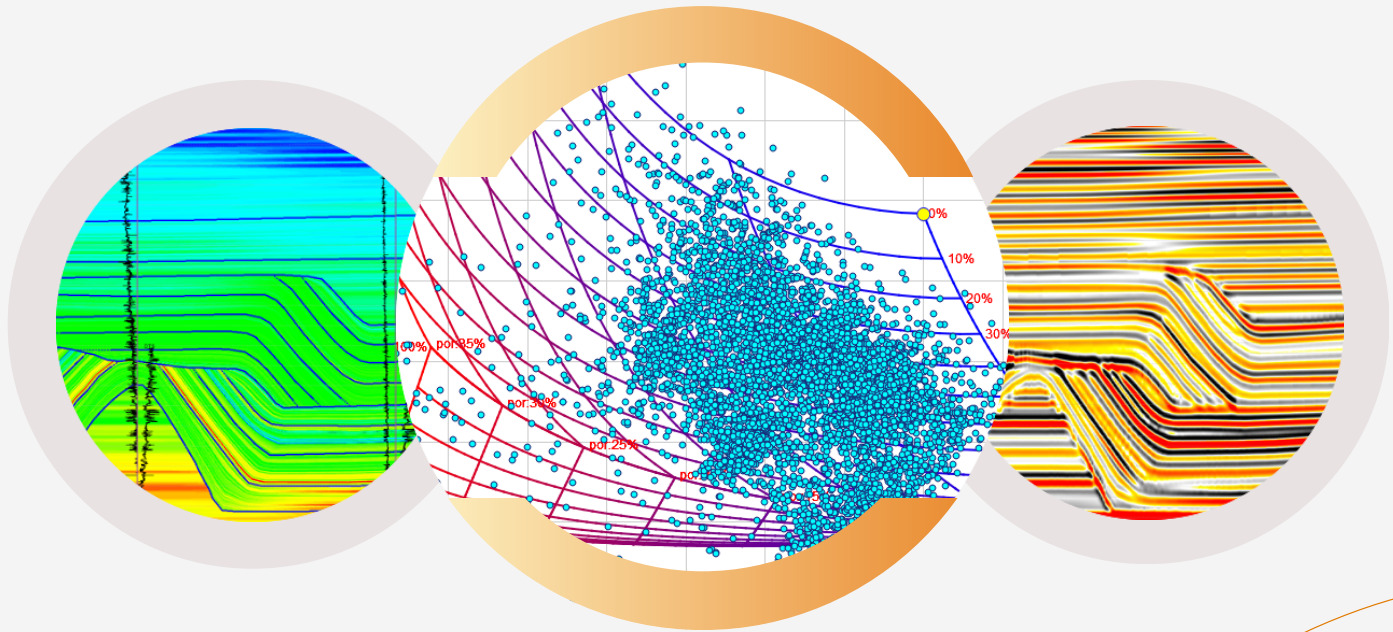


ColchisFM

**Reservoir Geophysics Integrated
Seismic Forward Modeling Software**



**An innovative way to connect reservoir
property analysis with seismic interpretation**

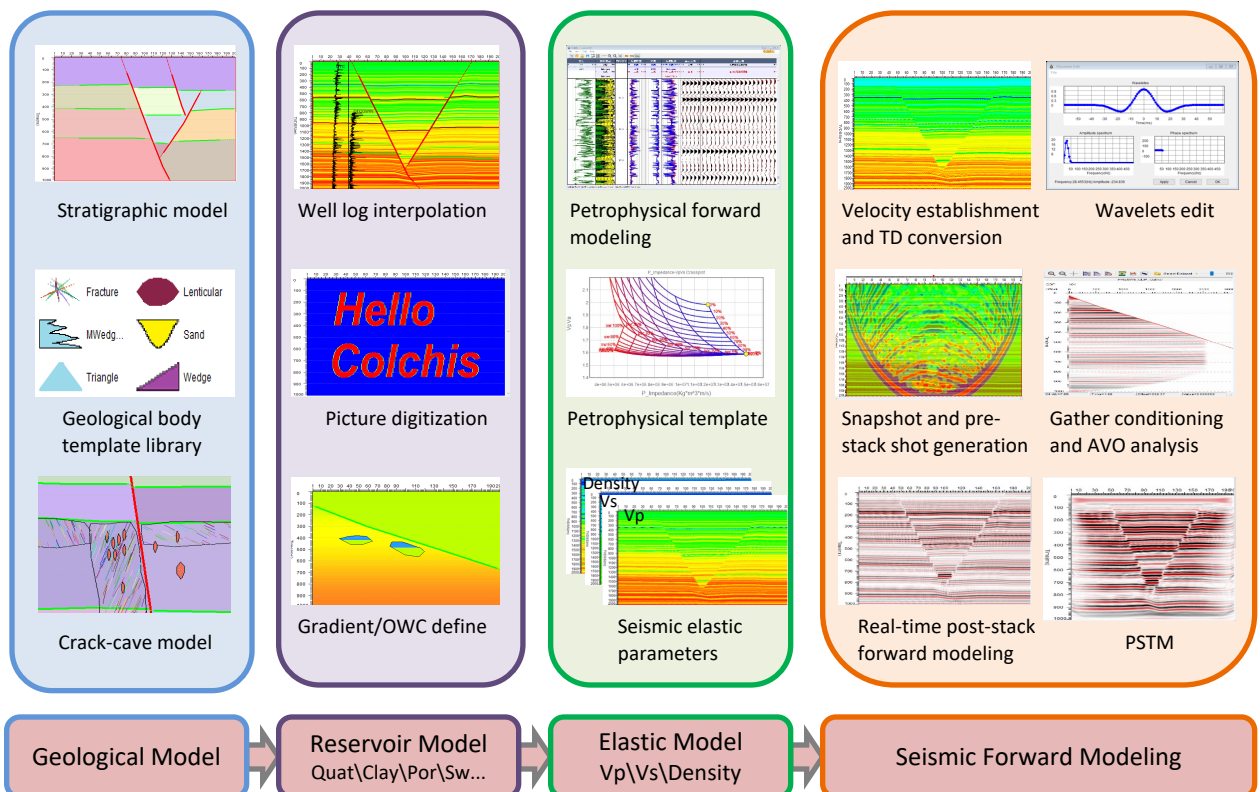
- Leveraging rock physics to minimize uncertainty in reservoir studies
- Enhancing precision in structural understanding and reservoir prediction

ColchisFM

A professional, user-friendly tool for geophysicists and geologists that integrates rock physics and seismic forward modeling

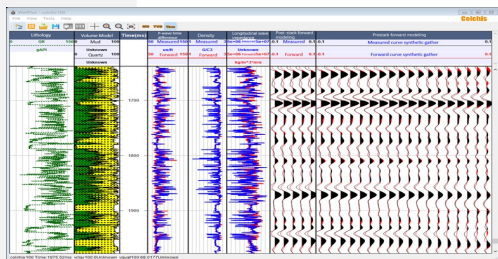
ColchisFM is an integrated reservoir geophysics forward modeling software developed by Colchis Petro Consulting. It bridges the gap between rock physics modeling and seismic forward modeling, offering a seamless workflow from reservoir geophysical parameters to seismic data. With built-in pre-stack