GVERSE® GeoGraphix®

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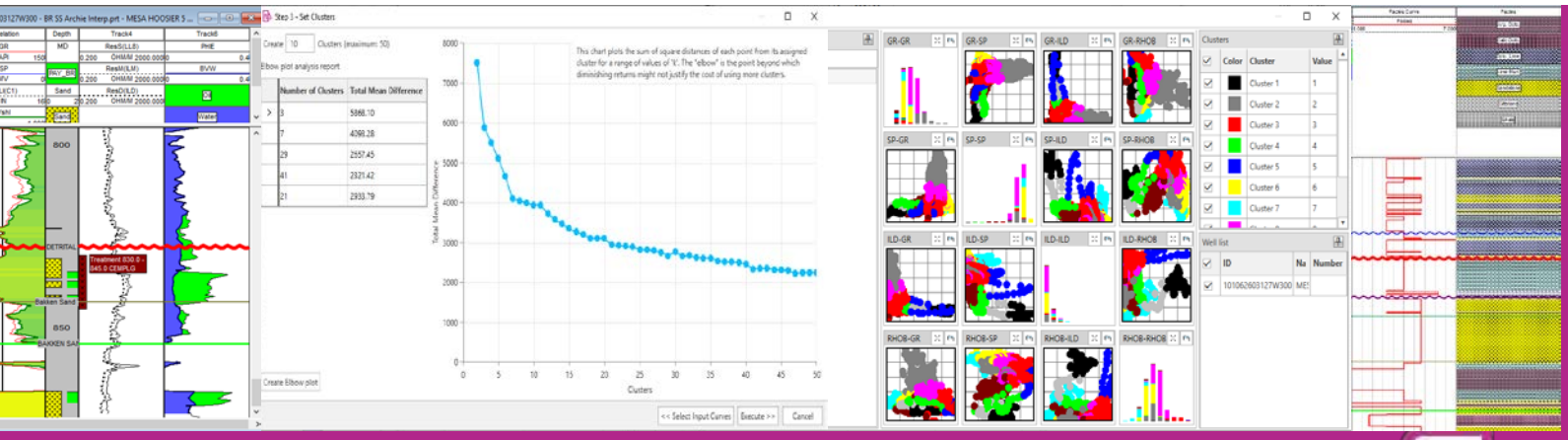
GVERSE® Petrophysics 2019.4



Petrophysics 2019.4

intelligent geoscience solutions

GVERSE® Petrophysics

Integrated log analysis for comprehensive interpretation

GVERSE® Petrophysics is a petrophysical application designed to assist geoscientists and petrophysicists in analyzing and interpreting well log data and characterizing the reservoir using simple to advanced log interpretation workflows in a large multi-well multi-user environment.

GVERSE Petrophysics supports the import of digital data from numerous sources and provides you with integrated data views and analysis. Using this application you can view, edit, and analyze well log data in three different views:

- **Log View**
- **Crossplot View**
- **Report View**

GVERSE Petrophysics enables you to quickly analyze well log data using industry standard petrophysical algorithms. In addition, the Petrophysics Development Kit allows you to write user- defined interpretive models in C, C++, and Visual Basic programming languages for more advanced applications in GVERSE Petrophysics.

GVERSE Petrophysics is integrated with GVERSE Geomodeling, XSection, GeoAtlas, and ZoneManager for a more comprehensive interpretation.

GVERSE Petrophysics accesses log and well data from the common project database, displays this data in log, cross plot, and report templates, and creates petrophysical parameters extracted for the petrophysical model for display or export for further analysis. You can use log templates created in GVERSE Petrophysics to display curves in GVERSE Geomodeling and XSection, and create cross sections from wells displayed in GVERSE Petrophysics, view WellBase information for wells displayed in GVERSE Petrophysics, and create IsoMap layers from GVERSE Petrophysics curve data statistics. In addition to these integration features, when working with well data in GeoAtlas, GVERSE Geomodeling, or XSection, you can easily view the selected wells in GVERSE Petrophysics.

