

1.1 Overview of Key Improvements

GEO Suite 7 provides many improvements, some of which may be of specific benefit to your workflows. Below is a summary of the key improvements.

A. GEO and GEOLite

Header pictures can be moved with mouse	Once a BMP or JPEG has been loaded into a header or trailer, you can adjust its position and size using the mouse.
Optimized TVD depth value display for horizontal wells	For highly deviated or horizontal wells, the TVD value can be set to appear at regular intervals even when no discernible vertical depth difference is recorded.
Curve display manager can be applied per layout	Display settings for a curve can be applied to all relevant layouts from within the current layout.
All curves can be displayed as text values	Useful if you wish to see the actual recorded value as text rather than a curve trace.
Vertical section display mode	GEO can convert the log to display relative to a plane of vertical section for deviated or horizontal wells.
Increased character limit in tables	Limit increased to 1000 characters per table row.
Unicode language support	GEO allows direct input of non-Western character sets.
Snap to lithology interval	Interpreted lithology can be set so that it snaps to a customized accuracy level. For example, it may be set to show depths accurate to 0.5ft, reducing decimal ambiguity.
Application color scheme	You may customize the color of the GEO interface using styles present in other Microsoft® applications.
Cross-hair guidelines	Primarily for core log applications, the mouse pointer can become a cross-hair for accurate placing of symbology or correlation, and referencing in general.
Image lock	You can lock an image to prevent it from being accidentally moved with the mouse.
Images can be set with different degrees of transparency	If an image has to overlay certain plot aspects, a transparency value can be set so that some portion of both can be seen.
TVD Sub Sea correction can be a positive value	TVDS correction can be entered as a positive value, adding to the TVDBRT data for wells with a reference below MSL.
Symbol repeat in x-axis	Core log symbols can be set to repeat when stretched laterally, to denote surfaces of differing lengths.
Mouse wheel zoom	Holding Ctrl and rotating the mouse wheel zooms the plot in and out.
GEOGraph histogram	Data can be displayed in histogram format using GEOGraph.
GEOGraph step curve	GEOGraph support curves can be displayed in step format.
GEOXSection log depth anchor	An EMF imported into XSection for correlation can be anchored to a specific depth for greater accuracy in placing logs for correlation.
Lithology tooltip shows all active depth systems	Placing the pointer over a lithology entry displays a tooltip that now includes all depth systems such as TVD and TVDSS values for top and base of unit.

1.1 Overview of Key Improvements

B. Vectdraw

Application color scheme	Customize the color of the Vectdraw interface using styles present in other Microsoft® applications.
Poly line tool	Construct poly line patterns.

C. GEOExport

Exporting of qualitative data	Qualitative data can now be exported via GEOExport.
New sorting capability for data exported to text files	Sort exported data based on which track the data is exported from.

1.2 Horizontal Log View – Geosteering

GEO Suite 7 provides the facility to rotate your log into horizontal mode. This can help the geologist to visualize information on lateral wells. The user can also generate and shape surfaces with the mouse for formation modeling. Where real-time data is being loaded, the (proposed) surfaces can be updated accordingly, creating an instantaneous wellsite geosteering interpretation.

The horizontal view can also be configured to show the well path in vertical section mode. This converts the view to show the well path from a specific projection, as well as showing the true lateral profile of the well by contracting any parts of the well that are not in that specified plane.

IMPORTANT NOTE: *This application does not interpret tool responses or predict what course of action to take to steer the well. That is entirely the domain of the user. However, it does help the user to make such decisions, through real-time display of data and through the easy ability to draw and continuously revise the geological interpretation on screen in response to the data.*

