

DecisionSpace® Earth Modeling Software

DecisionSpace® Geosciences

*Flow simulation-ready
3D grid construction with seamless
link to dynamic simulator*

*Comprehensive and intuitive
geocellular model generation directly
from Dynamic Frameworks to
Fill technology based on
original interpretation*

*Multiple variogram computation and
modeling with instant visual validation*

*Facies trend computation and
modeling workflows*

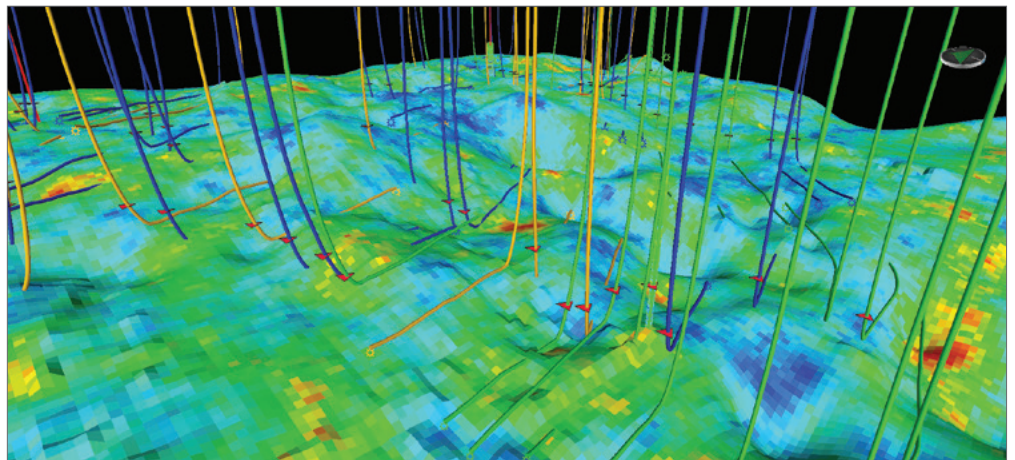
*See-it-now tool generating quick static
simulations for rapid results-checking*

Built on the DecisionSpace platform

OVERVIEW

The ability to characterize a reservoir's physical makeup in real time while accurately understanding reservoir potential and uncertainty remains a primary priority for exploration and production operators' efforts to develop and understand reserve replacement strategies. DecisionSpace® Earth Modeling application is an essential subsurface tool that provides an intuitive and flexible approach to assimilating dynamic mechanical and geoscience knowledge in order to best understand reservoir property distribution. The application integrates subsurface data from well logs, cores, and seismic along with qualitative data to construct a robust 3D representation of a reservoir. Using both efficient stochastic and deterministic approaches, DecisionSpace Earth Modeling software can deliver a multi-resolution geocellular model that more accurately represents the size, shape, orientation, composition, and internal arrangement of a reservoir. This model can then be leveraged for numerous downstream activities, including flow or basin simulation, well planning, stimulation, and risk analysis.

DecisionSpace Earth Modeling software is a module of the DecisionSpace® Geosciences 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, information management foundation of OpenWorks® database.



