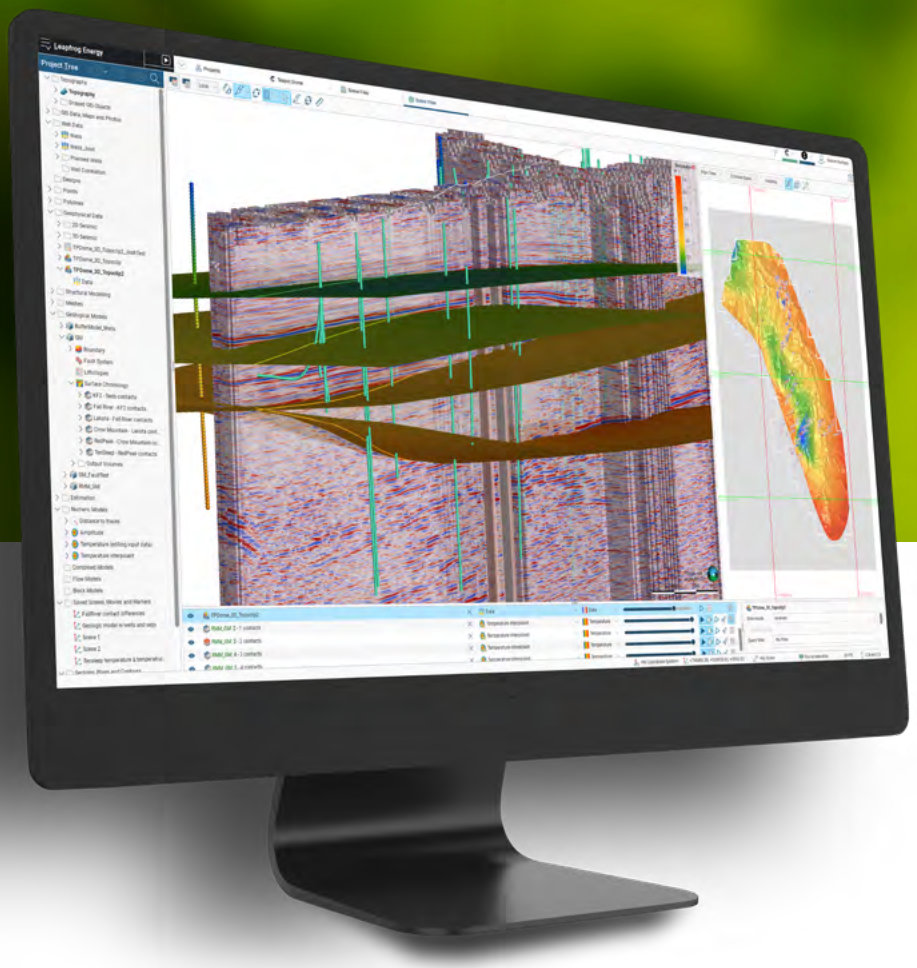
SEEQUENT

leapfrog | ENERGY

Leapfrog Energy **2024.1**

new release



Leapfrog 2024.1 Release Notes

Leapfrog 2024.1 is a strong release that continues to deliver a balanced mix of new functionality and enhancements to our core tools and workflows. There is a lot for everyone in this release, and we urge you to read the release notes in detail and watch our highlights video, in order to discover the tools that will enhance your work.

In the background, we are also working hard on laying the groundwork for connecting our desktop products to our rapidly evolving cloud ecosystem – with new schemas for cloud native data storage, cloud based-data management and computation services and the cloud infrastructure to support permissions and role-based access all in the pipeline. Work on componentising our core libraries and supporting connection to cloud is well underway.

Tight integration between our immersive desktop modelling solutions and the flexibility and power of cloud data management and compute will unlock a world of hybrid workflow opportunities.

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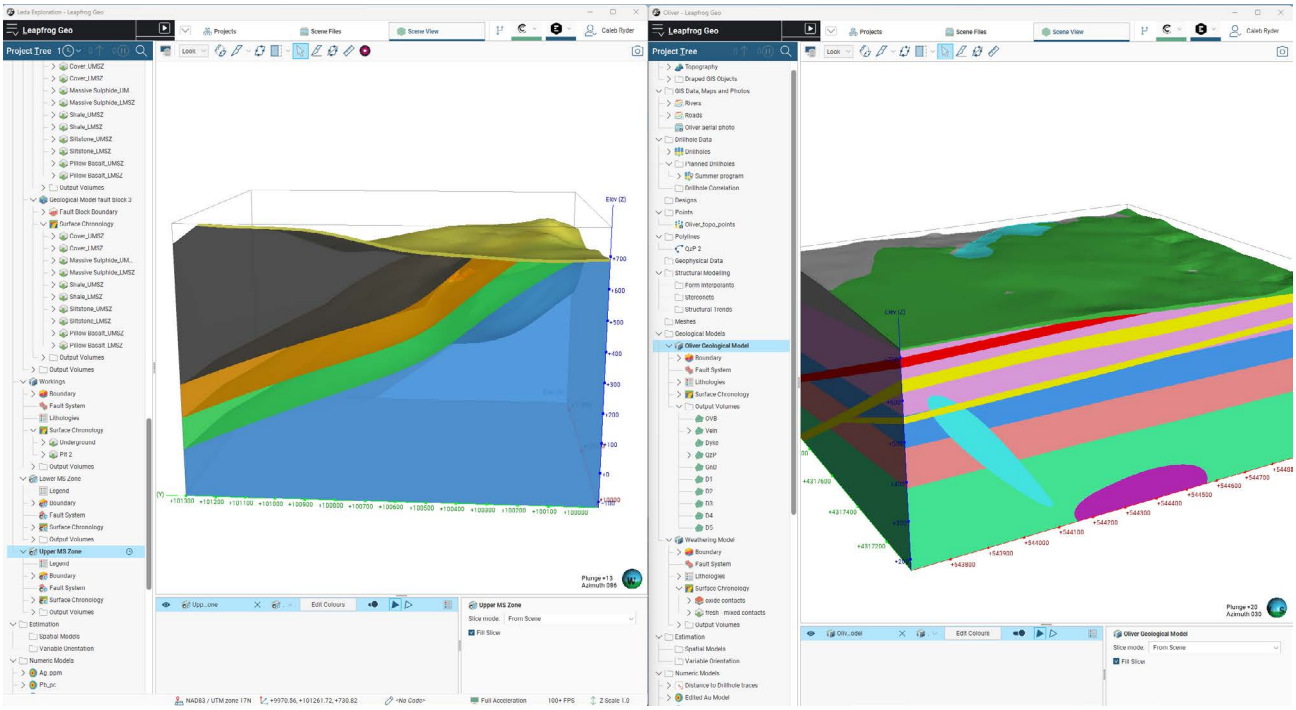
1. Features and Functionality

1.1. Multiple Instances Of Leapfrog



Multiple instances of Leapfrog 2024.1 can be run simultaneously by one user on the same machine. This allows greater flexibility regarding ways of working; open and process one project while actively working on a different project!

Please note, because the instances are being run on a single machine, the processing speed and performance is still limited by the capacity of your machine's hardware.