wave equation modeling and pre-stack time migration capabilities, ColchisFM handles 1D and 2D post-stack and pre-stack forward modeling independently. It's widely applicable to studies like reservoir seismic characterization, time-lapse seismic analysis, velocity model building, and structural time-depth conversion. Designed for simplicity and efficiency, ColchisFM is highly automated and easy to use, making it an excellent tool for geologists, seismic interpreters, reservoir inversion experts, and even geophysics educators and trainers in academia and industry.

ColchisFM - Integrated Reservoir Geophysical Seismic Forward Modeling Software

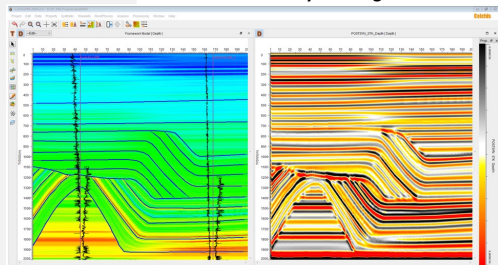




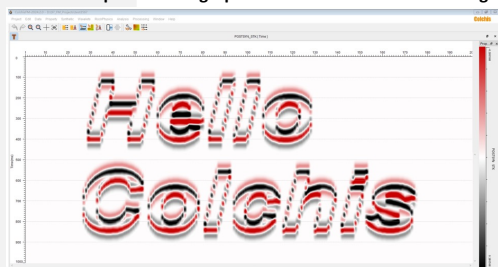
ColchisRP



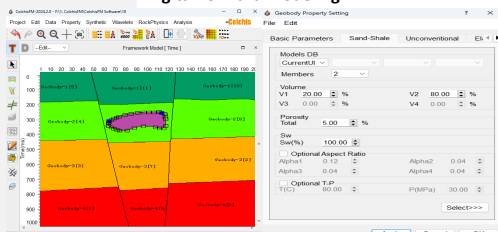
Comparison of rock physics forward modeling with actual measured curves and synthetic gathers



