Geomodeling
Fully Integrated 3D Interpretation

Release Notes

GVERSE Geomodeling 2019.2

Contents

Introduction

LMKR is pleased to announce the release of GVERSE® Geomodeling 2019.2.

This document provides an introduction to the GVERSE Geomodeling features and benefits. It also lists the changes available in this release.

What is GVERSE Geomodeling?

GVERSE Geomodeling introduces an integrated environment for geological/reservoir modeling that incorporates existing mapping and cross section features of smartSECTION® with the 3D view. GVERSE Geomodeling takes advantage of existing XSection cross section by saving them to GVERSE Geomodeling interpretation folder in the common XSection/smartSECTION *.ssdx* format.

The application is part of the GVERSE application suite by LMKR (http://www.lmkr.com/gverse).

LMKR GVERSE consists of geoscience and engineering solutions focused on workflow optimization and enhancing productivity of teams working on diverse geological and geophysical projects.

Main Features

The main features of the Geomodeling application are as follows:

- ▪ **Integrated 3D Visualization Environment**
  GVERSE Geomodeling introduces an integrated map, cross section, and 3D view of a geomodel which enables you to work in 2D or 3D views simultaneously. Observe the real time effect of topography and subsurface geology in your geomodel with tightly integrated and synchronous Map, CrossSection and 3D views. Designed for the geoscientists who work on integrated data sets that include petrophysical, geophysical, drilling, and GIS data.
- • **Well Data Visualization and Management**
  GVERSE Geomodeling provides simple and flexible methods to create geomodel based on filtered set of wells. Wells can be filtered by spatial selection or by predefined filters created in GeoGraphix®.
- ▪ **Display Surface Tops, Fault Cuts and Well logs in 3D View**
  Enhance the understanding of your reservoir by displaying log curves, surface tops and fault cuts along the wells in 3D view. With these features you can characterize your reservoir on the basis of log curves and surface geometries.
- ▪ **Interpolation**
  Log curve interpolation helps diagnose interplay between lithofacies, depositional trends as suggested by the log curve response. Advance your understanding of the reservoir by analyzing different geological sections and identifying lithofacies, stratigraphic sequences, and depositional trends from the interpolated logs.
- ▪ **Clipping Planes**
  In a complex geomodel, clipping plays a significant role in examining interrelationships and intrarelationships between surfaces and faults. Using GVERSE Geomodeling clipping tool, you can easily clip planes vertically or horizontally to keep a specific portion of the scene's geometry in focus and analyze trajectory of wells as they are drilled through geomodel surfaces.

- **Fence**
  Construct a true geomodel of the region by creating fence diagrams. This feature assists in construing and representing litho-stratigraphic relationship, pinchouts and truncations of units, unconformities, structural and stratigraphic traps and any other geological associations that exist in a region.

- **Displaying Petrophysical Model on Fence**
  Considering importance of Petrophysics, GVERSE Geomodeling represents petrophysical models (porosity, saturation and geomechanics etc.) based on statistical methods. These petrophysical modeling results are used to populate the fence diagrams to comprehend and analyze general behavior of the reservoir and future prospects.

- **Coblending Fence with Seismic**
  Justify the reservoir behavior by means of harmonizing acoustic impedance contrast with interpolated curve, lateral lithofacies variation, and relating structural geometries from both cross sections and seismic sections. Regional behavior of the reservoir can be quickly analyzed by applying co-blended Interpolated computed or raw curve responses over entire seismic.

- **Perforation Postings**
  Display Completion, Perforation Stage and Perforation along the wellbore path in 3D View to identify the productive zones of the targeted formations. Display of satellite image along the perforation data also helps to determine potential environmental hazards and plan areas for future prospect accordingly.

Benefits

- **Real-time Integrated Visualization of Results**
  GVERSE Geomodeling provides an integrated real-time map view, cross section view, and 3D visualization of a developing geomodel. Integrate petrophysical, geophysical, drilling, and GIS data into the interpretation and observe real time effect on a comprehensive geomodel.

- **Quick and Easy**
  As compared to traditional tools, GVERSE Geomodeling allows geoscientists to load and display large datasets with minimum time and effort required.

- **Scalability**
  GVERSE Geomodeling provides support for modeling surfaces created from wide range of datasets. Cross sections with high amount of wells and large aerial extents are handled in an efficient manner.

- **Flexibility**
  Features such as the ability to quick pick on Main Map view, clipping of 3D gird, developing fence diagrams, and creating regions and groups for wells offer greater flexibility in Interpretation workflows. Docking windows and panels provide the freedom to arrange the workspace as desired and saving complete state of the workspace facilitates the user to resume the work from where they left off.

Installing GVERSE Geomodeling

GVERSE Geomodeling is installed seamlessly as part of the GeoGraphix installation. For system prerequisites and installation instructions, refer to the GeoGraphix Installation Guide on the LMKR Support Portal > Knowledge Center > Release Notes and Installation Guides page.

