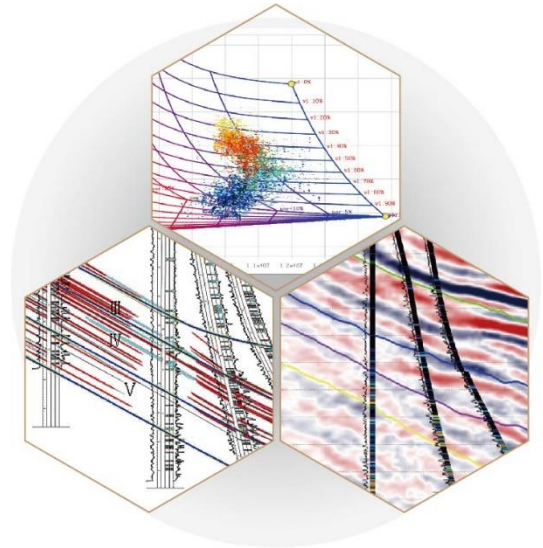# Reservoir Geophysics Forward Modeling Software

A tailored, professional, and user-friendly forward modeling and rock physics analysis toolkit for geophysicists and geologists.

ColchisFM ™

ColchisFM meet your needs for forward modeling of complex and unconventional reservoirs in the following aspects：

- Creation and modification of complex structural/geological models, with built-in common sedimentary patterns, making it easy to change the size and thickness of the model. Supporting custom geological patterns.
- Convenient creation and modification of thin interbedded and complex layered models.
- Filling parameters for various geological units is more convenient, and parameters such as lithology porosity and saturation can be filled in. The compaction trend can be considered, and parameters can be filled in with respect to vertical and horizontal variations.
- Anisotropy and fracture analysis can be conducted.
- The operation is more convenient, and the geological model, rock physics, and seismic forward simulation are linked in real time, making it easy to summarize the patterns of changes.
- One-click to complete forward and inverse modeling, easily and quickly completing related analyses.
- Research results are accumulative, sustainable, and reusable.

Geological Model

Synthetic Seismic Model

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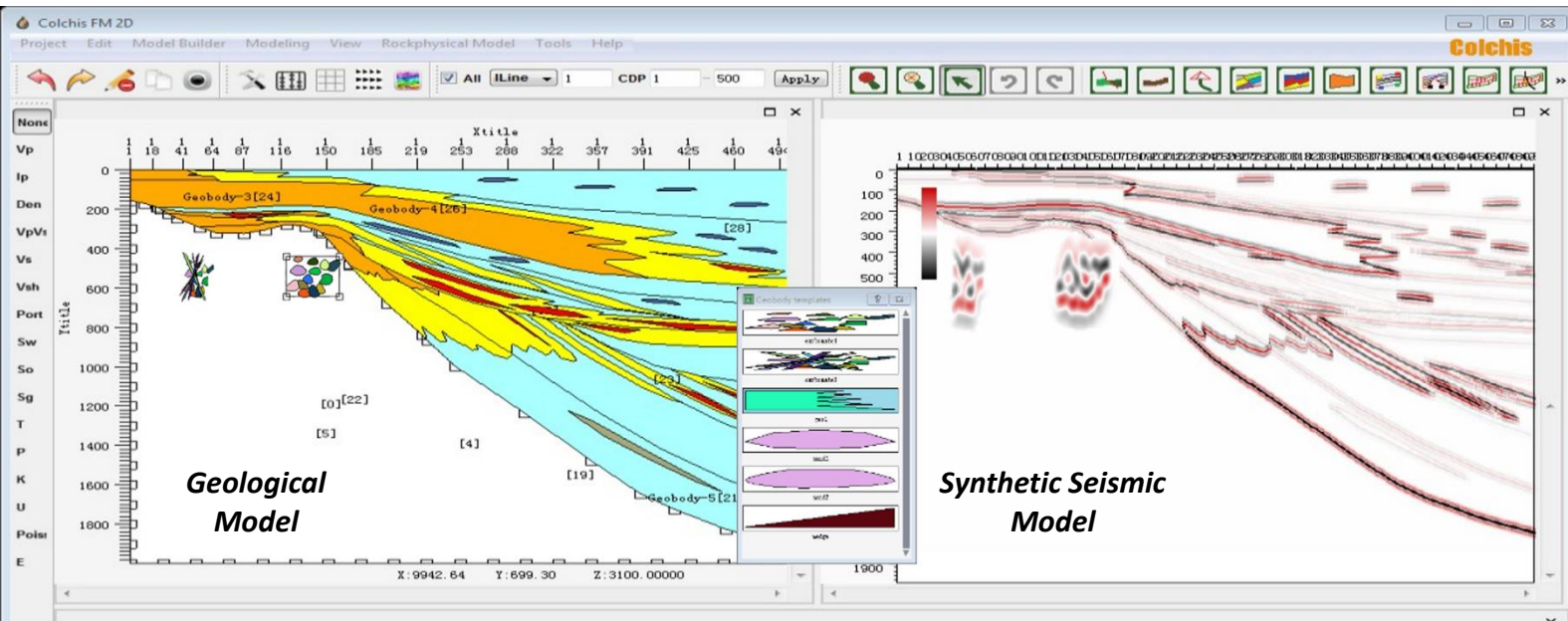
FEATURE 1: Interactive geological model building