A. Horizontal / geosteering log display

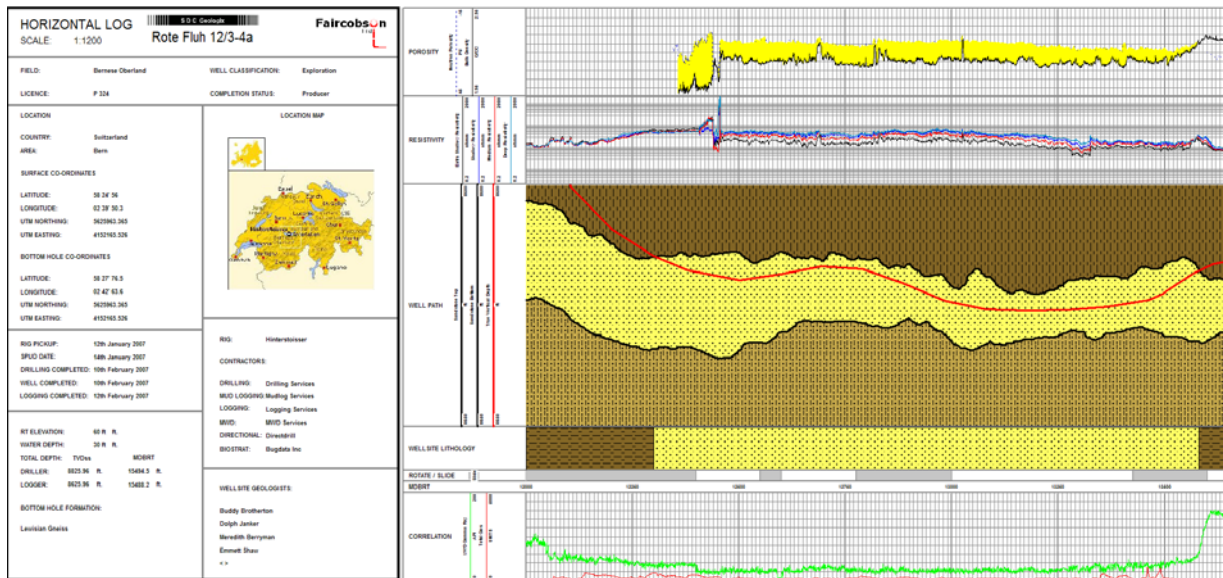


Figure 1.2.1 Log in horizontal mode showing the well path

With the log in horizontal mode, the data can clearly be attributed to the lateral well section. The actual well path (shown in red in Figure 1.2.1) can be displayed, and surfaces can be modeled around it based on information from geology and logging data.

B. What you will need

Suitable template Any log can be rotated to horizontal mode (with the appropriate module) for a better understanding of the information. The geosteering application is best delivered via a preconfigured template (ODT). The ODT provides a “ready to go” workflow that includes an optimized log view, geological patterns and automatic display of some known logging curves. Such an ODT is provided with the GEO Version 7 installation, or one can be created by you or customized by Geologix via our GEONet service.

WITSML server The real-time data feed comes from a WITSML server which the GEO application can log on to via the Internet.

C. Real-time applications

You can load surface and subsurface logging data in real time from a WITSML server with GEO Suite 7. This provides a continuous feed of data and eliminates the wait for data in LAS format and allows the instant modeling of the surfaces, helping the geologist understand and interpret the path of the well in relation to the geology.

1.2 Horizontal Log View – Geosteering

Proposed surfaces can be loaded for reference, as shown in block colors in Figure 1.2.2.

The user controls how often and what curve data is loaded from the server.

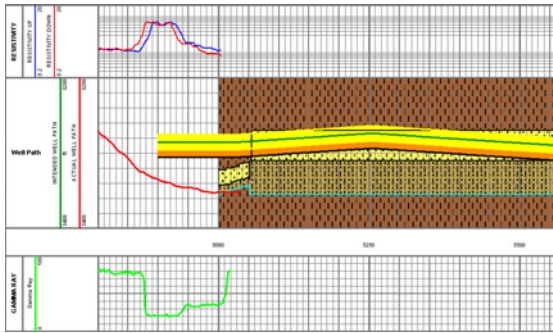


Figure 1.2.2 Display of real-time WITSML curve data and shaping of surfaces

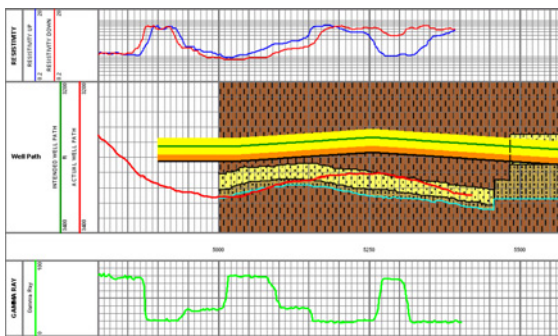


Figure 1.2.3 Display of real-time WITSML curve data and shaping of surfaces

D. More information

For more information on the horizontal log view or geosteering, or for guidance on how to apply this to your current log formats, please contact your nearest Geologix support team.

1.3 Borehole Imaging Display

GEO Suite 7 provides the facility to display data acquired by image tools. The display of such data in GEO can help the geology group better understand geological features by providing a richer well log display.