Seismic sequence stratigraphic model and forward modeling

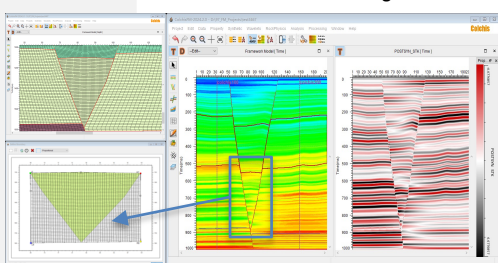


Digital forward modeling



Assign values by stratum, body, or similar attributes

Reservoir attribute assignment



Reservoir parameter gridding assignment

INTERACTIVE ROCK PHYSICS FORWARD MODELING (CochisRP)

- Built-in Xu-White, Differential Effective Medium Model (DEM), Self-Consistent Model, Xu-Payne, etc.
- Interactively modify forward modeling methods, skeleton points porosity, shale, aspect ratio, fluid parameters, temperature, pressure, etc.
- Rock physics modeling of complex minerals.
- Establishment and management of rock physics template library.
- Loading and management of rock physics research results.

INTERACTIVE GEOLOGICAL MODEL BUILDING

- Automatic establishment of the complex forward model, capable of processing normal/reverse faults, formation pinch-outs, formation overlaps, truncation, lenticular bodies, etc.
- Intelligent creation and editing, automatic processing of oil, gas and water interfaces, intelligent identification of layers, faults and geological bodies, and interactive editing.
- Includes geological grids and sequence models with clear geological significance.
- Built-in library of common geological body templates, with corresponding plugins available for different oilfield developments.
- Supports the establishment of weathering zone, fracture pore and carbonate rock geological models.

CALCULATION AND ASSIGNMENT OF DETAILED RESERVOIR GEOPHYSICAL PARAMETERS

- Supports gridded assignment of reservoir parameters and interpolation/extrapolation of various attributes.
- Built-in international top laboratory various rock and fluid standard measurement results.
- Supports assigning values by single attribute Vp/lp/l_s or assigning values by rock physics in real time based on given lithology, porosity and saturation.
- Supports assigning values according to strata and geological body attributes with a flexible attribute calculator function.
- Supports time-varying and space-varying parameter settings for arbitrary bodies.

REAL-TIME LINKAGE BETWEEN ROCK PHYSICS, WELL LOGGING, GEOLOGICAL MODEL AND SEISMIC FORWARD MODELING

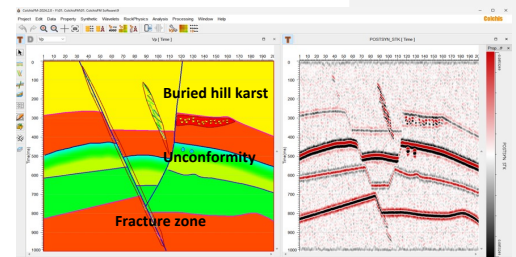
- The wavelet phase and amplitude spectrum can be edited, allowing for real-time interaction with seismic forward modeling.
- Supports interpolation of logging curves to generate attributes.
- Supports fracture forward modeling and unconformity forward modeling.
- Support adding random noise to simulate actual profile effect.
- Real-time fluid replacement possible.

MULTIPLE WAYS TO BUILD VELOCITY FIELD AND TIME-DEPTH CONVERSION

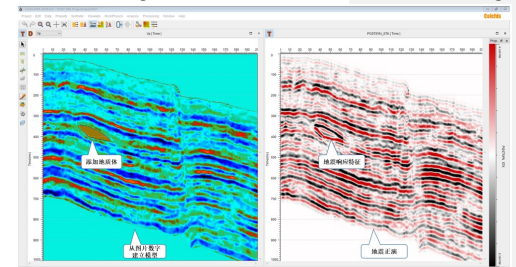
- Supports time and depth domain model editing, with built-in constant velocity field, which can maintain the structural form and switch between time and depth domains.
- Supports import of external velocity fields such as North China Velocity.
- Supports fine velocity field, which can examine the impact of shallow gas, abnormal geological bodies, faults, etc. on time-depth conversion.
- Automatically perform high-precision time-depth conversion on the grid internally.