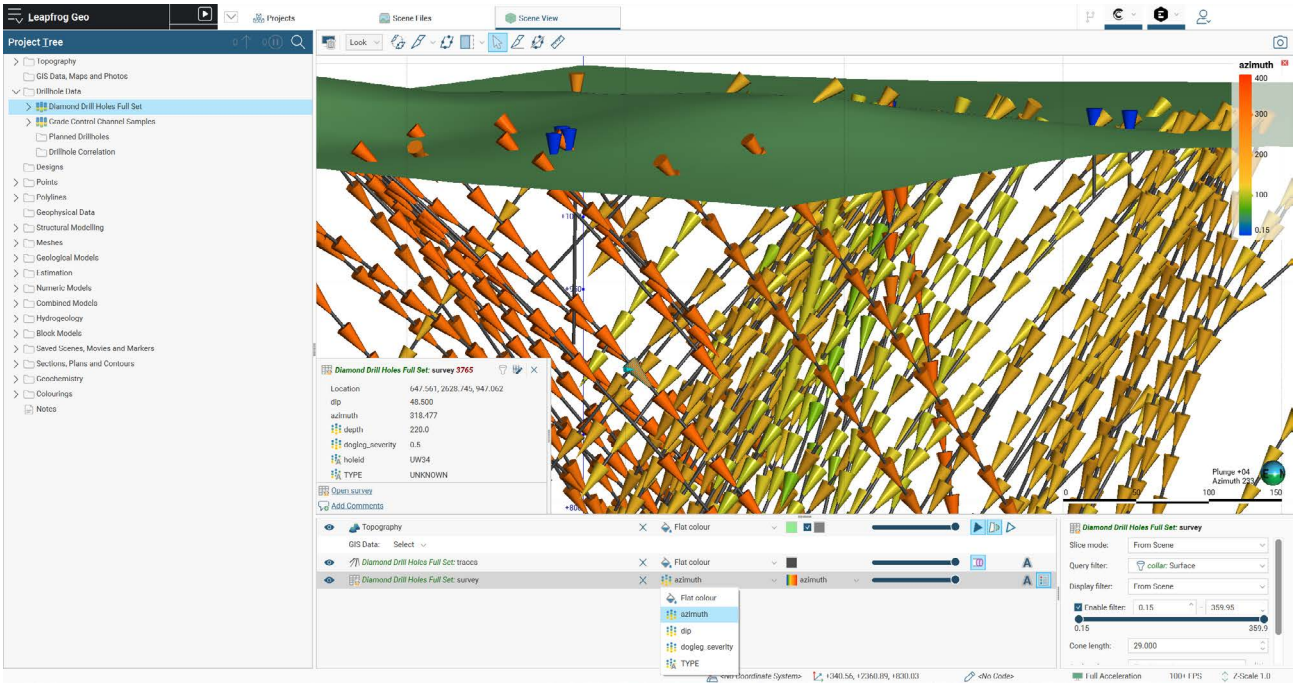
1.2. Drilling Data

The importance of drilling data to underground modelling cannot be overstated, as drilling provides the direct physical observations and sampling on which subsurface models are based. The high cost and value of drilling means that obtaining maximum value from this data remains a focus for Seequent. In Leapfrog 2024.1, several significant enhancements and new capabilities will improve the visualisation and analysis of data derived from drilling methods.

1.2.1. OpenGround Integration

OpenGround, Seequent's cloud-connected geotechnical database management and reporting solution, is now available via an integrated connection in Leapfrog Geo and Leapfrog Energy. For projects created from a mix of drilling data sources, the ability to import directly from industry standard databases is a crucial requirement.

1.2.2. Survey Data



Hole orientation information from downhole surveys is critical to determining the path of a drillhole. Survey data locations can now be visualised in the 3D scene as orientated cones, providing rapid visualisation and validation. Cones can be coloured by azimuth, dip and dogleg severity using the same colourmap and labels display options available as for any other type of data. Scene filtering on the display or selected column allows for optimal flexibility when viewing the data in 3D.

Standard table functionality has been added to provide adaptable analytic capabilities. Create query filters, add new category columns from survey data and evaluate modelled volumes and/or category columns from other tables onto survey measurement locations. The flexibility of viewing complementary information on survey measurements allows you to better understand your ground conditions, for example, what lithologies consistently result in higher rates of dogleg severity or deviation and in what direction.

1.2.3. Data Statistics

The box plot interface now includes a handy statistical summary table of the selected numeric column for each category, giving a quick and compact view of data insights. Graph axes have been swapped so that the boxes are vertical, conforming to standard reporting formats.

A new button opens the detailed statistics table view, with the settings from the box plot tab, e.g. the numeric and categorical column selection, automatically applied. Finally, the data from the statistics table can be copied to the clipboard for when you need to do more involved data analysis outside of Leapfrog.

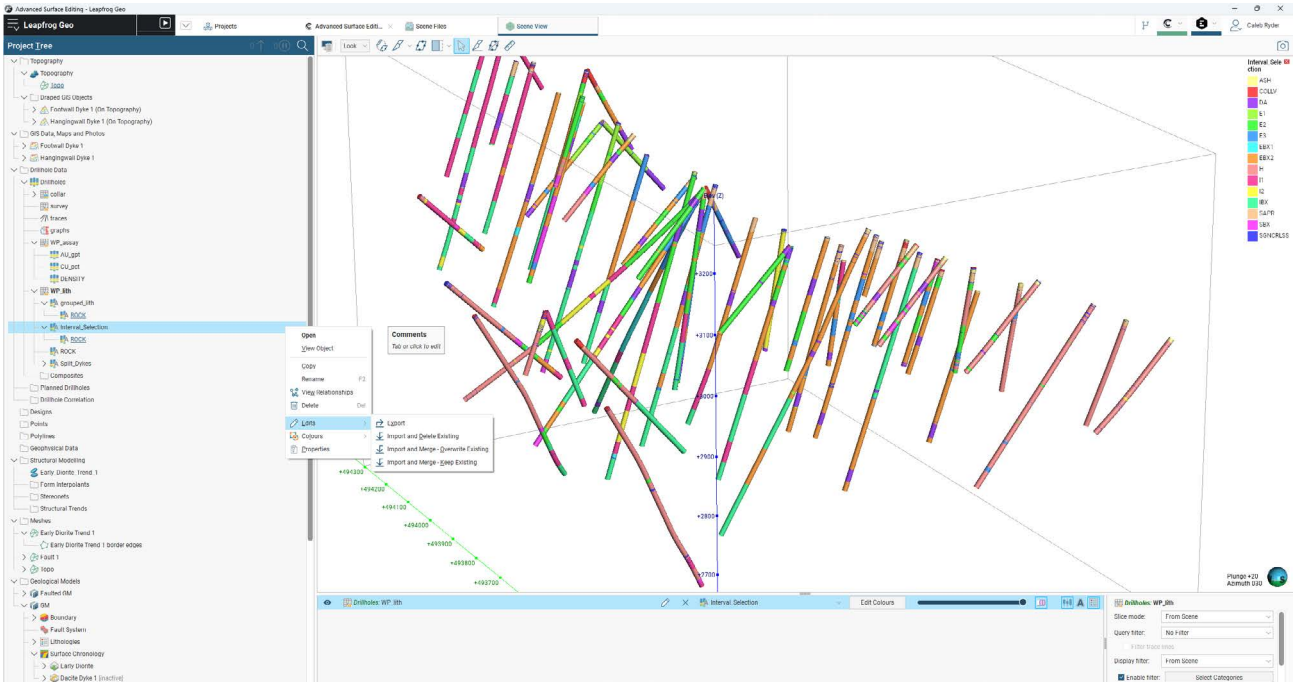
1.2.4. Custom Columns

A simple but useful action is the rename and copy of items in the project tree. Incrementally, this basic functionality is being extended to be consistent across more of the project tree.

Leapfrog 2024.1 allows grouped lithologies and category selections to be renamed, and the following items can now be copied:

CUSTOM COLUMN	AVAILABLE ON
Category From Numeric	Interval, downhole point and structural data
Category Selection	Collar, downhole point and structural data
Group Lithologies	Interval data
Interval Selection	Interval data
Split Lithologies	Interval data

1.2.5. Interval Selection



Interval selection is a critical step in creating model ready data. Several developments have been completed for this version of Leapfrog.

In Leapfrog 2023.2, the export of interval selection edits was enabled. In this version, you can now import interval selection edits enabling you and your team to share interval selection between projects and model with the same, most up to date set of interval selections. Edits can be imported using one of three options:

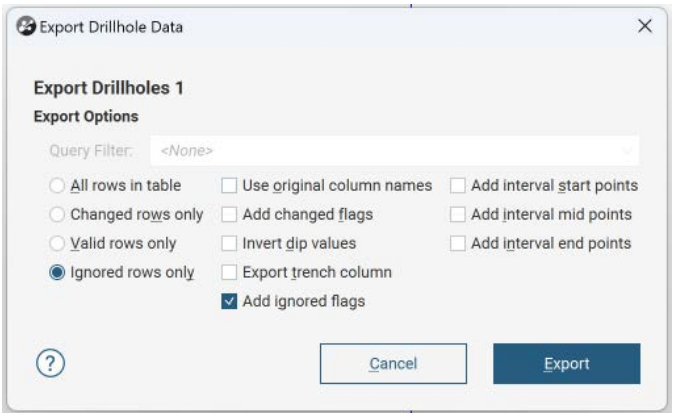
- Import new edits and delete all existing edits.
- Import new edits, merging new with existing edits, and overwriting any existing edits where the hole_id, from and to are in both existing and new with the new lithology.
- Import new edits, merging new with existing edits, and keeping any existing edits where the hole_id, from and to are in both existing and new and ignoring the new edit.

If any edits are rejected or ignored, for example, when using the 'keep existing' merge strategy, these edits are written to a file, and you will be informed via an information dialog with a clickable link to access the file.

An additional enhancement to the interval selection functionality means you can select individual intervals even if they share the same lithology with adjacent intervals. Previously, you could only select the entire set of intervals if lithologies were shared. To select at a finer increment required you to switch the view to a different item, which was cumbersome. This new functionality provides you with much greater flexibility to generate the interval selections you require.

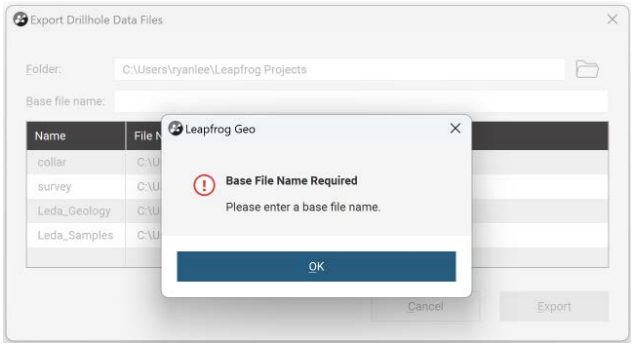
1.2.6. Data Export

Another enhancement to drilling data is the ability to export and/or flag ignored rows. These options are available when exporting point data, drilling data (including downhole points and downhole structural data), and structural data. A simple addition but crucial for working collaboratively in teams where QA/QC decisions need to be communicated and shared, to keep an audit trail and ensure everyone is working with the same data.



