Release Notes
Version 2018.2.0

Table of Contents

MOVE2018.2 RELEASE OVERVIEW

The new Move 2018.2 and previous 2018.1 releases of Move includes substantial new features, as well as improvements to the existing functionality and usability. This first section provides an overview of the new features, enhancements, and performance improvements to all current modules and tools and is followed by a more detailed breakdown of the changes to Move Core and the Modules.

With this release of Move2018.2 please review the additional sections below for details of some important changes. These include "System Requirements Changes and Notifications" concerning Linux platform support, "Software Downloads" regarding obtaining the software, "Move File Format Changes and Notifications" detailing changes to the Move file format, plus "FlexNet Licensing Changes and Notifications" detailing changes to Activation licensing support.
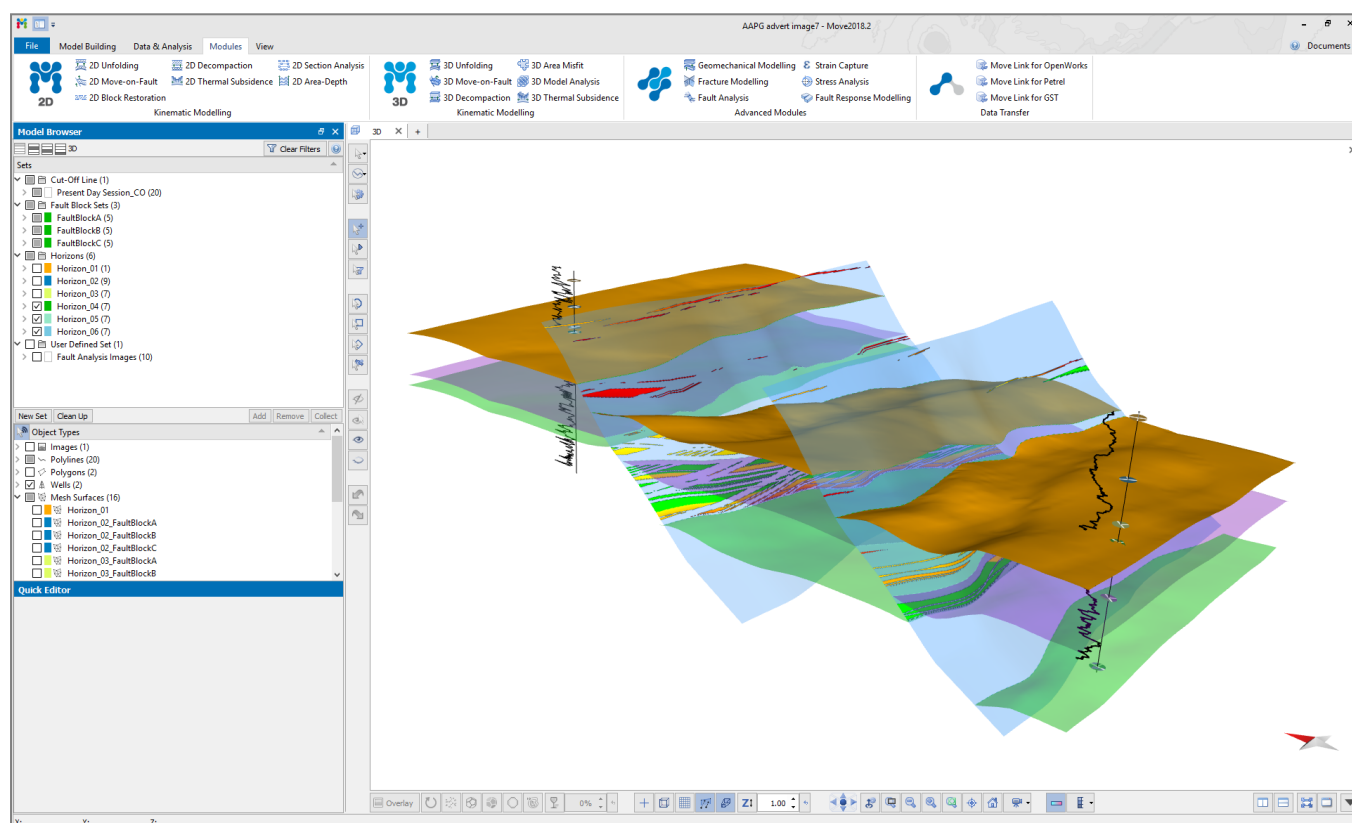

Figure 1 : Move2018.2 Interface with 3D View

One of the major additions to the Move2018.1 release for 2D Kinematic users was Elliptical Fault Flow: a brand new 2D kinematic algorithm. The algorithm has been developed by Midland Valley and models the deformation associated with isolated normal faults that exhibit decreases in fault displacements in all directions, away from the point of maximum displacement. Client feedback in the last year has led to the addition of a regional tilt (dip) to strata control in the Horizons from Fault tool, plus a more auto-population functionality in the 2D Move-on-Fault toolbox.

In 2D Kinematic in 2018.2 we have added a new 2D Area Depth tool. In addition and following client demand the Horizon from Template tool is now fully interactive. After a project dealing with complicated regional sections from the GOM there are now major developments and improvements to the Autopolygon and Tidy tools.

The 2018 release features substantial improvements to model building in 3D including the introduction of a brand new Surface with Boundaries tool which allows the user to create kriged surfaces with a user-defined outer boundary extent along with various constraints. The Extend tool in 3D has seen several key developments and functionality improved with new surface extension capabilities, namely extend surface using selected boundaries, and extend surface to lines.

Move 2018 sees several notable additions to Move Core in terms of imports, exports, and data handling. There is a new GIS vector data (including Shapefiles) live stage connection that allows tracking of external changes and a bulk refresh within Move. Handling of 2D and 3D seismic data within Move has been improved to allow a new export in SEG-Y format. The 3D Depth Conversion tool now supports seismic. The attribute Query tool is a new tool for Move2018 that provides several advanced methods for interrogating and selecting object, vertex, face or cell attribute data in Move. A common client request was to add the ability to visualize surfaces in Map View in various mesh and colour map styles in a similar way to the 3D View – this has been implemented in Move2018, including support for displaying time slices from seismic. The 2018.2 release sees the additon of new copy and paste functionality allowing images from the clipboard to inserted straight into the Views.
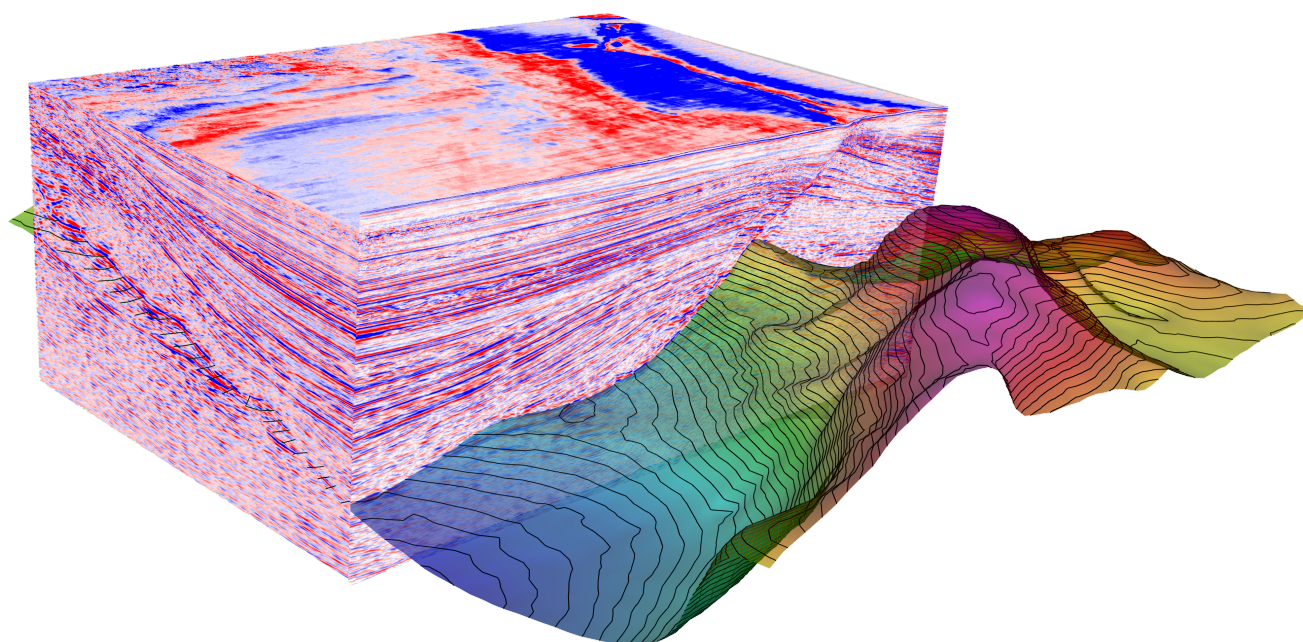
Figure 2: 3D Seismic cube and elevation surface

The Fault Analysis module introduces Stochastic modelling of hanging wall and footwall cut-off positions using known data resolution (i.e. seismic, velocity) to provide P10, P50 and P90 juxtaposition and seal values. For 2018.2 Intraformational well markers are now taken into consideration when calculating lithologies and seal proxies from Vshale logs, aligned relative to horizon top markers matching cut-off lines in the model. The well log chart on the Wells sheet now visualizes the log lithology as calculated from user-defined Vshale parameters.

Stress Analysis has been enhanced by adding a number of display options for focal mechanisms, including a beachball representation in the stereonet plot, plus tensile (T) and compressive (P) direction plots also being available in the Stereonet plot. The 2018.2 release allows Shear and normal stress attributes to be created as attributes.

The Fault Response Modelling module introduces Monte Carlo Stress Inversion. Stress inversion using Monte Carlo simulations combined with an iterative stress inversion using instability criterions, allows the

uncertainty in stress regimes derived from focal mechanisms to be quantified and allows users to analyse the heterogeneity of the underlying dataset.

After feedback from our User Meeting the Move Link for Petrel has been updated with a new Auto transfer option, allowing more control over the transfer process.

Move Knowledge Base

In Move2017 we introduced the first release of the Move Knowledge Base. This resource contains all Move Help Pages, Tutorials, and the release documentation presented in a single, offline, searchable entity, independent of Move. The material is cross-referenced and brings together tutorial workflows with more detailed help topics including algorithm theory and recommendations for tool application and parameter values. The Knowledge Base can be easily updated and made available to our users regularly therefore it is considered more up-to-date than the application help pages. This allows us to improve our teaching material, which is then independent of the Move software release cycle.

