aspentech

Brochure

Aspen Geolog®

The Industry Standard in Advanced Petrophysical Innovation

Superior Functionality, Robust Data Integration and Modular Design

Aspen Geolog has long been considered the industry standard for advanced petrophysical analysis and formation evaluation. In operation at 90% of the top-producing oil companies around the world, Aspen Geolog is unmatched in terms of its best-in-class petrophysical and geological analysis tools, well data management, superior graphics and robust data integration. Aspen Geolog combines technological superiority with a modern, user-friendly interface that is consistent across multiple platforms.

The easy scalability of Aspen Geolog means that it can be used for any number of applications, from log drafting to high-end petrophysics. Its modular design provides a flexible software environment that can be scaled from a single user on a laptop to a team collaborating over the network, customized to specific user requirements.

Powerful Capabilities in an Easy-to-Use Graphic Environment

The ability to effectively convey the results of an analysis is an essential component of the exploration and production life cycle. Aspen Geolog's central graphics module and user-friendly interface offer unrivalled ease of use and a short learning curve for new users. The launch platform allows the display of composite, high-quality well data presentations, and provides comprehensive data analysis and graphic editing mechanisms for various types of borehole information.

Powerful crossplot functionality, including interactive 3D crossplots, provides input for petrophysical calculations. Any combination of Aspen Geolog's graphic displays can be presented within a single workspace. Users can create, save and restore custom workspaces to meet their individual requirements, enabling them to increase the speed and efficiency of their processing and interpretation.

"Geolog minimizes the 'black box' nature of other petrophysical software by enabling the user to view and modify the modules used to compute petrophysical outputs. This allows us to run Geolog in complex wells where routine analysis is no longer routine."

—Senior Petrophysicist, Super-Major

The Aspen Geolog Project data management module provides tools for the interrogation of the powerful Aspen Epos® well database, and includes many tools for field-wide QC work. These map-based tools help maximize the returns from a study by managing pertinent information effectively and easily.

A complete audit trail enables users to query the history of any individual log.

Quick-look field-wide property mapping created in Geolog Project.

Better Reservoir Characterization through Shared Knowledge

The Aspen Epos interoperability integration framework enables our applications to access well data from a single source, creating new synergies between them. Through its common data repositories, Epos allows close collaboration between petrophysicists performing reservoir characterization and geologists working in interpretation and earth modeling.

Increased Openness and Connectivity

AspenTech is fully committed to supporting the Open Group's industry-wide OSDU initiative. Well Log data can be retrieved directly from OSDU data platform and loaded in an Aspen Geolog Project using the Aspentech Subsurface connector. Wellbore data and associated PDF files can be sent from Aspen Geolog back to OSDU.

## Direct Access to Third-Party Databases Saves Time and Enhances Productivity.

The Aspen Epos data services offer interoperability and data exchange between Geolog and third-party databases and applications such as Petrel* (direct two-way connectivity) and OpenWorks®, without the need for time-consuming data reformatting.

Designed to offer a collaborative environment for multi-disciplinary groups to share raw data, interpretations, and models, and easy scalability from an individual user to a team collaborating over a network.

Aspen Epos offers high levels of data access control and security, simplifying data management and interoperability. It is possible to assign specific data access permissions to different teams or individuals, thus providing IT Managers and Project Administrators with maximum control and flexibility.
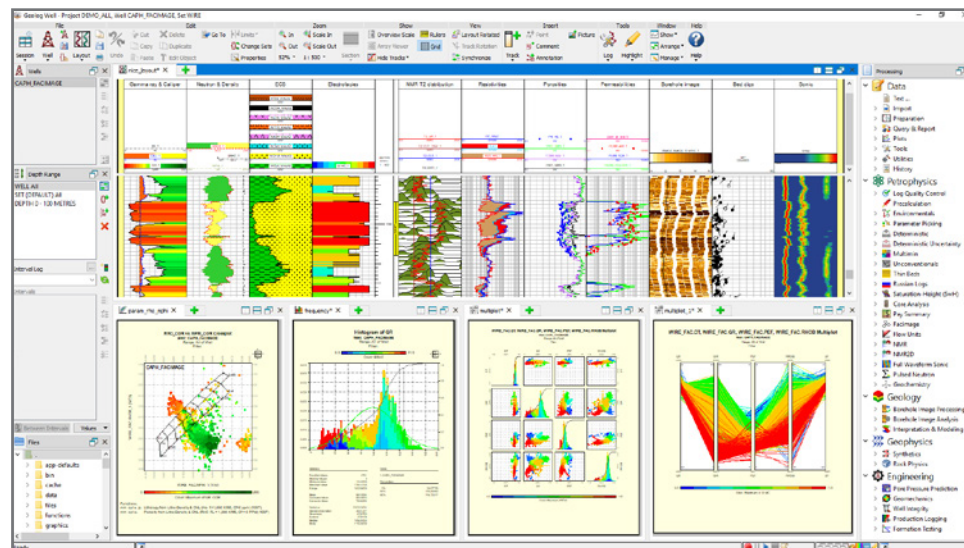
Aspen Geolog workspace showing log display, crossplot, frequency plot and multi-plots, with full inter-process communication between views.
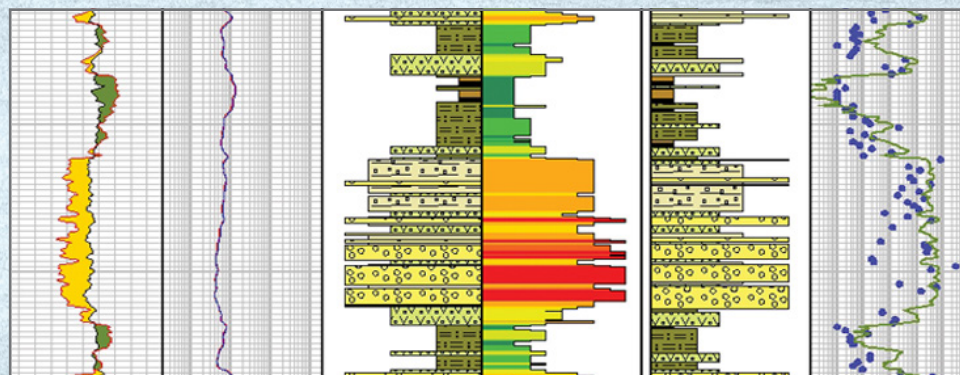
Aspen Geolog Facimage

