# Contents

# INTRODUCTION

This document describes the new features and enhancements that make up the T7.310 update release and differentiate it from the latest T7.300 releases. T7.310 is distributed as a patch release and must be installed onto an existing 7.30x installation as a patch. For a full description of the new features please refer to the relevant sections in the T7 user-manual. This document and the end-user manual uses the term "T7" and “TrapTester” when referring to the current release version of the software.

**Important Notes**:

1) T7 license feature versions are “7.3”. T7.3 will not function with a T7.2 (or ealier) license. Please send T7.3 license requests to support@badleys.co.uk.

2) Some new features may require specific license feature-lines to unlock their functionality. Please contact support@badleys.co.uk to check eligibility and obtain the required license.

3) T7.3 uses FlexNet 11.18.2 for its licensing. The installation will include the 11.18.2 version of the FlexNet license manager daemon.

4) Once installed, T7 may need to run a database upgrade on existing projects. **Please backup you projects before using them with T7.310**. Once a project database has been upgraded it will not be accessible using older versions of the software.

5) After a project has been upgraded, the Volume Editor default shortcut file (defining hotkeys) will be replaced with an updated set of hotkeys and shortcuts. The original shortcut definition file will be renamed to "default.7.3xx".

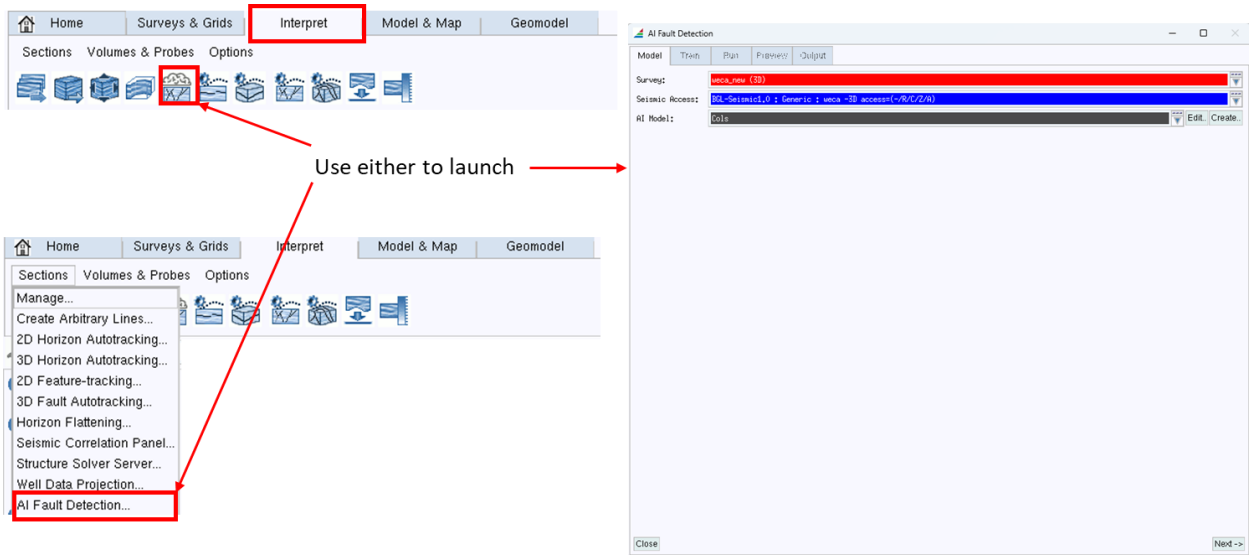
# MAIN FEATURES

## *AI Fault Indicator Creation*

**Requires AIFaults license feature**

A new AI auto-fault identification tool has been added to T7. This employs deep learning technologies in order to perform semantic segmentation on seismic amplitude volumes (although other volume types can be used too) in order to create fault indicator volumes. The tool enables both model training and inference.