What's New in GVERSE Geomodeling 2019.2

Block Diagram

Create Block Diagrams to display the point of penetration of a horizontal wellbore with the line of section to interpret it in the desired formations. You have the option to create Block Diagrams in the Map View either manually or automatically. To create a **Block Diagram**, select **Cross Section** tab **>> Define Block Diagram** and choose **Manual** or **Automatic** from the drop-down list.
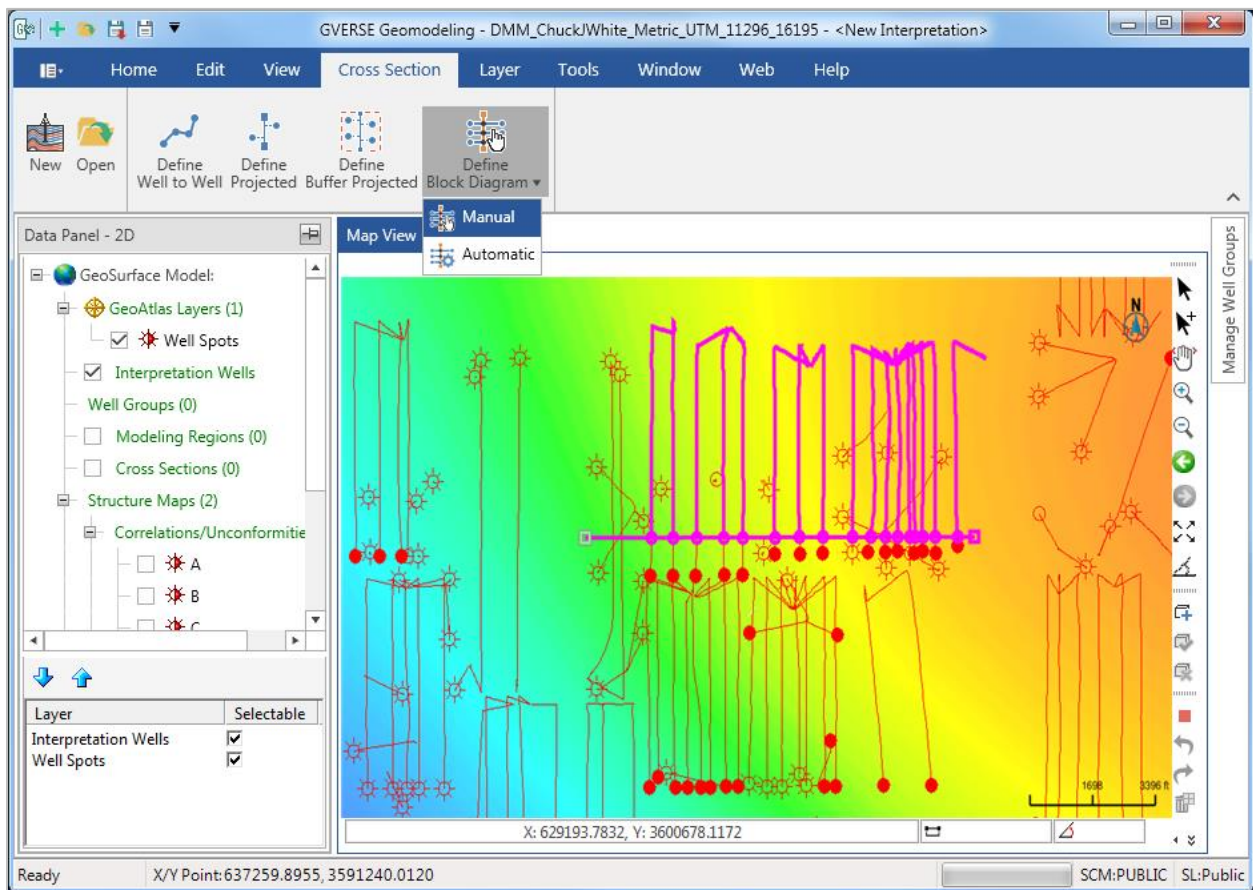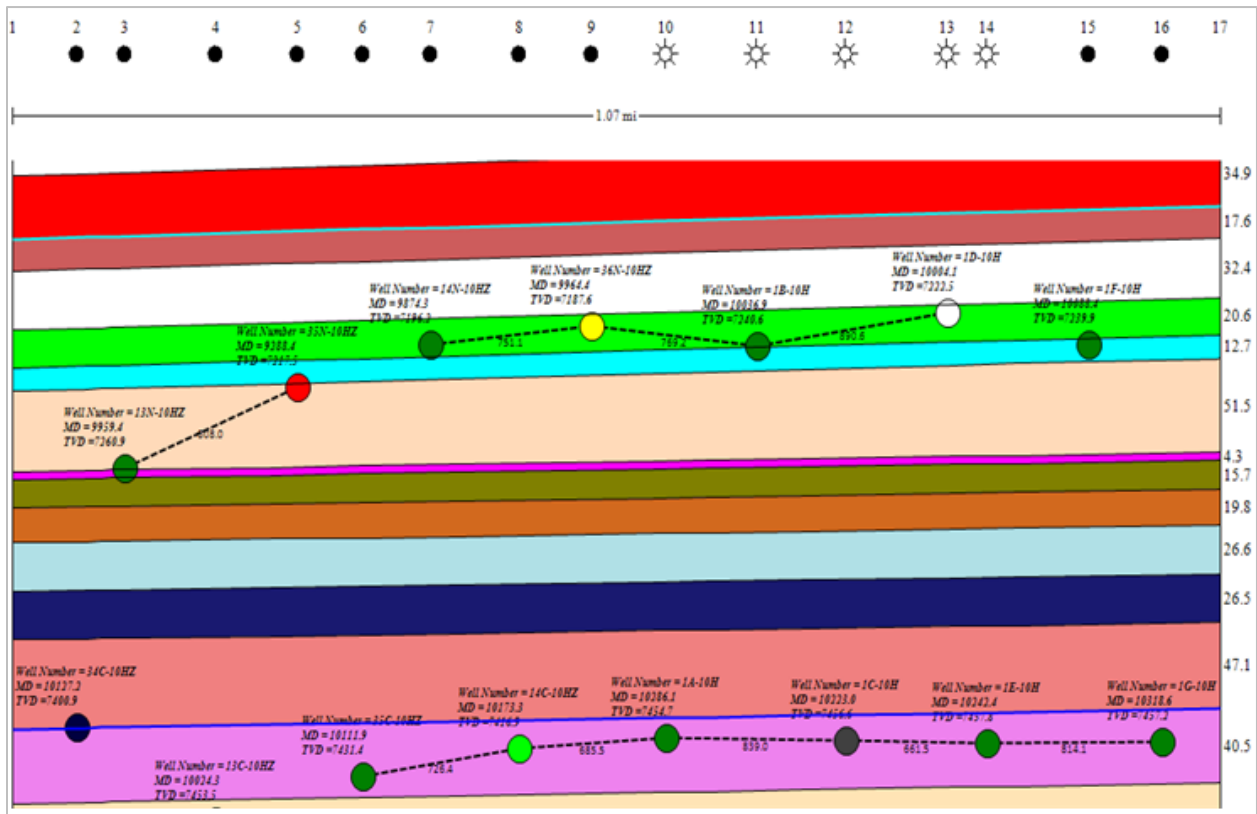
Display Distance between wells in Block Diagram