Invaluable to both petrophysicists and geologists, Facimage is an advanced, field-proven, electrofacies analysis and log prediction tool kit. Consisting of a suite of routines for electrofacies analysis and core data modeling, Facimage makes Total's Multi-Resolution Graph-based Clustering (MRGC) algorithm commercially available.

Comprehensive Deterministic and Probabilistic Petrophysical Analysis Tools

Aspen Geolog petrophysical packages provide an environment for effective geological and petrophysical multi-well, multi-zone analysis.

Determin, a comprehensive and rich suite of individual or combined modules, allows analysts to apply all the major petrophysical techniques in the traditional sequential analysis methodology up to net pay and averages reporting. It also includes an extensive set of vendors' specific environmental corrections.

The Monte Carlo mode allows users to set uncertainty ranges on any given inputs of the analysis and provides depth-by-depth output distributions of petrophysical properties, for a better assessment of their uncertainties.

Loglan, Aspen Geolog's powerful programming language, enables log analysts to customize modules to meet their needs or incorporate local or proprietary algorithms. An option is available for work in interactive mode, enabling automatic updates of all relevant calculations when values are changed on screen. Loglan also supports direct access to Matlab™ code and Python™ scripting, for the processing of data within Aspen Geolog.
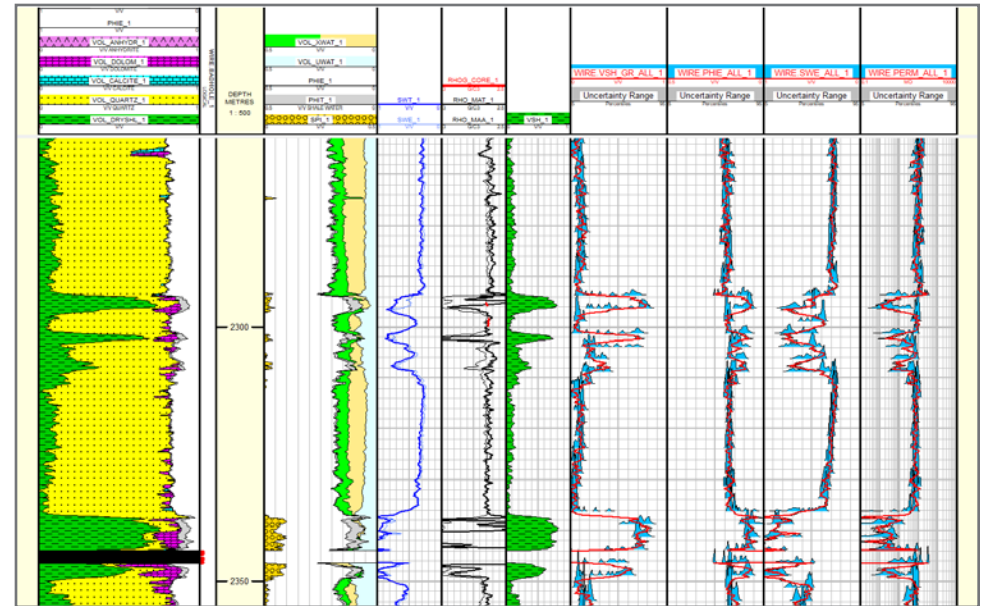

Determin with uncertainty assessment: Distributions of petrophysical curves output on a frame-by-frame basis show where uncertainty is greatest.

The Determin shale unconventionals module contains a number of routines for the calculation of TOC/kerogen volume from both Passey and Schmoker methods, the calculation of oil volumes and free & absorbed gas volumes, and a brittleness index for target identification and hydraulic fracture planning.

Aspen Geolog Image Log Processing & Interpretation

With the ability to handle a wide range of acoustic and electrical imaging tools, the image log processing and interpretation module* provides a vendor-independent solution for the processing and interpretation of borehole image logs. Interactive views (dip azimuth walkout, cumulative dip, SCAT, stereonets) help the geologist interpret structural data.