The AI tool takes the form of a wizard with five main tabs (outline below) that take the user through the entire workflow from model creation right to volume output. The tool can be launched from the Interpret main ribbon or from the “Sections” dropdown menu:

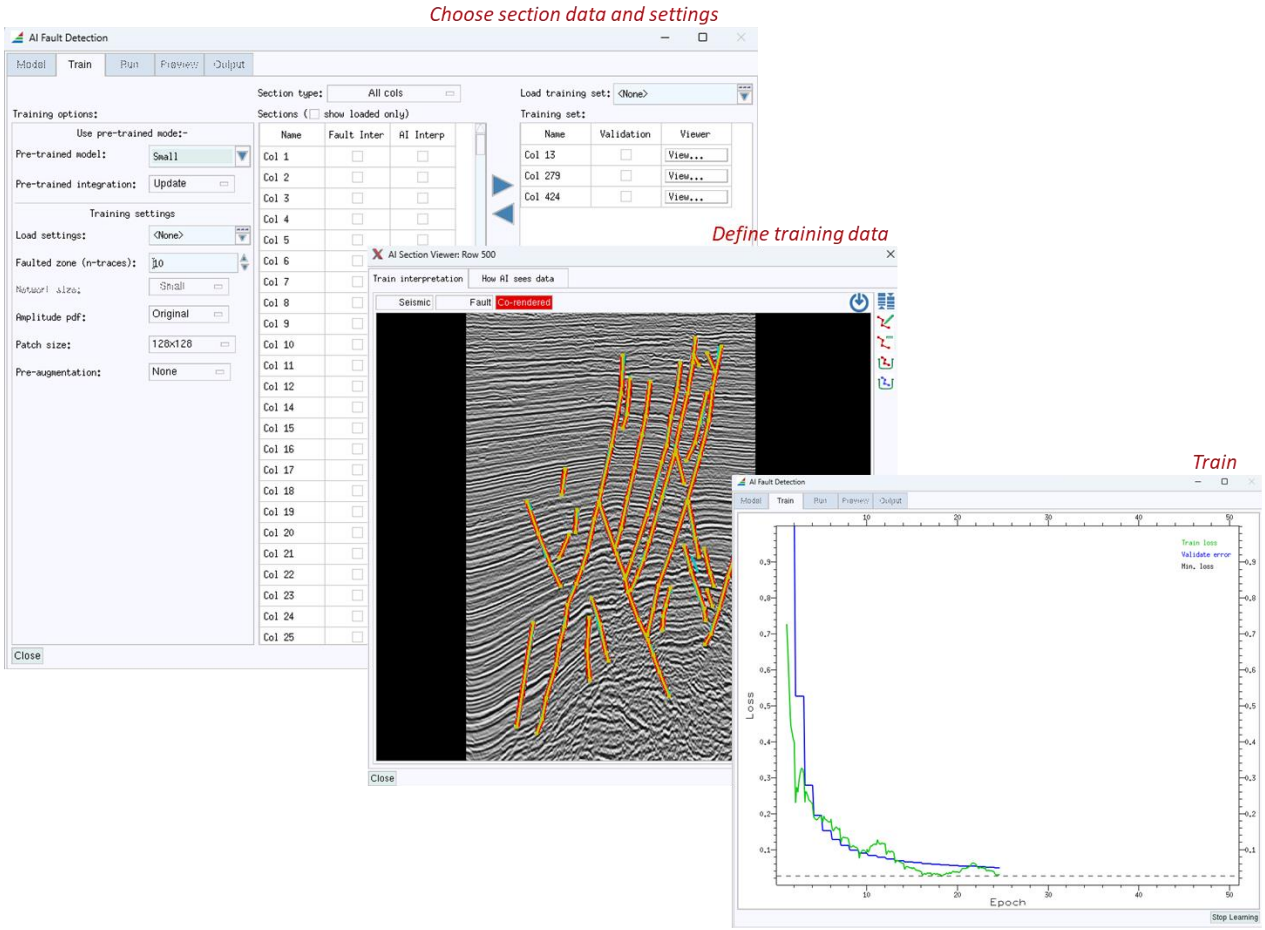



### *MODEL*

Here the user picks/edits a survey, seismic access definition (volume) and a T7 artificial intelligence learning model (AILM) – see manual for details.