GEO supports the display of raw image data acquired by both wireline and LWD methods, including display and updating of the presentation in real time through the WITSML standard.

A. Image log display

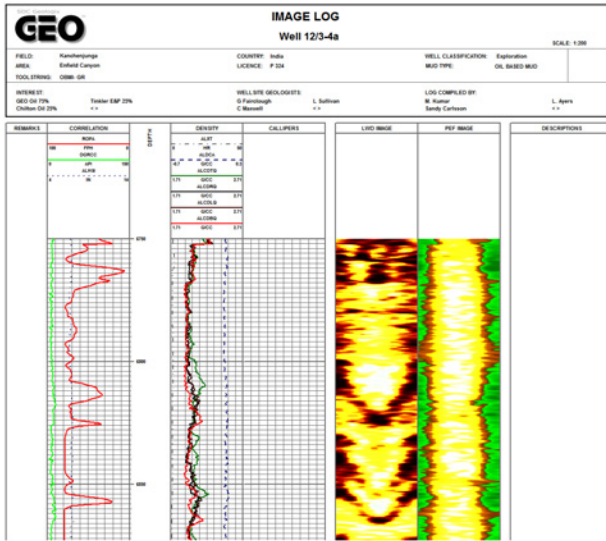


Figure 1.3.1 An example of an LWD dynamic imaging tool set alongside an LWD PEF tool display

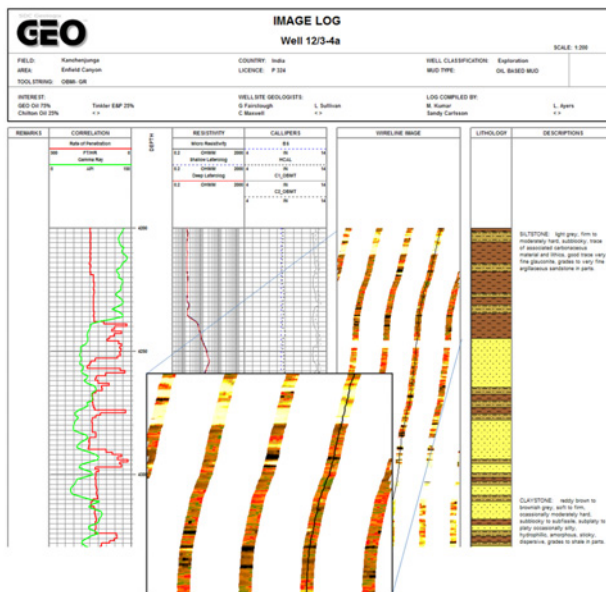


Figure 1.3.2 An image log presentation of OBMI data

1.3 Borehole Imaging Display

B. What you will need

It is possible to add this display to any log, provided your license supports the imaging tool module. However, to achieve a smooth and efficient implementation of the display into your GEO workflow, you may wish to consider the following:

Suitable template A template is useful for setting a standard for how you display your image data alongside your other information. It can be a layout as part of your normal operational logs (lithlog/complog) file, and can be used to pre-define tool configurations from your vendors for easy setup for each well. Such a template, an ODT, is provided with the GEO Version 7 installation, or one can be created by you or customized by Geologix via our GEONet service.

Tool configuration For each tool type from each vendor you utilize, it is best to set up an image tool template. The number of pads, flappers, or sensors, as well as the color zone mappings, can be stored in the template ready to automatically display the image when the data is loaded.

C. Real-time applications

The GEO Suite can load image data in real time. This eliminates the wait for data in file format and permits the instant view of the latest data acquired by the tool, allowing the geologist to make a quicker, more comprehensive interpretation.

The geologist may also interactively change the colour balance of the image to enhance certain features in real-time during drilling.

D. More information

For more information on the borehole imaging tool display feature, or for guidance on how to apply this to your current log formats, please contact your nearest Geologix support team.

1.4 Pore Pressure Monitoring

GEO Suite 7 provides the facility to calculate and display pore pressure, overburden gradient, and fracture gradient. It is possible to calculate these curves from common sources such as resistivity, sonic, density, and DXC. A normal compaction trend can be visually manipulated to adjust the interpretation.