*Incorporates technology developed by Total*
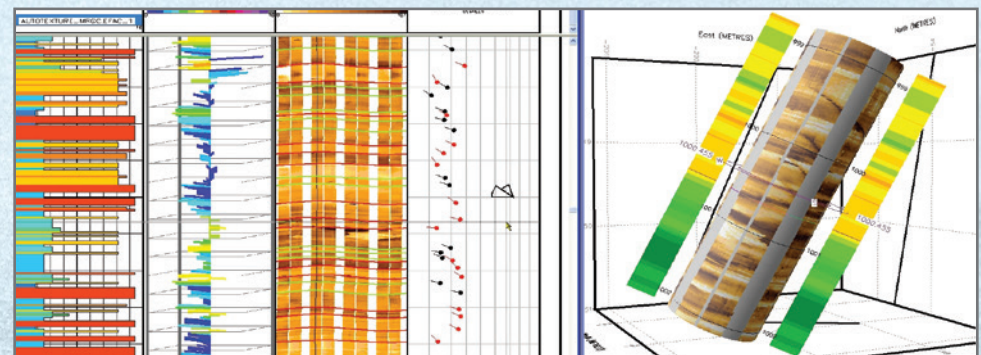
A **reservoir flow unit characterization** workflow allows petrophysicists and engineers to estimate reservoir flow properties from log data, to help estimate their production capacity.

The **Determin Uncertainty** add-on tool, a full Monte Carlo deterministic log analysis module, allows the uncertainty associated with a petrophysical analysis to be accurately quantified. The consideration of parameter inter-dependencies ensures that uncertainties are correctly carried throughout the analysis.

The full distribution of the petrophysical curves can be transferred from Geolog to the Aspen SKUA® system for integration into a reservoir uncertainty analysis using the **Reservoir Uncertainty** (Jacta®) module.

Multimin is an optimizing tool for statistically determining mineral and fluid characteristics and volumes from petrophysical data, such as logs, cores, XRD and petrographic data. Multi-well simultaneous analysis capabilities result in substantial gains in productivity and quality, even in the most challenging analytical environments.
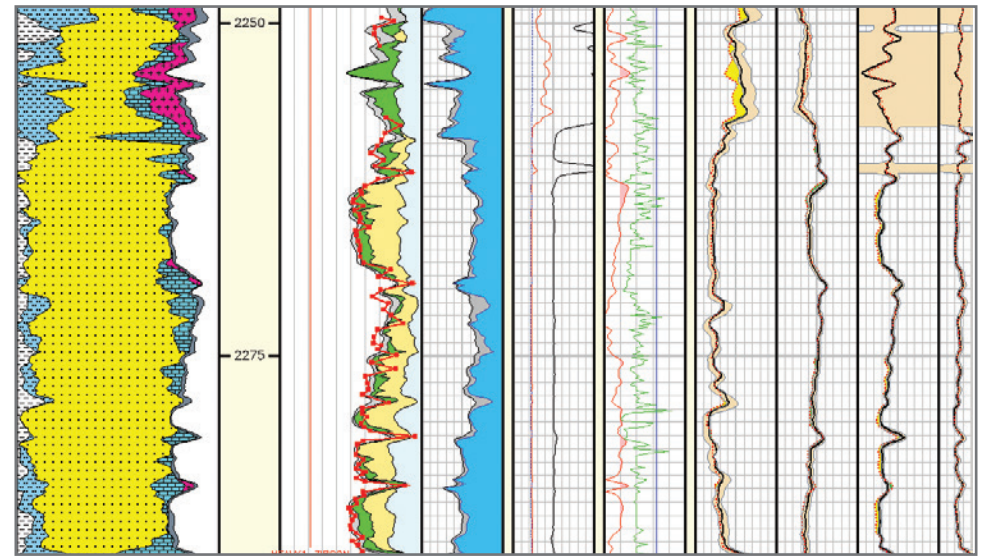
The reliability of Multimin outputs can be assessed using the quality curve and uncertainty distributions.

An embedded Monte Carlo Uncertainty Analysis tool allows the user to assess overall uncertainty on a Multimin petrophysical analysis, and identify those variables with the greatest impact.