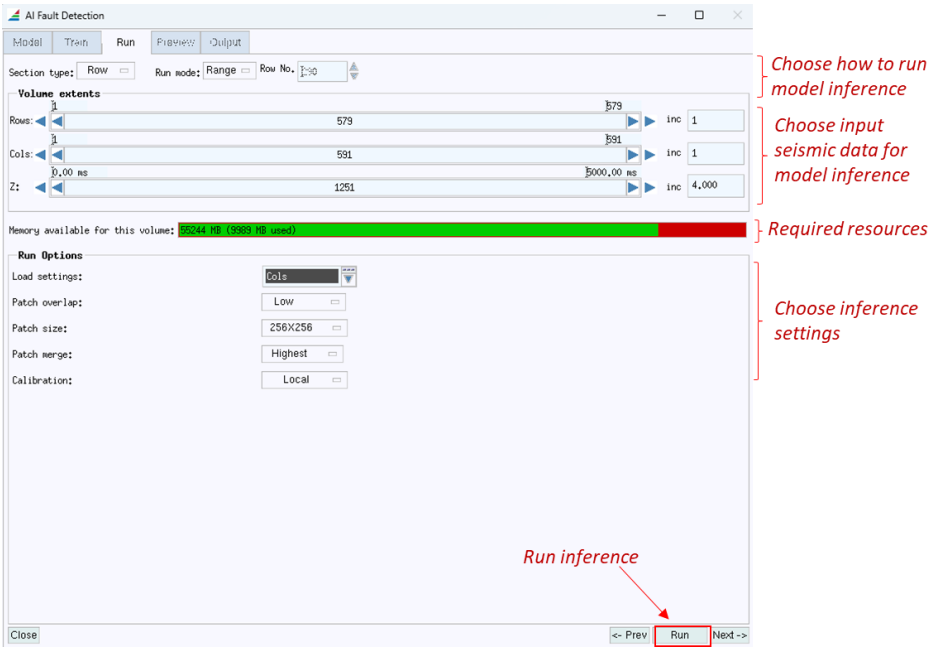
### *TRAINING THE AI MODEL*

Here the user can define what sections they wish to use and create the AI fault training set (akin to fault picking). Once a number of sections (typically two or three) have been interpreted the model can be trained. This data can either be used to refine an optional pretrained model or to create an entirely new model. Alternatively, the training step can be by-passed altogether by using a pre-trained model without any fine-tuning.