Two new options: Ignored rows only and Add ignored flags.

On export, the default names of drillhole *.csv files had to include a base file name. This is no longer the case. Now, when exporting your drilling information, you can omit the need for the base file name meaning re-importing this information is much easier by better matching the names of the tables already in the project.



Previous versions of Leapfrog enforced a base file name.

Drillhole traces can be exported as lines in *.dxf, *.dgn or *.dwg formats. A very common request for a generic export of the trace for the purposes of grout status categorisation, engineering and survey safety checks and other downstream processes both within and external to Leapfrog. Small on the face of it, this enhancement will save you time and effort previously working around this limitation.

1.3. Core Photo Links

1.3.1. Imago

With Imago now supporting Seequent ID, both applications have a common license provider meaning a smoother integration is now possible. Leapfrog can make requests and receive information that is far more relevant to you, the user. For example, instead of having to choose from 15 imagery types, only the types you have configured in Imago will appear in this list.

And, instead of having to manually type Workspace and Dataset names, drop-down menus will be pre-populated with a relevant list of items from which to choose. These efficiencies mean fewer chances for human error; no more spelling mistakes setting you back a step in your workflow and no more having to remember the precise names of items.

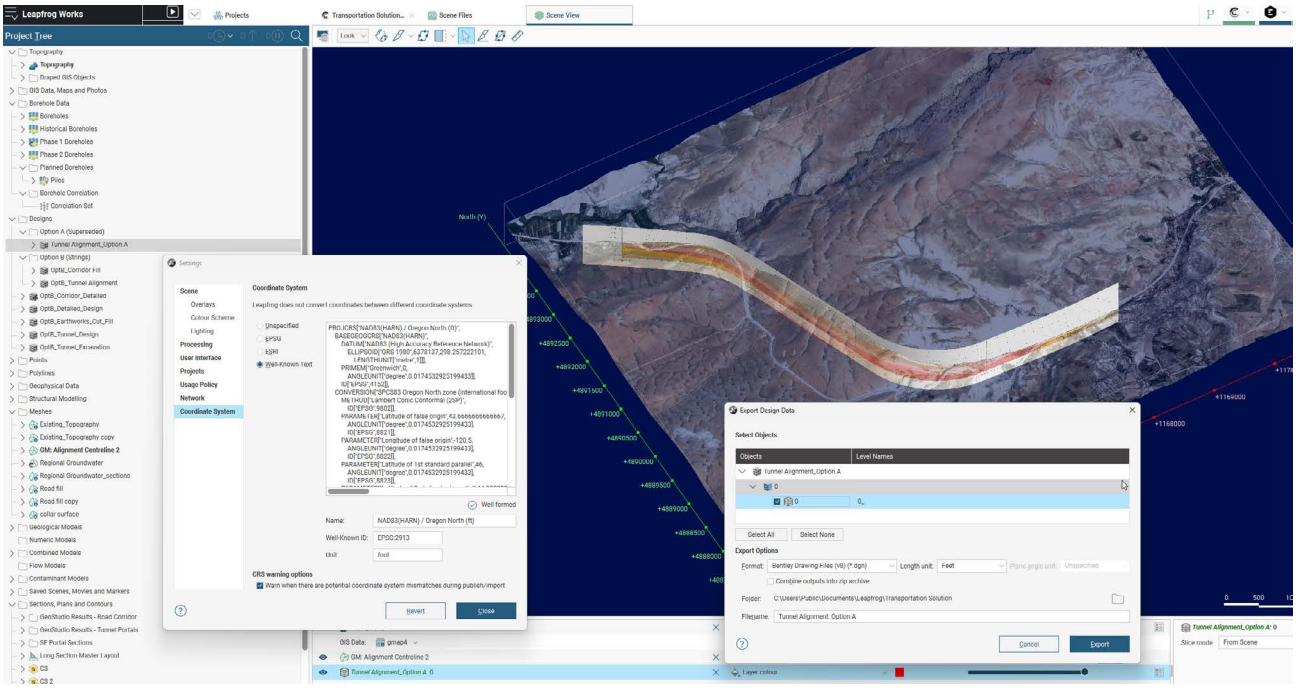
1.3.2. Kore

Leapfrog 2024.1 has updated the Kore deep link so that clicking on core photography links will open Kore's cloud application (rather than the desktop application).

1.4. GIS Data

As part of a bigger initiative to improve Polylines, the importing of GIS polygons has been sped up and improved in certain circumstances. Previously, Leapfrog was not able to handle overlapping polygons. In Leapfrog 2024.1 this has been resolved.

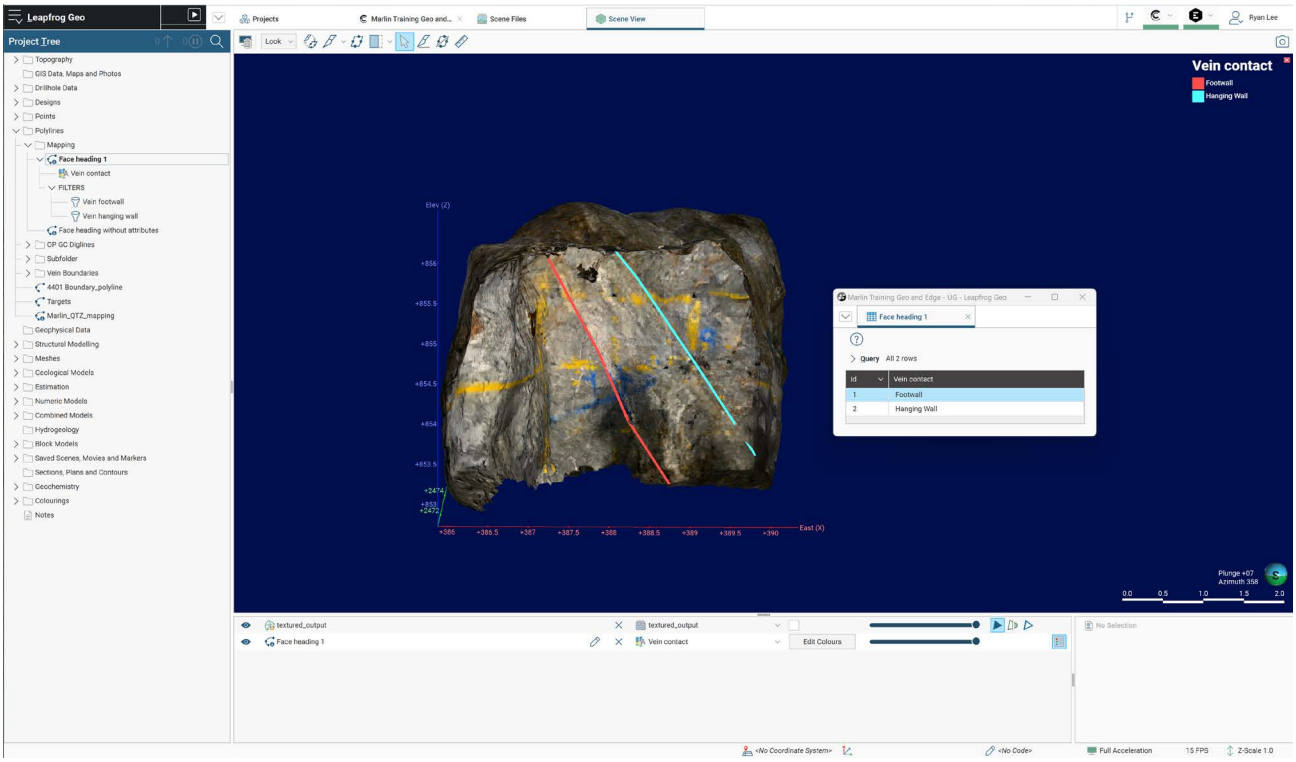
1.5. Coordinate Reference System Integration



In Leapfrog 2024.1, provide additional information on the Coordinate Reference System (CRS) of your project. Benefit from improved data handling and provide clearer and more usable CRS information when transferring data.

The new CRS options include Unspecified, EPSG and ESRI codes, and also Well-Known Text (WKT) options. For specific ESRI/EPSG codes, when available, the local datum transform of the projected coordinate system can be adjusted.

1.6. Polylines with Attributes



Leapfrog 2024.1 can now support attribution of polylines. The ability to import and set different types of attribute data such as category, text, numeric, date and timestamp will enable numerous new uses and modelling opportunities that were previously impossible.

