Overview

DecisionSpace® Prestack Calibration and Analysis software offers a comprehensive prestack interpretation component that is completely integrated in the DecisionSpace Geoscience suite and provides the seismic interpreter with dynamic access to large prestack volumes for processing, analysis and correlation with other reservoir data types. The software also empowers workflows for calibrating seismic data to geology for the extraction of essential information to better generate quality prospects, seek bypassed reserves, or to enhance reservoir characterization workflows. The location of cross-plotted attributes classified for fluids, or fracture response, can be projected onto map, section, and cube view displays. The application supports seismic modeling activities to help interpreters understand seismic behavior, including normal incidence and offset modeling, P-P and P-S wavelet estimation, and synthetic scaling. To help the geoscientist validate their interpretation with observed seismic responses, log modeling tools are included and contain fluid and porosity substitution, saturation and mixed phase scenario modeling. Finally, the software includes tools for extraction, synthetic generation, and manipulation.

Prestack interpretation remains one of the most reliable indicators of reservoir property identification especially in complex geologic environments where seismic data is essential to validating subsurface understanding. The DecisionSpace Prestack Calibration and Analysis software is a module of the DecisionSpace Geoscience suite, a unified visualization, interpretation, and modeling workspace where asset teams can collaborate more effectively to evaluate and develop assets. It delivers a true multi-user environment with unprecedented integration across multi-domain workflows and data types—all on the award winning OpenWorks data management foundation.
**BENEFITS**

**Comprehensive Prestack Data Quality and Anomaly Analysis**

The application provides a powerful set of features that allow the interpreter to ensure the precision of the seismic data quality while also understanding the interpretive influence of acquisition and anisotropic conditions. Analysis capabilities allow for the ranking of seismic anomalies cause and effect, so that amplitude anomalies and their reservoir relevance are better understood. Also, the application can consume VSPs and other related project data.

**Hydrocarbon Indicators Better Understood Though Lithology and Fluid Prediction**

Prestack seismic remains one of the most reliable tools for hydrocarbon identification. This software provides unique workflows for understanding the amplitude and azimuthal dependent effects on the seismic data so interpreters can more confidently discern between actual geologic conditions or seismic acquisition artifacts. Beyond that, advanced AVO and lithology features provide direct understanding of hydrocarbon presence.

**Seismic Scenario Testing That Enables “What If” Prestack and PostStack Comparisons**

The ability to interactively view the seismic data effects on the stacking or re-stacking of seismic surveys on the fly within the same viewing window allows for more precise understanding of data quality and interpretation readiness.

**Dynamic Prestack Volume Accessibility for Project Efficiency**

Built on the robust OpenWorks® data model, the software can deliver the interpreter fingertip access to all prestack volumes, creating online efficiency with critical interpretation project data for project level productivity improvements.
Shared Integration with Seismic Processing and Interpretation Environments

The software dynamically connects the processor and interpreter so that shortened cycle times from data acquisition, processing, through iterative interpretation can be achieved without data quality compromises.

FEATURES

Comprehensive Prestack Analysis Suite

The application can provide dynamic access to large prestack volumes for signal enhancement, geophysical and fluid analysis, synthetic modeling, and seismic to well data correlation.

Unique Prestack Visualization Connects Geologic, Well, and Seismic at Pay Zone

Toggling between views of poststack and prestack responses at specific areas of interest while simultaneously viewing all relevant geologic and petrophysical data in the same view provides the interpreter with a unique holistic subsurface perspective of the challenges, properties and conditions under evaluation.
Well-Tie Workflow
The well-tie workflow provides tools for synthetic seismic generation in time/depth, depth/depth, prestack and stacked sections. The scope of capabilities the workflow provides includes the ability to:

• Generate or edit required logs
• Manipulate checkshot points
• Analyze drift and induced artifacts
• Cross-correlation analysis
• Perform wavelet extraction
• Correctly account for deviated wells

Seismic Synthetics and Modeling
The software includes processing enhancement on offset synthetics. Also, additional features include scaling post-critical reflectors on offset synthetics and Wavelet and other general wavelet tools.

Interactive Crossplot Analysis
Log/Log, Seismic/Seismic, Log/Seismic workflows are supported in a single crossplot with the flexibility of displaying any combination of seismic, modeled seismic, curves, and previously saved crossplot data together.

Advanced Seismic Analysis
The software employs a patented prestack attribute calculation tool. The velocity quality control workflow enabled in DecisionSpace Prestack Calibration and Analysis software compares semblance differencing between corrected and raw gathers, and has a scaling algorithm that is designed for performance efficiencies.