Integrated workflows allow **Formation Test** data to be rapidly loaded and displayed, and its quality automatically assessed according to user-defined criteria. Uncertainty on pressure gradients and fluid contacts can be assessed using Monte Carlo analysis.
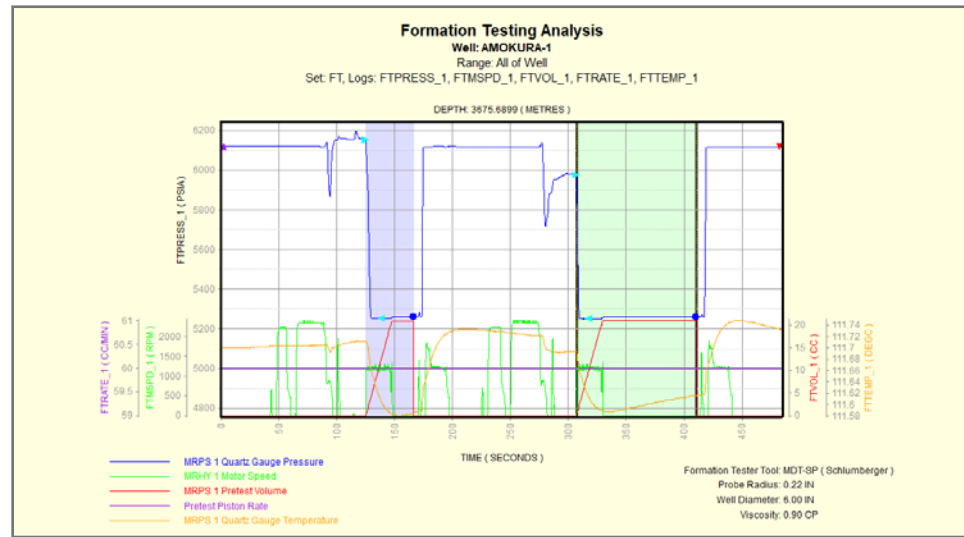
New methods for QC and interpretation of formation pressure test data enable users to rapidly load, organize and analyze FT data.

Synseis, Aspen Geolog's module for borehole geophysics, enables comprehensive data processing in both vertical and deviated wells. Working with other Aspen Geolog modules, Synseis is a flexible toolkit for depth-to-time conversions, synthetic seismogram generation, rock physics modeling, Gassmann substitution and AVO analysis.

3D petrophysics and **log modeling** modules provide the functionalities required for formation evaluation in high angle/horizontal wells.

"Geolog is more stable and versatile than any petrophysical software I've ever used. Throughout my career, I've used it to improve efficiency and quality, reduce costs and increase output in formation evaluations."

—Senior Petrophysicist, Super-Major

Core Analysis & Saturation Height Modeling

This module provides a comprehensive suite of algorithms for interpreting and integrating routine and special core analysis data, allowing effective correlation with conventional and NMR log data. It features a highly interactive graphical workflow for rapidly loading, correcting and analyzing special core analysis data for saturation height modeling, enabling seamless integration of this data with other petrophysical measurements, for more accurate reservoir characterization.
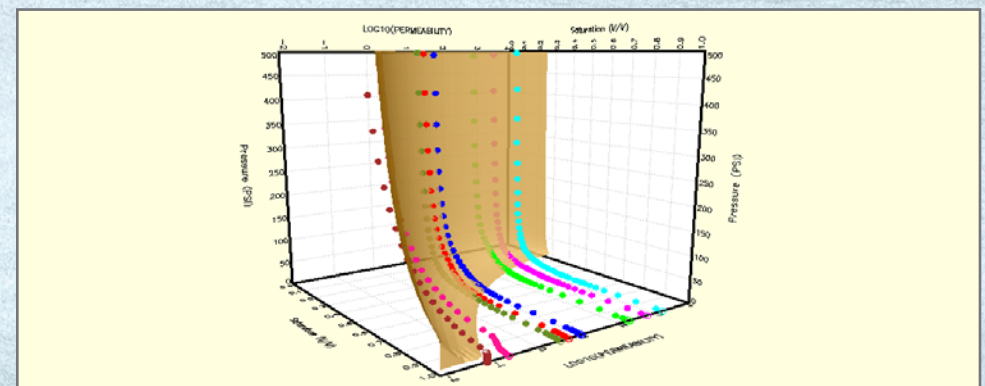
# Engineering Modules Expand Aspen Geolog's Reach into Additional Phases of the Production Cycle

Aspen Geolog includes technologies aimed at engineers working on wells that are already deep into the production stage, including:

- **Well schematics:** Users can visualize wellbore mechanicals in conjunction with all other data gathered from the wellbore, providing critical input to cased hole logging applications.

- **Timeline and well progress plot view:** Users can visualize any well event.

- **Well integrity:** An independent means of assessing the condition of both casing and cement in a wellbore, ensuring safe well operations and ultimate abandonment of a well.

- **Production logging:** Assists with post-production formation evaluation.

Together with the system's proven technologies for petrophysical and geological analysis, these make Aspen Geolog an essential tool for petrophysicists, geologists and engineers alike.
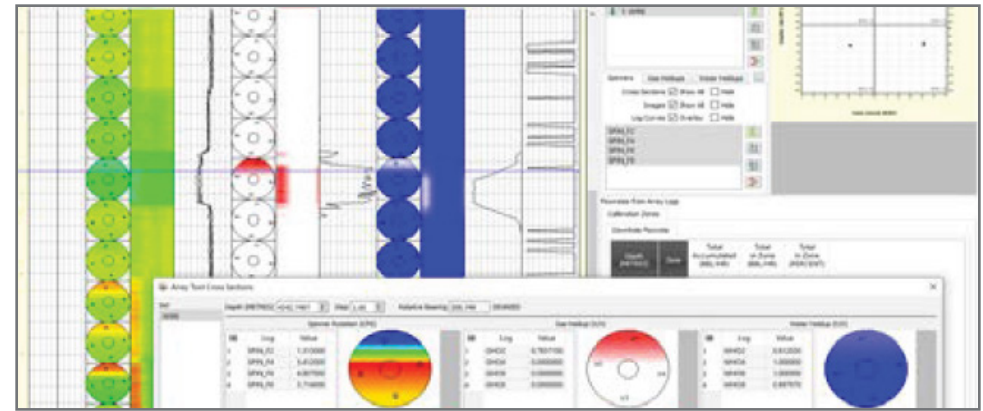

