Geomodeling™
insight from innovation

SBEDStudio

TECHNICAL BULLETIN

GEOLOGICAL SCENARIO MODELING

OVERVIEW

SBEDStudio generates geologically accurate models for more realistic reservoir simulations and uncertainty estimates. The software models the internal stratification and lithofacies relationships observed in depositional environments such as fluvial channel and channel levee complexes, deep water submarine fans and shoreface environments. By modeling stratigraphic features observed below the scale of seismic resolution, SBEDStudio incorporates the effects of small-scale geological heterogeneity on fluid flow.

You can distribute effective properties throughout SBEDStudio models and simulate multiple geological scenarios to evaluate your reservoir. By ranking the various scenarios, you can determine the range of uncertainty for volumetric calculations and production profiles. The results contribute to better E&P decisions and a better understanding of reservoir risk.

SBEDStudio WORKFLOW

- **Framework Modeling** - Create a framework grid by importing well data and seismic interpretation results, or by importing ECLIPSE or SBED small-scale grids.
- **Sub-Seismic Stratigraphic Modeling** - Refine framework grids using geological rules to model the following depositional environments: channel infill, channel levee, channel lobe, barforms and background.
- **Facies Modeling** - Simulate litho-objects (such as mud, sand, silt) within stratigraphic grids and define their facies proportions.
- **Property Modeling** - Define the reservoir properties you want to model and input the property statistics for each facies.
- **Volumetric Estimation** - Calculate reserve volumes that include the effects of heterogeneity within a defined range of uncertainty.
- **Geological Scenario Analysis** - Create multiple geological scenarios to evaluate the effect of geological detail on reservoir performance.

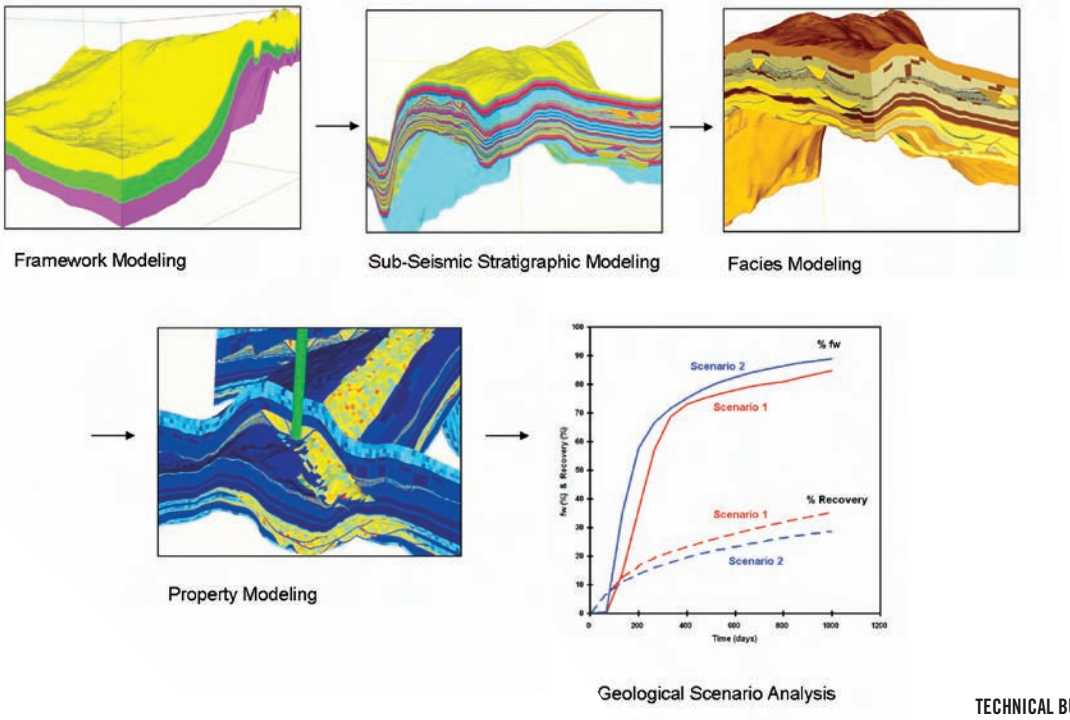


Figure 1. SBEDStudio Workflow

CALCULATE AND DISTRIBUTE EFFECTIVE PROPERTIES

- Generate Reservoir Property Statistics, such as porosity and directional permeability (X, Y, Z), for an entire flow unit within the reservoir model.
- Run flow-based upscaling in SBED grids to preserve heterogeneity associated with your original data.
- Distribute the effective property relationships generated from SBED small-scale models within SBEDStudio 3D grids.
- Modify existing property grids or create new property models with the Property Grid Calculator.
- Export property grids that include stratigraphy, facies, and porosity and permeability simulations in ECLIPSE format.