Attributed data can be imported using the *.csv file format and category attributes can be created within Leapfrog itself. Attributes can be visualised in the 3D scene as well as in a table, and all polyline geometry editing behaviour has been maintained. You can create query filters based on the polyline attributes and use these query filters on any objects in Leapfrog where polylines are an input. Polyline attributes are also maintained when a polyline is converted to a GIS line and vice versa. The editing of imported attributes is currently not supported, however, this first phase has laid the groundwork for further development. Similarly, while attributes must currently apply to the whole polyline path, other levels of attribution (nodes and segments) can be developed in future versions if the need is demonstrated.

Polylines are a fundamental data type and unlocking the richness of attributed data is a significant advancement, that has benefits for mapping, modelling and classification workflows.

1.7. GOCAD TSurf Visualisation

GOCAD TSurf gridded surface files support numeric attribution, however, previously Leapfrog did not retain this data on import. In Leapfrog 2024.1, this has been enabled, so that numeric attributes on mesh vertices are retained on import.

1.8. Mesh

1.8.1. Surface Values

In Leapfrog 2023.2, a change was made to Deposit and Erosion surfaces to expose the 'control points' that are used to construct these surfaces, and to modify the way edit information is incorporated into them. In this release, the same change has been applied to surfaces in the meshes folder that are built from point data, vein segment mid points and structural data.

The surfacing points that are automatically created from input data in order to control the surface have been exposed in the project tree and can be visualized in scene. The following categories can be visualized:

- Point contact
- Polyline/Structural contact
- Off-surface

"Merged distance" values are also assigned to each surface value and are interpreted as follows:

- Contact points = 0
- Off-surface points = any other values

Viewing surface values by category and/or by merged distance values can illuminate the factors controlling and influencing your surface. This in turn helps to understand the relative influence of your data, for example the effect of adding a polyline or structural disk on the surface compared to point data alone. Become a more powerful modeler by understanding and exploiting the modelling tools proficiently.

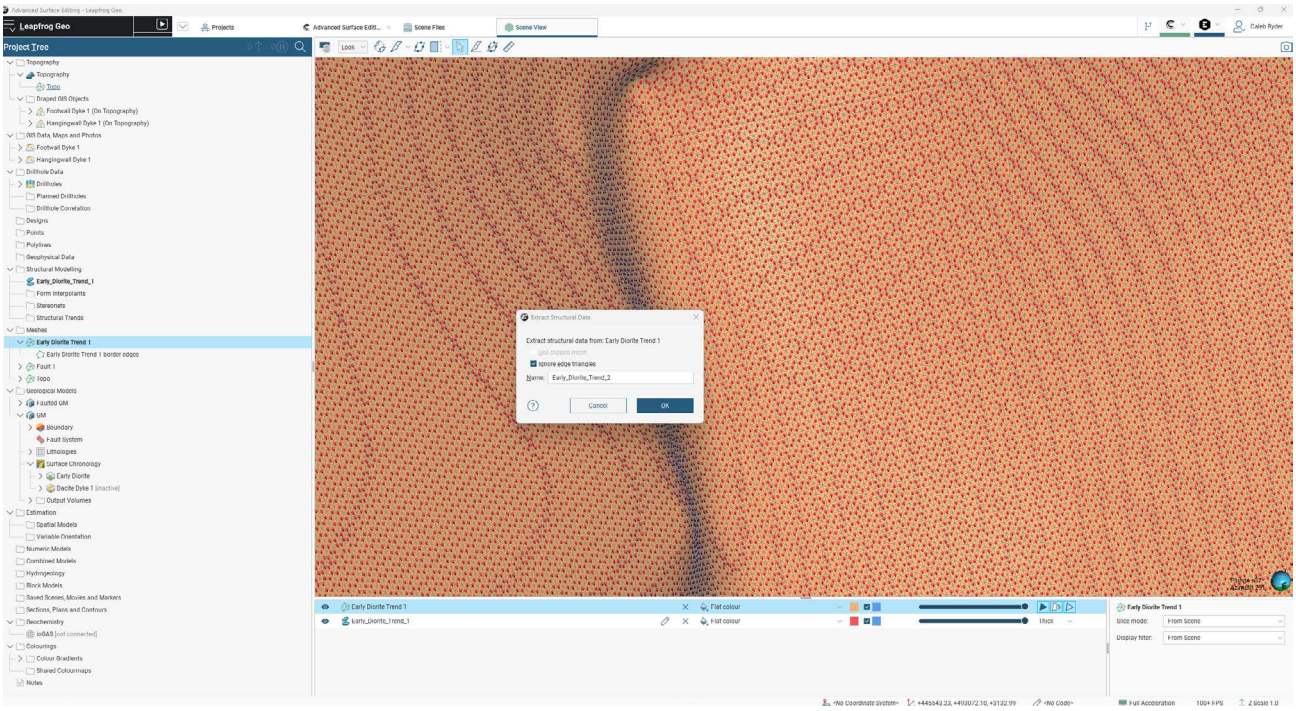
1.8.2. Set Surface Orientation From Plane

When input data has no obvious orientation the off-surface point generation routines are not viable. This new option, which has been added to the "edit mesh" dialog, allows you to provide some assistance to the surface point generator by specifying the surface orientation using a plane.

1.8.3. Off-Surface Value Usage Improved For All Input Data

Before Leapfrog 2024.1, the off-surface control points for meshes built from point data inputs only were generated using normals estimated from those points. If these surfaces were then edited using polylines (with orientation) or structural data, the previously calculated off-surface points were discarded, and replaced with off-surface points calculated normal to the edits. This could result in locally large changes to surfaces when edits were applied. In this release, a new option has been added to the "edit mesh" dialog to combine both sets of off-surface points.

1.8.4. Extract Dip And Azimuth From A Mesh

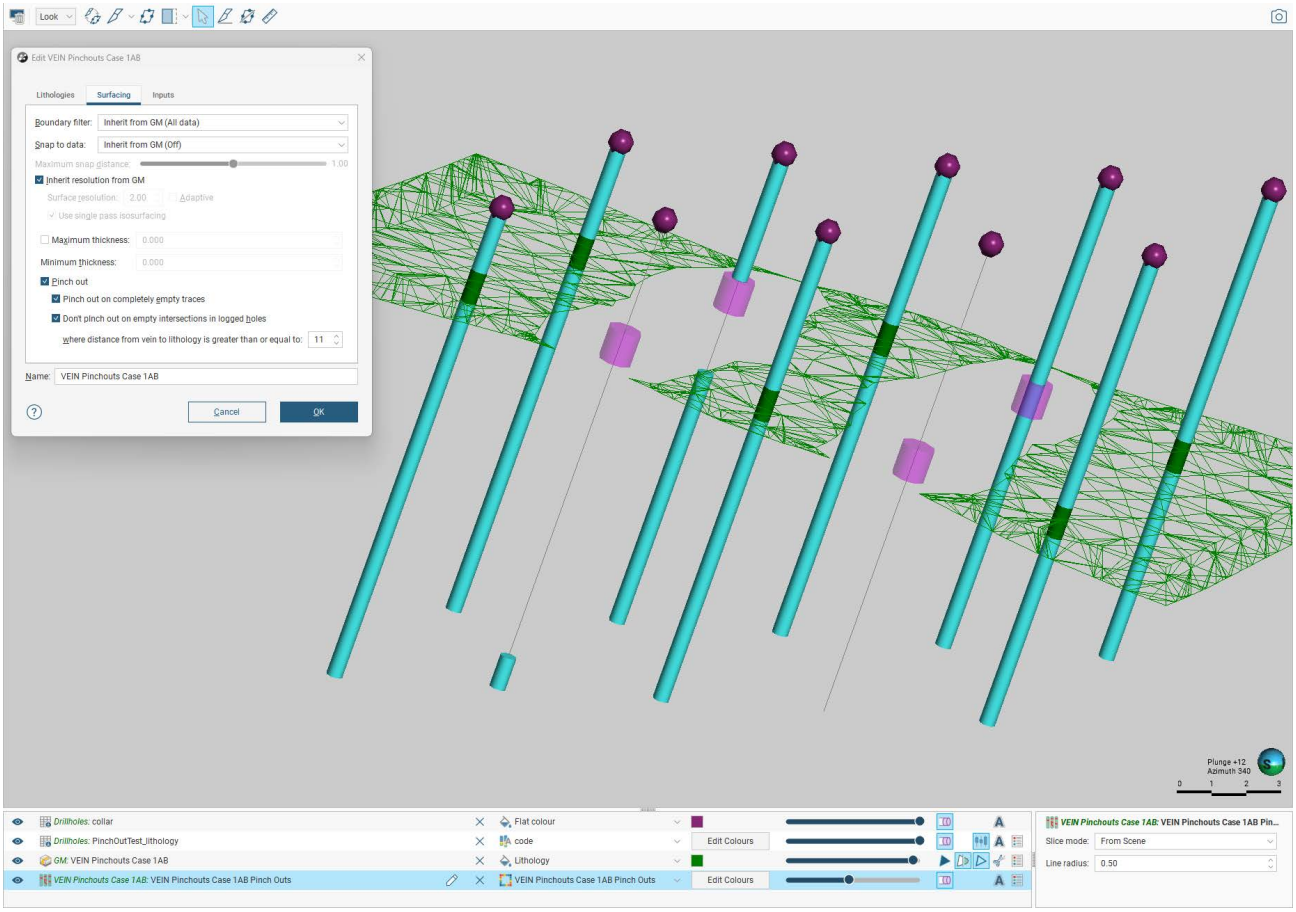


A new “Extract Structural Data” workflow generates a structural measurement (dip and azimuth) for every triangle in a mesh, directly. This omits the need to first extract vertices and subsequently “Estimate Structural Data” (note that the existing “Estimate Structural Data” functionality has been retained).