Production logging allows users to process and interpret spinner and fluid tools to identify and quantify volumes of fluid produced in their wells.
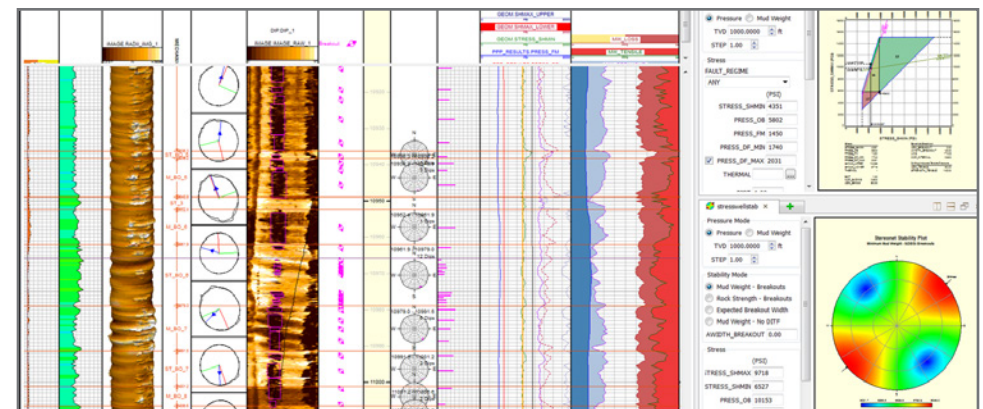
Geomechanics tools and interactive displays enable a detailed assessment of mechanical conditions around the wellbore.

NMR

The latest version of the NMR vendor-independent add-on module enables advanced interpretation for characterizing rock formations. With multiple inversion options and new machine learning capabilities, users can go from raw to interpreted data faster and with less technical expertise.
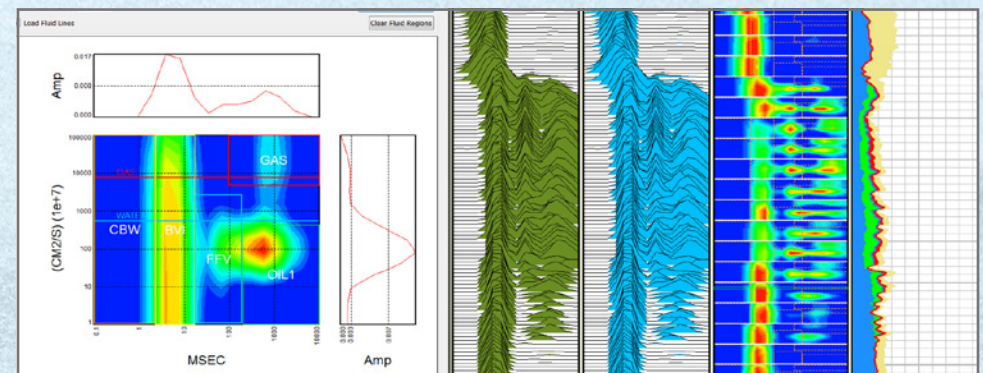
Geomechanics Minimizes Drilling Costs while Ensuring Safety

Aspen Geolog offers a geomechanics module comprising a comprehensive series of calculations and interactive tools for assessing mechanical conditions around the wellbore. These result in a better understanding of the reservoir, leading to improved recovery and reduced exploitation costs. The geomechanics package includes:

- Pore pressure prediction
- Dynamic and static elastic properties
- Unconfined compressive strength
- In-situ stress estimation (multiple methods)
- Wellbore stability plots: Mud window, stress plot, stereonet plot

Pore Pressure Prediction from Logs

A comprehensive suite of tools is available for the calculation of log derived normal, overburden, pore and fracture pressures. The pore pressure prediction module includes dedicated routines for initial data preparation and shale compaction trend analysis. Layouts displaying results at each stage are automatically generated, aiding QC throughout the workflow.
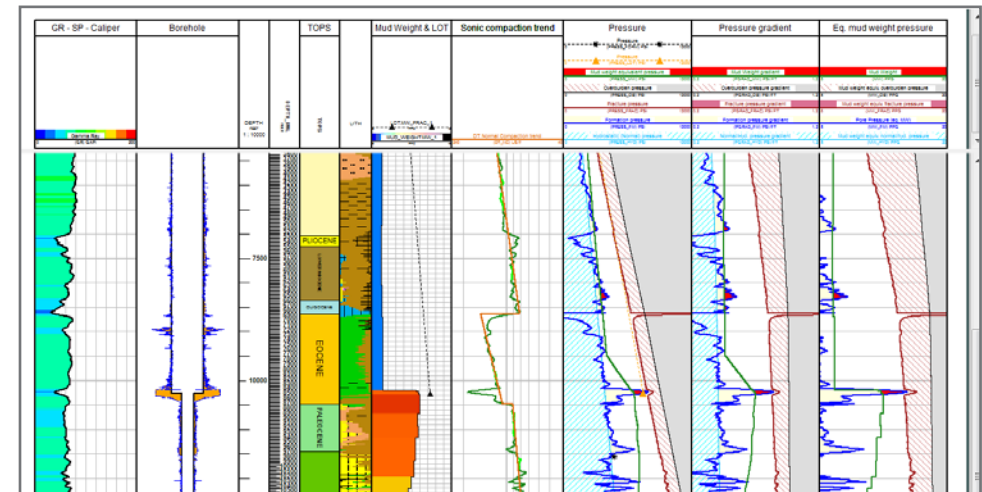
Pore pressure prediction outputs include results in pressure gradient and equivalent mud weight.

