosciences platform. Extended data conversion options exist to convert standard horizons to GeoShells. Conversely, GeoShell bodies may be converted to single-Z horizon patches. ezFault™ and ezSurface™ Software Technology
**ezFault™ and ezSurface™ Software Technology**

ezFault and ezSurface software technologies use unique surface fitting algorithms to generate smooth, geologically reasonable surface representations. Key features include:

- Interpret multi-Z valued surfaces
- Multiple simultaneous fault and surface interpretations
- Build new faults or interpret geobodies such as salt
- Interactive editing capability during interpretations

**swFault™ Software Technology**

swFault software technology enables the conventional and segment-based fault interpretation methodology within the 3D environment. In areas where data quality is low, segment-based interpretation and correlation can prove very powerful. Key features include:

- Read and display segments interpreted in any orientation from SeisWorks, OpenWorks or GeoProbe software
- Interpret segments in any orientation, on any object
- Correlate and uncorrelate groups of segments
- Triangulate planes and control display style
- Save to the OpenWorks database

**ezTracker Plus™ Software Technology**

Automated horizon interpretation features include:

- Waveform-based surface tracker
- Multiple seed input with flexible gate structure
- Use existing interpretation as boundaries
- Define tile size for accurate picking that mimics the interpretation process
- Control expansion of tracked area interactively with a probe
- Delete by track-path and region
- Simple slider bar GUI to guide non-expert users on optimal parameter selection

**Manual Horizon Interpretation**

In addition to automated horizon picking, GeoProbe software offers manual and semi-manual horizon picking options, such as:

- Point-to-point picking
- Waveform-based picking (auto dip/track)
- Preview track before pick
Structure Oriented Filtering
Structurally oriented coherency filters enhance data for horizon and fault interpretation, as well as improve the output of 3D attribute calculations such as curvature and relative amplitude change. The unique coherency filter preserves faults and sharp discontinuities while improving horizon and auto-tracking capabilities.

ezModel™ Framework Building
Using ezModel software, interpreters can quickly and interactively construct a sealed framework as part of the interpretation process. The resulting sealed model can be used in many workflows from depth imaging to reservoir modeling to basin simulation.

Attribute Analysis
GeoProbe software is designed as a multi-volume interpretation system, enabling interpreters to maximize the value of seismic data. Key features include:

- A comprehensive suite of volume attribute calculations
- Volume calculations computed by using multiple CPUs
- Sinc-interpolated horizon-based seismic attributes
- On-the-fly calculation and display of horizon-based attributes
- Horizon filtering and merging
- Tight links to 3rd-party attribute generation tools
PostStack™ Advanced Attribute Calculator
The software delivers multi-threaded computation of over 40 seismic volume attributes including phase, frequency, amplitude and combination attributes, such as dip-corrected structure cube.

Volume Illumination
A patented multi-attribute co-rendering technique enables interpreters to graphically merge two volumes into a single 3D probe. Unique shaded displays provide unprecedented insights into subsurface geology. Users describe this technology as making “the seismic look like rocks.”
System and Software

**Dynamic Integration**
GeoProbe software offers dynamic workflow integration with DecisionSpace software and other Landmark technologies, offering interpreters a choice of interpretation applications that work together without the need for duplicating seismic volumes, horizon and fault data. Workflow efficiency includes cursor tracking across applications and “drag and drop” capability for multiple object types and shared memory volumes from GeoProbe software into DecisionSpace and vice versa. Additionally, GeoProbe software extends traditional PostStack seismic interpretation with one-click access to prestack seismic interpretation tools.

**Well Planning**
Integration with Wellbore Planner and DecisionSpace TracPlanner software facilitates collaboration between interpretation and well planning disciplines.

**Support for 64-bit Linux® and Windows® Systems**
GeoProbe software delivers the same speed and functionality on 64-bit Linux and Windows operation systems.

“GeoShell deformation allows you to modify complex salt structures easily without having to reinterpret.”

**Geophysicist**

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