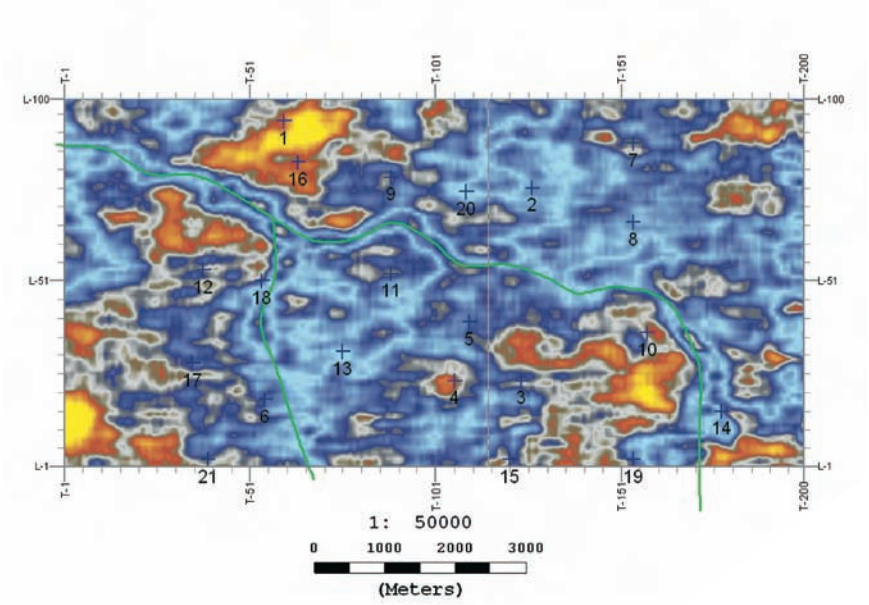


Figure 2A. Channel with digitized centerlines identified in time slice from VisualVoxAt seismic interpretation software.