The new option is available on most meshes in the project tree. An option has been provided to excluded triangles that touch the boundary of surfaces, to avoid biasing outputs with small marginal triangles. The extracted data can be viewed as structural disks in the scene, or used in stereonet analysis.

Extracting structural measurements from meshes with more than 250,000 triangles has been restricted due to the time taken to write the information to the database. This can be reviewed in future iterations.

1.9. Vein Modelling



A small yet important update to the vein modelling tool allows pinch-outs on empty intersections that occur in otherwise logged holes. An additional option has been added to the surfacing tab of the editing dialog so that you can control if/when you invoke a change to your modelling strategy. No changes will be enforced to existing vein models.

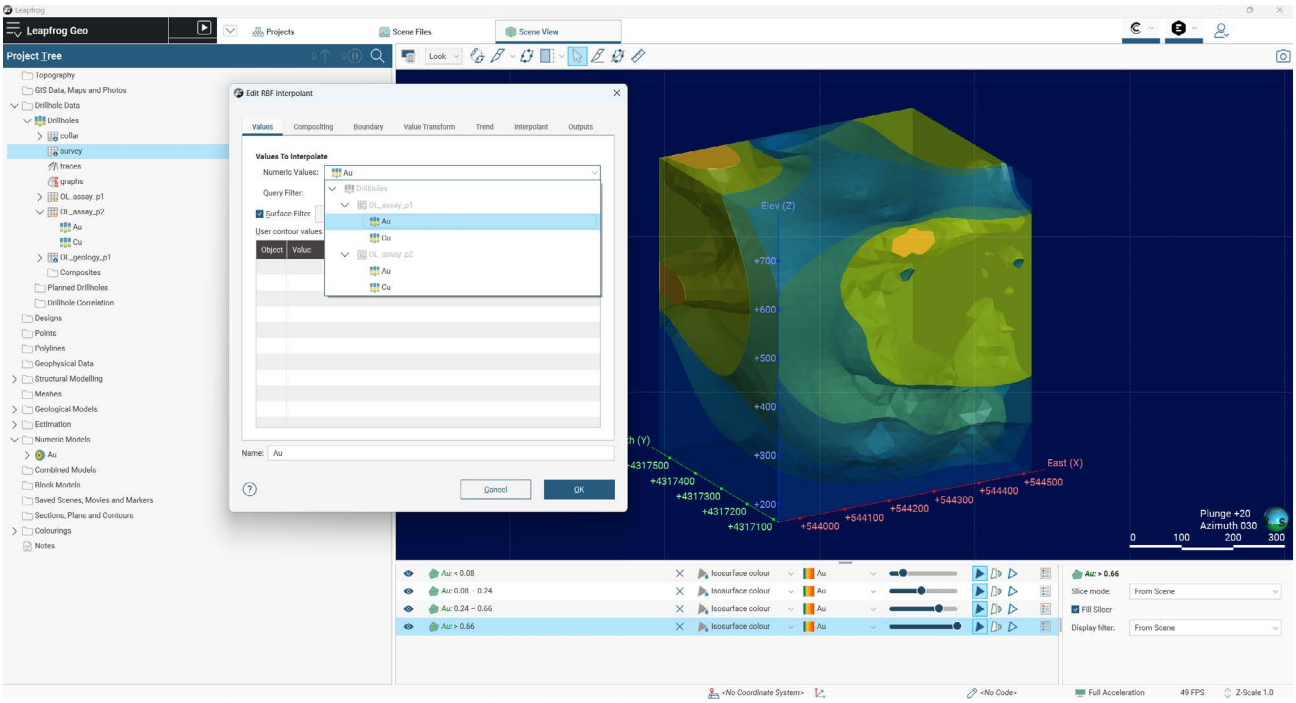
1.10. Volume Attributes Table

An existing feature of Leapfrog allows a ‘volume attributes table’ to be created and updated for any geological or numerical model, and properties to be manually assigned to each volume. Attribute tables provide a means to enrich the model volumes with information about ground conditions that can be transmitted to downstream users: for example to slope stability analysis as well as other operational analyses.

A handful of small, but notable improvements have been made to this table to make it easier to use and export via *.ifc (International Foundation Class) and *.lfm (Leapfrog Model File) formats. The geologist can now rearrange the columns and edit multiple cells at once for faster attribution and updates. An “Edit Attributes” link has been added to the in-scene information box making it quicker to move from the scene to the table for review and edit.

This work is preparatory to further planned improvements to volume attribution.

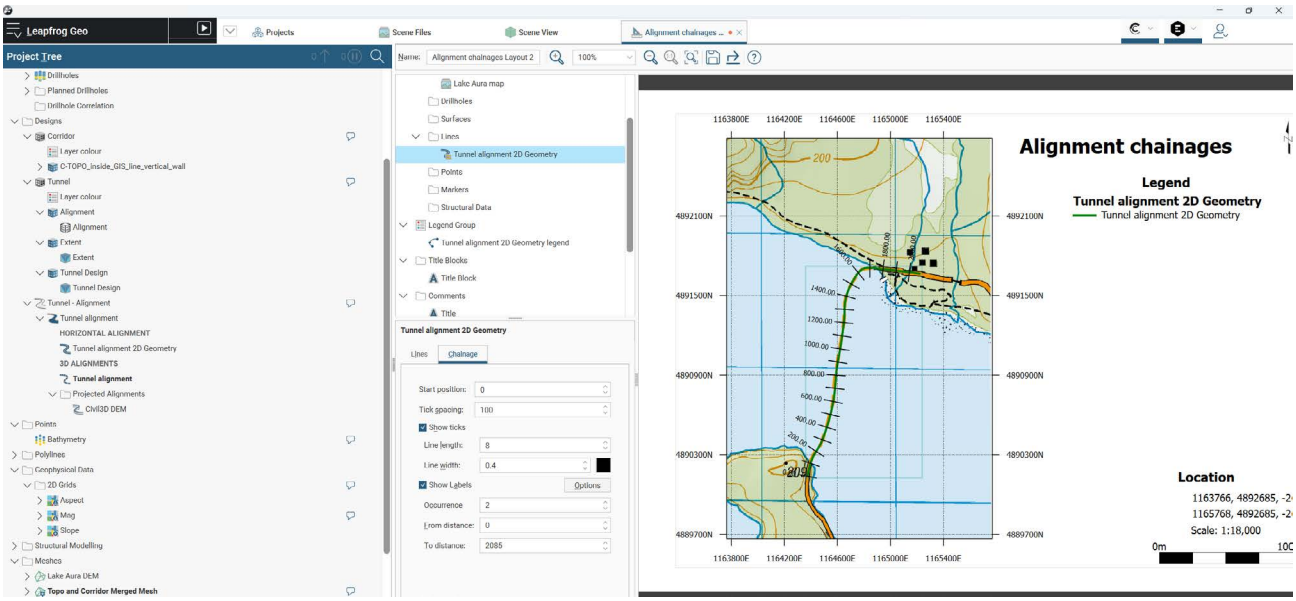
1.11. Numeric Modelling



Leapfrog 2024.1 introduces the option of changing the data source for numeric models after their creation. With this update, you can easily switch the input of numeric models (RBF interpolant, multi domain interpolant) without the overhead of rebuilding the entire model. This will most commonly be used in conjunction with copying of numeric models.

Other small enhancements include creating a copy of multi-domain RBF interpolants and distance function models and show warning overlays on volumes where an error is detected.

1.12. Alignment Chainage On Plans And Cross Sections



Alignment chainage can now be displayed on Plan Views and/or Cross Sections. This will improve understanding and communication about relative positions along alignments on the plan, cross section, and in the 3D scene.

Previously, you were able to add alignments to plans and regular sections, as well as to the strip view within sections. With Leapfrog 2024.1, you can now also display the chainage distance along your alignment. Display options include start position, tick spacing, tick length and width, label text/number formatting as well as label density,

The scene view display of alignment (both 2D/3D) has also been improved to allow you to configure the chainage start point and the number of decimal places to display. The existing spacing and occurrence parameters remain unchanged. Intercept and clipping options are available for cross sections, but not for plan and strip view.

Chainage distances are not yet available to use on long sections.

1.13. Domained Estimation (Edge only)

1.13.1. Bulk Create

Leapfrog 2024.1 continues work on improving the creation and management of resource estimates within Leapfrog Edge.