Key Benefits

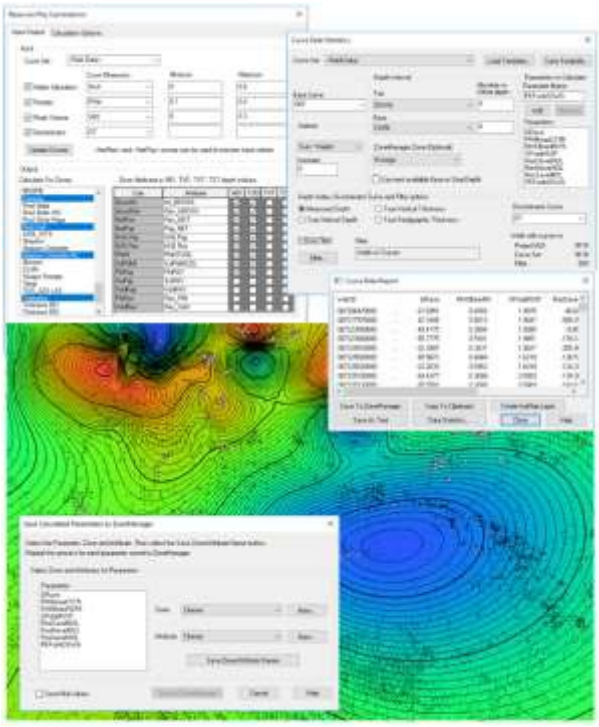
Intuitive Language: GVERSE Petrophysics uses a simple and intuitive scripting language. With little effort, users create sophisticated petrophysical models. These models can then be applied to individual wells for detailed analysis or to thousands of wells to generate reservoir-to-regional scale formation characterizations. Utilizing log template displays and petrophysical interpretations, users then view the petrophysical models from single-well log templates to multi-well cross sections to 3D fence diagrams.

Scalable Functionality: GVERSE Petrophysics includes over 250 predefined standard log analysis equations as well as several predefined water saturation, lithology, and coal bed methane (CBM) models. The equations are grouped into easy-to-understand families of calculations that can be copied and edited into a script to solve most formation analysis problems. For the more sophisticated user, GVERSE Petrophysics can be linked to external models created in Visual Basic, C, or C++ code. External models offer unlimited analytical complexity as well as integration with presentation, attribute extraction, and mapping utilities.

Seamless Petrophysical Analysis, Attribute Extraction, and Mapping: Users can extract attributes generated in the petrophysical models within formation zones of interest and/or filtered well-sets for direct map layer creation, statistical analysis, or export. GVERSE Petrophysics easily links to ZoneManager, GeoGraphix attribute analysis application, to support well-by-well/zone-by-zone parameters for petrophysical models or read/write parameters for Pickett Plot analysis.

Key Features

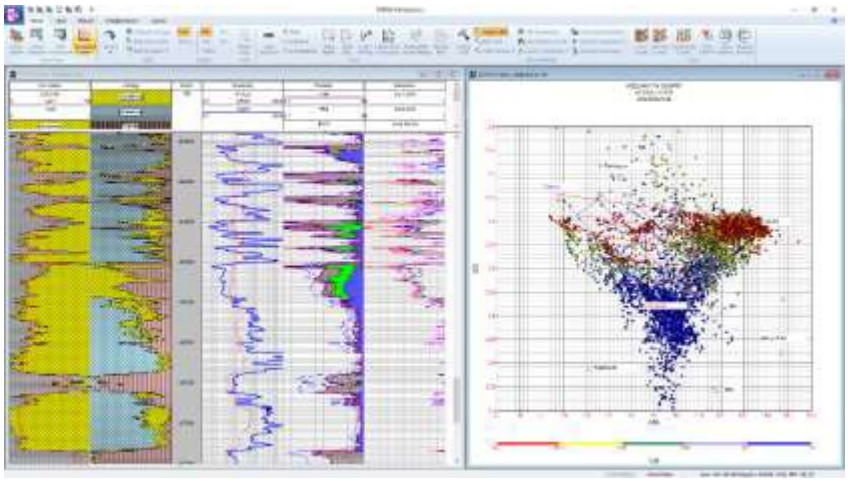
Multi-Well Interpretation



- Perform one-step reservoir pay summations for common reservoir attributes such as gross, net, net/gross, porosity feet, and hydrocarbon-filled porosity with corrections for true, vertical, and stratigraphic thickness.
- Generate virtually any statistic from curve-derived attributes over a zone or depth interval of interest with Curve Data Statistics.
- Easily confirm results using data-distribution histograms, statistics, and cross plots.
- Map the results directly in GeoAtlas, GVERSE Geomodeling, or save results to ZoneManager attributes.
- Create proposed completion stages and perforation cluster intervals, then save as proposed completion records in the WellBase Completion table. These records are available for data posting symbology on the well log templates.