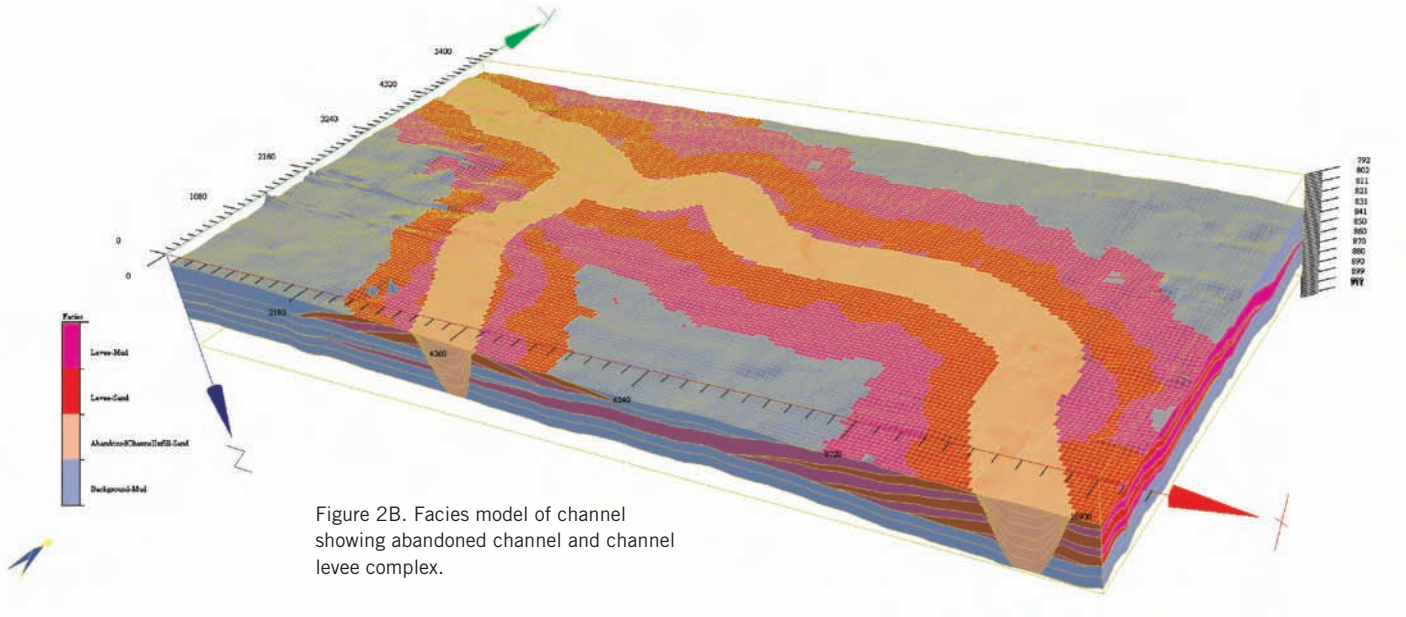


Figure 2B. Facies model of channel showing abandoned channel and channel levee complex.

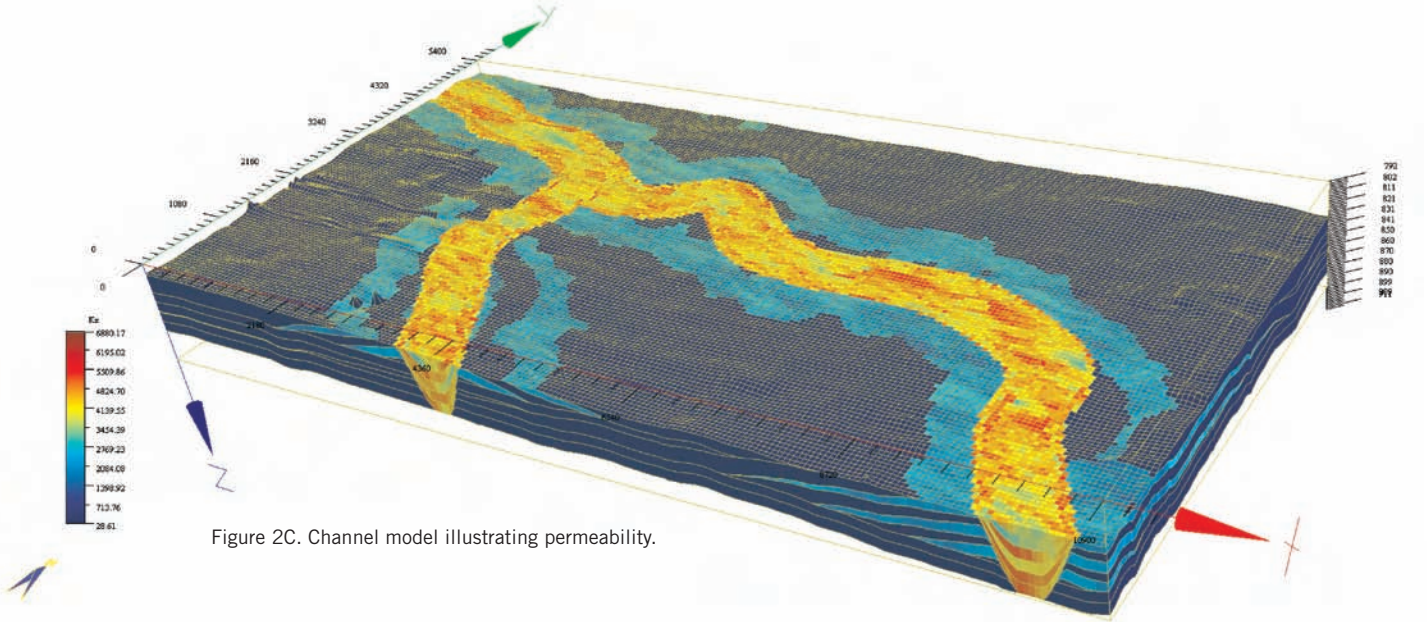


Figure 2C. Channel model illustrating permeability.