For 2018.2, the Knowledge Base has improved cross-referencing of tutorials and help topics and the addition of a new menu to the top bar. The new menu (Monthly Features) allows users to access the back catalogue of Move Monthly Features that form part of our monthly newsletter that is made available to registered users.
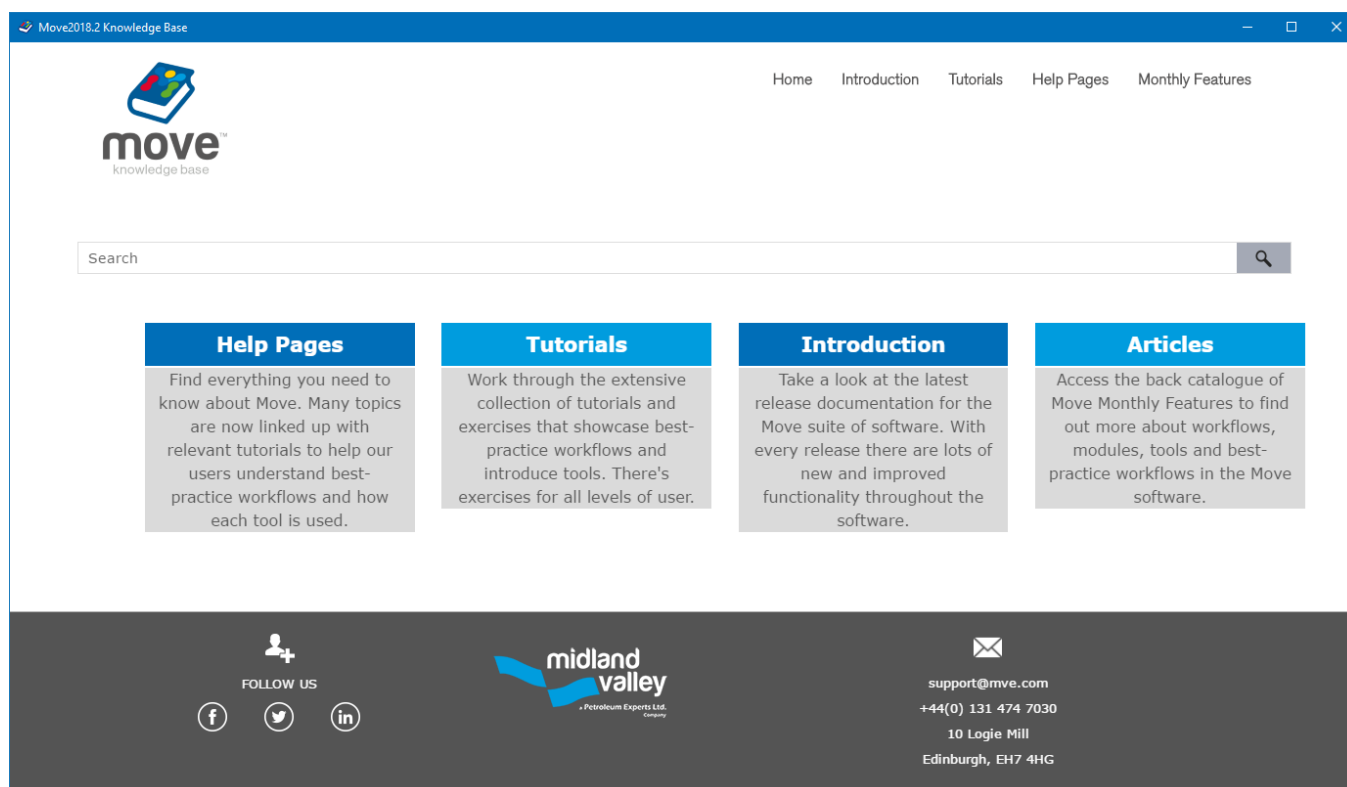
Figure 3: Opening window of the Move Knowledge Base – a platform on which the Move help pages, tutorials and monthly features have been integrated.

New tutorials have been added for Move2018 covering new functionality including Elliptical Fault Flow, Geologically Constrained Model Building techniques and Monte Carlo Stress Inversion. These tutorials are based on real datasets and provide users with detailed step-by-step instruction on the best practice workflows recommended by our structural geologists. Tutorials have also been updated with additional exercises on Uncertainty Modelling in Fault Analysis, improved 3D Model Building using the new Surface with Boundaries tool and new 3D Model Conditioning techniques. All 36 tutorials can be accessed from the Knowledge Base and from the software download link.

Move Core

The Move file format has changed. Older versions of Move will no longer be able to open files saved by Move 2018.2 - see the section below.

The GIS vector data (including Shapefiles) live stage connection allows users to work with Shapefiles within Move, whilst simultaneously editing the data in other applications such as those belonging to Esri ArcGis platform. When Shapefiles are imported, their time-stamp is recorded to detect external updates. In such cases, the user has the ability in Move to control how external and internal updates should be handled by replacing or duplicating modified objects. The 2018,2 release sees support for additional point, multi-point, and multi-polygon Shapefile formats.

The new Surface with Boundaries tool allows the user to create kriged surfaces with a user-defined outer boundary extent. Various constraints, such as inner holes, additional fault boundary surfaces and dip data can be applied to create more complex surface geometries. Also, an isolated fault can be used to tear and reshape a horizon surface locally.
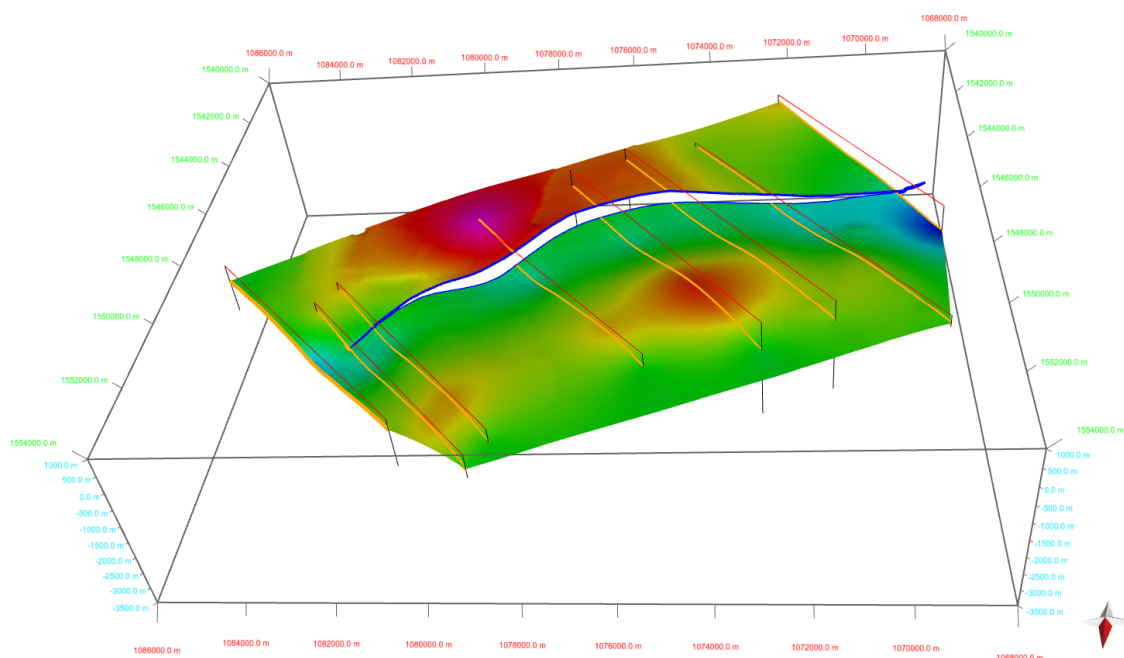
Figure 4: Example of a surface constructed using Surface With Boundaries tool, input data for surface consisted of orange lines interpreted on section and green outline of fault gap. These were combined to ensure surface had appropriate geometry and internal hole where fault is present.

The Extend Surface tool has been improved with new surface extension capabilities, such as extend surface using selected boundaries and extend surface to lines. The line extrusion functionality has been moved from the Surface creation tool into the Extend tool and has been merged with existing functionality to tie all surface extension methods into a single place. When extending a surface using a selected boundary, the user has several options available to control the surface extent interactively. Furthermore, the underlying extension methodology is based on bisectors to improve the quality of the extended area.
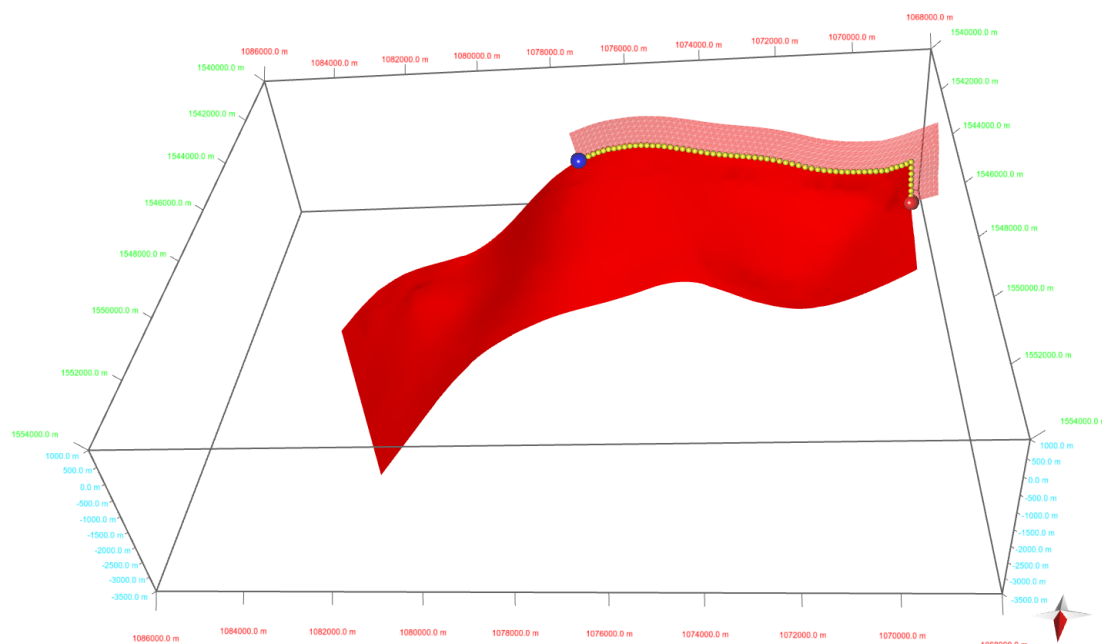
Figure 5: *Fault surface being extended using Selected Boundary. Surface is being extended using a partial selection of the object boundary.*

The new Query tool provides several advanced methods for interrogating and selecting data in Move. User-defined conditions in the form of logical equations can be created to test values of objects, vertex, faces or cell attributes. In addition to these, various spatial conditions can be performed to examine the geometric relationships between objects. Spatial queries, for example Within Distance or Closest to Vertex can also be used to transfer attributes from one object to another.

The Object Analyser is new for Move2018 – this uses some of the functionality from the Object Browser but also allows selected objects to be viewed in a table form with any associated object attributes displayed. It will also automatically determine length, area and map area as appropriate. The analyser behaves the same as existing analysers such as the Vertex Analyser and allows the interrogation of data, a number of data plots and the manipulation of data.