Full Waveform Sonic

The full wavefrom sonic processing module is used to process and interpret array sonic logs, from raw data to results, including anisotropy processing. This enables maximum stress direction determination for the calculation of geomechanical properties.
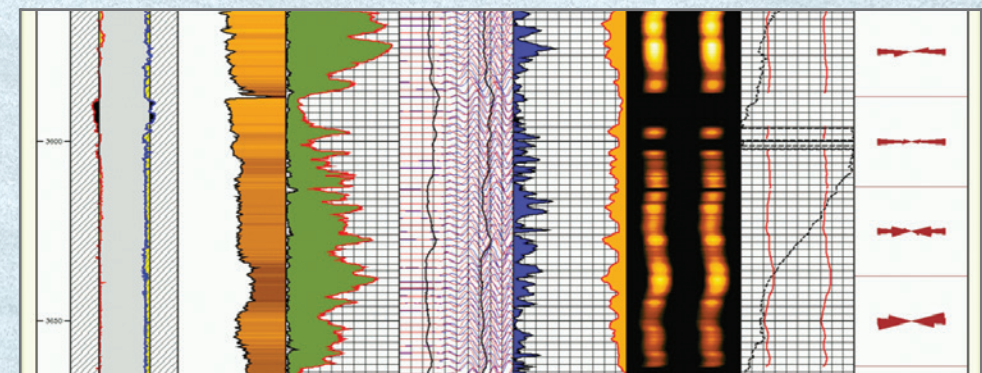
# Independent Geosteering for Real-Time Well Modeling

Aspen Geolog works in collaboration with the Aspen Epos-based product suite, providing a powerful log-scale interpretation capability that integrates petrophysical, geological, geophysical and drilling workflows. This integrated application group provides a well planning environment in which complex well paths may be designed and engineered for optimal placement in the reservoir based on a combination of seismic, geological or reservoir data. Aspen Geolog Geosteer gives users the independent ability to model, monitor and interactively modify a well in real time as it is being drilled.
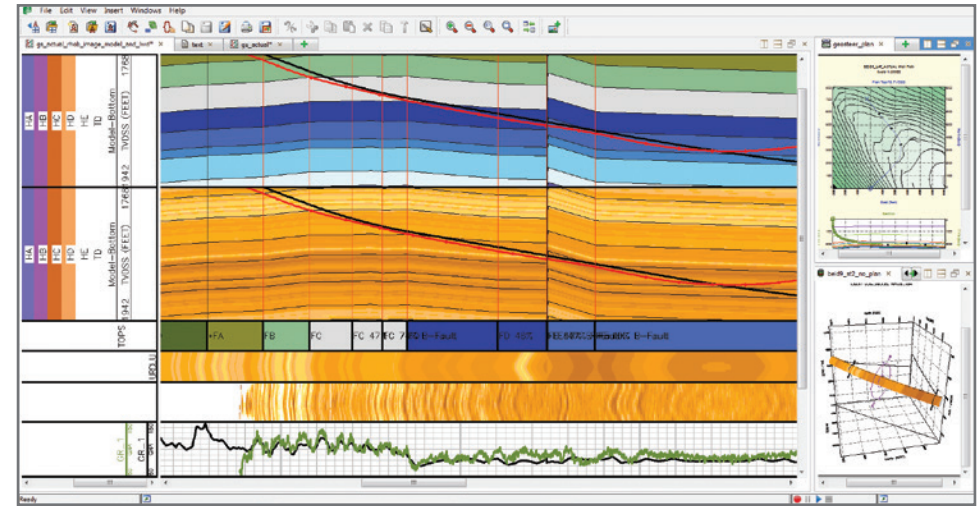
Aspen Geolog Geosteer allows an independent comparison of real-time log responses with a pre-drilling model, enabling monitoring of well progress and well plan modification if required.