ONE-CLICK PRE-STACK FORWARD MODELING AND PRE-STACK TIME MIGRATION

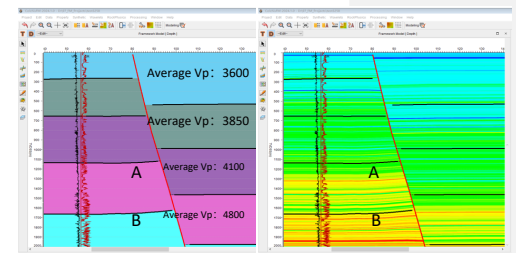
- Supports time and depth domain model editing, with built-in constant velocity field, which can maintain the structural form and switch between time and depth domains.
- Supports forward modeling of one-dimensional AVO gathers.
- Supports forward modeling of two-dimensional acoustic wave equation and full elastic wave equation.
- Supports automatic gather extraction processing.
- Supports automatic pre-stack time migration processing and stacking.
- Supports multi-threading and GPU parallelism.



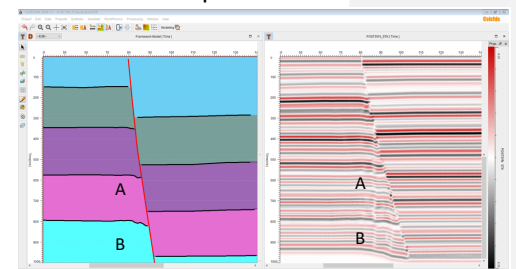
Geological model Post-stack forward modeling



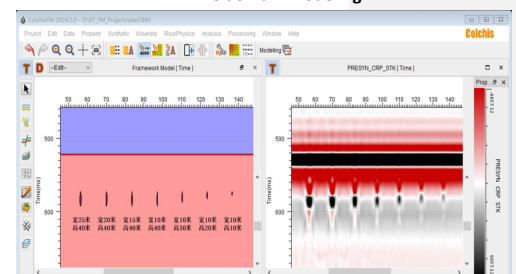
Velocity Model Established Using Image Digitization (Left) and Seismic Forward Modeling (Right)



Depth domain model



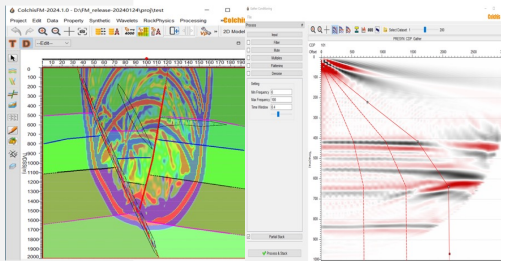
Time domain modeling



Pre-stack forward modeling of carbonate cave reservoirs based on fine grid (5m)

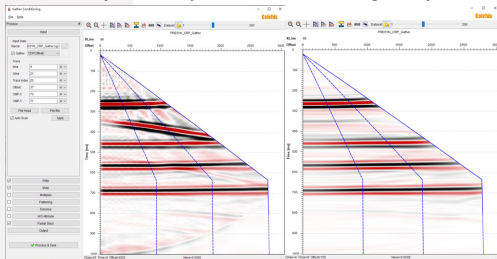
Geological model	Grid size	Number of grids	CPU Calculation time	GPU Calculation time	Speedup
Horizontal 5000m	5m	40w (1000*400)	182s	11s	About 17 times
Vertical 2000m	1m	1000w (5000*2000)	6157s	311s	About 17 times
Recording time: 1s					
Time steps: 0.3ms					

CPU and GPU time comparison(Wave equation forward modeling)