Figure 6: *Object Analyser with a number of different objects where the data has been sorted on Object Type.*

In Map View, the user can now display surfaces and grids in different mesh styles as they would be displayed in 3D Views. The three different styles are: outline, flat fill, or shaded fill. With shaded and flat fill styles, wireframes, contouring and colour maps can be visualized. In addition to this GeoCellular and TetraVolumes,

Fracture sets and Time Slices from 3D Seismic can now be visualized in Map Views. With this extension, the Map View combines the best of both the 3D and Map views.
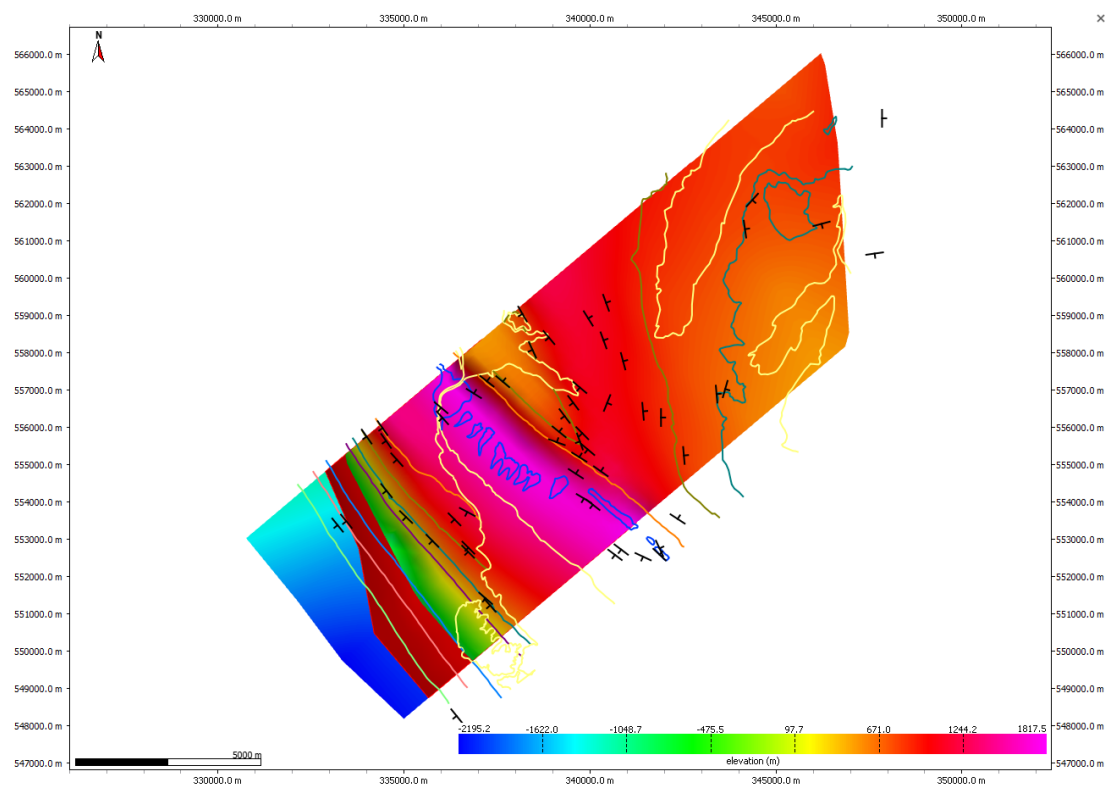
Figure 7: Map view with a surface colour mapped for elevation, highlighting the new solid fill state which is possible for mesh surfaces.

2D and 3D seismic data can now be exported in a SEG-Y format. This includes seismic profiles and volumes that were imported in time and depth converted in Move. The export also works on seismic reflection profiles that have been restored using the tools in the 2D Kinematic Modelling module. The 3D Depth Conversion tool will also support the conversion of seismic cubes.

In the Move Core the 3D PDF export now exports in PRC format. This PRC format is useful for embedding the 3D content into compatable authoring packages. PRC can be used as a 3D file type for storage and interchange. Such 3D binary files can be interchanged with other PRC compatible applications.

Kinematic Updates

In 2018.2 we have added a new tool, 2D Area Depth to the 2D Kinematic Modelling Module for Area Depth Strain analysis. The 2D Area-Depth tool provides a set of non-kinematic techniques used for predicting detachment depth and to test a section for area balance and internal consistency. Along with calculation of detachment depth, the 2D Area-Depth tool can quantify layer parallel strain, as well as shortening due to folding and/or faulting. The Area Depth plots calculated provide useful insights in to the structural evolution of the region of interest such as the depth of an ipper detachment or the boundary between growth and pre-growth stratigraphy.
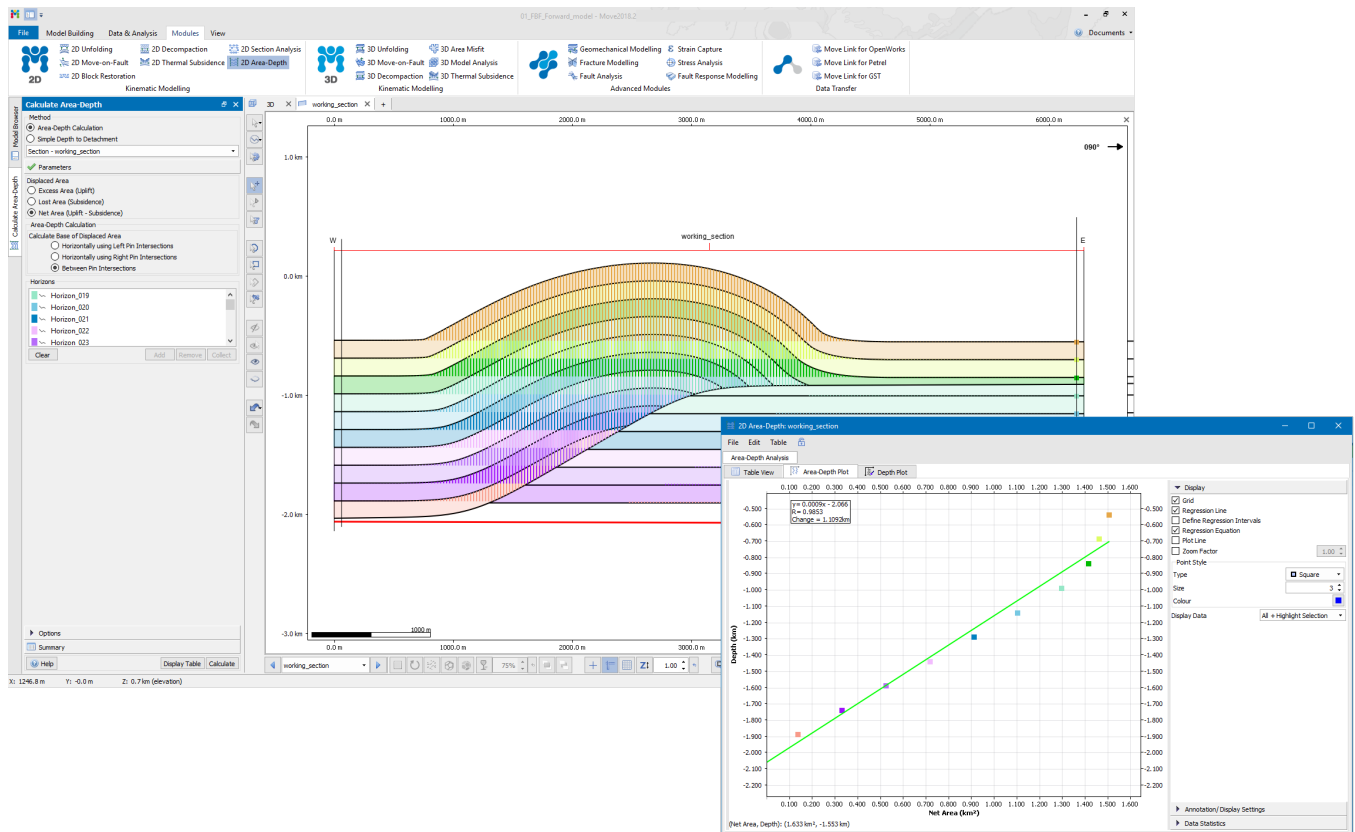
Figure 8: 2D Area Depth tool example, with Area Depth plot displayed.

Following client demand the Horizon from Template tool is now fully interactive. When modelling horizons using the Horizons from Template tool, horizon thickness can be modified easily by clicking and dragging the polylines interactively in the Section View. This interactive behaviour has also been incorporated in to the Create Lines tools allowing users to digitize horizons based on the stratigraphy in real-time.

Another highlight of the Move2018 release is the addition of a regional tilt (dip) to strata in the Horizons from Fault tool. This allows users to vary the pre-tectonic orientation of strata and construct more informative forward models of fault-related folds. This is particularly useful in orogenic wedges where strata usually dip towards the foreland.

After a project dealing with complicated regional sections from the Gulf of Mexizo there are now major developments and improvements to the Autopolygon and Tidy tools for Move2018.2. Thanks to these improvements the autopolygon tool now has a success rate of >99.5% and can handle structurally complex geometries as demonstrated in the figure below. The Tidy tool has been enhanced to give better visual feedback of potential issues and improved automatic correction of problems. Duplicate faults are now clearly highlighted and the default values within the toolbox changed to better reflect a wider range of section extents.A shotcut has also been added, Alt+T,Tidy Selected, to speed up the Tidy workflow.
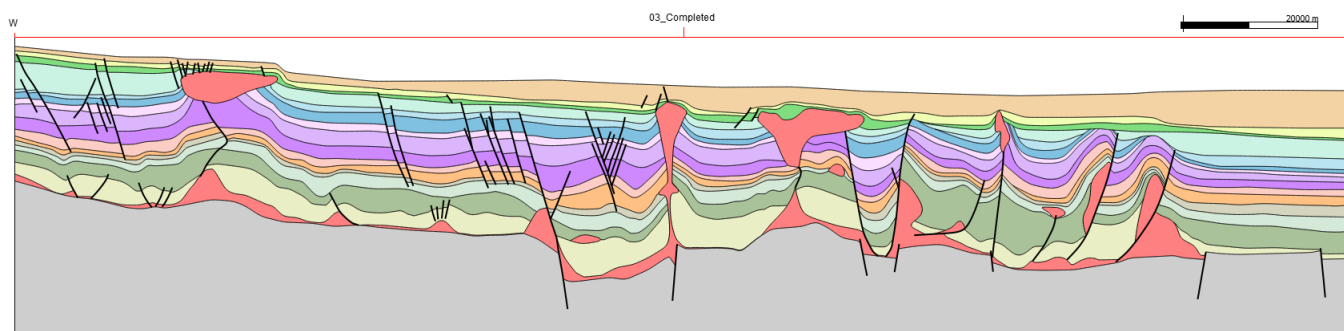
Figure 9: Complex cross section adapted from Bouroullec et. al. (2017). All polygons displayed in the section were successfully created using the Autopolygon tool in Move2018.2.

Elliptical Fault Flow provides a new way to model and restore faults with variable offsets. This new kinematic algorithm was created by Midland Valley and is accessed through the 2D Move-on-Fault and Horizon from Fault toolboxes. Elliptical Fault Flow is the first kinematic algorithm to fully incorporate non-uniform fault displacement profiles and gradients; as a result, the algorithm significantly expands the range of faulting styles that can be modelled using 2D Move-on-Fault algorithms.

As with other 2D Move-on-Fault algorithms, Elliptical Fault Flow predicts fault-related deformation for a given fault shape and offset using mathematical relationships derived from empirical field data (Watterson 1986; Barnett et al. 1987; Walsh & Watterson 1988; Gibson et al. 1989). In Move, the interface for the Elliptical Fault Flow algorithm has been optimised to allow the validity of interpretations to be quickly assessed, and to ensure that faults with non-uniform fault displacement profiles and gradients can be restored as easily as possible.