- Automatic construction of complex forward modeling models, intelligent identification of stratigraphic layers, faults, and geological bodies in image and digital interpretation results.

- Creation and editing of normal/reverse faults, unconformities, overburden and erosion, allowing for easy creation and modification of model size and shape through dragging. It supports quantitative and batch creation/filling of geological bodies.

- It includes geological grids and sequence patterns, and the geological meaning of the model is clear.

- It has a built-in library of common patterns, supports custom geological body styles and arbitrary combination styles, and automatically handles oil, gas, and water interfaces. It can develop corresponding plugins for different oilfield basins.

- It can modify and add/delete existing models and export image files. The high-quality image can be directly used for reporting.

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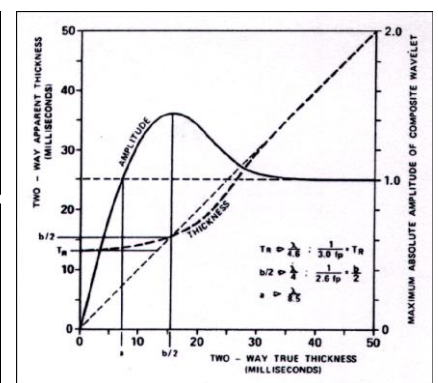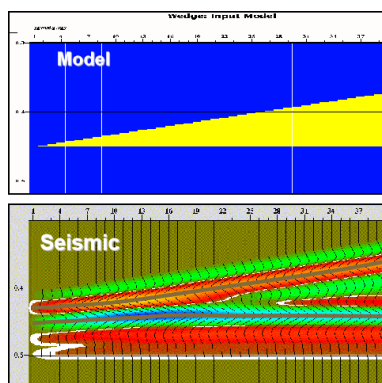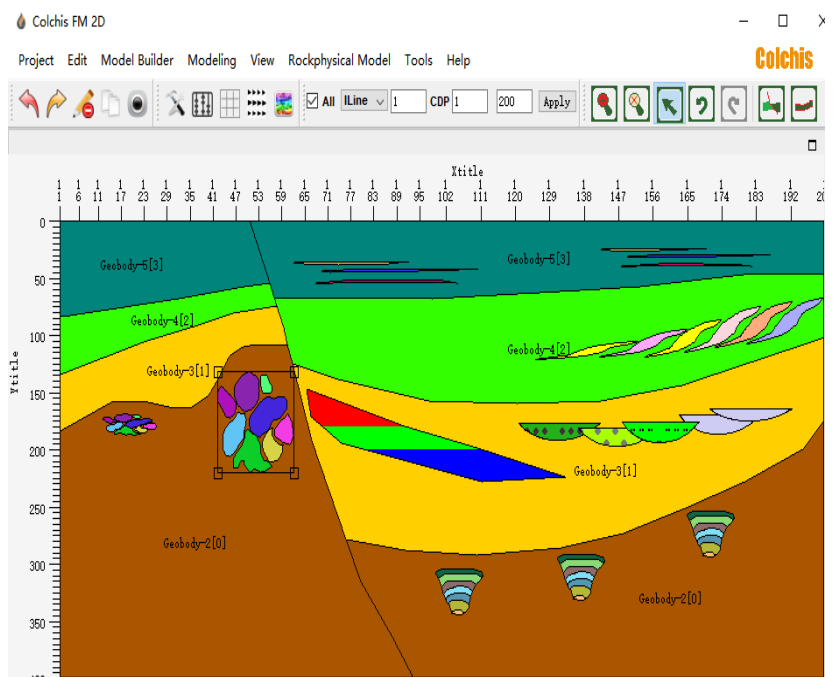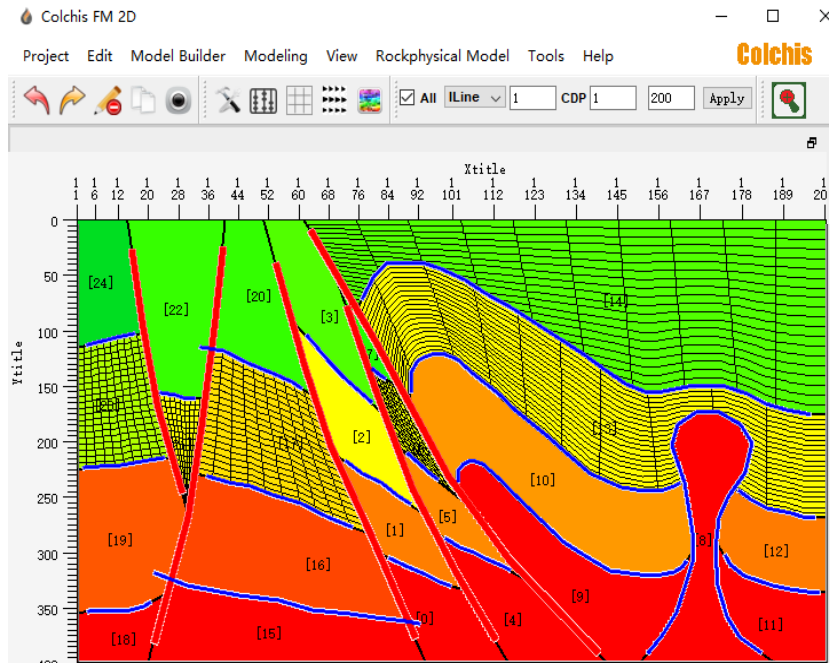
FEATURE 2:   Interactive rock physics forward modeling

- The interface is user-friendly, efficient, and flexible, enabling rapid and detailed completion of all work related to conventional and unconventional rock physics research. It is WYSIWYG and has multiple QC functions.

- Supports various models, such as Xu-White, Hudson, Difference Effective Medium, Self-consistent, and Xu-Payne.

- The rock physics forward modeling method, mineral matrix, porosity, clay content, aspect ratio, fluid parameters, and pressure can all be interactively modified.

- It has various interactive functions, which can monitor the matching degree of forward modeling with logging curves and crossplots in real-time and can perform batch processing of multi-well rock physics forward modeling.

- Powerful interaction functions help to supervise forward modeling results with well logs and cross-plots. Batch processing for multiple wells is also available.

- It supports various complex mineral and rock physics modeling and is suitable for fast modeling of conventional reservoir layering systems. It also has unique solutions for carbonate rocks and unconventional formations.