Identify the exact separation between the wells using Absolute and Horizontal well distance options on the **3D Annotation and Distance** toolbar in Cross Section View. To display the desired distances, click **Display Absolute Well Distance** or **Display Horizontal Well Distance** .
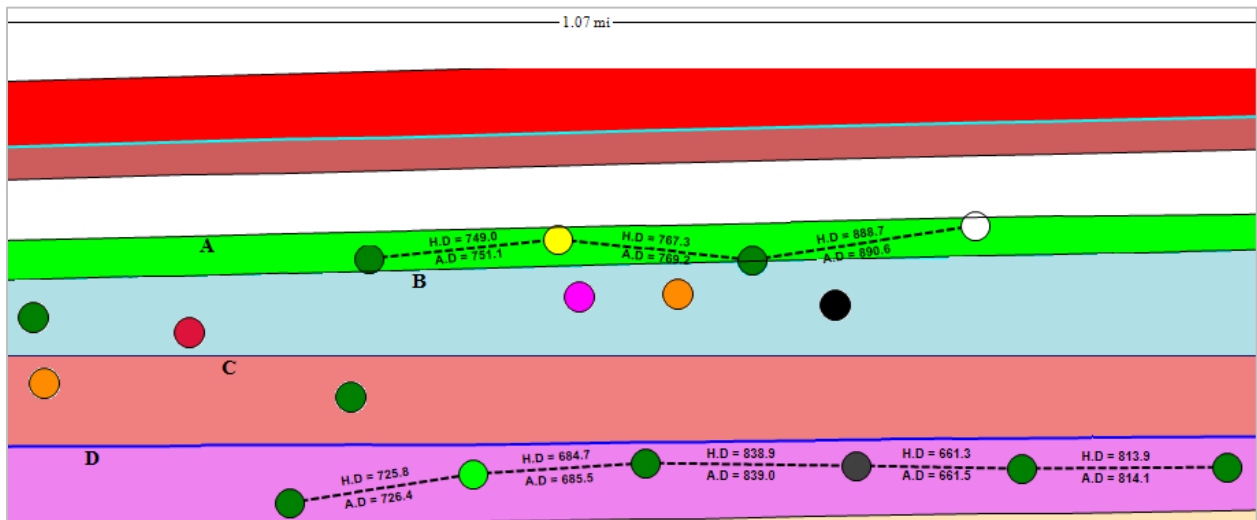
Display Boundary Distance

Display the distance between cornered wells and the cross section margins in Block Diagram by using the boundary distance option. To display the boundary distance, select **Display Boundary Distance** option from the **3D Annotation and Distance** toolbar in Cross Section View.
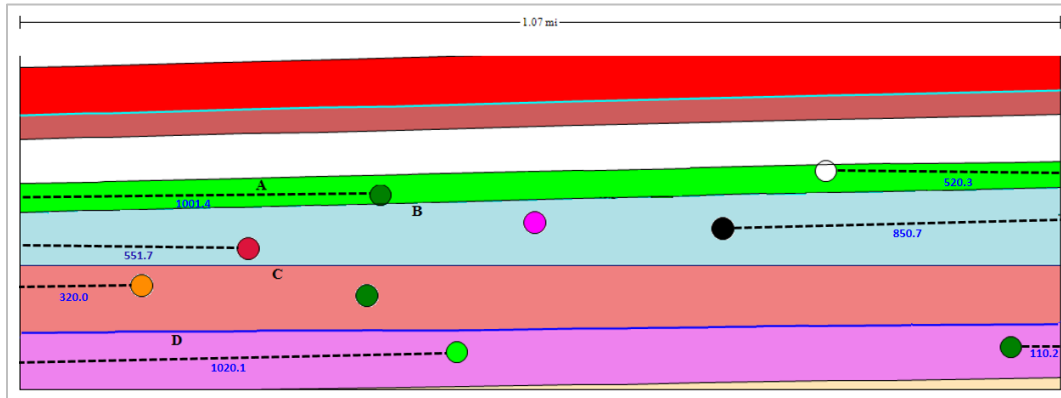