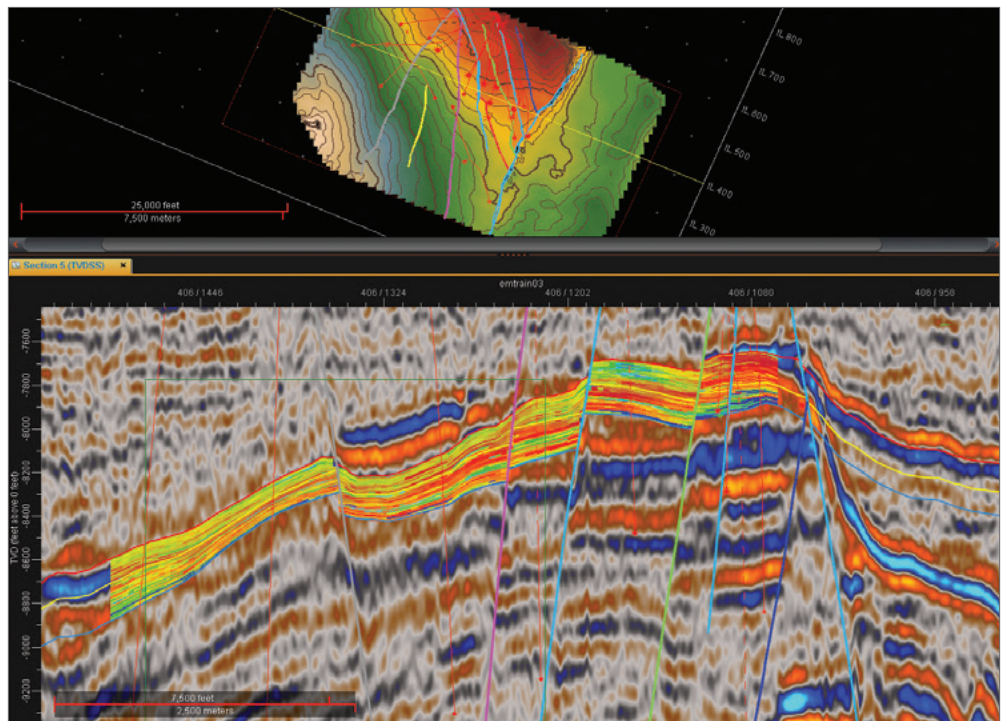
BENEFITS

High Resolution Models Derived from Landmark Dynamic Frameworks to Fill and Industry Standard Geostatistics Algorithms

The Earth Modeling workflow has been optimized to promote integration, usability and high science, from building geocellular models directly from a sealed structural framework, such as the Dynamic FrameWorks to Fill® workflow, through intuitive facies and petrophysical modeling, to static volumetrics and uncertainty. The application combines an intuitive design, along with innovative facies control and advanced techniques, such as lithology proportion mapping and variogram analysis. Advanced geostatistical algorithms available natively in the application, including Pluri-Gaussian, Sequential Gaussian and Sequential Indicator, enhance the horsepower of this solution.

Full-Field Visualization Provides Unique Ability To Work In 3D and for In-Situ Understanding of Sweet Spot, Optimal Fracture Design, and Well Placement

The ability to visualize the earth model in 2D and 3D displays within DecisionSpace Geosciences software – in the context of regional, interpretive and GIS information – provides powerful validation and quality control capabilities, as well as enhanced understanding of the reservoir. The ability to quantify petrophysical and mechanical property distribution, uncertainty, volumetrics and reserves, with the rigor of geostatistical techniques, simply and easily, can result in enhanced efficiencies throughout the acquisition to decision workflow. This is critical to several processes, including sweet spot quantification (particularly suitable for unconventional reservoirs), upscaling and zone definition analysis, well targeting and lateral placement, fracture design, and well engineering.



Optimal Integration and Downstream Handshake with Popular Reservoir Simulation Tools

DecisionSpace Earth Modeling software integrates seamlessly with the advanced Nexus® Reservoir simulator as well as other industry available simulation applications. Visualization and editing of non-Landmark format models is possible through the DecisionSpace Geosciences suite, as well as the ability to launch a simulation deck and/or integrate reservoir simulation models and replay the time-steps. This enables viewing the entire interpretive lifecycle from raw interpretation to static and dynamic simulation models, in a single application at the same time.