For more information on Elliptical Fault Flow, see the Move monthly feature available on the Midland Valley website or now as part of the Move Knowledge Base.
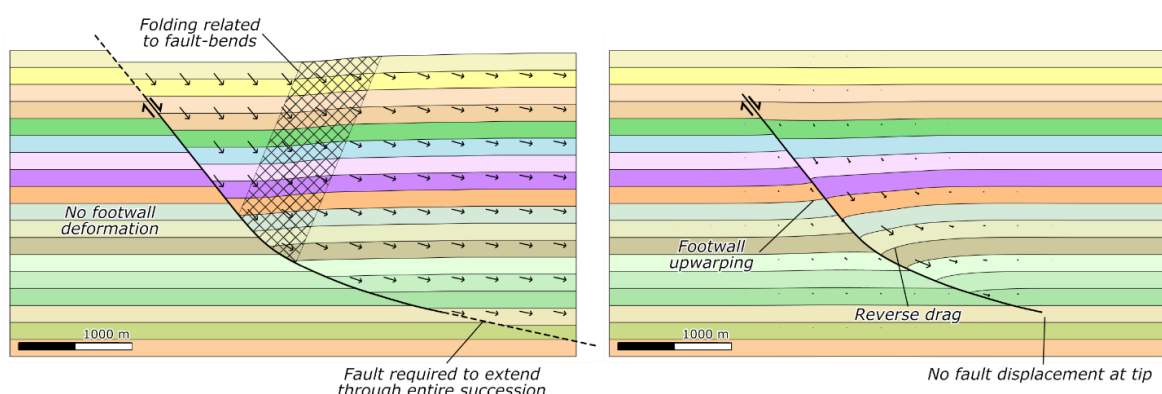
Figure 10: Forward model of normal fault using: (a) inclined Simple Shear with approximately uniform displacements in the hanging wall; (b) Elliptical Fault Flow, with displacements that decrease away from the centre of the fault.
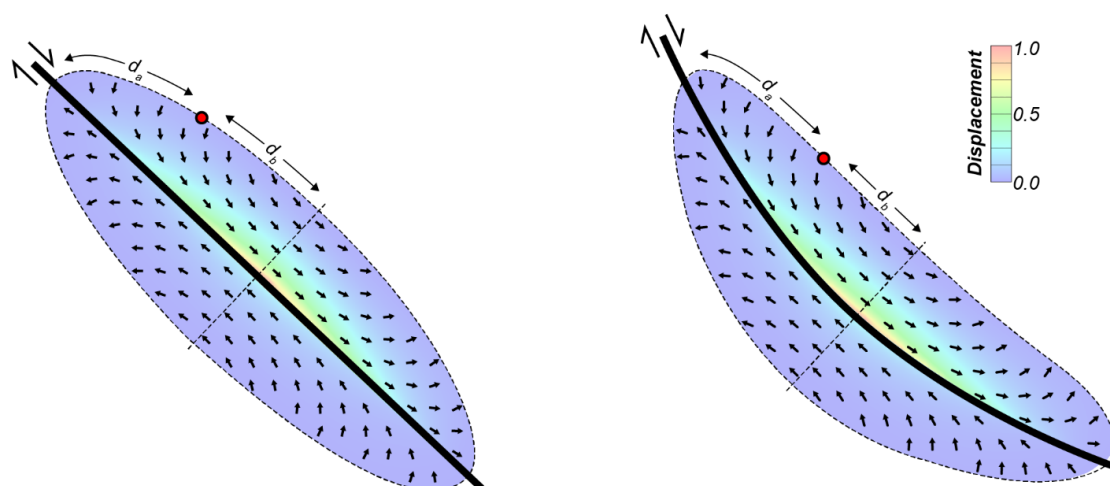
Figure 11: illustration showing key parameters used to calculate displacement with Elliptical Fault Flow for: (a) a planar normal fault; (b) a concave upward curve, normal fault. Black dash lines represent the spatial extent of fault-related deformation. Area around faults are colour mapped for the normalised displacement, including 20% footwall movement.

Finally, the time required to perform most restoration workflows has been reduced through the inclusion of more auto-population functionality in the 2D Move-on-Fault toolbox. In 2018, when a fault is collected into the toolbox, the software will automatically identify the youngest stratigraphic horizon that is offset by the fault and set up the Join Beds collection boxes with the appropriate hanging and footwall line segments. For sections containing multiple faults, this means the user simply specify the Active Fault and click Apply, reducing the number of mouse clicks and saving lots of time.
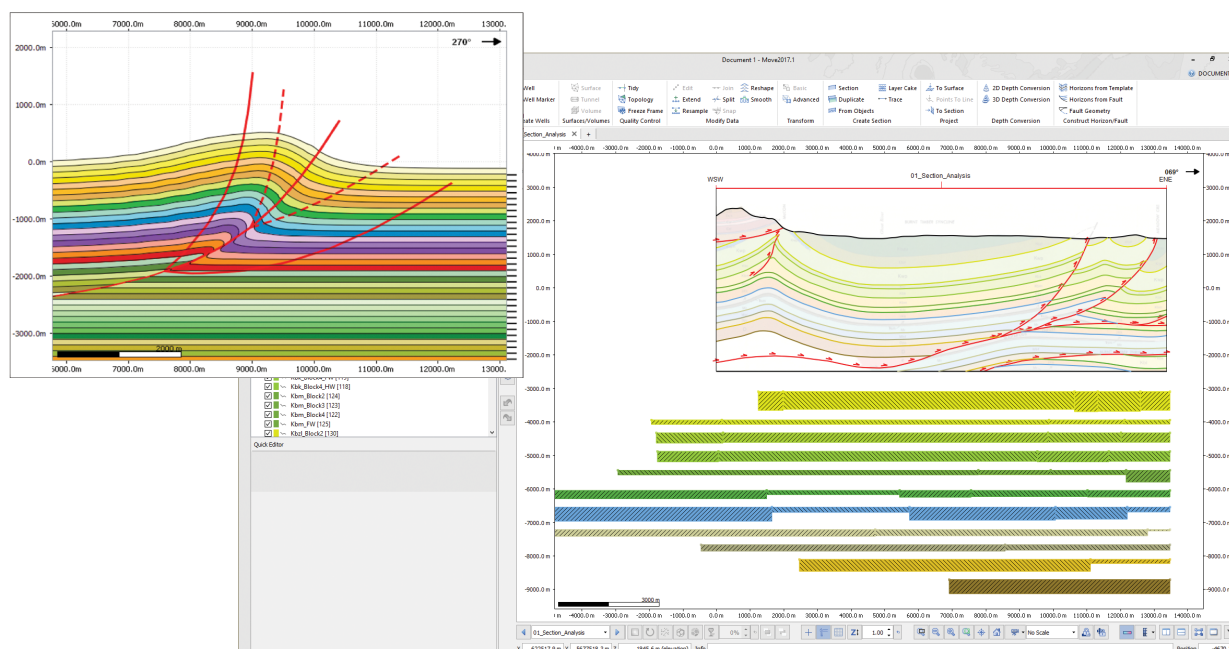
Figure 12: Move kinematic examples.

Fault Analysis

Fault Analysis has been expanded to include Uncertainty Modelling for 2018. The the 2018.2 release intraformational well markers are now taken into consideration when calculating lithologies and seal proxies from Vshale logs, aligned relative to horizon top markers matching cut-off lines in the model. The well log chart on the Wells sheet now visualizes the log lithology as calculated from user-defined Vshale parameters.

The Fault Analysis Uncertainty Modelling tool allows users to run a Monte Carlo simulation that models deviations in fault cut-off position and Vshale log values. Using these simulations, the impact of data resolution can be investigated and the certainty of fault juxtaposition and seal proxies to be quantified. A strike projection of the modelled fault can be visualized and colour mapped for the mean, mode or percentile (e.g. P10, P50, P90) result. These values can be saved to the fault in 3D. A graphical display of any point or region on a fault gives each possible result and its likelihood, or the probability of a result to be determined.

Uncertainty Modelling quantifies the likelihood of a fault acting as a conduit or barrier to across fault fluid flow. This can add confidence to prospect generation and trap evaluation and reduce financial risk.
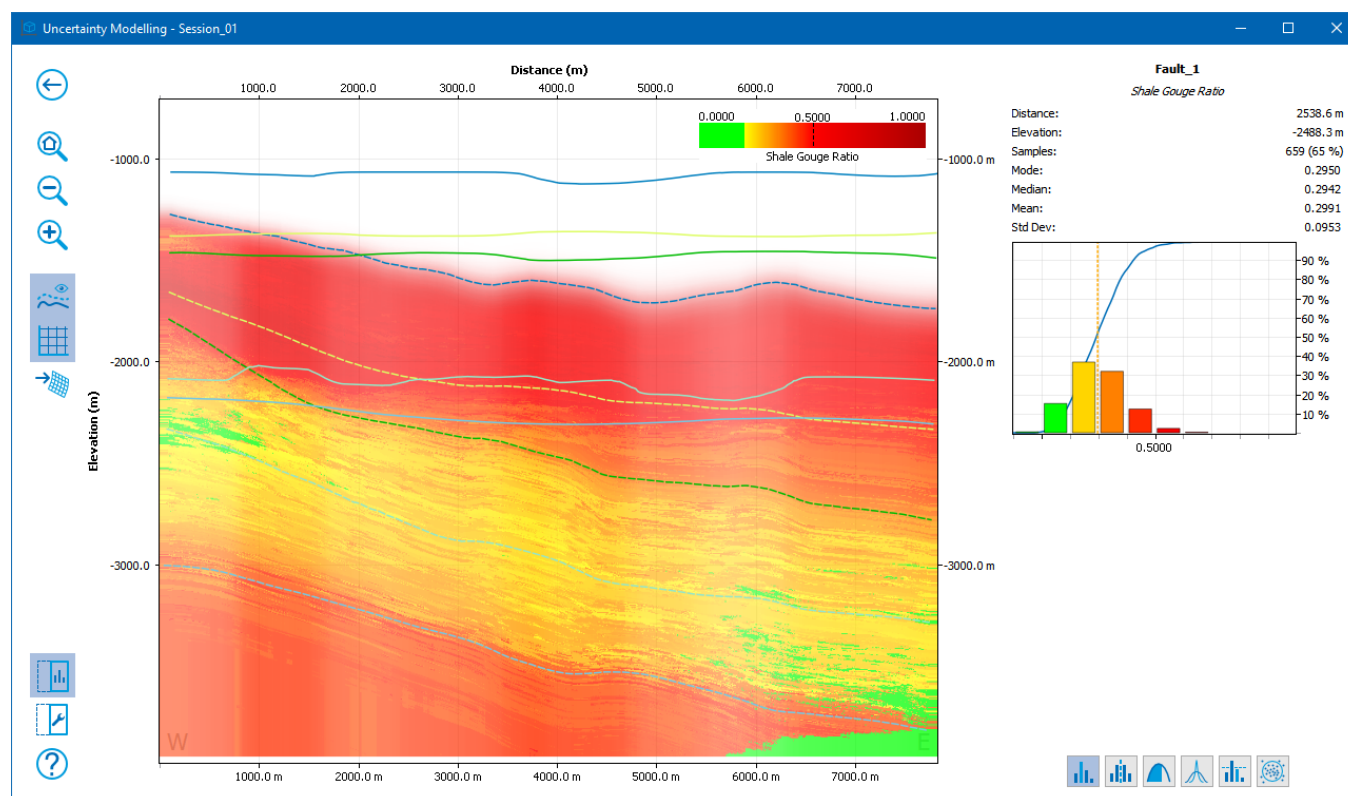
Figure 13: Strike projection of a fault surface colour mapped for the mode values of SGR based on 1,000 iterations in the uncertainty modelling tool. The graph on the right of the window shows the possible results and the probability of occurrence of each.