IMPORTANT NOTE: *The user is responsible for all interpretations and decisions made as a result of the pore pressure calculations performed using GEO software. Geologix Limited bears no responsibility for these decisions. This application is intended to offer a "quick-look" presentation of pore pressure for the operations geology group, and should only be undertaken by users that fully understand the pore pressure subject.*

A. Pore pressure monitoring log display

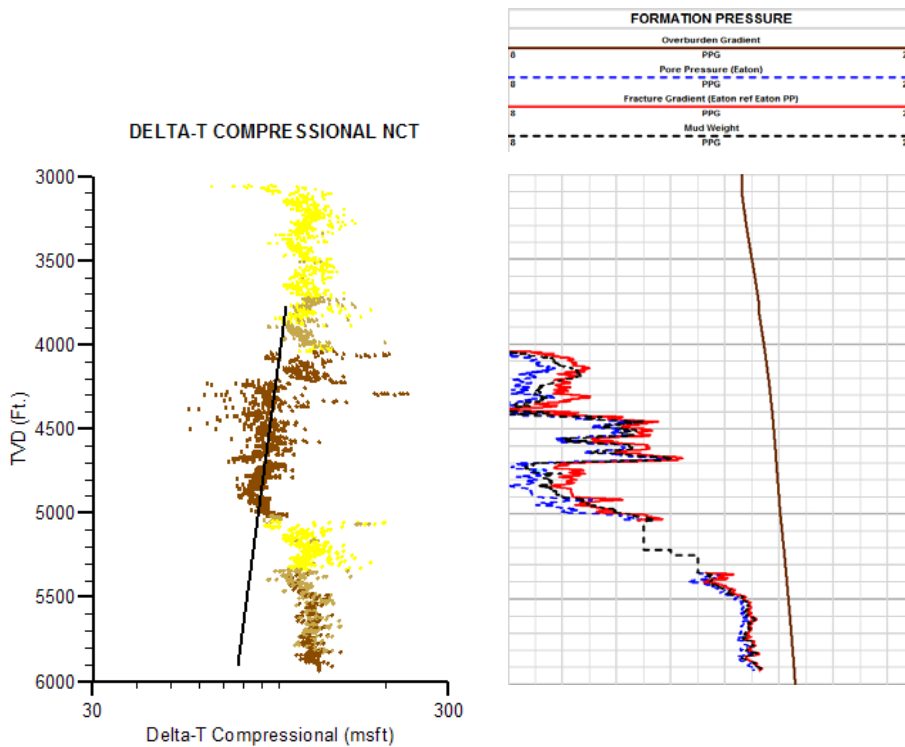


Figure 1.4.1 Pore pressure monitoring log display

The calculated curves populate on the track beside your actual mud weight (provided by the service company) for you to review and interpret. You can adjust all components of the workflow, such as NCT gradient and Poisson's ratio values, to fine-tune your pore pressure analysis.

Composite displays, including data such as Gamma ray, LOT and Formation Tests, can be added to enhance your pore pressure study.

B. What you will need

Suitable template

The pore pressure monitoring application is best delivered via a template (ODT). A suitable ODT provides a "ready to go" workflow that includes a calculation suite, graphs for NCT interpretation, and a visible track/grid display for your computations. Such an ODT is provided with the GEO Version 7 installation, or one can be created by you or customized by Geologix via the GEONet services.

1.4 Pore Pressure Monitoring

Source data The application supports calculations that accept a range of source data including resistivity, sonic, density and drilling exponent. You will also need TVD data and your lithological interpretation for the fracture gradient.

Associated information In order to run the complete calculation, you may need such data as Poisson's Ratio for your lithology.

C. How it works

Because the template provides a regulated workflow, with automation and common settings as default, the burden on user interaction is kept at a minimum. This makes the workflow shorter and more accessible. The user is required to load relevant source data and then interpret the NCT, after which the calculation for the pore pressure, fracture and overburden gradients will automatically run. The resultant data will automatically display on the grid as curves.

Please note that the ODT can and should be modified to suit differing environments. It should not be assumed that it is immediately suitable for all pore pressure environments. It is therefore imperative that you know how to adjust calculations and their parameters to suit varying scenarios.

D. Real-time applications

GEO Suite 7 can load data in real time using the WITSML standard, which provides continuous re-calculation of the pore pressure suite allowing the user to regularly update the interpretation as drilling progresses.

E. More information

For more information on the pore pressure monitoring workflow, or for guidance on how to apply this to your current log formats, please contact your nearest Geologix support team.

1.5 Shale Gas Well – Composite Log

GEO Suite 7 provides new features to manage the data acquired when drilling shale gas wells. Data supplied from rock mechanics, core desorption tests, borehole imaging and its interpretation can be set alongside typical geological and log interpretations to create a composite log specifically appropriate to a shale gas well .