- Establishment and management of rock physical template library

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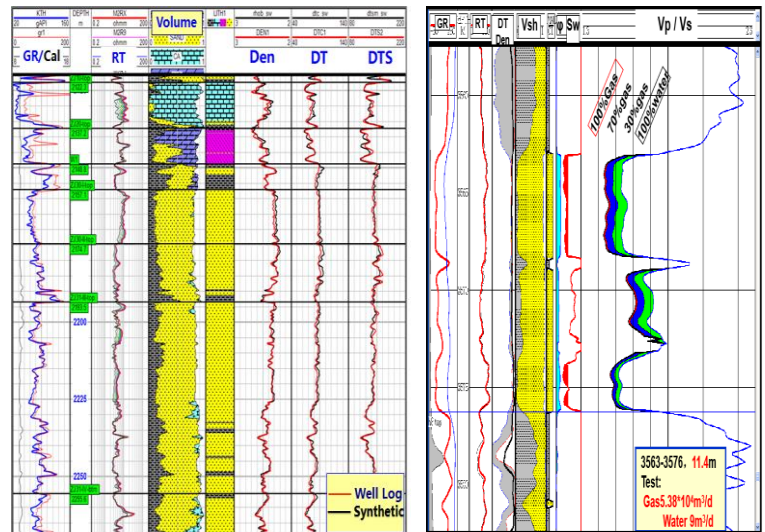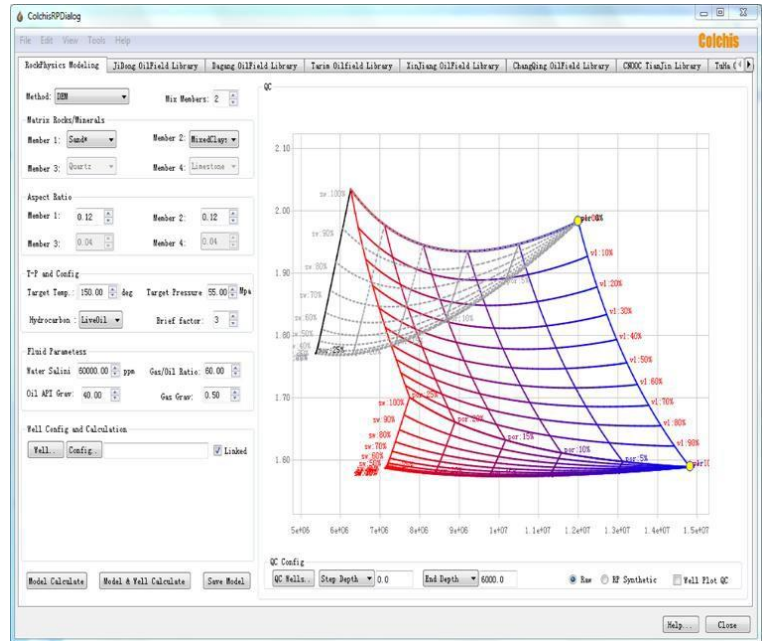
**FEATURE 3:** Precise calculation and assignment of geophysical parameters of reservoirs

- It contains fine geological grids and seismic grids and can perform various attribute interpolation/extrapolation following strict stratigraphic principles using multiple wells.

- It is possible to modify any property of arbitrary geological units or any property of each geological micro-layer.

- Built-in various rock and fluid standard measurement experimental results from international leading laboratories for calibration.

- It can assign values to single properties such as Vp/Ip/Is or assign values in real-time using rock physics based on given lithology, porosity, and saturation.

- Assigning anisotropic factors ε, δ, and γ.

- Assigning values based on stratigraphy and geological body properties, performing automatic assignment of multiple geological body properties, and copy geological body properties, etc.

- Attribute calculator is available for attribute calculation.

- It can automatically handle oil, gas, and water interfaces.