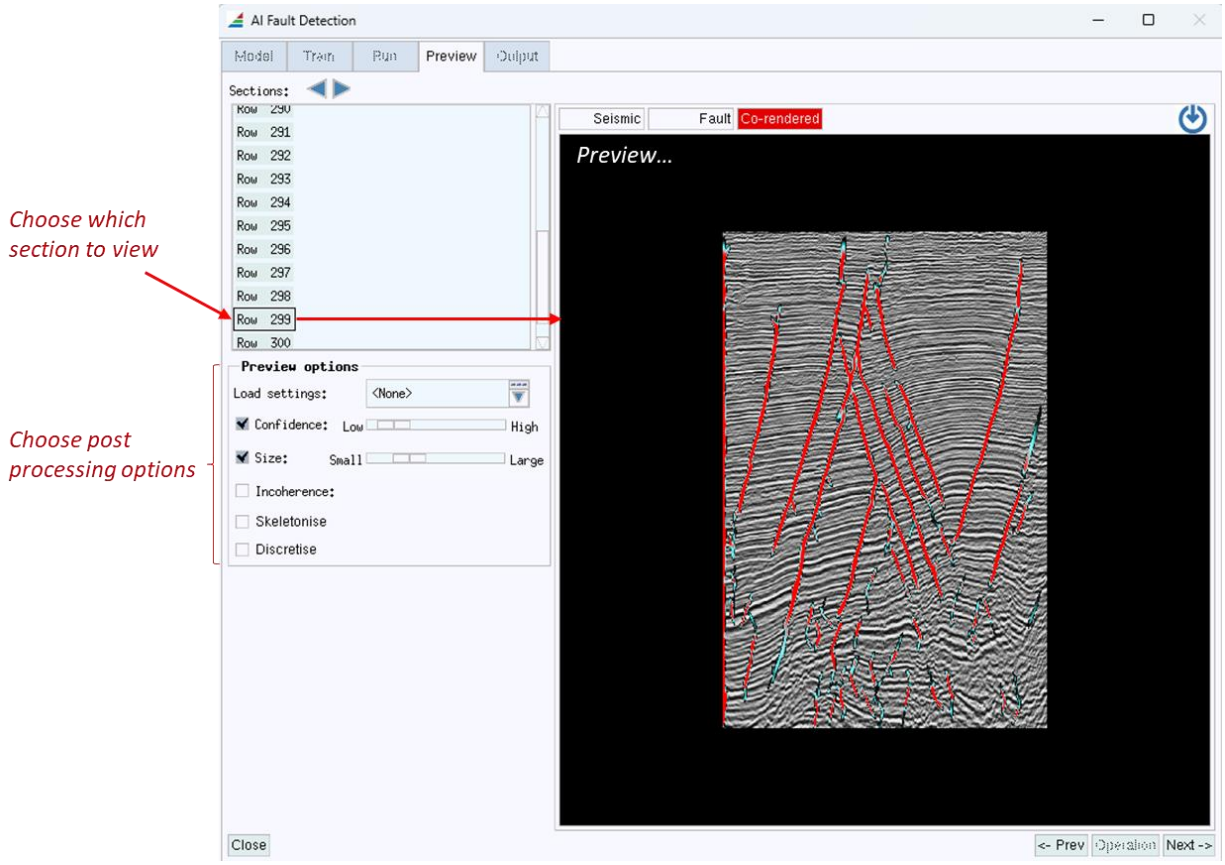

## *MODEL INFERENCE*

Once the model has been created/chosen/trained it can be used to “infer” fault locations on the input seismic volume. It should be noted that there are number of options (see T7 manual for details) here that can affect the quality of the output. It is best to experiment with these before performing inference on an entire volume. Typically, one would wish to operate on a small number of sections first to see what the best settings are for inference.



***PROCESSING***

After running the model you can view the output results in the processing tab. This provides a list of the sections upon which the AI model has been run. By selecting a section you can view the results in an accompanying viewer. The output is not a true indicator but instead a probability field that be can be modified using a number of different processing steps (see T7 manual for details). These help reduce noise, highlight areas of high fault probability and provide more continuous outputs. Again, these are presented as a series of options. It is typically worthwhile undergoing a small series of cycles of inference and processing before running the model on a significant portion of an amplitude volume.




***OUTPUT***

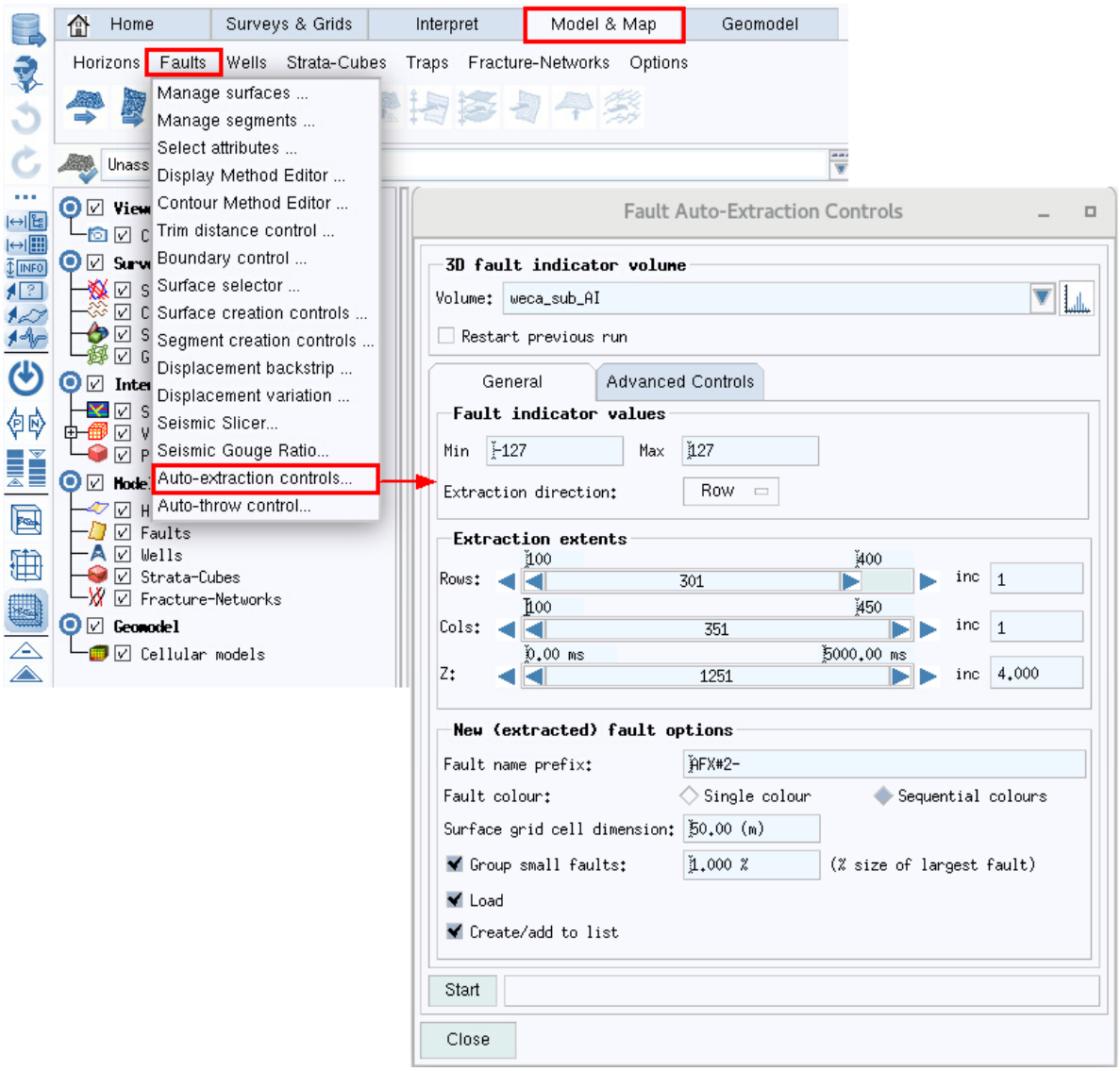
As the name suggests this tab is used to write the results from model inference to a BGL volume that can then be treated like any other data volume (loaded alongside seismic data in Volume Editor). The data can be integrated into other existing volumes or new volumes can be created depending on the output settings – see T7 manual for details.