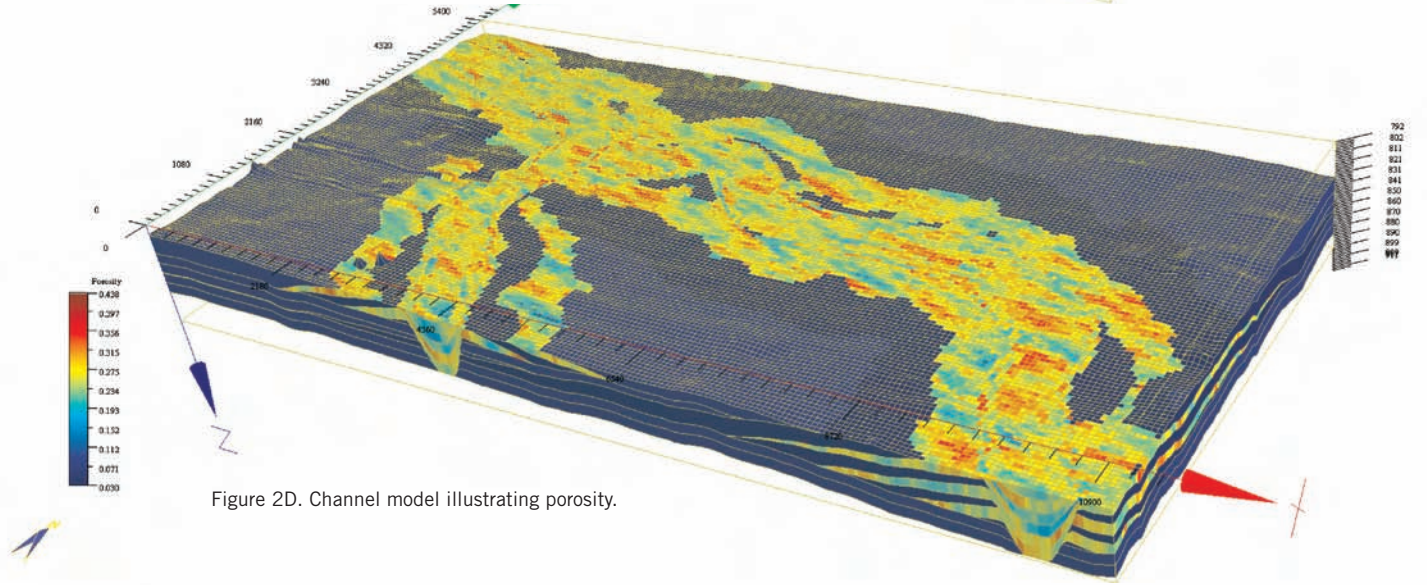


Figure 2D. Channel model illustrating porosity.

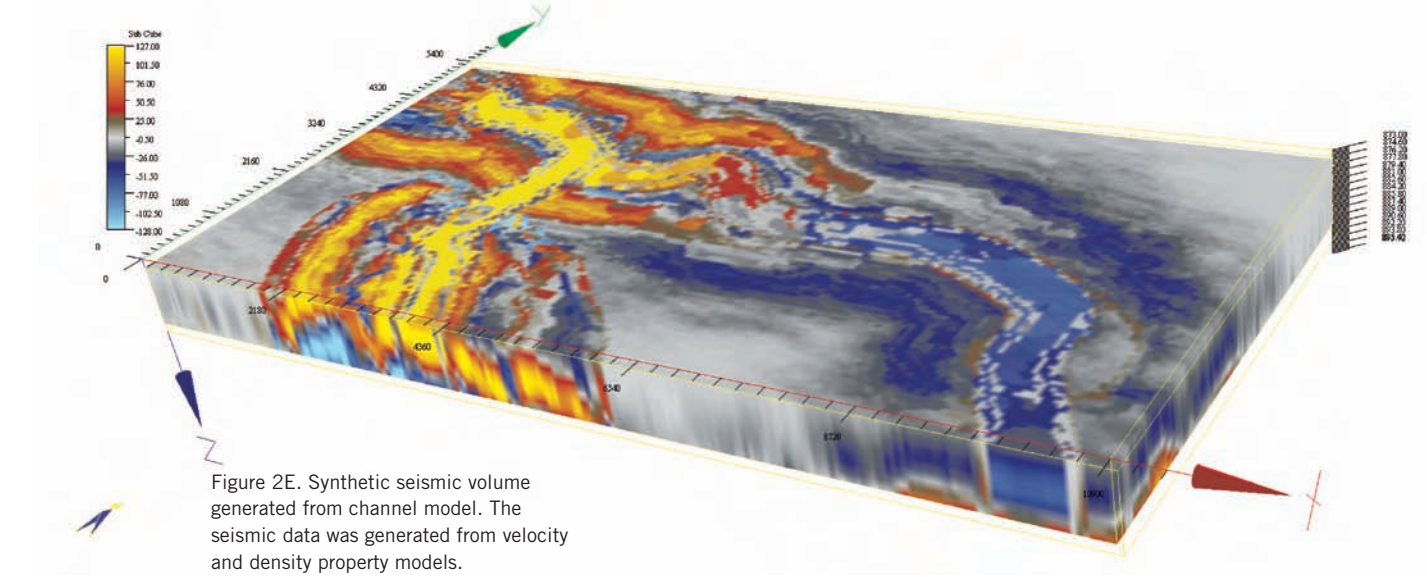
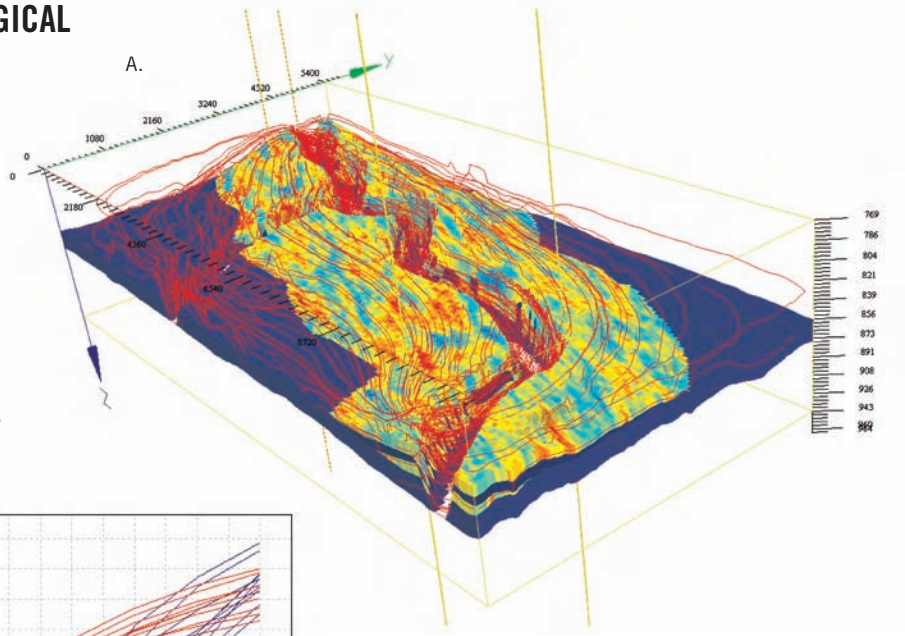