Bringing together a wide range of data within one document enables increased understanding and reduces the number of applications and log copies needed to provide quick and confident interpretations.

A. Shale gas well – composite log display

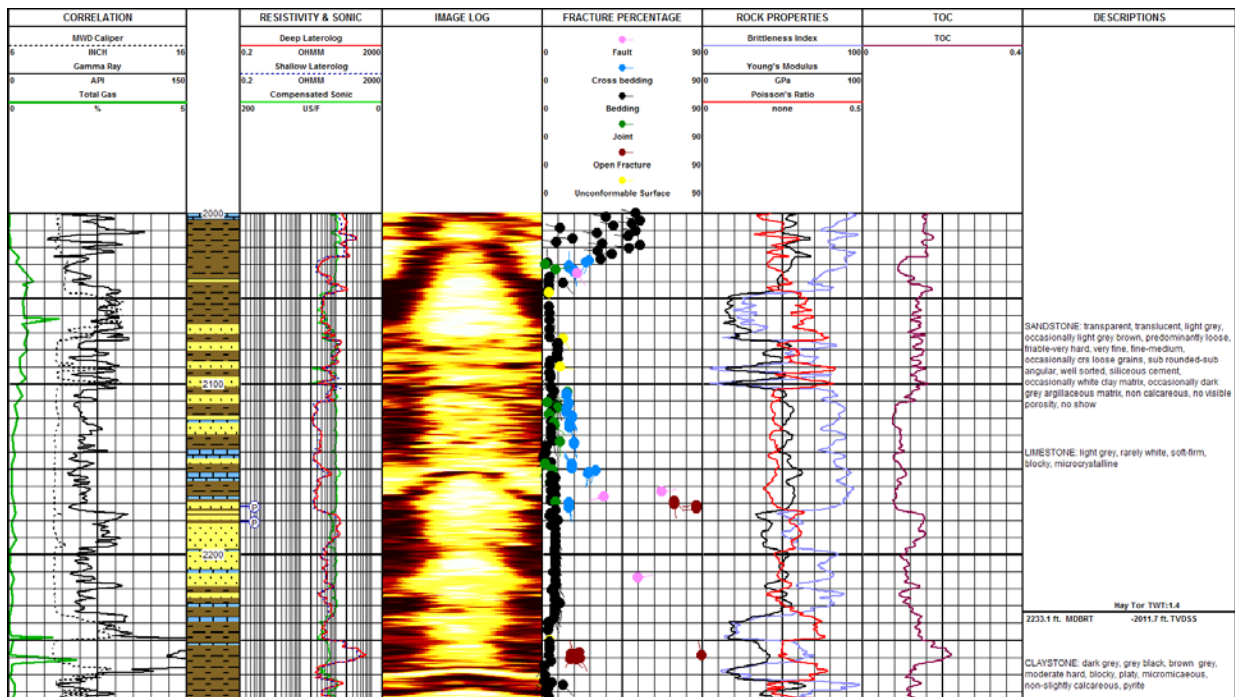


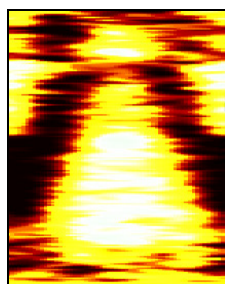
Figure 1.5.1 Shale gas well composite log display

B. What you will need

It is possible to add this display to any log, provided your license supports the imaging tool module. However, the best route is to use a template which provides efficient workflows and automates certain processes, providing an instantly usable application. The list below shows the features included and how they relate to data from shale gas wells.

Image tool configuration

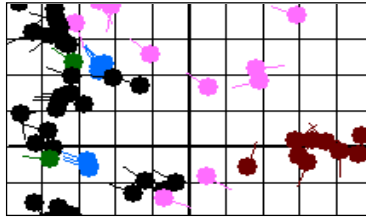
It is best to set up an image tool template for each service company tool you utilize in your operation. The number of pads, flappers or sensors as well as the color zone mappings can be stored in the template ready to display the image automatically when the data is loaded.



1.5 Shale Gas Well – Composite Log

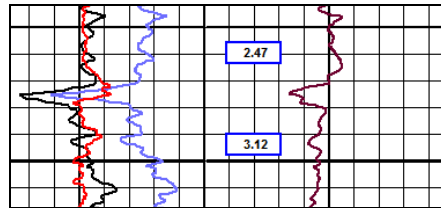
Fracture type analysis

Inclination and azimuth of a fracture can be displayed as a 'tadpole' on the plot. A third parameter, fracture type, can be used to color the 'tadpole' so that shale formations can be assessed.