The latest phase of development introduces the ability to “Bulk Create” multiple Domained Estimation objects in a single action. A dialogue allows you to select as many input domains and variables as you wish, apply query filters and compositing rules, then generate empty Domained Estimation object for each of the domain/variable combinations chosen.

These domained estimation objects can then be populated by generating declustering objects, data transforms, variograms and estimators within each object. However, it is envisaged that Bulk Copy will most commonly be used in conjunction with the new “Copy Estimator To” functionality, and the much enhanced Estimation Parameter report editability that are outlined below.

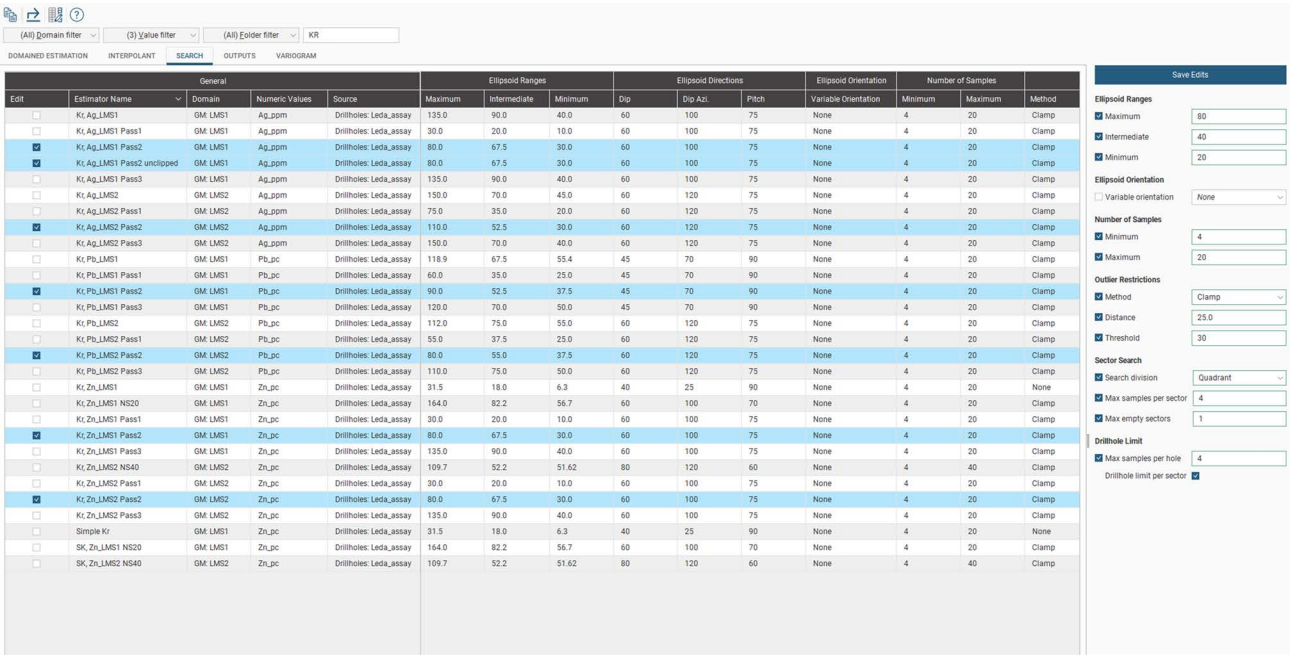
Note, that work on enhancing the set up and management of resource estimates is actively ongoing. The bulk create feature is a step on the way.

1.13.2. Copy Estimator To

Copy an individual estimator from one domain to another (or to multiple) rather than being restricted to copying the complete Domained Estimation object.

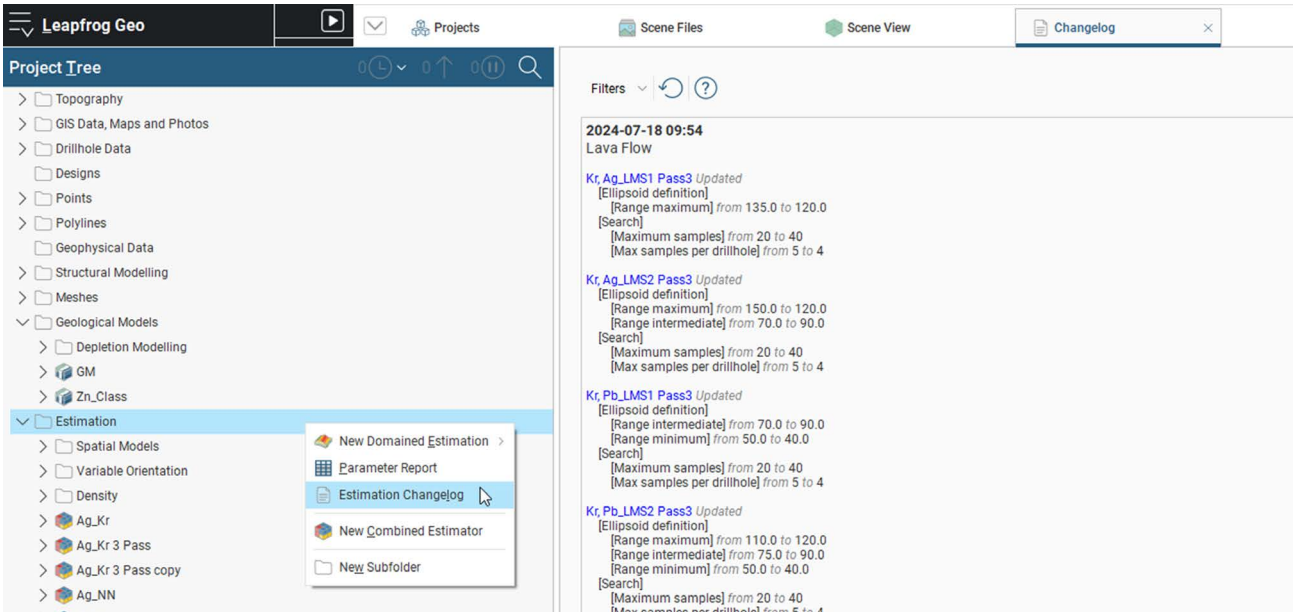
The domain and variable of the target Domained Estimation object are applied to the copied Estimators and the Estimators are renamed if the domain and variable names are present in the source Estimators. An option is offered that allows any Declustering objects applied to the source Estimators to also be copied.

1.14. Estimation Parameter Report



Editing of Estimation Parameters has been improved significantly, with the introduction of a right hand 'editing panel' that is more intuitive and allows simultaneous editing of multiple parameters across multiple objects. This is coupled with enhancements to report filtering and sorting, allowing rapid validation of parameters grouped by logical sub-sets of estimation objects, and common parameters to be easily applied to those estimators. The Estimation Parameter Report now assists the user in navigating the edits they're making by highlighting where parameter values are different, to help ensure all edits are deliberate and true. The user can also choose which columns within the table are displayed, making it much easier to navigate the Estimation Parameter Report. The amount of flexibility now available allows the user to have complete control of their edit operations.

1.15. Estimation Change Log



Coupled with the changes to editing described above, the new Estimation Change Log allows the user to maintain a record of all edits made to parameters in Domained Estimation and Estimator objects; recording all create, edit, delete and rename actions by all users on a per project basis.

This information is accessible and filterable by users, to allow them to interrogate the history of their Estimation on as granular a level as they wish. Edits made to Variogram, Variable Orientation and Declustering objects are not recorded, however, when these objects are applied to and incorporated into Estimation objects, these actions are recorded.

The change log provides an unprecedented level of audit and documentation for tracking the history and evolution of a project, further enhancing the existing power of Central project management for preserving complete project versions at a snapshot in time.