Display Well and Boundary Distances for Specific Formations in Block Diagram

Display the well and boundary distances for specific formations in a Block Diagram by applying the formations filter. To display the well and boundary distances for selected formations, click **Well Distance Formation Filter** or **Display Boundary Distance** option from the **3D Annotation and Distance** toolbar in Cross Section View and select the desired formations from the drop-down.
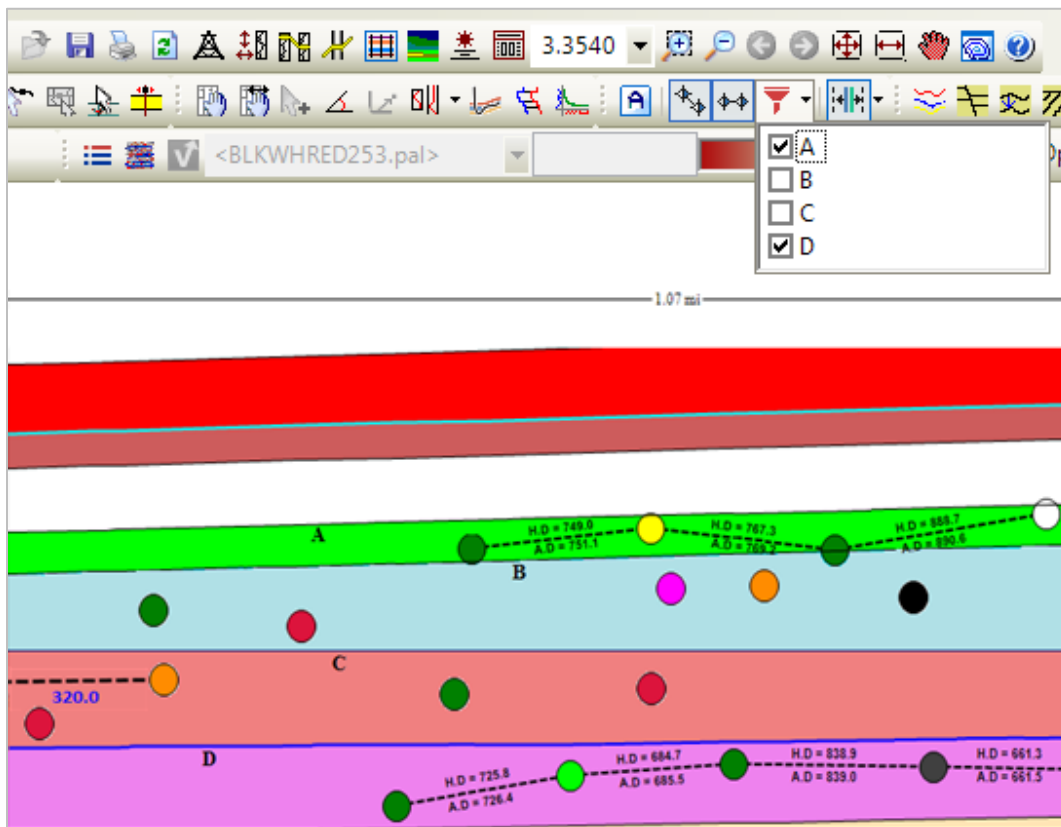
Apply Custom Display Properties to Wellbores in Block Diagram

Distinguish the overlapping wellbores and efficiently correlate the wells with other objects of cross section by assigning custom colors and adjusting the symbol size for individual wellbores. To set custom display properties, right-click the desired well and select **Display Properties for Selected Well** option from the context menu.
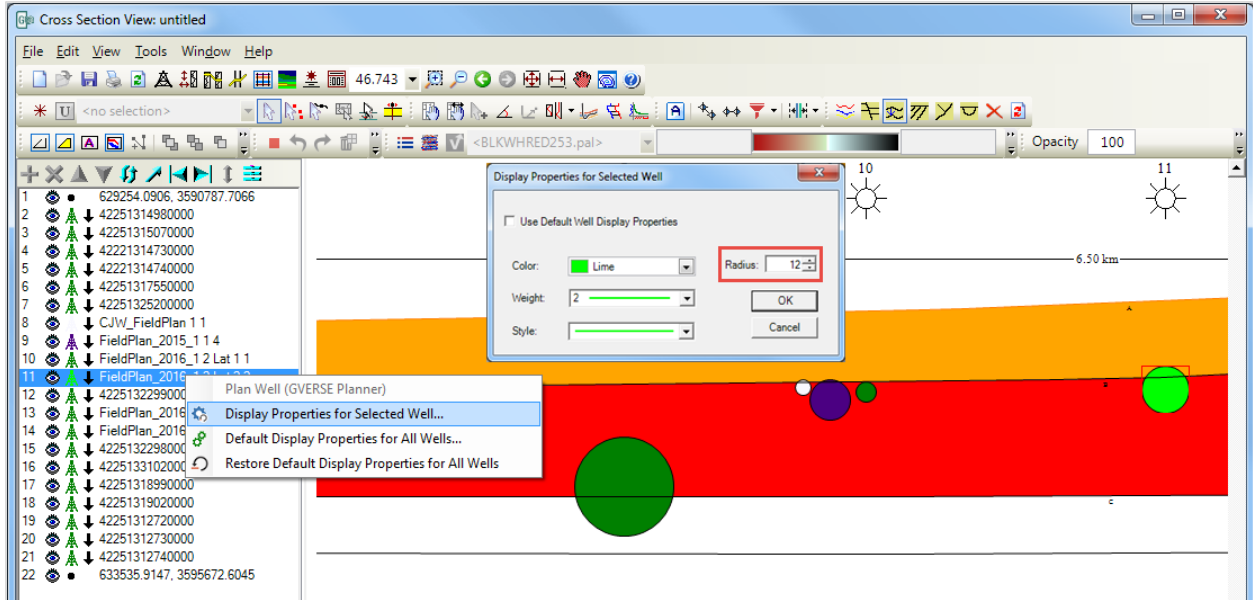
Posting Properties for Wells

Post the well footer at different locations and justify its position using the **Digital Headers** tab of the **Cross Section Display Preferences** dialog box.