Figure 2E. Synthetic seismic volume generated from channel model. The seismic data was generated from velocity and density property models.

PREDICT RECOVERY WITH GEOLOGICAL SCENARIO ANALYSIS

- Evaluate dynamic properties in the model (including fluid distribution, sweep efficiency and recovery factors) with the built-in 3DSL reservoir simulator link.
- Calculate reserve volumes and production curves with a defined range of uncertainty.
- Evaluate the parameters that impact hydrocarbon recovery.
- Rank multiple geological scenarios for reservoir prediction and management.

A.



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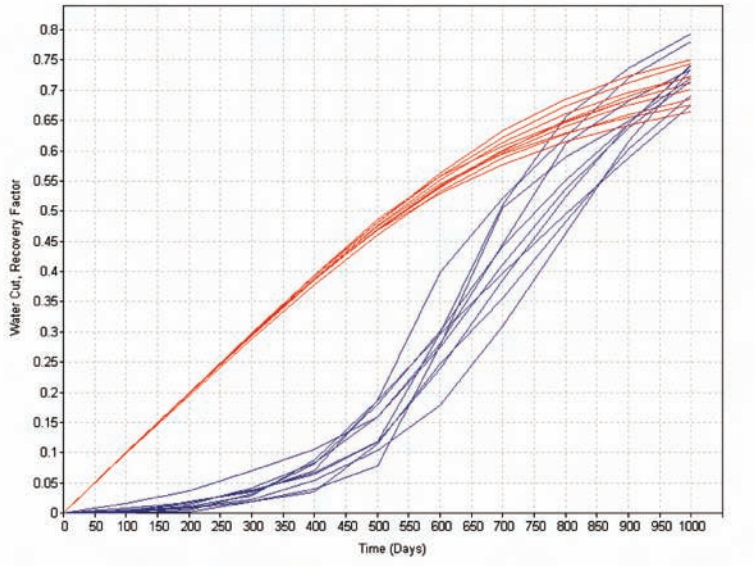

Figure 3. (A) Streamline simulation of channel model using 3DSL reservoir simulator link. (B) Production profiles of multiple geological scenarios.

Geomodeling™

www.geomodeling.com

SBEDStudio reservoir modeling software integrates well log, seismic, stratigraphic, lithofacies and petrophysical data to build geologically realistic models for predicting reservoir production profiles and managing reservoir risk.

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