1.16. Variogram

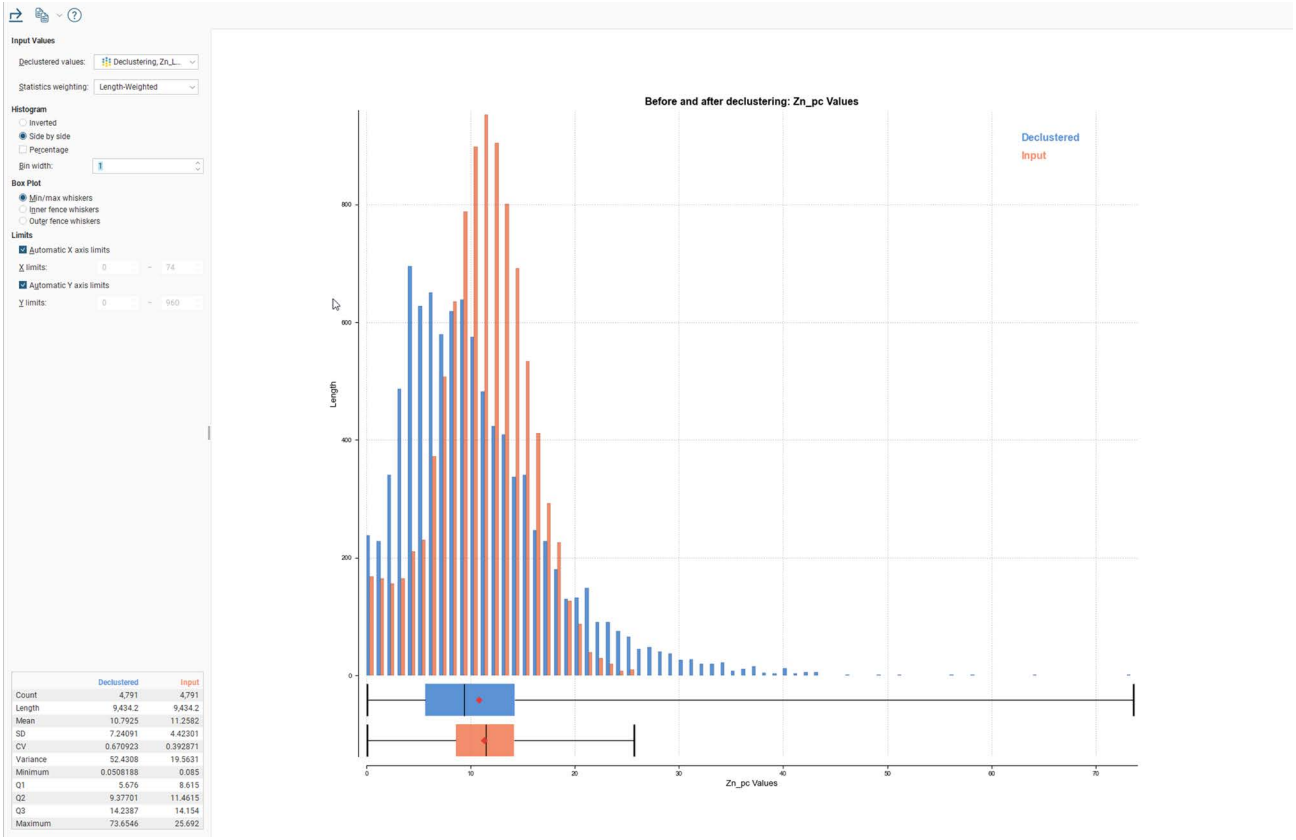
The Axis aligned variogram view can now be exported and copied allowing this more compact and informative view to be added to reports and presentations.

1.17. Declustering

1.17.1. Algorithm Improvements

Leapfrog has improved the existing moving window declustering algorithm to reduce boundary effect. Previously, samples near to the boundary of a domain would receive a higher weighting because of their proximity to the boundary of the mesh. The algorithm now incorporates sampled locations from outside of the boundary, resulting in much improved declustering weights. The effect of parametric choice on declustering can be easily tested by generating multiple declustering objects.

1.17.2. Statistics



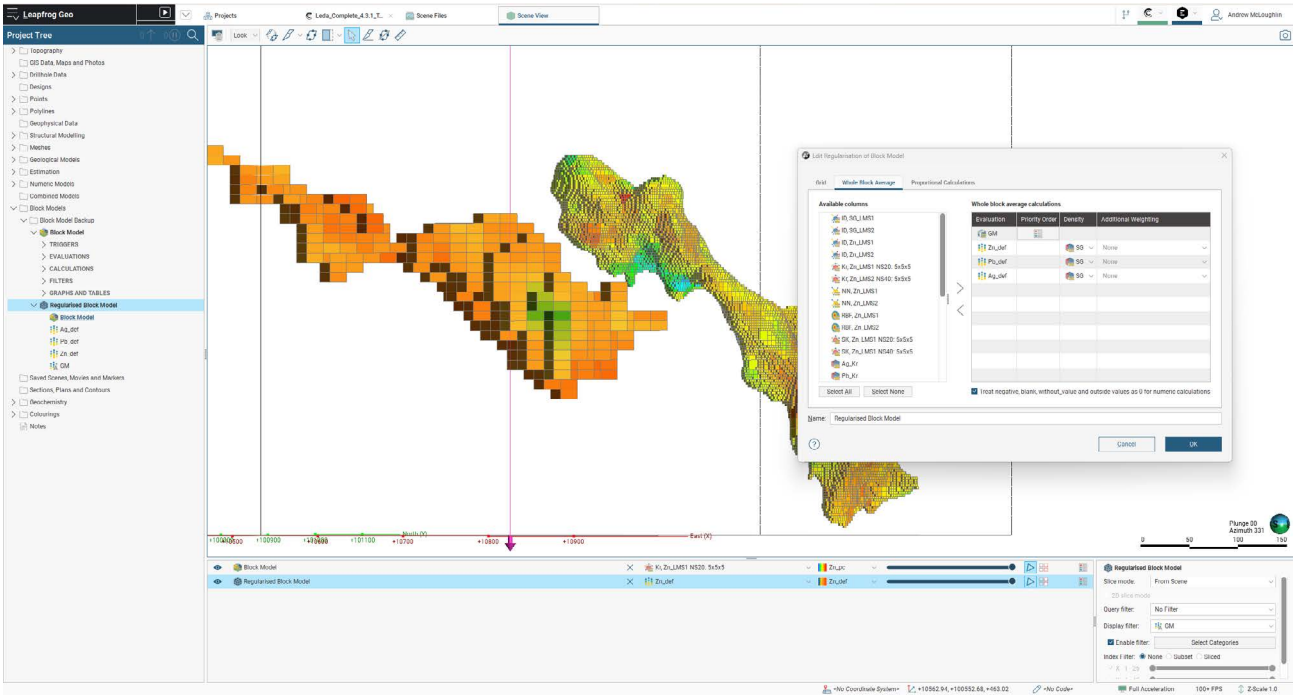
A key validation of block models is to compare domain average block estimates against declustered input sample statistics. Users can now easily generate declustered summary statistics within domained estimation objects. Declustered values and decluster weights can be viewed in scene, compared via multiple graph options and exported to file.

1.18. Estimation Performance

Leapfrog 2024.1 continues to deliver ongoing improvements to estimation performance – with the focus in this release being on search neighbourhood. The largest boost will be seen for estimates where large search neighbourhoods are being applied to dense data, although improvements in speed will be seen for all estimators.

Please note however, that these improvements do not apply to estimators using Variable Orientation.

1.19. Block Model Regularisation



Regularisation reduces the size of a block model by combining blocks and is often used in mine planning where detailed block models are an unnecessary overhead for processing, transfer and/or storage and are imperative for comparing and reporting on block models.

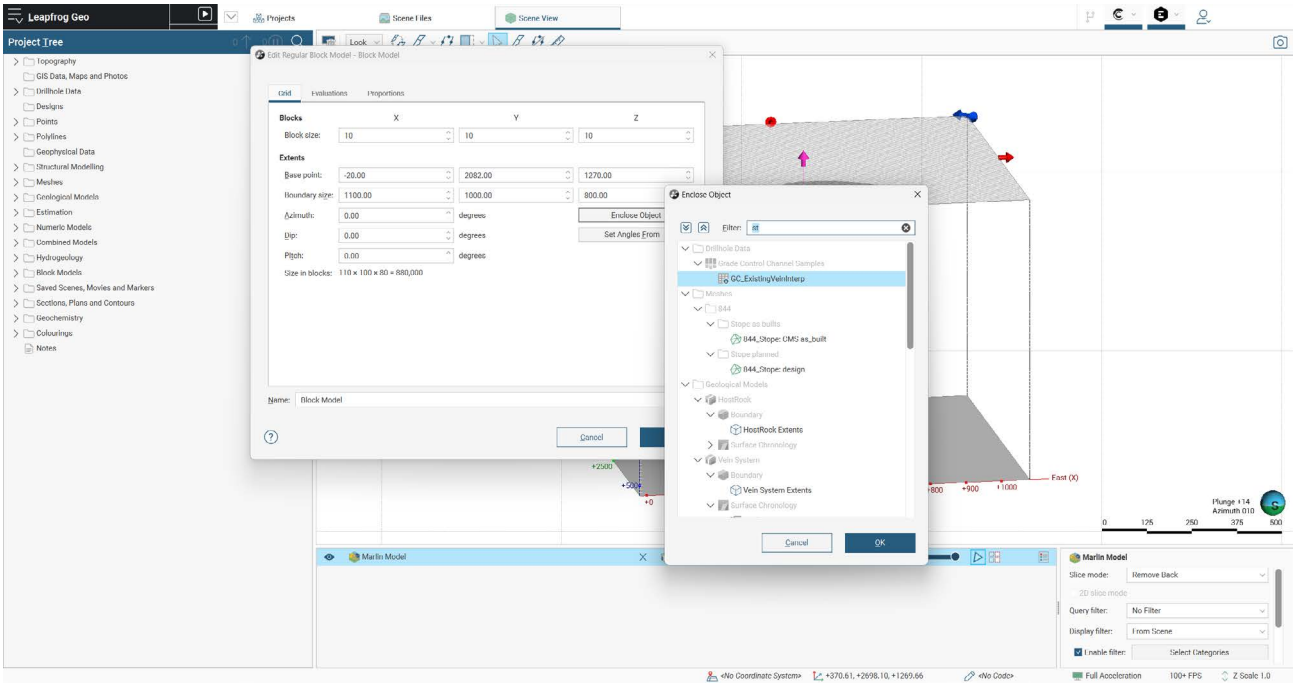
In Leapfrog Edge 2024.1, you can create a regularised block model as a copy to any block model in your project. Choose the size of the regularised blocks, with options being the parent size of a sub blocked model or larger multiples of that size. Importantly, it's in your hands to specify how best to translate category and numeric data. Categorical assignment is determined by taking the most common category as the new value for the regularised block(s). Additionally, categories can be ranked where two or more categories are equally common. Numeric data is calculated using a volume weighted average. Further weighting can be assigned using a "density column" and an "additional weighting" column and enables mass weighted calculations. Proportions for each category and numeric value can also be calculated within each new regularised block. These proportions are often used in pit optimization workflows.