Apply Single Color Palette to All Displayed Surfaces

Working with multiple surface/fault trends in 3D View is made a lot easier with the **Aggregate Fill** option. You can use this option to apply a single color palette to all the displayed surfaces and faults in order to determine the structural trend in 3D View. To apply a single color palette, select the Surfaces or Faults (main node) from the 3D Data panel and use the **Show Aggregate Fill** option from the properties panel.
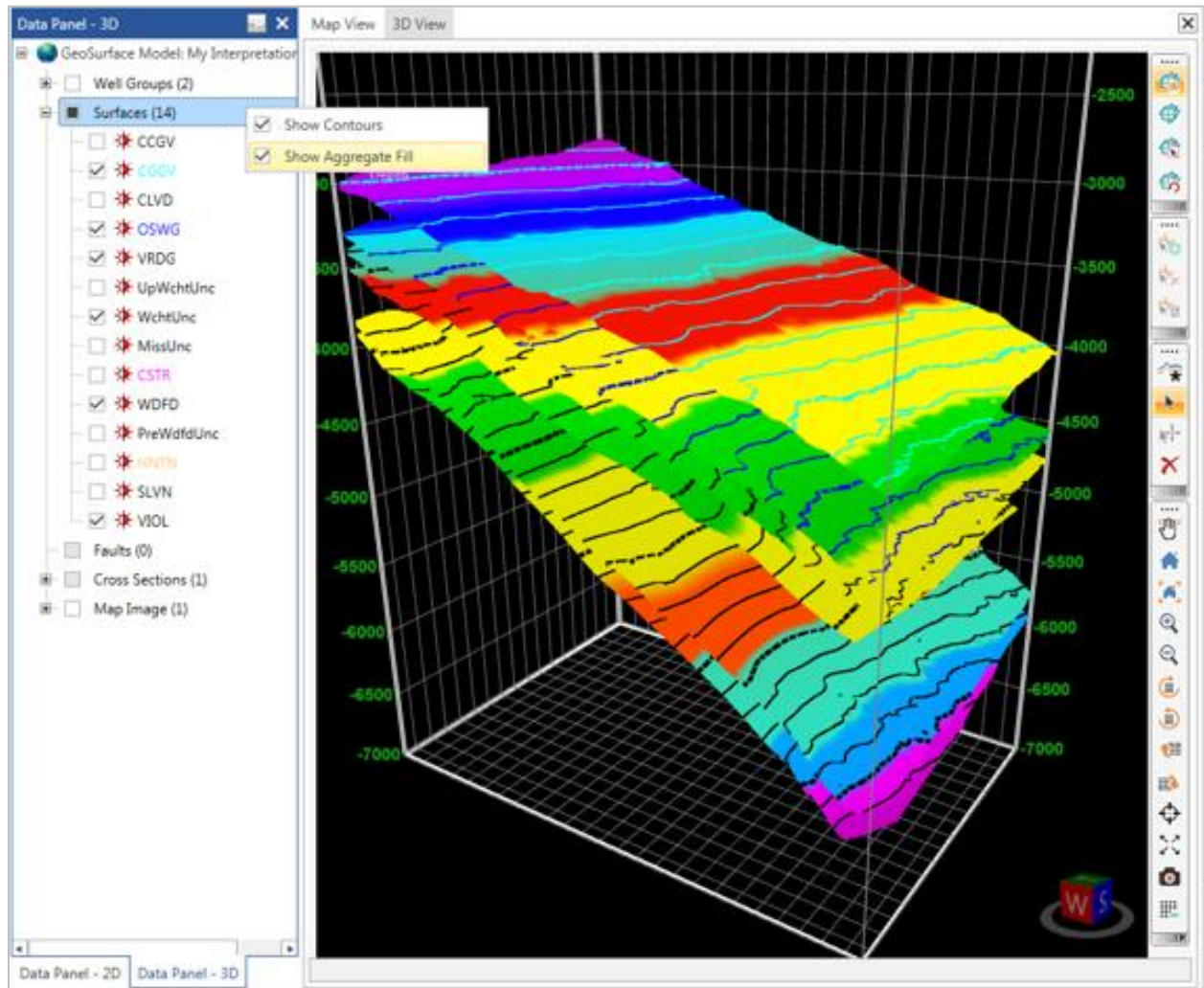
List Wells with Well Name, Number, Operator, and Status

Identify the wells in a Cross Section with multiple annotation options using a **Well List Text Options** button on the wells tab of the Cross Section View. You can use it to list the wells with **Well Name**, **Well Number**, **Operator,** and **Status**.