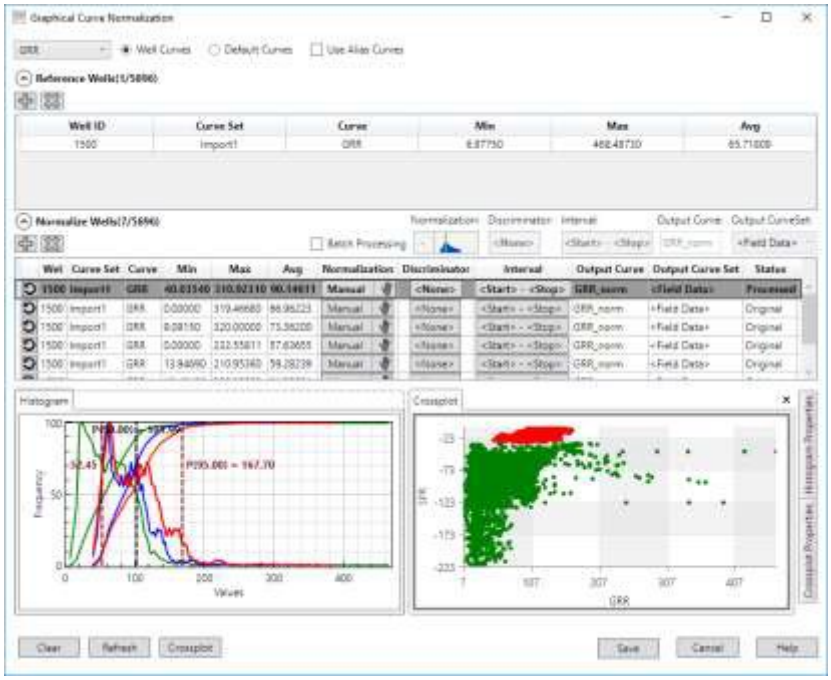
Petrophysical Analysis

- Easily perform quick and interactive log calculations for standard interpretations and reconnaissance with user-defined equations.



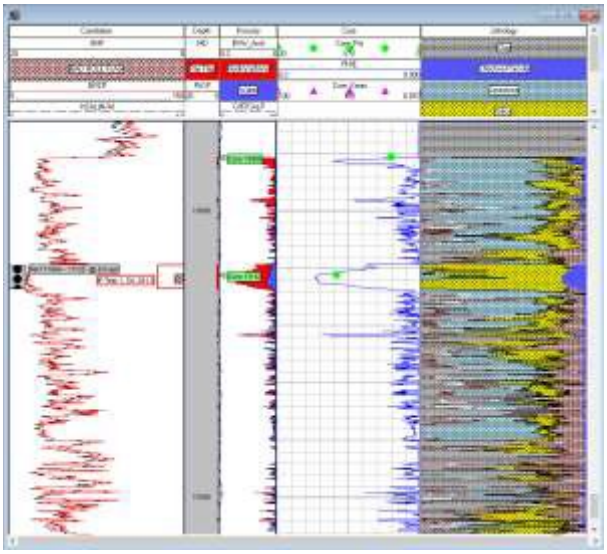
- Utilize pre-written interpretations for 3 and 4-mineral determinations and Archie, Dual-Water, Indonesian, and Modified Simandoux saturation models.
- Link complex, external models written in C, C++, or Visual Basic.
- Build and save personal equations with user-defined equations comprised of over 250 pre-defined standard log analysis equations.
- Calculate Poisson's Ratio and Young's Modulus using mechanical properties/UDE Group.
- Utilize standard Halliburton, Schlumberger, and Baker Atlas charts for environmental corrections or digitize additional charts.

Curve Data Management



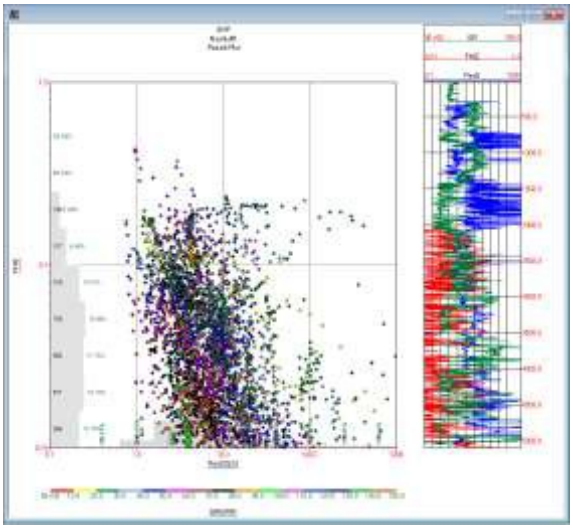
- Import standard LAS, LBS, ASCII, DLIS, and LIS/TIF data files.
- Automatically merge and splice curves using the curve import tool or optionally merge or splice at user defined depths.
- Benefit from project-based mnemonic inventory, mnemonic aliases, and unit conversions.
- Manually or bulk normalize curves using the graphical curve normalization utility which includes average, single, and two-point normalization methods.
- Utilize single or multi-well curve copy, renaming, deletion, rescaling, min/max clipping and filter smoothing tools.
- View standard core curve analysis attributes plus 200 user-defined core curves attributes.
- Combine multiple curve mnemonics for similar curve types in hierarchical order based on a pre-determined preference.