The output volumes can be used as input into the "**Automated Fault Surface Extraction**" tool – described below.

# *Automated Fault Surface Extraction*

**Requires AIFaults license feature**

With the implementation of the AI Fault Indicator Volume Creation (described above), T7.3 also provides a tool for extracting fault surfaces as tri-meshes from such a volume. This new tool will operate on any fault indicator volume – generated through T7 or by a third-party system. The new tool is accessed from the Model & Map tab in the Volume Editor.




The various controls are described below.

### *3D FAULT INDICATOR VOLUME*

Specify the fault indicator volume to be processed.

If the input volume has already been used for an extraction process, it is possible to use the “Restart” option to re-run the later phases of the extraction with different options.

### *FAULT INDICATOR VALUES*

Define the input volume(s) sample value range that represents the fault data and differentiates it from non-fault data.

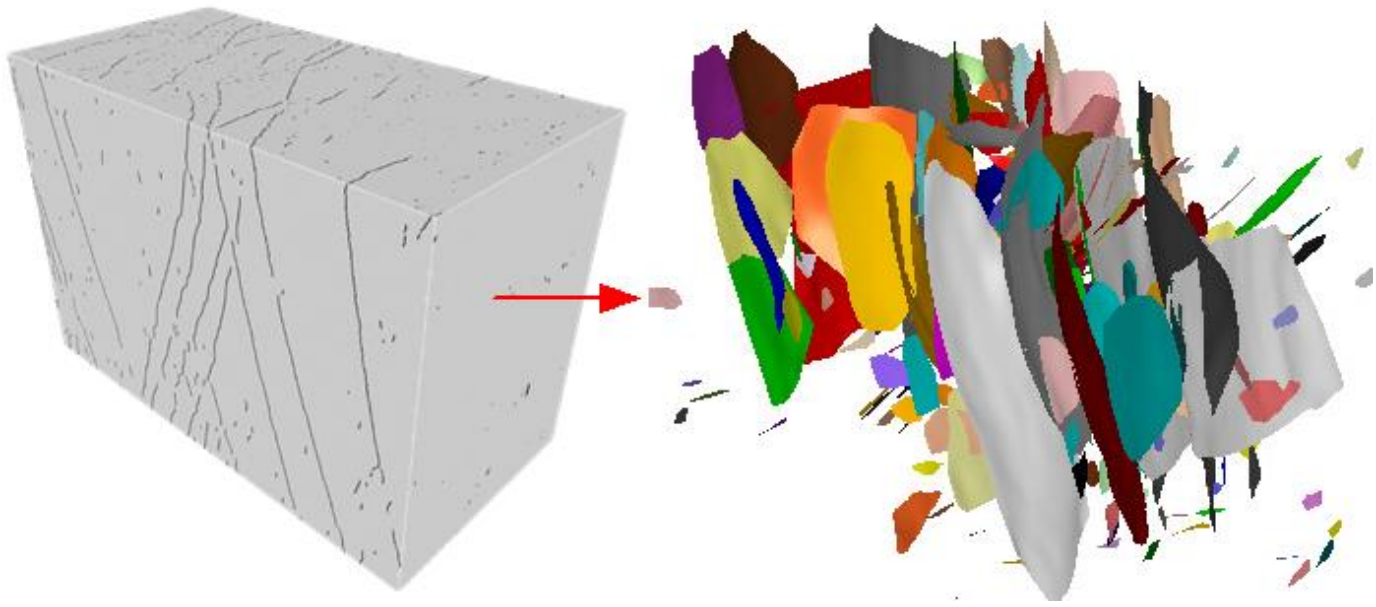
Set the “Extraction direction” to define how the extraction procedure will analyze the input indicator volume: row by row or column by column.