Modeling within Defined Regions and Cross Section Handling

Restrict modeling parameters within a defined region on the Map and 3D View for enhanced performance and detailed analysis. Use the **Create Modeling Region** button on the Map View toolbar to draw the modeling region and activate it. You can also load the cross sections lying partially or completely inside the active modeling region.
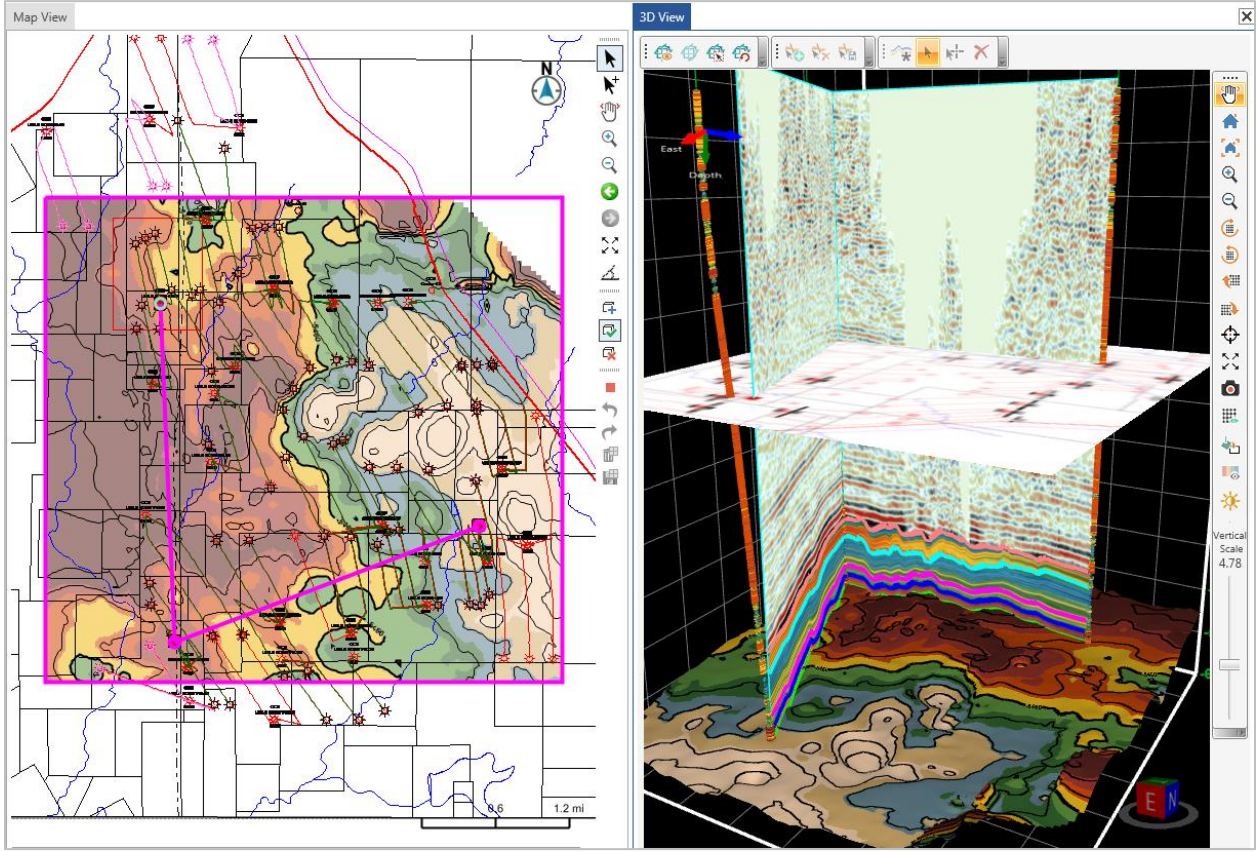
Add/Select Surface and Fault Points on Fence Diagrams

Add Surface/Fault points on the fence diagram as correlation lines using the Data Selection panel in the 3D View. To do so, click a desired fence, fault, or a surface to activate the **Data Selection** Panel and use the **Add Surface/Fault Pick** tool from the **Picking Options Toolbar**. You can also select and drag a point on the fence to modify its depth.
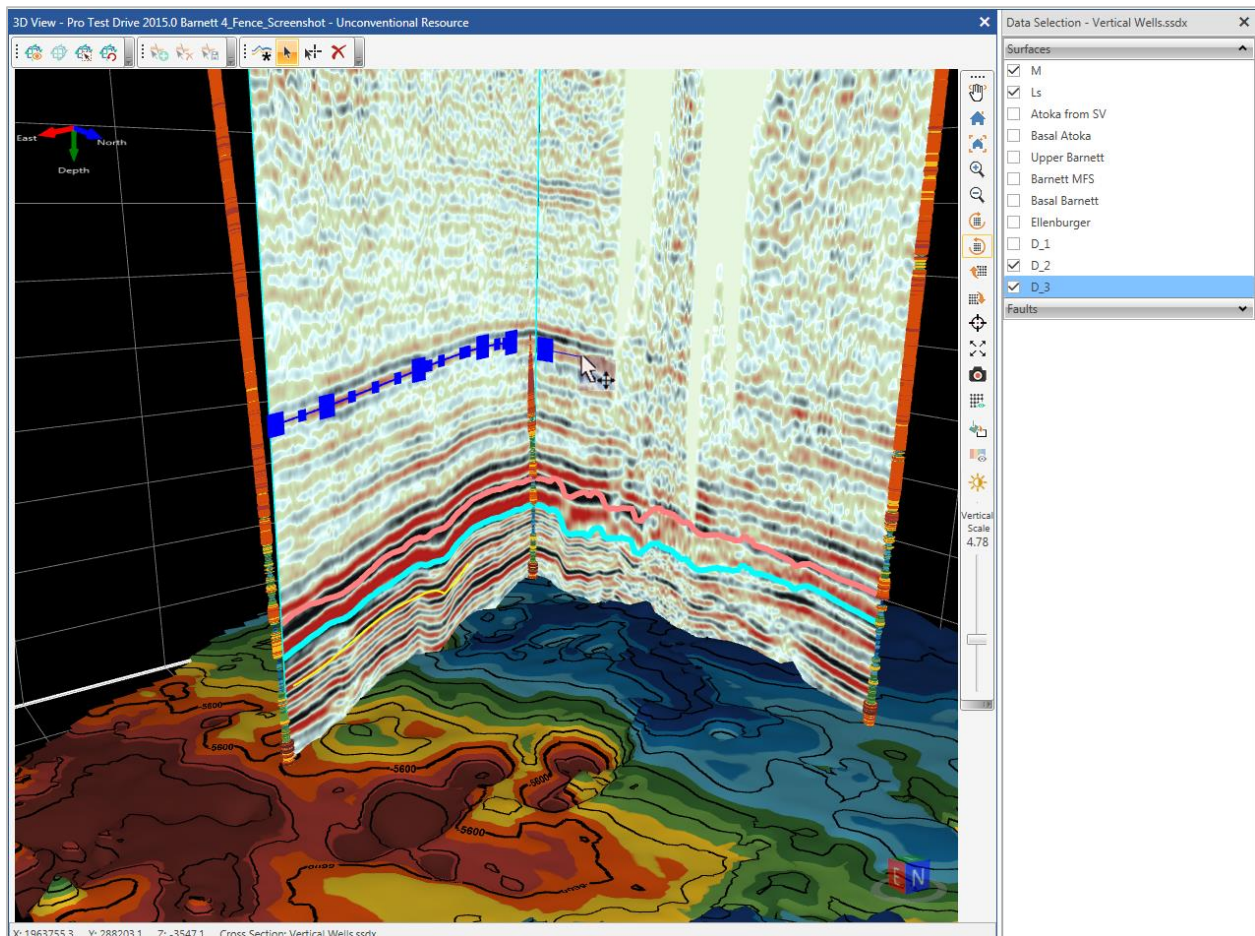
Spline Polygons

Choose to smooth the polygon edges in the Cross Section View using the Spline Factor option in the **Polygon Properties** dialog box. To apply the **Spline Factor**, right-click a polygon node, select **Display Properties** from the context menu and use the **Spline** check box on the **Polygon Properties** dialog box.