Log Analysis and Display



- Control presentation templates to display curve and depth-registered images with virtually unlimited tracks, curves, colors, and pattern fills.
- Display different track types including linear, logarithmic, mineral percent, depth registered images, text, core description, lithology pattern fills, tadpoles, and descriptions.
- Easily cut, copy, and paste curves between tracks using the on-screen presentation editing feature.
- Automatically post DST, core, perforation, mechanicals, IP, casing, tubing, and zone information.
- Interactively pick and display formation and fault markers and user-defined attribute intervals.
- On-screen QC editing of curves including performing simple or complex depth shifting, adjusting SP baseline shifting, and utilizing curve patch tools.

Cross Plot Analysis and Display

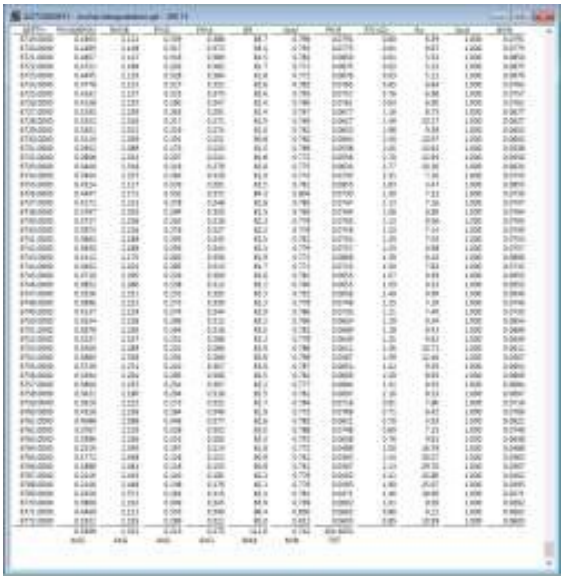


- Display data relationships over total well depths, user-specified depth range, or one or more zone(s).
- Create three-axis display with linear or logarithmic scale, user-controlled symbols, size and color, Z- axis color spectrum, and X and Y axis histograms.

Multi-Well Cross Plots

- Benefit from multi-level discrimination with user-drawn polygon capabilities.
- Differentiate between wells by assigning colors to individual wells for better analysis.
- Fit curves using linear regression, reduced to major axis, and polynomial regression capabilities.
- Interactively determine the Formation Water Resistivity (Rw), Bound Water Resistivity (Rwb) and Cementation Exponent (m) using the Pickett plot.

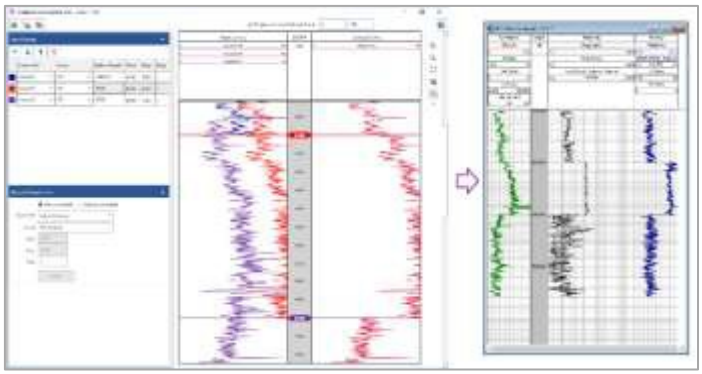
Customizable Reports



- Create user-defined well reports such as net pay, average porosity, water saturation, total porosity feet, or hydrocarbon-filled porosity.
- Define curve choices, sample rates, depth interval, or zone selection using the provided tabular list.
- Export to tab or comma delimited text files, or copy results to the Microsoft® Windows® clipboard.

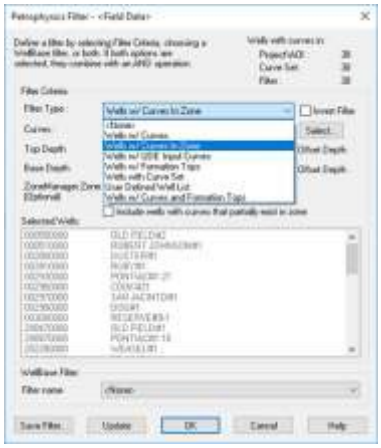
Graphical Curve Splice

- Graphically splices the curve data for different runs in a well.
- Combine two or more input curves logged on different depth ranges to form a continuous composite curve into one single dataset, so that the measurements are available over the greatest possible depth interval.
- Display the single composite curve as a new curve in Log View of GVERSE Petrophysics.