Additional developments to Fault Analysis in 2018 allow:

- Seal proxy colour maps can be customised.
- Seal proxies to be filtered by horizon displacement area.
- Fault Triangle diagrams to be calculated from well logs without stratigraphic markers.
- Charts allow guide lines to be created and optionally converted to mesh surfaces in the model.
- The well log chart on the Wells sheet now visualizes the log lithology as calculated from user-defined Vshale parameters.

- In Uncertainty Modelling it is now possible to visualize the probabilities of combined lithological juxtaposition scenarios.
- Uncertainty Modelling now offers the option to transfer scenario percentiles P10, P50 and P90 to the fault in a single operation.
- Uncertainty Modelling now offers the option to transfer the probabilities of all lithological juxtaposition scenarios to the fault in a single operation.
- Intraformational well markers are now taken into consideration when calculating lithologies and seal proxies from Vshale logs, aligned relative to horizon top markers matching cut-off lines in the model.
- Fault Scaling and Fault Growth plots are now calculated from data projected onto individual fault planes, rather than a single combined plane.
- Uncertainty Modelling now offers the ability to simulate variations in parameters to Probabilistic SSF and Hydrocarbon Column Hight.
- The Fault Growth chart now visualizes a range of likely growth activity based on lateral sampling.
- Added ability to adjust displacement reference frame for throw calculation.
- Fault Triangle now allows arbitrary well markers to be created by dragging guidelines from the well log charts' horizontal axes.

Figure 14: Faults colour mapped for Throw with associated horizon cut-off lines displayed in black on the fault surfaces generated using the Fault Analysis Module.

Fault Response Modelling

For 2018, Monte Carlo Stress Inversion has been added to the Fault Response Modelling module.

This new technique introduces iterative stress inversion methods based on Monte Carlo simulations and direct inversion method to invert stress fields from focal mechanisms (Angelier 1990). Rather than using the grid search method, various fault plane realisations through Monte Carlo simulations will be directly inverted and the best fitting stress tensor is identified by investigating the resulting stress orientation pattern from many simulations. To gain further confidence several confidence estimators are cross plotted to approximate differential stresses.

The new functionality aims to reduce the effects of the two major challenges, the fault/auxiliary issue and the heterogeneity of the underlying dataset. The stress inversion methodology shows how statistical simulations can contribute to resolve these issues. In combination with estimator cross plots, this technique allows the user to quickly verify heterogeneity and helps to separate fault populations from each other. Furthermore, the statistical approach minimises the fault/auxiliary plane uncertainty inherent to earthquake focal mechanisms, resulting in stress orientation patterns and shape ratio variations as shown in the figure below.
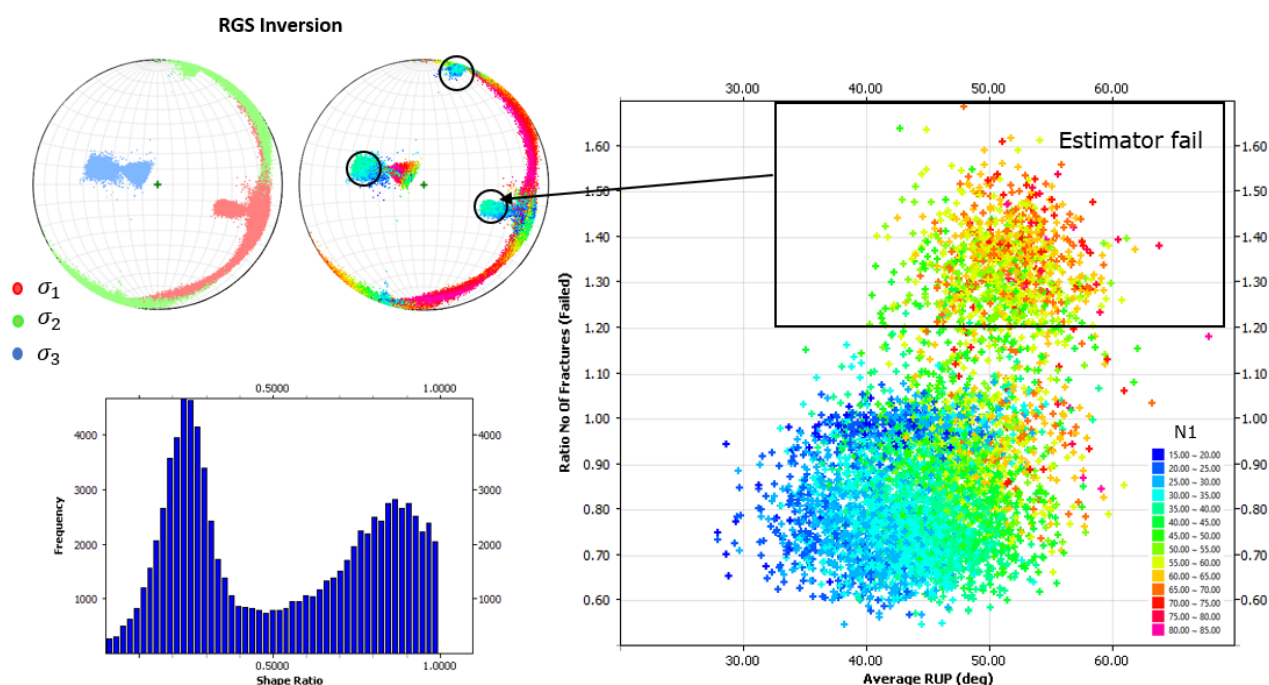
Figure 15: Focal mechanisms derived from a DC moment tensor decomposition have been applied to a RGS Inversion. On the Stereo net to the left, the principal orientations from 10.0 stress inversions are shown. On the Stereo net to the right, the principal orientations are colour mapped with the corresponding shape ratios. The Estimator cross plot on the right-hand side can be used to investigate the quality of the resulting stress regime.

Stress Analysis

Stress Analysis now offers the user several options to display focal mechanism data. Once the moment tensors have been decomposed with either the shear or tensile source model (this functionality was introduced in Move2017), the results can now be displayed with a beachball representation in the stereonet plot (for a single focal mechanism), or in Map Views and 3D Views. In addition to this, the tensile (T) and compressive (P) direction plots are now available in the stereonet plot within the tool. Where only fault planes and their corresponding rake directions are available, the tool can now perform all necessary orientation attributes to produce beachball displays.

The 2018.2 release allows Shear and normal stress attributes to be created as attributes, when the user creates a the stress overlay as an attribute.
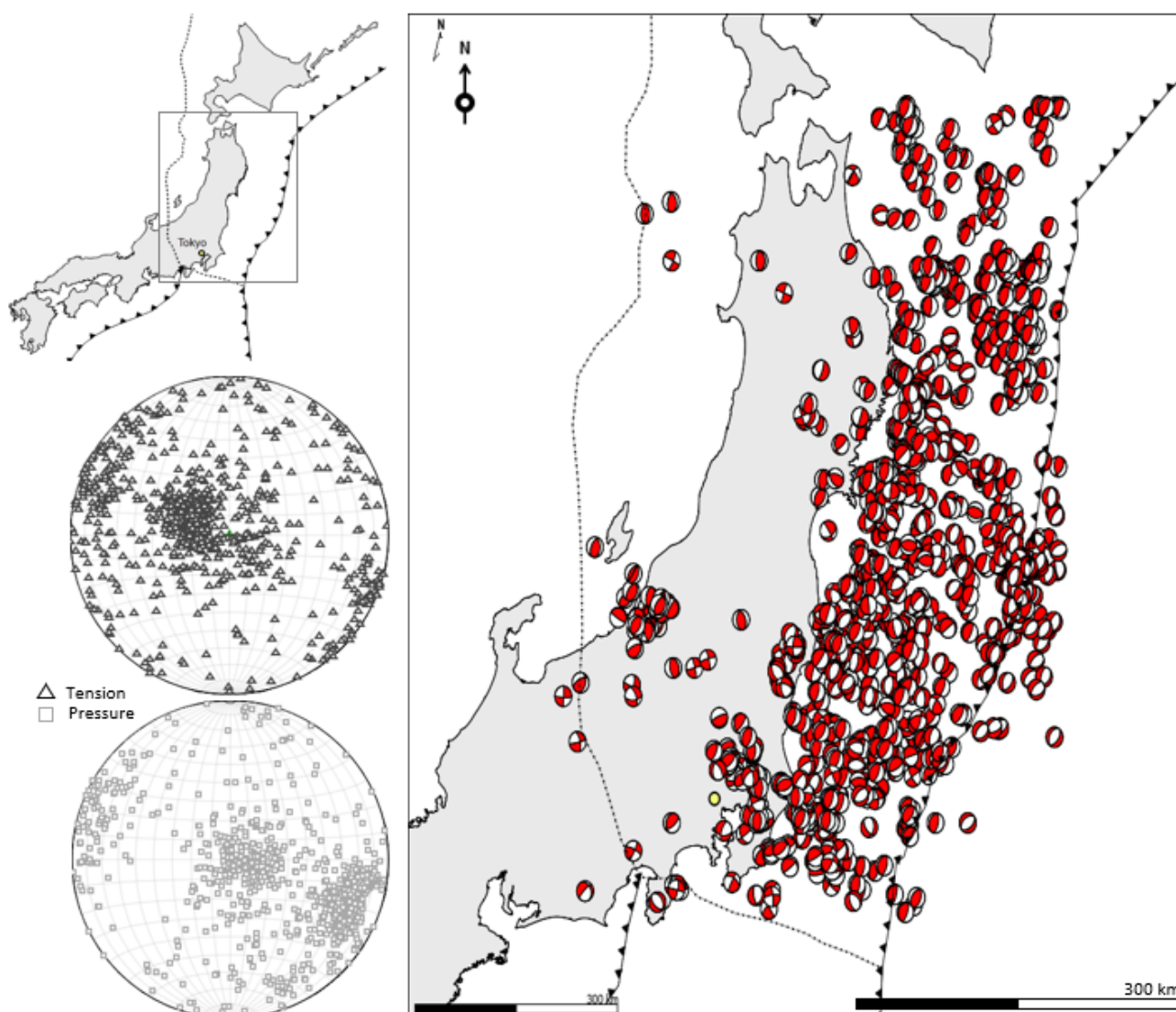
Figure 16: Tensile (T) and compressive (P) direction plots available in the Stereo net plot with the Stress Analysis tool. The beach balls shown on the Map View are generated from the Stress Analysis tool.