1.20. Detect Block Model Definition On Import

Importing regular block models into Leapfrog without a block model definition file is now easier. If all centroids of the block model are included within the file, Leapfrog will determine the model definition directly from the file and pre-populate the required fields automatically.

2. User Interface And Interaction

2.1. Object Selection Dialog



Previously in Leapfrog, selecting items from the project tree could be difficult and time-consuming when there were a lot of objects in the tree and, by default, the project tree was opened fully expanded.

A new object selection dialog now replaces large drop-down lists, making location and selection of items from the project tree more intuitive and faster. Instead of needing to use keystroke shortcuts, such as Shift + < to collapse the list, you are now presented with a dialogue that allows you to collapse all, expand all and filter the project tree. Filtering is smart and responsive as you type, so you can rapidly home in on items of interest. You can choose whether the list is collapsed or expanded as a default.

Please note, not all lists have been updated.

2.2. Central Projects Tab

The Central projects tab has an updated user interface to improve usability and to better align with best practice design standards.

2.3. Project Tree Status

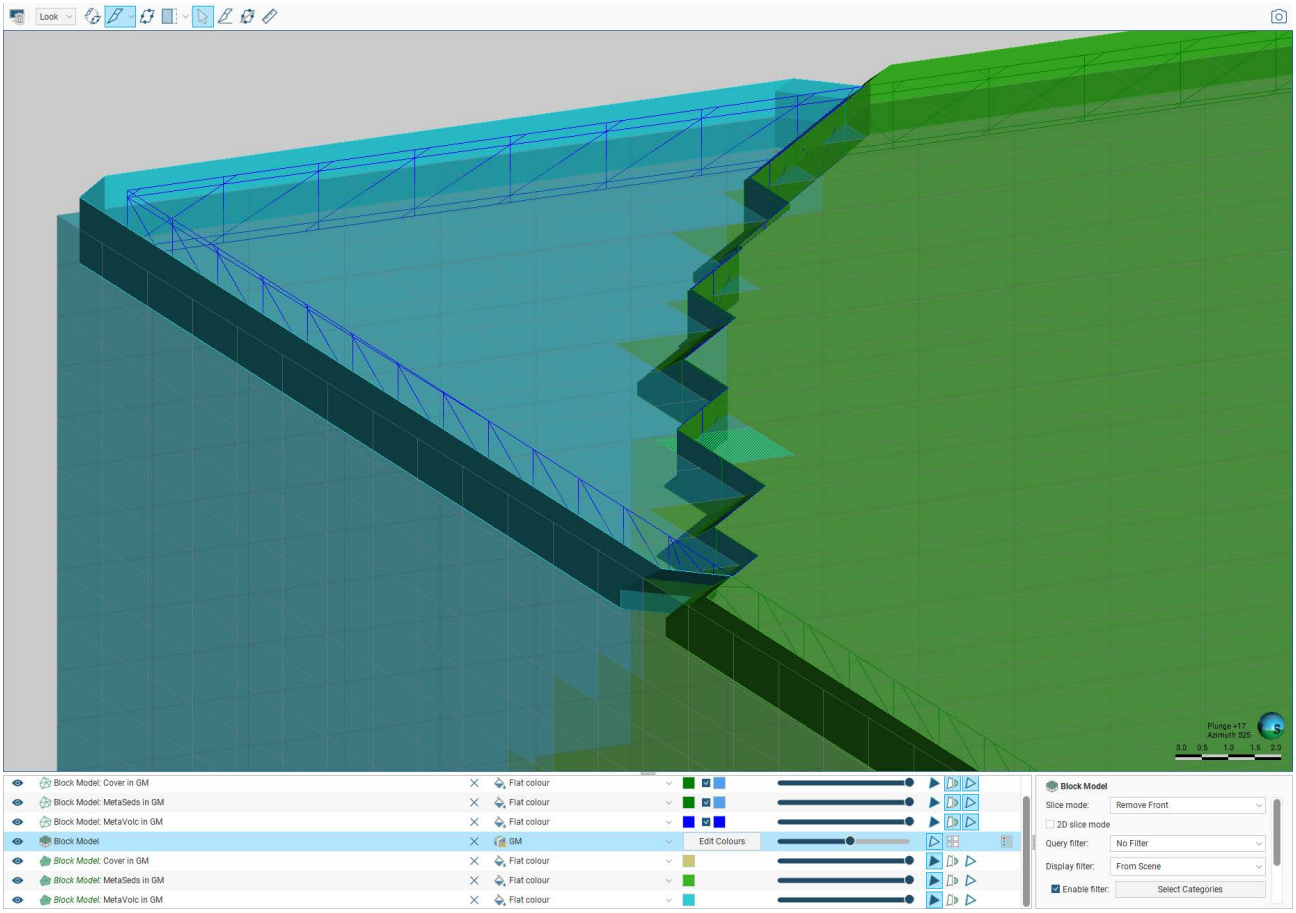
Status icons on the right-hand side of the Leapfrog project tree have had a couple of minor changes to facilitate scalability and usability.

Where one or more items within a folder had one or more statuses to update, for example, out of date; in error; paused; or frozen, previously a set of icons was used to visually convey this information. This stacked iconography has been replaced by a single icon (⋮). Hovering over this icon will display a tool tip with details of what statuses are affecting items within the folder.

3. Version Update Resulting In Changes

On occasion, necessary changes made to Leapfrog result in volumes being reprocessed and changes in shape, volumes or some properties are unavoidable. Understanding the impact this has on projects and the time it takes to ratify those changes is important so where possible, updates and consequential changes are communicated. In Leapfrog 2024.1 two such changes were mandatory and are outlined below.

3.1. Grid Surface



The “Grid Surface” option on grid of points, regular block models and geophysical grids has been updated and optimised. Consequently, the shape of the volume on the boundary is smoothed.

3.2. Compiler Change

All software is subject to unavoidable change and upgrade. In Leapfrog 2024.1. an upgrade to the Intel compiler used in Leapfrog calculations was enforced and necessary. This update brings big performance improvements to certain processing tasks depending on the hardware specifications of your machine.

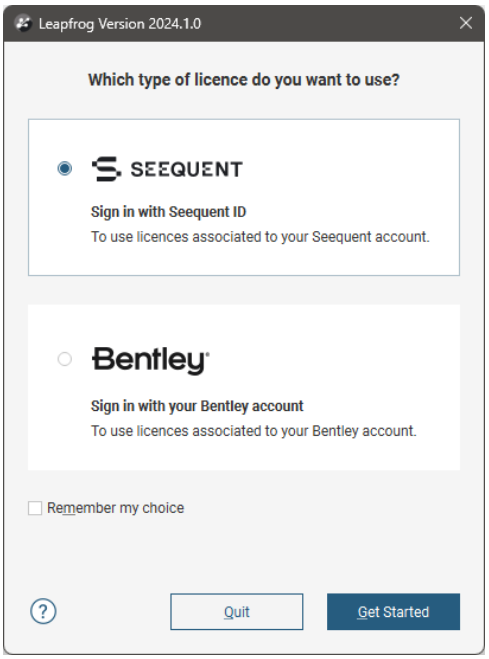
However, a consequence of this change is that small changes occur to floating point numbers. Most changes are in the >8th decimal place and any effects are immaterial; however, there are some circumstances may result in more noticeable localised changes. An example is in estimation using variable orientation – in rare situations, a minor change in orientation can result in a change to sample selection, and consequently a local different estimate. Extensive testing has shown that any such changes are rare and localised, and global changes to estimates are immaterial.

4. License Provider Selection

When you first launch Leapfrog, you may be prompted to sign in to your license provider and select your license.

If you have installed previous versions of Leapfrog on your computer, Leapfrog 2024.1 will detect the license provider you have been using to sign in and will not prompt you to choose a provider.

If Leapfrog hasn't previously been installed on your computer, you will be prompted to choose which license provider you will be using:



Which options are available to you depend on which Leapfrog product you have a license for:

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