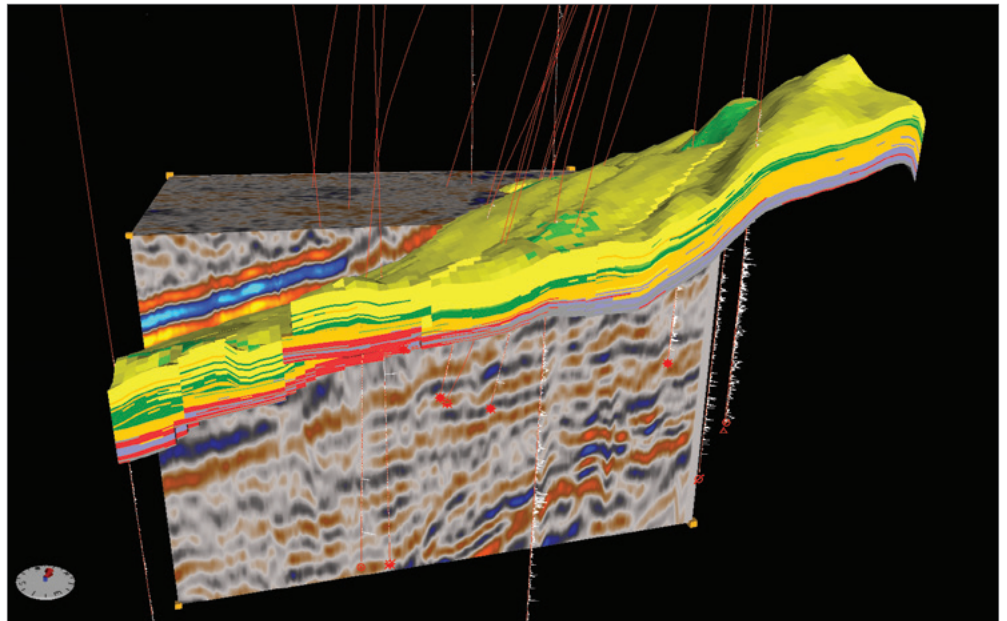
FEATURES

Project Designer and Knowledge Capture

The application includes intuitive graphical flow chart tools to create project workflow templates and capture workflow modeling steps in ODP or HTML Report Files with capabilities of attaching documents, notes, images, and PDFs. Project Designer also includes batch file capabilities.

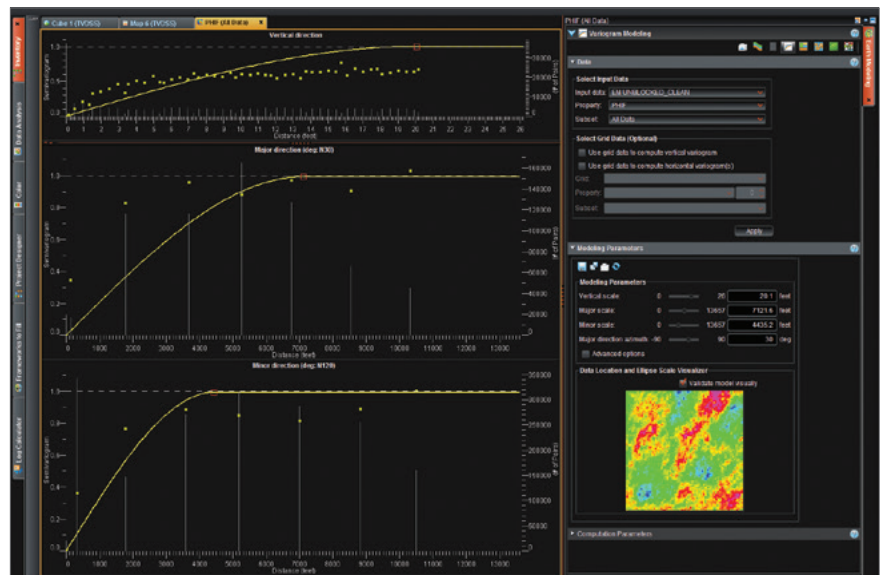
3D Grid Design

Flow simulation ready 3D grid construction with vertical cell-walls and stair-stepped faults based on Cartesian geometry. DecisionSpace Geosciences Earth Modeling suite uses the identical grid topology as Nexus simulator software so the workflow from the static earth model to the dynamic simulator is seamless. Interactive tools to design any shape area of interest within the boundary constraints of the structural framework.



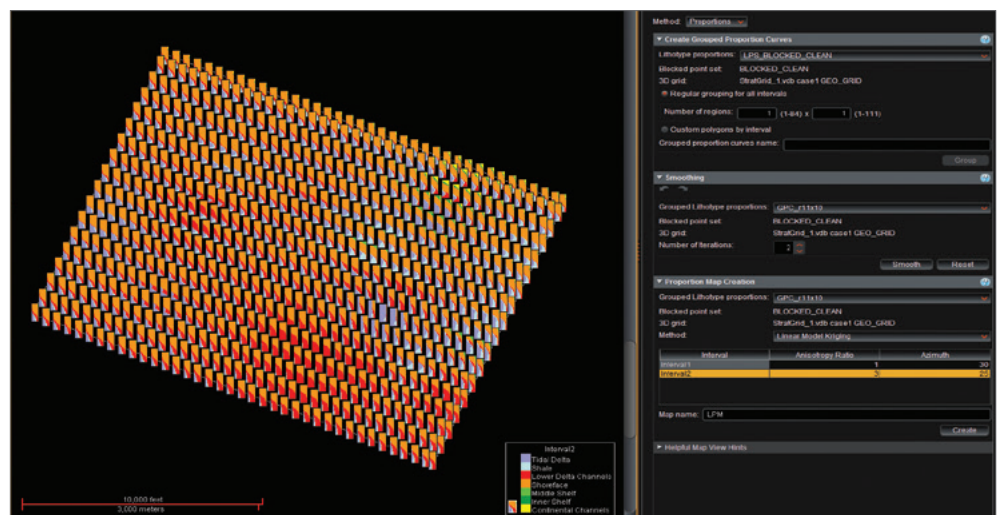
Variogram Computation and Modeling

Patented tools used to compute, model and visualize omni-directional, multi-directional, and nested variograms for continuous and discrete attributes from point sets or 3D grids. When computing the variogram, the defaults given by the application are intelligent defaults meaning that defaults are not constant for every data set; instead we look directly at the data and provide the best defaults to use with the data available. Variogram modeling also includes an instant visual validation map showing the effect of the variogram model on the geocellular model in a live-interactive mode.