Petrel Link

After feedback from our User Meeting the Move Link for Petrel has been updated with a new Auto transfer option, allowing more control over the transfer process. A Manual Transfer Option allows the user to select which objects are to be transferred from Petrel To Move before committing to the transfer. The MoveLink for Petrel Plug-in has also been updated to be compatible with Petrel 2018.
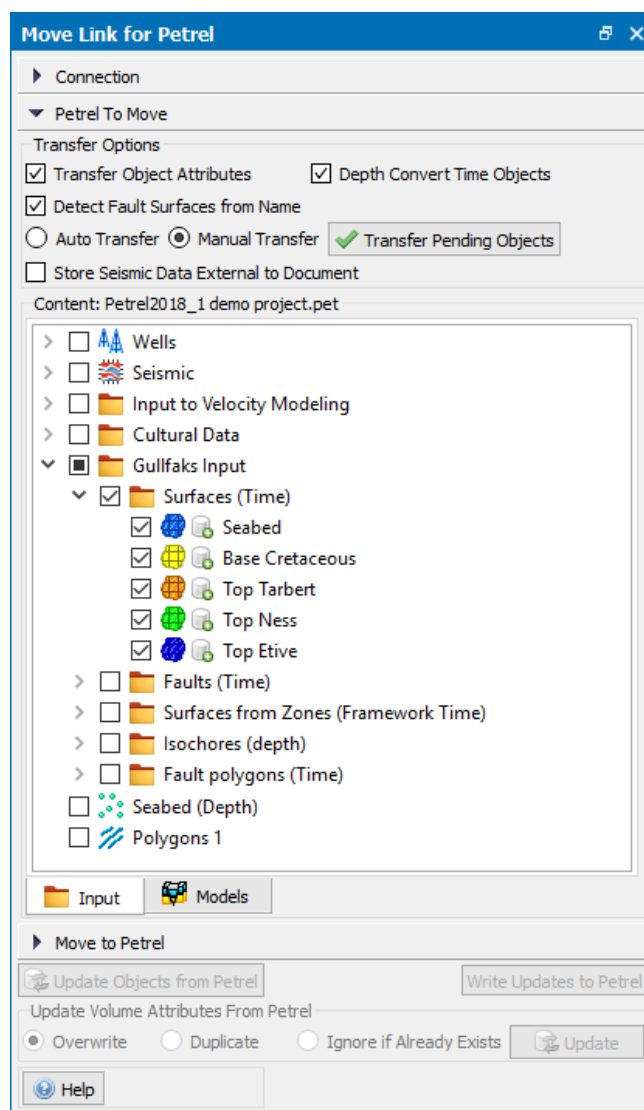
Figure 17: Move Link for Petrel in Move2018.2 with new manual transfer functionality

Other General Improvements

Improvements have been made to the handling of data and the control of object and attribute visibility. A new context menu option has been added to the Sections Browser in the Model Browser to support the display of cross-sections. This option will allow the user more control over the display where there is a large number of cross-sections in the model. The Quick Editor for wells and fractures now includes options to control the display of marker data and the percentage of fractures displayed, respectively. Selection speeds have been improved when working with wells with many well logs.

To improve the handling of large files, two new options have been added to Preferences to control whether objects are visualized when a Move project is opened, or new data is imported into an existing Move document. These options will allow the data to be imported but will automatically render the objects invisible until the user wishes to show them by controlling object visibility from the Model Browser. This speeds up rendering times when working in a 3D View with a large number of objects. In 2018.2 reading time for Move files with larger GeoCellular Volumes has been improved on multi-processor machines.

New options have been added to the Quick Access tools to make it quicker to Close the document, Close All documents or Save the current document. Usability has also been improved with the introduction of a new shortcut – Ctrl + D to duplicate a cross-section. Due to this the Resample shortcut has been changed to Ctrl + R.

The support for Closed Lines and Polygons with internal holes has been enhanced to allow situations where a multi-line is converted to a polygon, if parts of a line form an internal boundary then this boundary is preserved in the polygon. Where polygons with an internal hole are converted to mesh surfaces, the new mesh surface will have an internal hole.

Summary of Main Release Highlights

Knowledge Base

- Improved cross-referencing of tutorials and help.
- Addition of the back-catalogue for the Move Monthly Feature articles.

Move Core

- PDF export now exports in PRC format
- GIS vector data live link for Shapefile format.
- Map View control of 3D data - surfaces/grids/contours/colour maps.
- Query tool: logical attribute queries.
- Object Attribute Analyser – new analyser for 2018.
- Surface with Boundaries tool in 3D model building.
- Extend tool improvements and additions in 3D Model Building.
- Export 2D and 3D seismic in SEG-Y format.
- Copy and Paste of Images - from Clipboard into the active View

2D Kinematic Modelling

- New 2D Area Depth tool
- Horizon from Template tool now fully interactive
- Major improvements to Autopolygon and Tidy
- 2D Elliptical Fault Flow algorithm.
- Auto-population for 2D Move-on-Fault toolboxes.
- Support of a Regional Dip being defined in Horizon from Fault.
- Depth conversion of 2D Seismic.

3D Kinematic Modelling

- Depth conversion of 3D Seismic.

Fault Analysis

- Addition of Uncertainty Modelling - Quantify uncertainty in juxtaposition and sealing behaviour of faults by simulating deviations in hanging wall and footwall cut-offs as well as Vshale logs based on known data resolution:
  - Run Monte Carlo simulations for a fault property by testing data deviation scenarios within given ranges.
  - Visualize aggregate statistics, distribution percentiles as well as probabilities of specific outcomes across a fault surface.
- Intraformational well markers are now taken into consideration when calculating lithologies and seal proxies from Vshale logs, aligned relative to horizon top markers matching cut-off lines in the model. The well log chart on the Wells sheet now visualizes the log lithology as calculated from user-defined Vshale parameters.
- Interrogate distributions of possible outcomes for a point or area on the fault.
- Seal proxy colour maps can be customised.
- Seal proxies can be filtered by horizon displacement area.
- Fault Triangle diagrams can be calculated from well logs without stratigraphic markers.
- Charts allow guide lines to be created and optionally converted to mesh surfaces in the model.

Fault Response Modelling

- Monte Carlo Stress Inversion

Stress Analysis

- New algorithm called Focal Mechanisms, which has its own sheet of options in the Stress Analysis tool.
    - Derive all necessary attributes and focal plane orientations from fault plane and rake information only (rather than deriving this from moment tensors).
    - PT Direction Plot (tensile T and compressive P).
    - Beachball display within the stereonet plot for a single selected focal mechanism.
    - Beachball display for Map Views and 3D Views with beachball scaling capabilities.

  Shear and normal stress attributes are now created as attributes

Software Components delivered in Move2018.2

- Move modules and third-party software links:

    - 2D Kinematic Modelling
    - 3D Kinematic Modelling
    - Geomechanical Modelling
    - Fault Analysis
    - Fracture Modelling
    - Fault Response Modelling
    - Stress Analysis
    - Move Link for Petrel, OpenWorks, GST

- Move Link for Petrel software (Petrel installers).

- Midland Valley License Manager (FLEXnet 11.14.1) software.

System Requirements Changes and Notifications - Important Information

Move2018.2 is a 64-bit only release on Windows and Linux, platforms.
Move2018.2 has been tested and is fully compatible with Microsoft Windows 10; also, full support for Windows 7, Windows 8, and Windows 8.1. Move2018.2 is not support on Windows Vista.

Move2018.2 on Linux is supported on RHEL6 and RHEL7. Move2018.2 is not support on RHEL5.

Please note the following important platform changes:

- Move support on Linux is to be discontinued, with Move2018.2 being the last release supporting Linux.
- Move support on OS X is discontinued, Move 2017.1 was the last Move OS X release.

Move File Format Changes and Notifications - Important Information

Beginning with Move2018.2, the .move file format will not be forwards compatible, however will remain backwards compatible. In summary:

- Older versions of the software (including Move2018.1 and previous Move versions) will NOT be able to read any ".move" files produced from a newer version e.g. Move2018.2.
- Newer versions of Move e.g. 2018.2 will still be able to read older versions of ".move" files (including files saved from Move2018.1 or any previous Move versions).
- Please bear this in mind when either testing a new version of Move in an environment where older versions of Move still exist, or if utilising multiple versions of the Move software.

FlexNet Licensing Changes and Notifications - Important Information

- Beginning with Move2018.2, The FlexNet Activation licensing method has been removed from the software and licensing system. In summary:
- The Move2018.2 installer does not install a FlexNet Activaton Service as previously.
- Any existing FlexNet Activaton Service can be optionally removed.
- The Move2018.2 software does not support licensing via Activation.
- Existing Activation customers can choose either a Network License option, or a Local License option as an alternative.

Move2018.2 Software and Supporting Documentation

Move2018.2 Release Software

The following software is provided with Move2018.2

Move2018.2 Software Installers for Move and Knowledge Base	
Move2018.2/Windows64	Installers for Windows (64-bit)
Move2018.2/Linux64	Archive for Linux (64-bit)

License Manager Software	
LicenseManager/FLEXnet11.14/Windows64	License Manager for Windows (64-bit)
LicenseManager/FLEXnet11.14/Linux64	License Manager for Linux (64-bit)
LicenseManager/FLEXnet11.14/docs	License Manager Documentation

Move Link for Petrel Software Installers	
MoveLinkforPetrel/Petrel 2016	MSI and PIP Installers for Petrel 2016
MoveLinkforPetrel/Petrel 2017	MSI and PIP Installers for Petrel 2017
MoveLinkforPetrel/Petrel 2018	MSI and PIP Installers for Petrel 2018

Move2018.2 Release Documentation

The following documents, Tutorials, and Knowledge Base are provided with Move2018.2 ..
 The Knowledge Base resource contains all the Move Help Pages, Tutorials, and the release documentation presented in a single, offline, searchable entity, independent of Move.

- Move2018.2 Release Notes PDF
- Move2018.2 Installation Guide PDF
- Move2018.2 Licensing Guide PDF
- Move2018.2 Tutorials.
- Move2018.2 Tutorial Data Files
- Move2018.2 Knowledge Base

Software Downloads - Important Information

Going forward new releases of the MOVE software will be distributed via email notification with a download link when it becomes available. In due course the option to download software directly from the Midland Valley web portal will be discontinued. Customer maintained licences may request a download link to the latest release of MOVE software at any time by sending an email request to edinburgh@petex.com.

FLEXnet License Manager™ – FlexNet 11.14

After you install Move2018.2 please contact **support@mve.com** as an updated license may be required. If you are running Move 2018.1 you do not need a new licencefile.

Midland Valley is using version 11.14.1 of the FLEXnet License Manager™ for all Move components. This is a newer version of the License Manager version that shipped with Move2015, Move2016 and Move2017. If you are running Move2015, Move2016 or Move2017 you will need to install the new License Manager.

We have however incremented our license key versions to "2018.1", therefore the Move2018.2 software cannot be licensed with existing older license files. Previous Move versions (Move2010 – Move2017) of the software however can be run and licensed with an upgraded license file. Move 2018.1 installations are not affected.

MOVE2018.2 NEW FUNCTIONALITY

File Format, Imports, Exports, Help

Exports

- PDF export - now has the option to export in PRC format.
- Accented characters in GOCAD filenames are now changed to their simple ASCII equivalents.

Imports

- Shapefile import - now able to read the following OGR Geometry types: wkbPointM, wkbLineStringM, wkbPolygonM, wkbMultiPointM, wkbMultiPolygonM, wkbPointZM, wkbLineStringZM, wkbPolygonZM, wkbMultiPointZM, wkbMultiPolygonZM

Move Files

- Loading time for Move files with larger GeoCellular Volumes has been improved on multi-processor machines.
- The Move file format has changed. Older versions of Move will no longer be able to open files saved by Move 2018.2.
- When dragging and dropping files onto Move the user can now decide to either open the files as separate documents or insert the files into a single document. If the files are dropped on the top bar then they are opened as separate documents. If they are dropped on a 3D View then they are inserted into the current document.