Aspen Geolog Correlator

The Aspen Geolog Correlator is an advanced, log-based tool for geological correlation, fault and zonal correlation in Aspen Geolog. It is particularly useful in complex, high-angle/horizontal wells. Aspen Geolog Correlator is available as part of the Aspen Geolog for Geologists bundle.
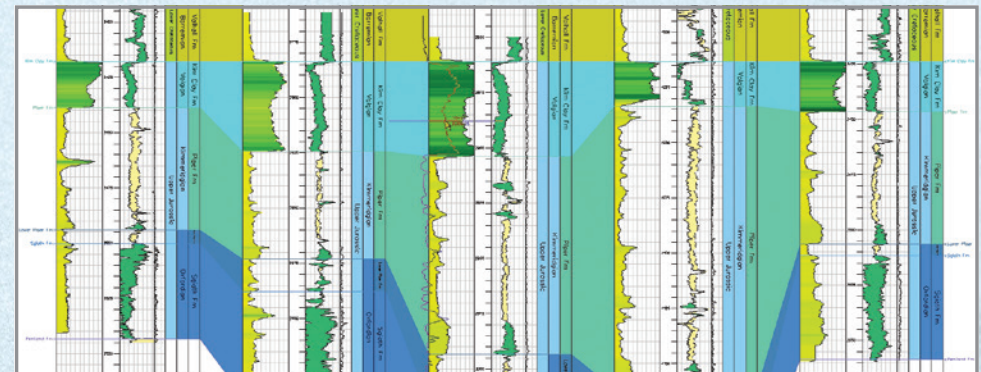
> **"I previously used Aspen Geolog in the hydrocarbon exploration and production industry, where the system's ease of use and powerful Python scripting capabilities significantly contributed to workflow efficiency. I found that Aspen Geolog easily makes the transition to Carbon Storage."**
>
> **—Adam Haecker, Director of Geoscience, Milestone Environmental Services**

Support for New Energy Workflows

Aspen Geolog tools have been successfully used in different industries over the years. New functionalities are constantly being added and existing ones enhanced, to support their use in such markets as carbon capture and storage (CCS), geothermal energy, radioactive waste disposal, and mining. Existing technologies include:
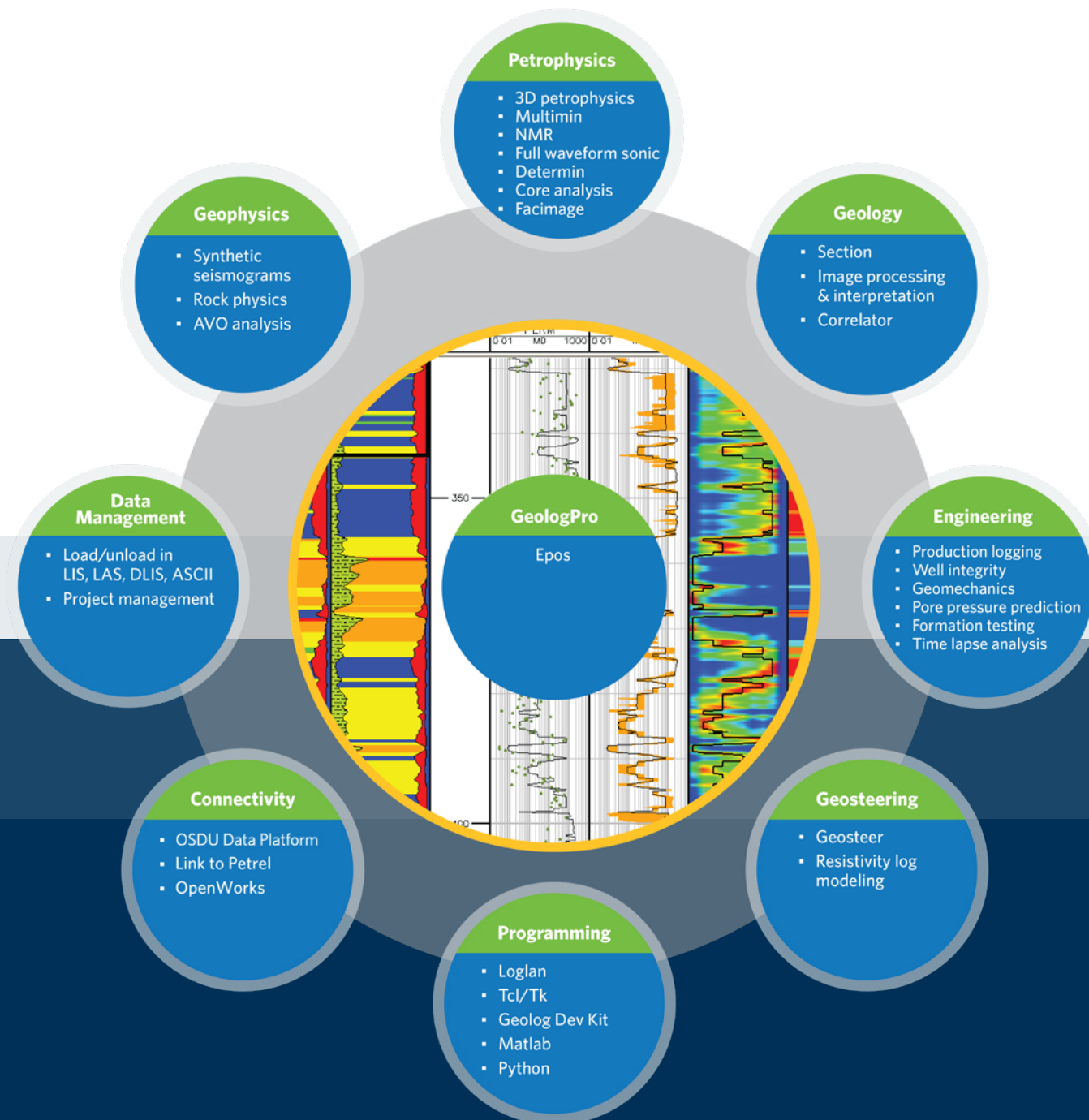
- A geochemistry module for water analysis, which helps in assessing the properties, type and quality of the subsurface waters and their interaction with their hosting framework.