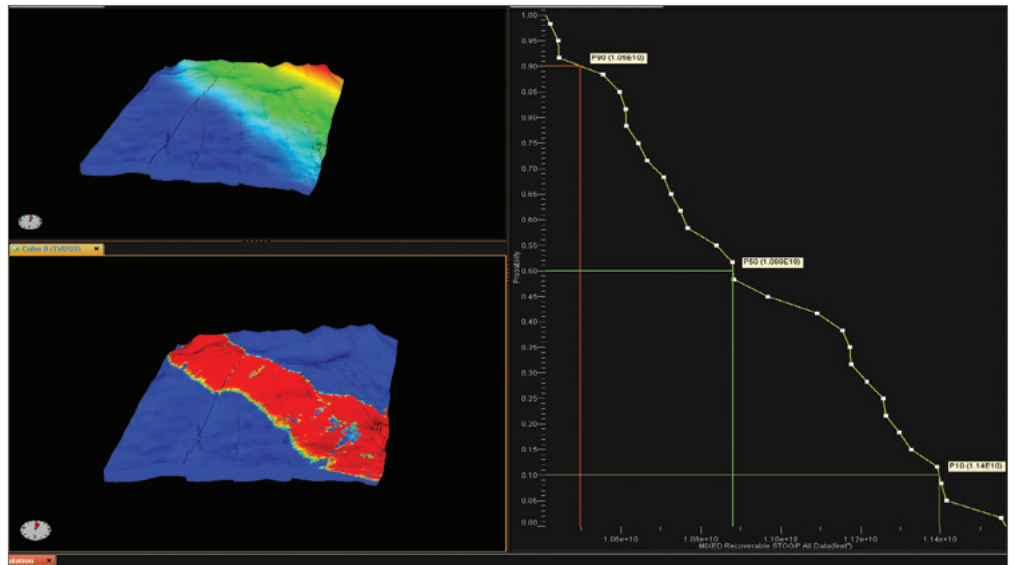
Facies Trend Computation and Modeling

Powerful workflows create geographically varying 3D lithology proportion volumes from well and seismic attributes, which are then used as background trends during Facies Simulation. There are tools to interactively edit copy and move individual proportion curves to better define or customize the background trend.



Stochastic Facies and Petrophysical Property Simulation

An easy and unique workflow to create multiple facies realizations and populate them with petrophysical properties is critical for modeling fluid flow. Instantaneous visual validators allow users to preview results quickly prior to execution to ensure outcomes are reliable. Also, having the ability to use multiple facies simulations linked to multiple petrophysical realizations at the same time allows these results to be used in volumetrics computations to get a more complete probability when calculating P10, P50 and P90.



Probabilistic Volumetric Computation

Tools to compute and display probability curves depicting the risk of hydrocarbon volume based on stochastic facies and petrophysical property realizations. Volumetrics can be used with gas, oil and mixed reservoirs.

Uncertainty Analysis

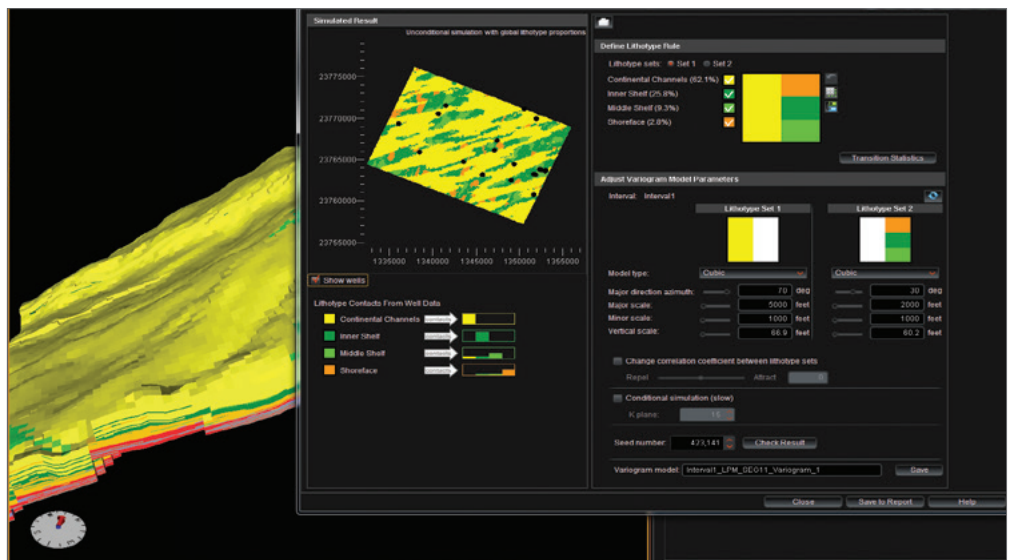
Uncertainty analysis tools can be used to create summary volumes from multiple realizations (mean, standard deviation, 1st and 2nd confidence intervals, probability above, below or between cut-offs).