Application, Model Browser, Quick Editor

Shortcuts

- The shortcut "Alt + T" will tidy multiple lines to other lines
- New shortcuts have been added to improve support when multiple files and / or multiple views are open. F6 and Shift-F6 to page through the current open documents. Ctrl-F6 and Shift-Ctrl-F6 to tab through the current open views for the current document.

Copy Paste

- Paste now supports pasting an image copied into the system clipboard into the active Move view.

Model Building

Auto Polygons

- When opening the Tidy Tool from the Auto Polygon Tool, the Auto Polygon tool is no longer automatically closed

Create Horizon Line

- If the Use Horizons from Template options is selected (Section view only) and the Construct Horizons from Template tool is open, it is possible to carry out real-time construction from template of horizons using the stratigraphy.

Create Surface

- Create Top/Mid/Base, lines can now be used to create a new mesh or grid.

Horizons From Fault

- New option to quickly hide the displayed horizons to allow improved viewing of the underlying seismic.

Horizons From Template

- Interactivity has been added to the tool to modify horizon thicknesses during construction.
- The Horizons from Template tool now allows the option to create horizons based on the stratigraphy in real-time as the user is digitizing a line or horizon.

Model Building

- New 3D context menu option "Trim Horizon To Fault" allows horizon fault contacts to be maintained during multiple fault 3D restoration.
- The coefficients used for exponential and gaussian modelling when kriging have been updated for 2018.2.

Object Attribute Analyser

- The Object Attributes Table now displays horizontal length for lines.

Resample

- Output from rational reduction of surfaces now honors the original surface border.

Tidy

- The Section and Map view context menu Tidy option now works with multiple selection with the following rules. 1. Selected horizon lines are tidied to both ends. 2. If horizons and faults are selected (or everything in the section is selected) then only the horizons are tidied. 3. Faults are only tidied if only faults are selected.
- Tidy Tool now automatically updates when changing sections using the section list on the Display toolbar.
- Tidy Tool has new option to detect overlapping and duplicated faults.

Topology

- The 'Remove Duplicate Boundary Vertices' option has been removed. The same functionality can be achived using the 'Remove Duplicate Vertices' option.

Data and Analysis Panel

GeoVol Display

- Geocellular volumes in Move now always display k values and layer indices with zero as the top / highest layer / cell.
- Performance of the GeoVol Tool has been improved for larger volumes.

SCAT

- Log curves can now be displayed on all depth plots.

Well Log Analysis

- The ability to create data as points is available again.

Modules Panel

2D Area Depth

- In 2018.2 we have added a new tool, 2D Area Depth to the 2D Kinematic Modelling Module for Area Depth Strain analysis.
- The 2D Area-Depth tool provides a set of non-kinematic techniques used for predicting detachment depth and to test a section for area balance and internal consistency.
- Along with calculation of detachment depth, the 2D Area-Depth tool can quantify layer parallel strain, as well as shortening due to folding and/or faulting.

Stress Analysis

- Shear and normal stress values are now created as attributes, when the user creates a the stress overlay as an attribute.

Fault Analysis

- The well log chart on the Wells sheet now visualizes the log lithology as calculated from user-defined Vshale parameters.
- In Uncertainty Modelling it is now possible to visualize the probabilities of combined lithological juxtaposition scenarios.
- Uncertainty Modelling now offers the option to transfer scenario percentiles P10, P50 and P90 to the fault in a single operation.
- Uncertainty Modelling now offers the option to transfer the probabilities of all lithological juxtaposition scenarios to the fault in a single operation.
- Intraformational well markers are now taken into consideration when calculating lithologies and seal proxies from Vshale logs, aligned relative to horizon top markers matching cut-off lines in the model.
- Fault Scaling and Fault Growth plots are now calculated from data projected onto individual fault planes, rather than a single combined plane.
- Uncertainty Modelling now offers the ability to simulate variations in parameters to Probabilistic SSF and Hydrocarbon Column Hight.
- The Fault Growth chart now visualizes a range of likely growth activity based on lateral sampling.
- Added ability to adjust displacement reference frame for throw calculation.
- Fault Triangle now allows arbitrary well markers to be created by dragging guidelines from the well log charts' horizontal axes.

GST Link

- When uploading multiple objects from Move to GST, the "Use NULL for Unmatched" user decision from the previous object is carried forward to the next object.
- Partially locked objects are no longer being reported as violating the partial lock when locked vertices are moved by a very small.

Petrel Link

- The MoveLink for Petrel Plug-in is now compatible with Petrel 2018.
- Move Link for Petrel has been updated with a new Auto transfer option, allowing more control over the transfer process.
- Users can now assign Surfaces as faults determined by name or container name.

View Panel and Display

Section View

- When dip data from different sets are copied between cross-sections, the data will no longer be merged into a single dip data point cloud.

Google Map View

- Point/Dip data are now displayed correctly in Google Map view.

Vertical Toolbar

- The user can use the mouse wheel to adjust the width or use F5 key (when the horizon label area is in focus), to set the width to fit the largest horizon name.

MOVE2018.1 NEW FUNCTIONALITY

File Format, Imports, Exports, Help

Exports

- CPS-3 & ZMAP - Attribute values may be saved as Z values.
- SEG-Y - Move now supports the export of 2D SEG-Y.
- Shape File - Polylines with constant Z, where the Z is not 0, are exported as 3D polylines to preserve the non constant Z value.
- Open TecLink - The section age is exported correctly when exporting multiple sections.
- 3D PDF - When exporting polygons on a seismic section, they are now displayed with correct colours.
- 3D PDF - When exporting point data, 'Enhanced Symbol Style' is now turned on so that the data is rendered correctly.

Imports

- GIS Data - The Terrain Layer object types, and osgEarth file import are no longer supported in Move.
- General Imports - On opening multiple files at once, the import will fail if one of the imported files fails to import
- SEG-Y - With certain 2D seismic files, Move could display an invalid Top Position in the 2D SEG-Y Import.
- Well Import - When inserting dip/marker data data along a well, the overwriting/merging data will honour the type specified on import.
- ASCII Well Data - When loading or inserting well data using a user defined Type, the correct Type is now added to Markers tab of the symbols database.
- Eclipse Import - General improvements to support import of the different Eclipse ASCII formats for both importing and exporting.
- GIS Data - When importing part of a grid, negative elevations are no longer clipped to zero.
- File Open - Recent Documents now have the correct directory separators.
- Shape File - Units for z are now correctly handled.

Move Files

- When loading files that contain Terrain Layer objects, they will be automatically converted to grids for elevation layers, and horizontally-referenced images for image layers.
- When using Save or Save As, a warnings is now shown if a document is not saved properly due to excessive path lengths.

Modules tab

2D Decompaction

- No longer creates excessive vertices when upsampling sections with a length greater than 250 km.
- Fixed a number of problems when trying to work with simple flexural isostasy models consisting of just a load and a base.

2D Move On Fault

- Using Join Beds with the Elliptical Fault Flow algorithm will now support reverse movement.
- Auto population of objects in 2D and 3D Move-on-Fault is now possible.

- An additional option has been added to the Sedimentation sheet to allow sediment to be added either in just the Hanging Wall or in both the Hanging Wall and Footwall.

3D Move On Fault

- Strain measurements are no longer incorrect when loading an existing file containing strain steps.

Fault Analysis

- It is possible to Stochastically model hanging wall and footwall cut-offs to provide probabilistic juxtaposition scenarios.
- Large lists of well logs can now be filtered when assigning them to faults.
- Charts in Displacement and Seal Analysis now show task progress and error messages.
- Added button to restoration slider to quickly toggle between restoration methods.
- Image resolution can now be set with finer granularity using a slider.
- Seal Analysis now shows icon next to buttons to indicate when filter is active.
- Only show trim & inclusion distance pins when Faults sheet is active.
- Manually defined top and base horizons are now sized based on collected faults and horizons, rather than the model bounding box.
- In the Fault History chart horizontal guide lines can be created and optionally converted to mesh surfaces in the model.
- Seal proxies can now be filtered by horizon displacement area.
- Added help button to charts.
- The Fault Scaling chart now allows faults in the model to be selected by clicking on the respective data points.
- Fixed error in calculation of Clay Smear Potential.
- Improved assigning cut-offs to faults and improved progress display.
- Significantly improved performance of seal proxy calculations when Vshale logs are used.
- Created images are now overlaid in Map Views as well as 3D Views.
- Well log settings are now preserved when additional wells are collected.
- Checking the minimum size of collected horizon surfaces is now done against the bounding box of collected faults, rather than the model's bounding box.
- Seal Analysis charts now show a warning message when an incorrect stratigraphic order has been detected.
- When using non-proportional log alignment, Vshale values are now correctly taken only from the log segment for the respective horizons.
- Improved chart display on for high-DPI screens.
- Improved creation of cut-off lines.

Fault Response Modelling

- Monte Carlo Fracture Response Modelling has been added.

Fracture Modelling

- When a random length distribution is defined for fracture length, the minimum and maximum lengths of fractures produced can now be defined.
- The speed of calculating properties has been improved.

Geomechanical Modelling

- Source line can be changed by clicking on the line's temporary nodes as well as the points on the source surface.

GST Link

- Enabled Move Link for GST on Linux.
- Special, non standard, characters are now correctly handled when transferring objects from Move to the GST database.
- Objects that don't require to be renamed will not be renamed.
- Auto Match button now works when matching attributes for upload.
- When uploading objects to GST, and attributes between Move and GST, the source and target attributes are now similarly ordered.

Openworks Link

- Each 3D Seismic data set can now only be linked to a single Seismic Cube in Move.

Petrel Link

- IBM format data is now correctly imported when transferring seismic data.

Strain Capture

- When switching to an attribute with an azimuth colour map then switching back to the previous attribute, the colour map associated with the previous attribute is no longer replaced with the azimuth colour map.

Stress Analysis

- Max shear direction will now show the sense of slip
- It is possible to represent points in the stereonet plot, and the Map/3D view as beachballs.
- The default settings have been changed to more realistic values, pore pressure is now turned on by default. S3 is slightly above the hydrostatic pressure, and the pore pressure curve is equal to the hydrostatic pressure.
- Stress field auto-updates are now shown correctly.
- Pressure profile sigma labels now update when manually adjusting points.

Surface Analysis

- Curvature attributes will be created with correct units.

Thermal Subsidence

- Thermal properties are now stored on the top horizon object for 3D operations.

View tab and Display

3D View

- Points from sections when visualized in 3D views will now have there symbols lying on the section plane to replicate how they are visualized in Section views.
- Zooming to a point, or to selection bounds in the 3D View will now allow you to zoom in closely to that point, rather than moving past it. Traversing the scene by zoom behaviour will be restored, by the cam-

era home action, the absolute camera direction actions, going to a saved camera position, or toggling zoom to selection off.
- It is now possible to pick vertices on surfaces which have been coloured by a face attribute.

Google Map View

- Improved support for polylines containing multiple segments and highly sampled lines.

Lighting

- The lighting tool will now allow control of the lighting on meshes displayed in Map views.