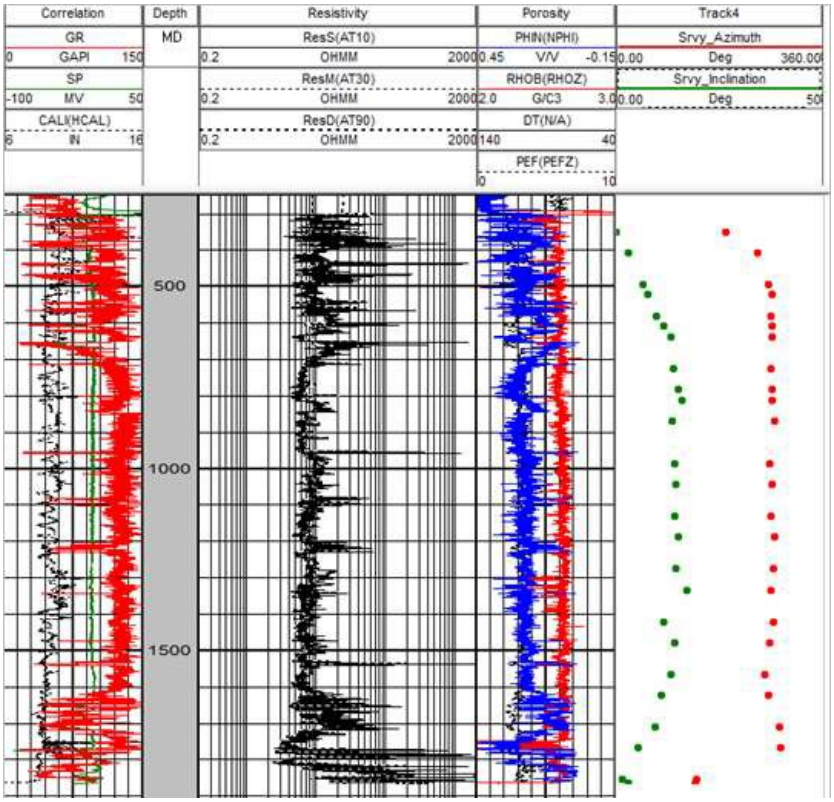
Filter Wells with Curves in Zone

- Define Wells with Curves in Zone filter to refine the inventory.
- The filter focuses on only the wells with curves lying fully or partially in the corresponding zones.



Survey Curves

- Display the Survey Curves in GVERSE Petrophysics using the Azimuth and Inclination survey data from WellBase.
- Use the Survey Curves as discriminator curve or in equations in UDE models.



Release Highlights 2019.4

Electrofacies Analysis

Use up to 12 log curves as input for the AI based k-means method for cluster analysis to identify similarities in the inputs and create an electrofacies log. Use QC tools like n-dimensional crossplots to assign labels, colors, and values to make the electrofacies curve your own.

Better Curve Data Management

Clean up any messy database with more control on deleting unwanted curves and curve sets from selected wells. Keep it organized by importing to existing curve sets, filtering by curve mnemonics and merging curve sets for multiple wells in bulk.

Get More out of Formations and Faults

Calculate curve data statistics over an interval around a formation or fault pick. Display formations and faults on logs in crossplot view.

Log Presentation and Postings

Set UDE outputs as default and access them directly on templates. Post chamber recovery information. Toggle display of aliased curve names in curve headers. Control display of decimals places for log values.

Usability Improvements

Increase overall productivity with many usability enhancements including redesigned dialogs for easier access to information and settings, improved formatting for copy to clipboard and locking zone column in place to always view while scrolling the dialog.

Requirements

Minimum

- 2.4GHz 64-bit Intel class or better
- 8 GB RAM
- 1,024 x 768 graphics resolution
- CD-ROM drive
- 19-inch monitor

Recommended

- Quad 2.4 GHz 64-bit Intel class or better
- 16 GB RAM or greater
- NVIDIA GeForce or Quadro - 2GB video RAM
- DVD-RW drive
- Dual 21+-inch monitors

Software

- Microsoft® .NET 4.5
- Microsoft DirectX 11

Operating System(s)

- Windows® 7 Professional x64
- Windows® 7 Enterprise x64
- Windows® 7 Ultimate x64
- Windows® 10 Professional x64
- Windows® 10 Enterprise