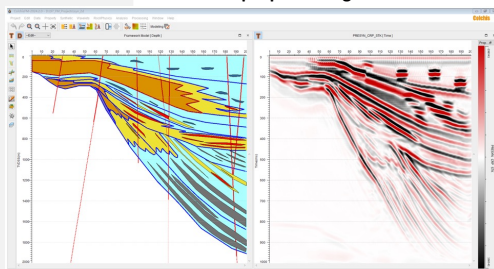


Wave equation snapshot

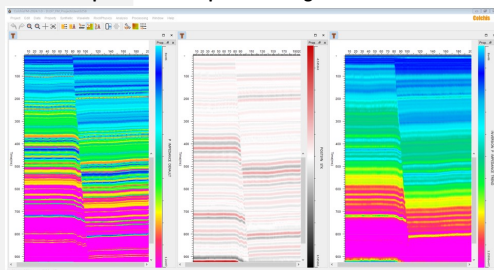
seismic gather processing



Demultiple processing

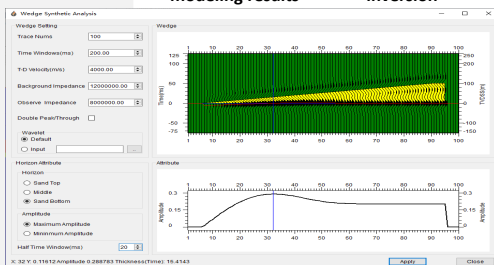


Complex model vs. pre-stack migration stack seismic

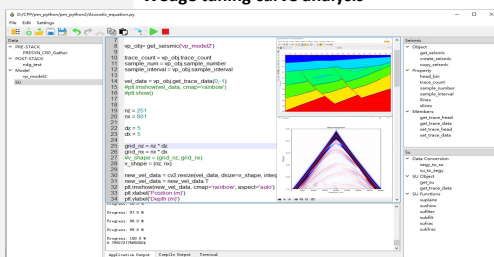


Model

 Seismic forward
modeling results

 Post-stack seismic
inversion


Wedge tuning curve analysis


 Python algorithm development module main
interface and pre-stack forward effect diagram

COMPREHENSIVE SEISMIC GATHER PROCESSING

- Support SEGY external format gather processing.
- Mute gathers, filtering, full stacking, partial stacking.
- Gather random noise and coherent noise suppression.
- Featured gather flattening processing.
- Improve resolution processing.

ONE-CLICK INVERSION AND AVO ATTRIBUTE ANALYSIS

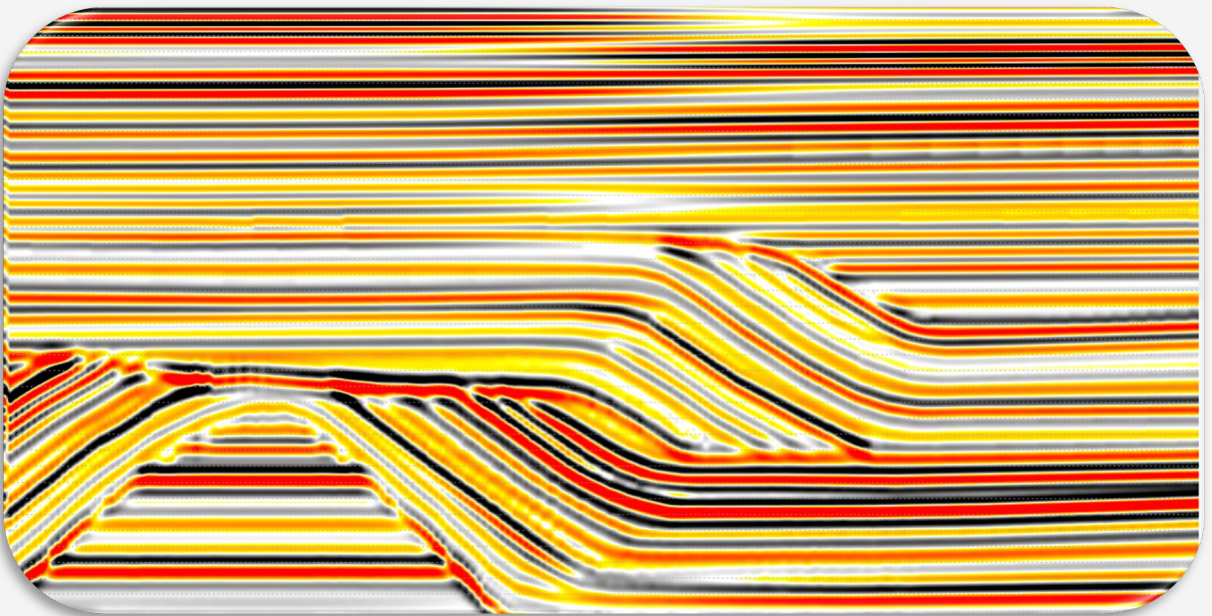
- Sparse pulse inversion comparable to commercial software.
- Filtering and frequency merging are possible.
- AVO attribute analysis (P, G...).
- Wedge tuning curve analysis.
- Seismic multi-attribute analysis.
- Reflection coefficient analysis.

SUPPORT PYTHON INTERFACE AND ALGORITHM EXPANSION

- Built-in Python user's programming environment.
- Supports Python algorithms and library imports
- Integrates common CWP/SU common algorithms, with rich processing functions.
- Built-in flexible data access interface, convenient data call.

Colchis Petro Consulting

Colchis PetroConsulting Ltd. is an international solution provider to the oil and gas industry. Working together with its global technology partners, Colchis offers a unique "From Rock To Reservoir" integrated solution that covers detailed reservoir study combining nano space Digital Rock Analysis with petrophysics and geology/geophysics studies for more efficient E&P. With a core expert team of more than 20 years' industry experience, Colchis provides best-in-class consultancy to help clients resolving complex multidisciplinary issues.



An example of seismic reflection characteristic study based on sequence stratigraphy, created by ColchisFM

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