Map View

- Mesh and Grid faces, wireframes and points, plus tetravolumes, geovolumes and seismic volumes can now be shown in Map views in the same way that they are in 3D views.
- Colour mapped and contoured surfaces can now be viewed in the Map view.
- Fracture sets are now visible in Map views.
- Map and section views now have the same overlay control pop-up accessible from the Display Toolbar as 3D views.
- The default style for display meshes in Map Views can now be set from the Mesh Style button in the View Control Panel. This style will be set as default for all new map views.
- Posts can now be loop selected in Map View.

Section View

- Horizon Colours are now properly updated when the Horizon names have changed in the Stratigraphy Database.
- Well logs with colour maps can now be displayed in all cases on both sides of the well track.

General UI

Backstage View

- The license page now shows scroll bars when the window is too small.

Quick Access Toolbar

- The options: Close, Close All and Save are now available.

Application, Model Browser, Quick Editor

Context Menu

- Convert to Mesh - mesh surfaces created from polygons will maintain internal boundaries.
- Convert to Polygon - where a multi-line is converted with lines representing internal boundaries, the resultant polygon will contain holes to match internal boundaries.
- The Edit Line option is now available in the context menu when a line is selected in a 3D view
- Convert to Line - When loop selecting points to convert to a line, the points are by default sorting using coordinate positions.

General UI

- All dockable Tools and Attribute Analyser panes now have Midland Valley blue headers, and narrow blue borders when floated.
- Object Properties and Selection Filter dialogs will have more appropriately styled headers and borders in Windows 10.
- The status bar has been restyled with reduced use of frames, in the manner of modern Office products.
- Move will no longer crash when opening a file using Ctrl-O from a default map view.

Licensing

- Move license FlexNET feature number is now "2018.1"

Model Browser

- Section Browser has new display options to improve control of section visibility in maps and 3D views.
- When merging fracture sets the new set takes the name of the first selected fracture set.

Preferences

- In Performance Preferences, users can choose to hide all objects in 3D and Map views by default when opening, or importing files. This can greatly speed up loading times.
- Map and Section Views can be opened with navigator windows already open by default if 'Navigator' is enabled in Preferences.

Quick Editor

- The percentage of individual fractures in a fracture set that will be rendered can now be controlled by a slider in the Quick Editor.
- Dips and Markers on a Well can now be visualized from the 'Markers' tab of the Well Quick Editor.
- The object name of a seismic cube can now be changed in the Quick Editor.
- If there is only one log, or one group of logs, then only the attribute name will be used to represent the name of the well log in the well log list.

Selection

- Improved the performance when loading wells with large number of well logs.

Shortcuts

- Ctrl + D will Duplicate Section. Ctrl + R is now the shortcut for Resample. Ctrl + M remains as the shortcut for Basic Transform.

UndoRedo

- Undoing changes to objects no longer removes the strain data.
- Using Ctrl + Z to undo a line extension no longer changes the end of the line being extended.

Data and Analysis tab

Attribute Analyser

- Constrained Attributes can now be added as Face Attributes.
- Attribute Analyser - it is now possible to use the Tree View to hide/show all attributes at once.
- Stereonet Plot - It is now possible to use a grey scale contour map.
- The select tool should now work with Text Attributes when using the '=' method.
- Cross Plot - the user can now copy the diagram without axis. Furthermore, the size settings of the diagram are saved in order for the diagram to keep the same size when opened in different Analysers.
- Cross Plot - What is selected in the view corresponds to the selection in the cross plot.
- Calculator - The calculator now honours units correctly. The unit from the most left attribute is used to identify the unit of all constant values within the equation.
- Cell Analyser - When averaging orientation data from point data into the GeoCell volume, the data is now averaged using the mean principal orientation.
- Create Principal Strain Planes - e1-e2 and e1-e3 Principal Planes now produce results as expected.
- Histogram Plot - The correct unit is now shown when changing frequency options.
- Stereo Plot - when selecting points in the plot, invert selection is now enabled.
- Stereo Plot - Loop selecting points and modifying selected points with Modify Cells will no longer crash Move.
- Filter Table Data - will now recognise False as a value for Boolean attributes.
- When creating a new attribute, the attribute list will automatically find it in the list of attributes, if it already exists.
- Column width will no longer reset when a row is selected.
- Filter Table Data - When filtering values for X(East), Y(North) and Z, the unit is now taken into account.
- Variogram - Attribute Kriging now takes the correct attribute for Kriging even when some nodes are set invisible in the tree view.
- Modify Cells - the Attributes to Modify drop-down now only contains attributes from the selected cells.

Document Properties

- Attribute Manager - it is now possible to delete any user created attribute using the Attributes & Units, Remove option. The attribute will be removed from all objects using the attribute. The changes can be undone.
- Journal - Menu option added to refresh the Journal if it has been open, and is not up to date.

Measure

- Fixed a number of issues with the display of horizontal and vertical distances on the screen.
- The current settings are now maintained when the tool is closed and reopened.

Query

- Spatial query Inside Polygon available in Map and Section views. This will find all objects within a specified polygon.

Stratigraphy Table

- It is now possible to reset the Stratigraphy database to the initial default setting using the 'Reset Move Default' option in the Stratigraphy Database File menu.
- Fixed issue when creating parallel beds at an angle using stratigraphy, If a horizon had zero thickness and zero angle then beds above would not be created correctly.

Well Log Analysis

- Creating Markers from Dip Meter Well Logs will now allow the user to merge as well as overwrite the current well marker data.
- The Type attribute now correctly populates the list of types depending on the Data_Type setting.
- Attributes can now be renamed.

Well Marker Analysis

- Modify Cells - now supports constrained attributes in the Well Marker Analyser.

Model Building tab

2D Depth Conversion

- The accuracy and quality of 2D Depth Conversions has been improved when using large horizon velocity changes.

3D Depth Conversion

- Converting 2D seismic images using the database method now calculates the new top and base of the seismic correctly.

Advanced Transform

- Rotation of Horizontal Image about centroid now works correctly.

Basic Transform

- Move no longer crashes when using the Basic Transform tool with Lineation data
- Improved support for the rotation of very long seismic images.
- Basic Transform Manipulators are now in the correct position for fault mesh surfaces.
- When translating and cropping images simultaneously, the image no longer disappears.

Create Guide Lines

- Guidelines on a section are now displayed correctly in a 3D View.

Create Line

- The Resampling option is now maintained for each section while the Move file is open, even when working on a dog-leg section.
- The correct points are selected in 3D Views if the view in depth

Create Surface

- Create Surface will now display "Normal Displacement" rather than "Z" for changing the position of inclined grids. Z position is not correct when moving an inclined grid.

Edit Lines

- When editing a line in a 3D View, the passive point setting are set automatically if the number of vertices on the line exceed a certain limit.
- Toggling show/hide passive points will now work correctly for nodes which have been manually changed from passive to active.
- When editing a line if active point sampling is switched on, if the end point of a line is deleted, the next to end point is now displayed as an active point.

Edit Surfaces

- Fill Hole - Improved performance when filling the gap between a mesh surface boundary and a closed line.
- Fill Hole - Fixed possible crash when using the Fill Hole option with parts of a mesh boundary and a closed line selected.
- Remove Point - Surface normal are now calculated correctly.

Extend

- Checkbox "Filter Thin Border Triangles" should get rid of the thin triangles if checked.
- New option to extend a surface to a line.
- When using Merged Segment mode, the tool no longer causes the line to disappear.
- Switching between sections using the previous/next buttons on the Display toolbar will now clear the temporary line displayed by the extend tool.
- It is possible to extend surface using surface boundary when the surface has an internal boundary.

Horizons From Fault

- Support for regional dip.

Horizons From Template

- Fixed issue with editing the template line if the template line consisted of only three or four points

Model Building

- Separate / Merge Line - When using with closed lines, the new line will remain closed preserving internal boundaries.

Snap

- Snap surface is now correct when source surface needs trimmed.

Split Lines

- When Undo is selected after splitting a closed line, the closed setting is no longer lost.
- Splitting closed lines now produces consistent results.
- It is now possible to split lines belonging to a section in Map View.

Split Surfaces

- When splitting a mesh surface with a fault which splits one edge of the mesh, points are now duplicated where the surface is split.

Surface with Boundaries

- Offers better support for construction of surfaces from a combination of data types.
- The orientation of dip data may be used to constrain the geometry of the surface.
- Extrusion of lines with dip data control has been added to the Construct Surface with Boundaries tool.

Tidy

- No longer identifies self overlapping lines that weren't overlapping.

Topology

- After removing duplicate vertices, the fixed surface no longer falsely detects that the surface consists of multiple patches.

Move2018.2 Known Issues

File Format, Imports, Exports, Help

Imports

- ASCII import of latitude/longitude data, only values in decimal degrees are supported.

Exports

- 3D PDF - If the 3D view is set to Pixel mode and the user exports a 3D PDF point clouds and well markers will be rendered smaller than expected. Change the View settings to Metric to export correctly.

Modules tab

2D Kinematic

- 2D Elliptical Fault Flow, any user cahnges to the default Displacement Extents are lost if Preview, or Apply followed by Undo is selected.

Fault Analysis

- Decompaction of branchlines using a Fault History diagram is currently experimental. Consequently, the results may be inconsistent with 3D restoration and decompaction results. It is recommended that faults containing branchlines are restored using the Only Join Beds method.

View tab and Display

3D View

- 3D Graphics, in certain cases there may be a issue with the high performance display of lines in 3D views. If you experience any application crashes when deleting lines in a 3D view then the 'Enable Batch Rendering' option in the Performance section of the Preferences dialog should be unchecked.

Section View

- On some older graphics hardware, under some conditions (particularly if lots of different Move documents are open at the same time), users may experience problems with Medium and High quality seismic rendering in section views. In these cases, the seismic image may appear cropped, and the level of crop changes when the user zooms in and out. In these cases, closing and restarting Move, or restarting the computer may resolve the problem. If it does not, or if the user does not wish to do so, then setting 2D seismic quality to Low in the Performance Preferences dialog at runtime will make the seismic images appear correctly.
- Images larger than 20,000 pixels x 20,000 pixels cannot be displayed in Section views. These can be down-sampled on import.

Application, Model Browser, Quick Editor

General UI

- Linux - When using KDE, dragging the toolbar causes the whole window to be moved. As a work around go to System Settings > Window Behaviour. In the Window Actions tab, make sure the Left button option under Inner Window, Titlebar & Frame is set the Nothing and check what the modifier key is set to. In Move, the Tool Bar can now be dragged by holding the modifier key and dragging the Tool Bar as normal.

Selection

- Linux - With some window managers, the Alt button in combination with loop-select will not perform the usual Move behavior of selecting full objects. This key combination may be reserved as a special window manager short-cut.

Data and Analysis tab

Survey Box Editor

- When working in a file with multiple surveys one of which has been edited, the survey box extents are not restored to custom extents, instead a default box is created from survey coordinates and model bounding box.

Model Building tab

Basic Transform

- Basic Transform tool, when using the manipulator to rescale a fault surface, the resultant surface can be positioned incorrectly. The options in the Advanced Transform tool can be used as an alternative.

3D Depth Conversion

- Depth Conversion of seismic cubes. If a volume has been created from the original cube, the clipping extents are lost when creating the new volume.

Horizons From Fault

- Detachment Fold - Syn-tectonic beds may not be fully drawn correctly if the sediment thickness is less than the uplift in each step.

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