- Supports the setting of vertical and horizontal parameters for arbitrary bodies, such as compaction laws, geothermal gradients, and pressure gradients; and can establish attribute bodies by frequency division.
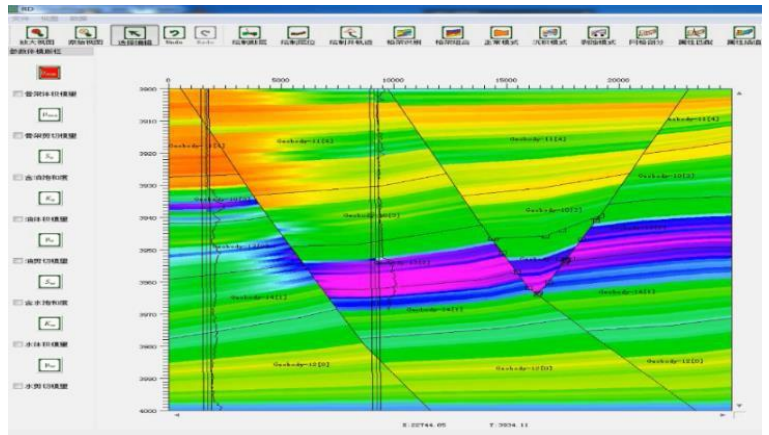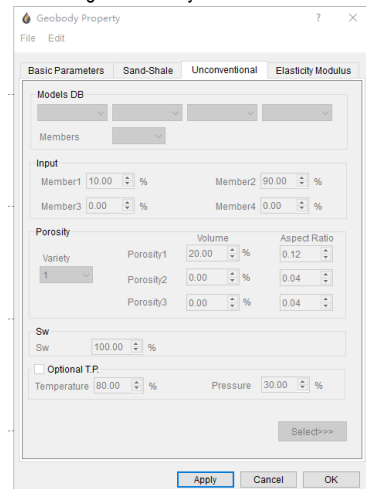

• Assign values by formation, body, or similar property.
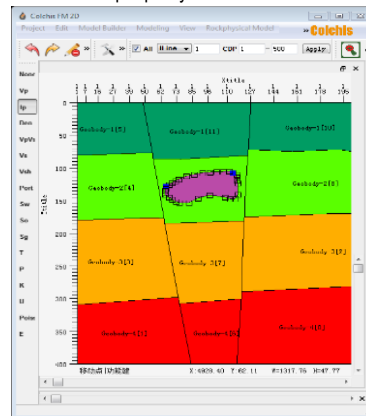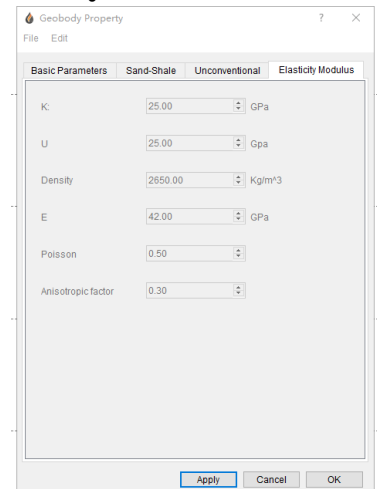

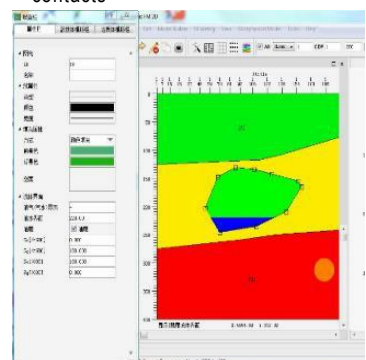• Assign elastic properties
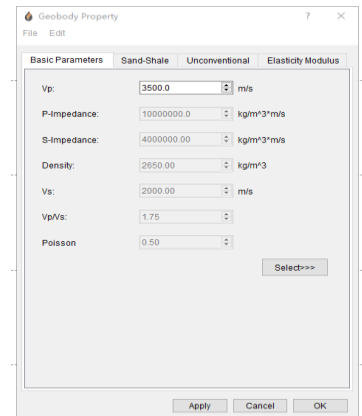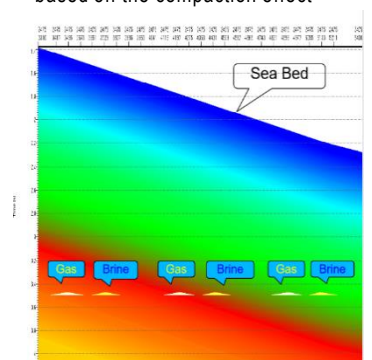