Analysis Workflows
The software includes workflows such as:

• Multi-well crossplotting
• Prestack enhancement
• Fluid substitution
• Fluid / Lithology attribute classifications
• Header plots
• 4D prestack math
• Wavelet extraction
Optimized Prestack Data Management

DecisionSpace Prestack Calibration and Analysis software supports unique prestack data management up to basin-size projects regardless of data volume size by leveraging the industry leading OpenWorks project data management and SeisSpace® seismic processing platform capabilities. The interpreter does not need to worry about file location or formats. The software:

1) Stores native prestack seismic and horizons
2) Includes a 99.9999 fidelity lossless prestack compression algorithm
3) Supports 2D/3D multiple surveys and coordinate systems

Allows prestack seismic data to be accessed directly from the SeisSpace processing system locally or remotely from anywhere in the company through the new SeisLink™ software capability

Enterprise Subsurface Science Platform Integration

The software provides instant access to processed prestack and poststack data volumes through the OpenWorks database catalog. It also enables multi-user project and seismic data access to all project geoscientists and engineers working a specific field and integrates with well, geologic, VSP, and other corollary data.

Prestack Processing Accessibility Through Direct Connection to High Performance Computing Resources

The application natively connects to Landmark’s SeisSpace® processing system and shares direct cataloging of JavaSeis® prestack data volumes between processing and interpretation environments. This approach provides the advantage of a direct connection to the seismic processing high performance computing environment available, which enables true collaboration between interpretation and processing environments. This can ultimately deliver efficiency improvements to critical deepwater workflows, such as 3D prestack gather QC and interpretation, and integrated velocity model building and migration analysis.

Unconventional Specific Workflows

This workflow allows for the:

• Generation of prestack attributes for AVAz to evaluate the fracture system in shale
• Data conditioning for prestack seismic inversion prediction of key shale properties such as Brittleness and TOC
• Log vs. log, log vs. seismic crossplot analysis to correlate shale properties with seismic elastic properties
Amplitude
DecisionSpace Prestack Calibration and Analysis software includes quantitative workflows for direct hydrocarbon or reservoir property identification and mapping. In subsalt reservoirs, seismic attribute analysis directly from prestack data can reveal subtle fault and fracture patterns that are often masked by stacking process. Prestack delivers reliable and repeatable risk assessment workflows.

Prestack Data Volume
Prestack volumes magnify seismic investments and storage infrastructure. Giving interpreters the ability to catalog and bring data online can be critical to time sensitive workflows as well as detail interpretation continuity steps. Adjacent to salt bodies, prestack amplitudes can provide a critical “picture” of deeper property conditions.

Depth seismic synthetic
PSDM seismic events can be miss-tied to the newer well that drilled after seismic acquisition and processing. Depth-depth synthetic workflow is critical to calibrate depth seismic-to-well data especially in the subsalt drilling scenario.
4D Earth Modeling with volumetric and reserve estimations
This feature includes:

• Fluid saturation modeling and 1D seismic forward modeling to understand 4D seismic response
• Seismic math operations, including dataset calculator, dataset math, trace match to QC and compute subtle differences between seismic time lapse datasets
• Crossplot analysis to validate if observed subtle change in seismic over time is related to fluid movement in the reservoir
• Data conditioning for prestack seismic inversion of seismic time lapse datasets to calibrate and estimate pressure and saturation changes in the reservoir.

Pore Pressure/Geomechanics from 3D Seismic
DecisionSpace Geoscience software allows for integration with Landmark’s Drillworks® geomechanical application enabling real-time pore pressure and wellbore stability integrated workflows that can help derive pore pressure from 3D seismic. Abnormal pore pressure can result in complex drilling hazards. Seismic velocity is an important input data to predict and analyze pore pressure abnormally, especially in the area of limited well control. Therefore, it is critical to verify if the velocity anomaly truly relates to change in pore pressure or just processing artifacts. The validation process requires the access pre-stack seismic data. Landmark 1D velocity probe workflow enables integration between velocity modeling and pre-stack interpretation to validate pressure assumptions.

System and Software

SOFTWARE REQUIREMENTS
OpenWorks® 5000.8.3.0
Oracle® 11.2.0.2. database
DecisionSpace® Base module
DecisionSpace® GIS component for GIS workflows

OPERATING SYSTEMS
Red Hat® Enterprise Linux®
Workstations 5.8, 64 bit
Windows® 7, 64 bit
“You have made this so easy to use. Everything is intuitive.”

GEOSCIENTIST

Landmark offers solutions to help you deliver on your business strategies. For questions or to contact your Landmark representative, visit us at landmarksoftware.com.