- Modules allowing assessment of key in-situ formation thermal properties (heat capacity, thermal conductivity and diffusivity) for geothermal energy prospects.

- With its extended set of mineral options and tool support, Multimin can be used to perform petrophysical interpretation in new energy sectors such as mining, radioactive waste disposal and geothermal energy.

- Aspen Geolog can display the evolution of completions over time, which is useful in many industries, including geothermal energy and CCS.
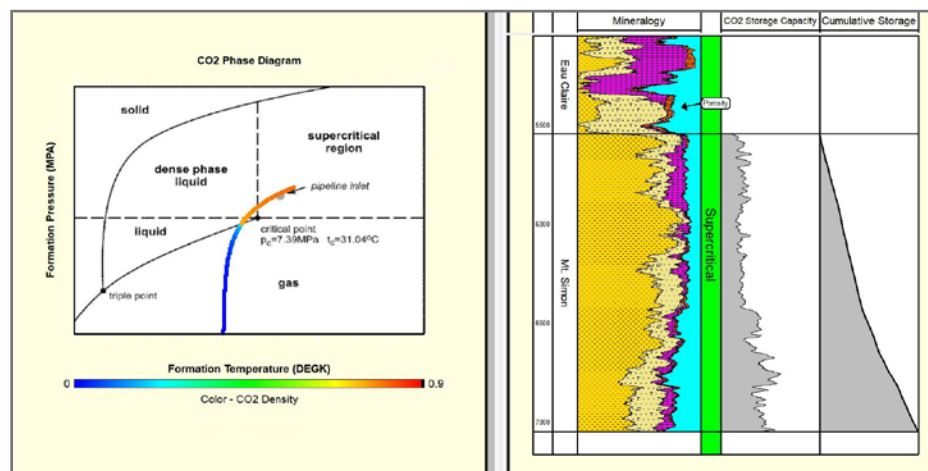
Identification and evaluation of target reservoir potential for CO_2 storage using Aspen Geolog.

The Aspen Geolog Formation Evaluation Solution Suite

Petrophysics
- 3D petrophysics
- Multimin
- NMR
- Full waveform sonic
- Determin
- Core analysis
- Facimage

Geophysics
- Synthetic seismograms
- Rock physics
- AVO analysis

Geology
- Section
- Image processing & interpretation
- Correlator

Data Management
- Load/unload in LIS, LAS, DLIS, ASCII
- Project management

GeologPro
Epos

Engineering
- Production logging
- Well integrity
- Geomechanics
- Pore pressure prediction
- Formation testing
- Time lapse analysis

Connectivity
- OSDU Data Platform
- Link to Petrel
- OpenWorks

Programming
- Loglan
- Tcl/Tk
- Geolog Dev Kit
- Matlab
- Python

Geosteering
- Geosteer
- Resistivity log modeling

Features

- Multi-well, multi-zone petrophysical analysis
- Flexible data import/export
- Easy-to-use environment for log editing and interpretation, including user-defined workspace
- Presentation-quality graphical output
- Consistent look and feel for Linux and Windows users
- Interface ergonomically optimized for use with multiple large computer screens
- Powerful crossplotting, providing input for petrophysical calculations
- Comprehensive petrophysical processing tools
- Monte Carlo uncertainty assessment available in all views and modules
- Data management tools that increase interoperability and scalability
- Audit trail, with the ability to query the history of any individual log
- Automatic report generation using customizable template
- Petrophysical analysis of unconventional shale fields
- Cross-section creation tools
- Log-based pore pressure and fracture pressure prediction
- Aspen Epos integration framework and well data servers

System Specifications

- Microsoft® Windows® 10 and Windows 11 Professional or Enterprise edition
- Red Hat® Enterprise Linux® 8.8 or subsequent minor releases

Facimage and the Geolog Image Log Processing and Interpretation modules are based on Total technology.

The Aspen Geolog Advantage

- Vendor independence gives users the freedom to choose the best tools for each task, with no conflict of interest.
- Fully scalable and customizable, Aspen Geolog meets the needs of users from generalist geologists, to expert petrophysicists, to engineers working in field development.
- An intuitive, interactive, Windows-style interface optimizes usability and ensures a short learning curve.
- Integration with other AspenTech Subsurface Science & Engineering products provides access to a full range of industry-leading E&P software.

Interoperability

- OSDU Data Platform
- OpenWorks R5000.10
- Petrel 2024, 2023, 2022
- Matlab
- Python

About Aspen Technology

Aspen Technology, now part of Emerson, is a global software leader helping industries at the forefront of the world's dual challenge meet the increasing demand for resources from a rapidly growing population in a profitable and sustainable manner. AspenTech solutions address complex environments where it is critical to optimize the asset design, operation and maintenance lifecycle. Through our unique combination of deep domain expertise and innovation, customers in asset-intensive industries can run their assets safer, greener, longer and faster to improve their operational excellence.

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