• Assign values by mineral volume model

• Assign elastic modulus

• Automatically assign values for fluid contacts

• Establish attributes by frequency based on the compaction effect

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FEATURE 4:

One-click inversion
Targeting four-dimensional seismic and complex oil and gas reservoir research
Real-time linkage between well logging and rock physics
Real-time linkage between rock physics and seismic forward modeling

- One click away from "inversion" and the result can be quickly compared with the model.

- Supports complete post-stack and pre-stack seismic forward modeling.

- The software allows for fluid replacement of geological bodies, enabling the study of changes in seismic responses under different oil, gas, and water conditions and observation of the 4D seismic effects.

- Supports forward modeling of different directional anisotropic factors to find differences in different directional anisotropy.

- To deeply understand the mutual relationships between geological formations and their impact on seismic reflections, to explore the value of seismic data and improve reservoir prediction accuracy.

- The geological model and rock physics model can be dynamically linked with the seismic forward model in real-time. Any modifications to the geological model, rock physics model, or parameter settings can be reflected in the changes to the forward modeling results in real-time.
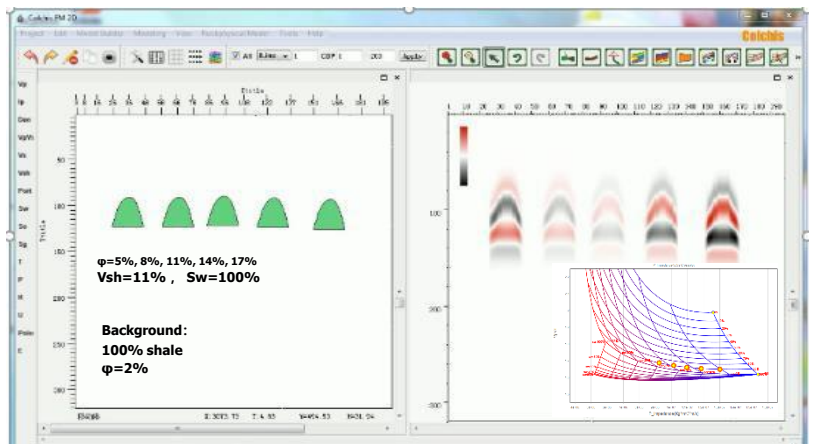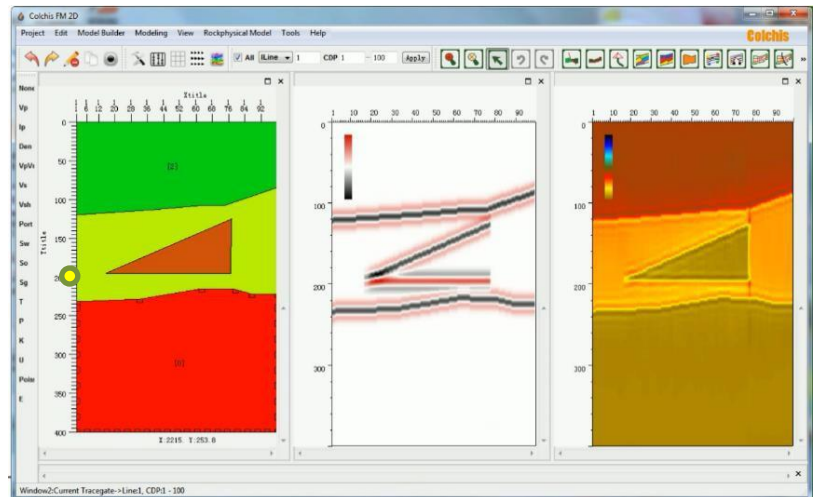
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