Desorption data

Recorded in table format, the values can be displayed automatically on the log at the appropriate depth, giving instant reference to lab-derived test results.



Total organic carbon (TOC)

The TOC can be calculated from known models such as (ΔLogR) to show organic rich formations. Such a curve can be automatically calculated and displayed along with your source log data.

Rock mechanics

Brittleness Index can be computed from Young's Modulus and Poisson's Ratio and displayed as curves for reference next to gamma ray and TOC.

C. More information

For more information on the shale gas well complog features, or for guidance on how to apply this to your current log formats, please contact your nearest Geologix support team.

1.6 Core Description Log

GEO Version 7 has the ability to create laboratory quality Core Log descriptions as well as improve the wellsite Core log interpretation. Capture data from many sources in your Core Log from plugs, wireline, and sedimentological descriptions.

GEO will provide the facility to record all aspects of your core from tray numbering and quality, through comments, biostrat, mud %, grain size, structures, carbonate facies as well as standard log practices such as curve display and geological content.

The grain size or facies profile can be shaped with the mouse, offering you much the same flexibility that a hand-drawn Core Log can.

A. Core Log example

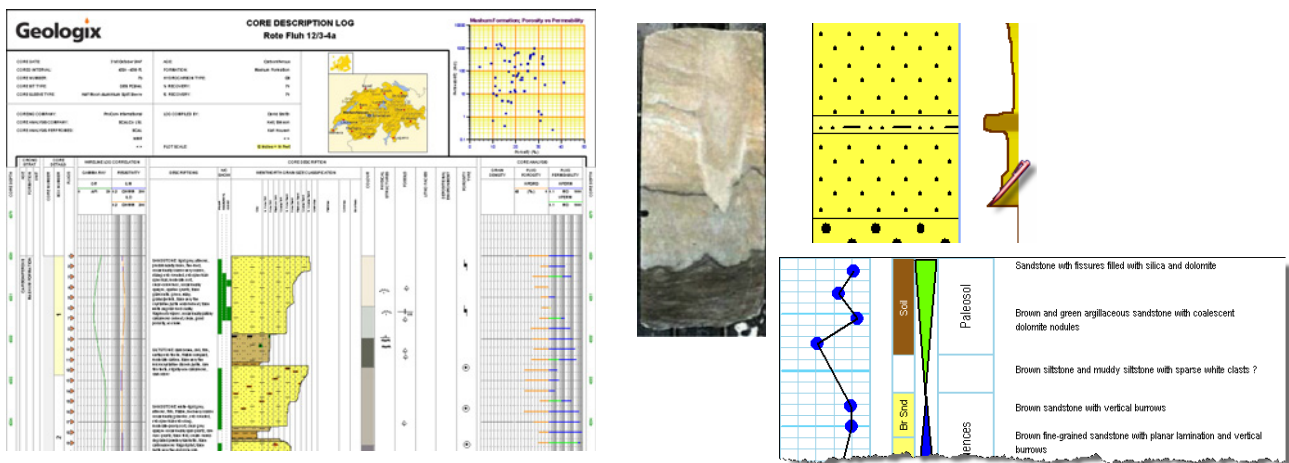


Figure 1.6.1 Core Log example with highlighted details

B. What you will need

Suitable Template

GEO Suite 7 comes with three comprehensive templates for describing a Core Log. These have multiple layouts affording you the ability to expand your description to include interpretations and photographs in one file. Alternatively a customized template can be created by you within GEO or created by the Geologix GEONet service.

Library

A digital Core Log descriptions' greatest asset is the library of symbols, structure, fossils and accessories at its disposal. We have a collection of over 300 to represent many sedimentological features. They can be rotated and resized to suit the specific feature. With Vectdraw any sedimentologist or geologist can create custom graphics quickly and easily for use in a core log.

Windows Tablet/Laptop

GEO can be used in the core laboratory or at the wellsite to describe the core directly into the application. GEO can be used with a conventional mouse to shape the core profile or a tablet stylus.

C. Digitizing paper Core Logs

GEO Version 7 has been optimized to allow the digitization of existing paper Core Logs. This facility can provide real grain size values and assign carbonate facies as well as automate the production of a lithological or facies column. Add structures, fossils and features as well as plug & logging data to complete the log as a comprehensive aggregated document.

D. More information

For more information on the Core Log feature or for guidance on how to apply this to your current log formats please contact your nearest support team.