Upscaling

The upscaling component is used to create coarser grids while keeping fine grid detail around critical areas like faults for use in flow simulators. Several algorithms and methods are available, including classic upscaling methods using appropriate averaging techniques for porosity and permeability, as well as dynamic flow-based permeability upscaling based upon the pressure solution obtained by flowing a single-phase fluid through the fine-grid gridblocks which comprise each coarse gridblock.

See-It-Now

The See-It-Now tool is an extension of the visual validator, which enables users to quickly create static simulations of facies, petrophysics, and mechanical properties, in line with our frameworks-to-fill philosophy. In other words, static property simulations can be completed virtually and instantly using thick cross sections or fence diagrams. Using these tools, modelers can pre-check their results prior to running the full model. The unique characteristics of the See-It-Now technology, in addition to its speed, are that the results generated are the same statistical results seen in the final model for the region(s) specified.



Perform Superior Data Analysis

Before modeling even starts, DecisionSpace Earth Modeling software offers simple, practical histograms, box plots, cross plots, and cloud transforms. You get a clear understanding of data distributions and relationships. DecisionSpace Earth Modeling software makes it easy to distinguish reliable data from suspicious outliers and turns data quality control into a quick and easy process.

System and Software

SOFTWARE REQUIREMENTS

OpenWorks 5000.8.3.0

DecisionSpace Base module

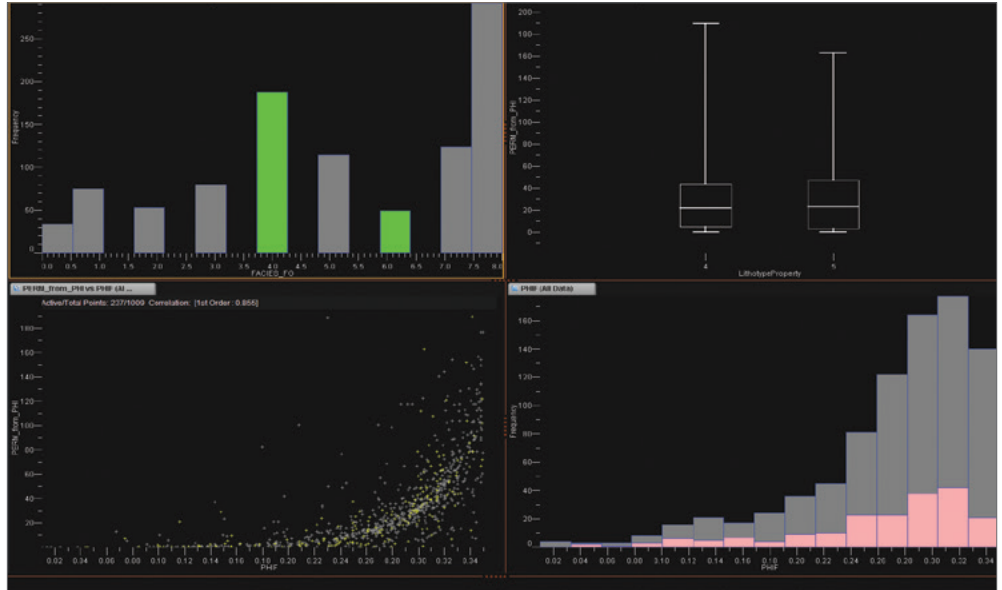
*DecisionSpace GIS component
for GIS workflows*

OPERATING SYSTEMS

Red Hat® Enterprise

Linux® Workstation 5.3, 64 bit

Windows® 7, 64 bit



“I am predicting that your DecisionSpace environment should change the way we do our technical work – and for the better.”

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