Single Surface Mode

Perform your interpretations on individual surfaces in Map View with **Single Surface Mode**, through which you can activate and display a single surface in Map View while keeping the other surfaces hidden. To activate the **Single Surface Mode**, right-click any surface from the 2D Data panel and use the **Single Surface Mode** checkbox from the context menu.
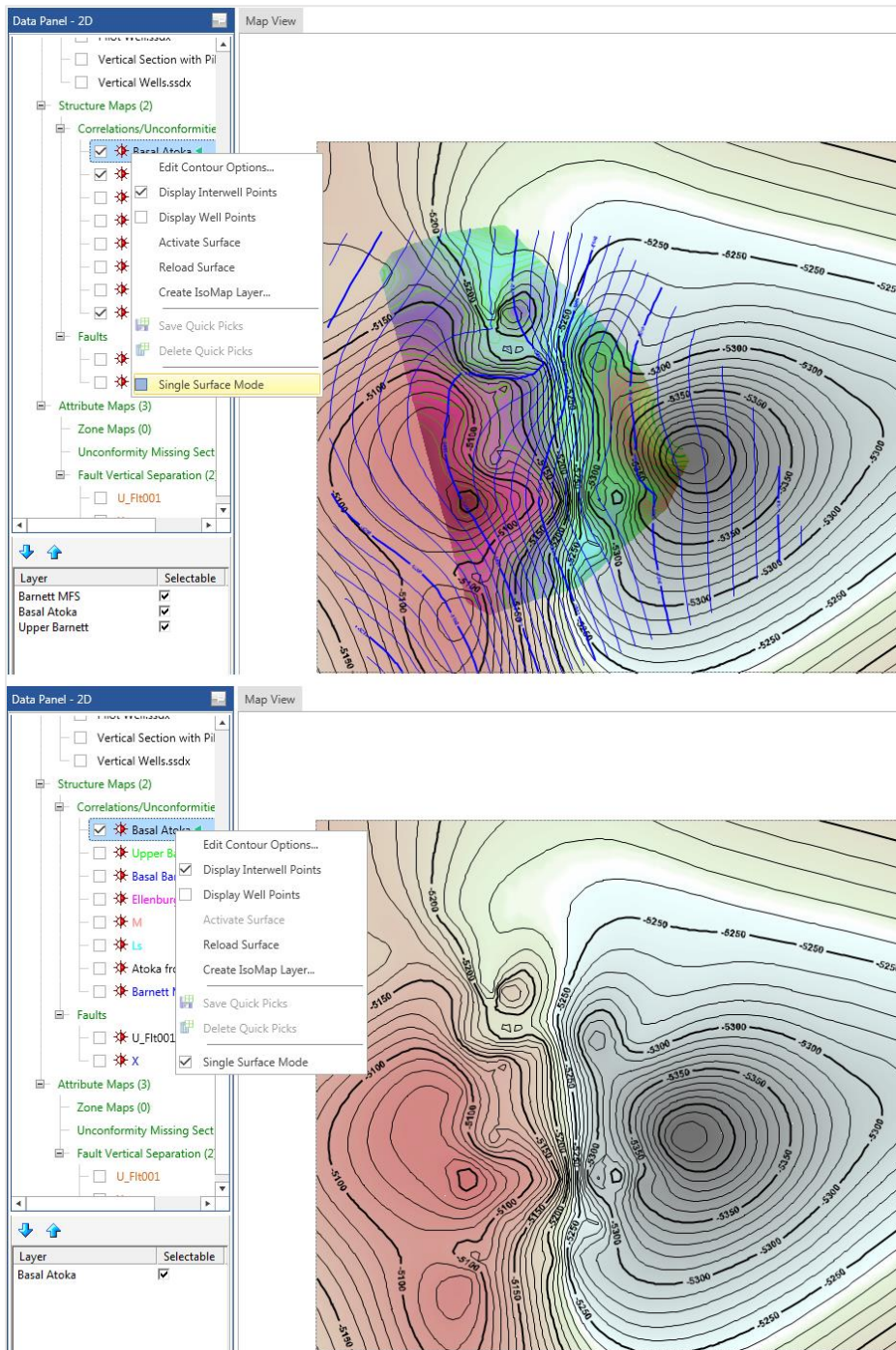
Fixed Issues

The following customer reported issues were fixed in this release.

ID	Description
168347	The Cross Section Template setting of the Straight Line View mode automatically resets to True Space mode if the template is applied to smartSTRAT vertical section, due to which the wells display properly without any manual editing.
179614	The selection of surfaces, faults, or annotations in the Cross Section view is preserved on moving a projected or buffer projected cross section in the Map view.
177802	Fixed the rendering issue of the Seismic Backdrop traces in the Cross Section view, where the computation was correct but one of the traces was being rendered outside the view in reverse order.
186518	Fixed the angle calculations of well distance text annotations so that they rotate and follow the trajectory of distance line. Previously, in the Block Diagram cross section, surfaces and faults shifted irregularly on displaying well distance text annotations between the wells, specifically when the wells were duplicated or their wellbore paths were intersecting in the Map view.
186792	Added a check to resolve the Null Reference Exception. Previously, on reloading a drilled well in smartSTRAT or Map view, a disposed object reference was being accessed that caused the error.

Third Party Acknowledgements

LMKR acknowledges that certain third party code has been bundled with, or embedded in, its software. The licensors of this third party code, and the terms and conditions of their respective licenses, may be found in the help file.

To access the 3rd party license agreements:

1. To access the online help, click the **help** tab located on the tab commands bar.

   The Help window displays.

2. In the **Contents** pane, locate the **Third Party Acknowledgements** help topic as shown in the image below.
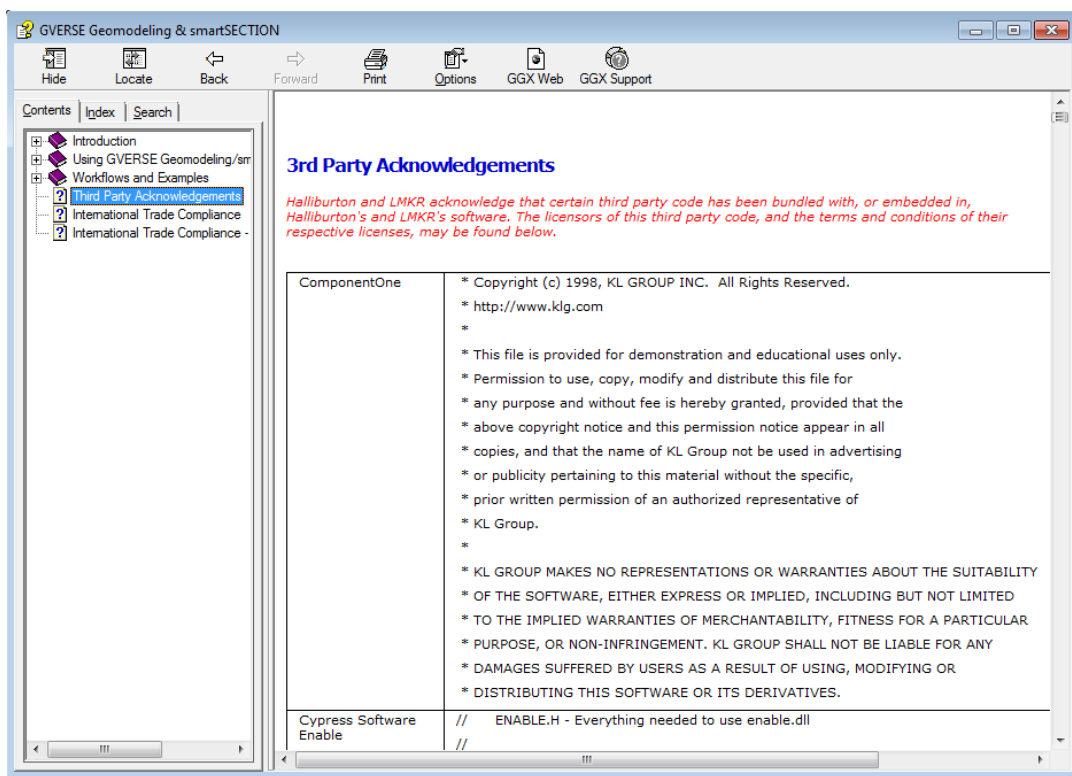
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This application is manufactured or designed using U.S. origin technology and is therefore subject to the export control laws of the United States. Any use or further disposition of such items is subject to U.S. law. Exports from the United States and any re-export thereafter may require a formal export license authorization from the government. If there are doubts about the requirements of the applicable law, it is recommended that the buyer obtain qualified legal advice. These items cannot be used in the design, production, use, or storage of chemical, biological, or nuclear weapons, or missiles of any kind.

The ECCNs provided here (if available) represent LMKR's opinion of the correct classification for the product today (based on the original software and/or original hardware). Classifications are subject to change. If you have any questions or need assistance please contact us at support@lmkr.com.

Under the U.S. Export Administration Regulations (EAR), the U.S. Government assigns your organization or client, as exporter/importer of record, responsibility for determining the correct authorization for the item at the time of export/import. Restrictions may apply to shipments based on the products, the customer, or the country of destination, and an export license may be required by the Department of Commerce prior to shipment. The U.S. Bureau of Industry and Security provides a website to assist you with determining the need for a license and with information regarding where to obtain help.

The URL is: http://www.bis.doc.gov.

Definitions

ECCN - Export Control Classification Number - The ECCN is an alpha-numeric code, e.g., 3A001, that describes a particular item or type of item, and shows the controls placed on that item. The CCL (Commerce Control List) is divided into ten broad categories, and each category is further subdivided into five product groups. The CCL is available on the EAR Website.

EAR - Export Administration Regulation - The EAR is a set of regulations that are administered by the Bureau of Industry and Security, which is part of the US Commerce Department. In general, the EAR govern whether a person may export a thing from the U.S., re-export the thing from a foreign country, or transfer a thing from one person to another in a foreign country. The EAR apply to physical things (sometimes referred to as "commodities") as well as technology and software.

The EAR number and the License type for this product are included in the table below. Also included is the date the table was last updated.

Product/Component/R5000	EAR Number	License	Last Updated On
GVERSE Geomodeling	EAR99	EAR	11/28/2017

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Please refer to our Customer Support timings mentioned below to ensure that you have access to our support analysts assigned to your region. When getting in touch with LMKR support, please remember that real-time support will not be available during bank holidays or after office hours. If you do get in touch with LMKR Support outside of work hours, please leave a voice message with a brief description of the issue that you are facing. Your voice message will be used to automatically create a support case for you. This will enable our analysts to attend to your issue and provide you with a resolution as soon as possible

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Name	Website Address
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LMKR GVERSE	http://www.lmkr.com/gverse
LMKR Support Portal	http://support.lmkr.com