### *EXTRACTION EXTENTS*

Define the input volume row, column and Z-range to use for fault surface extraction.

### *NEW (EXTRACTED) FAULT OPTIONS*

- Set a prefix to be used to name the faults created during the extraction process.
- Define the colour of the faults created – or whether to use a colour sequence.
- Define a surface grid cell dimension as a multiple of the input volume sample size.
- Choose whether or not to group the smaller faults into a single “fragments” object.
- Choose whether or not to load the extracted faults upon completion.
- Choose whether or not to add all the extracted faults to a new list upon completion.



*Example AI Indicator Volume and Fault Surface Extraction*

The Fault Surface Extraction process can create large numbers of faults which can be unwieldy to manage. The **Fault Surface Selection Tool** (introduced in T7.3 and described in detail in the T7 Reference Manual) can be used to manage the selection and display of fault surfaces based on their geometric properties (dip, strike, size).

### *ADVANCED CONTROLS*

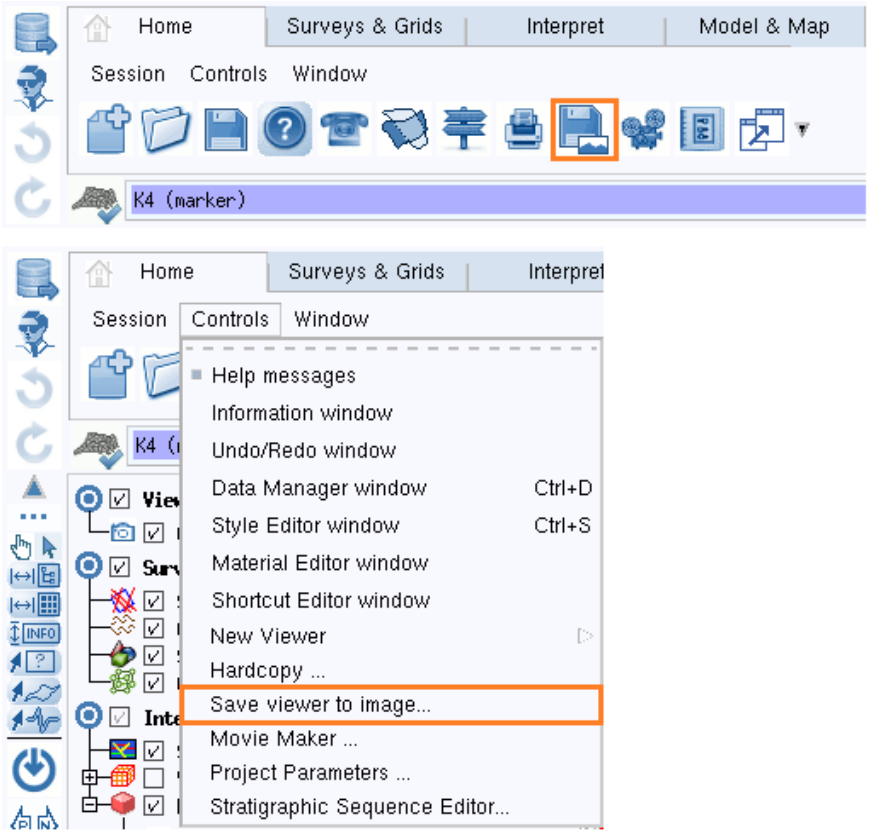
The Advanced Controls can be used to fine tune the extraction process. Refer to the T7 Reference Manual for full details.

# FUNCTIONAL ENHANCEMENTS

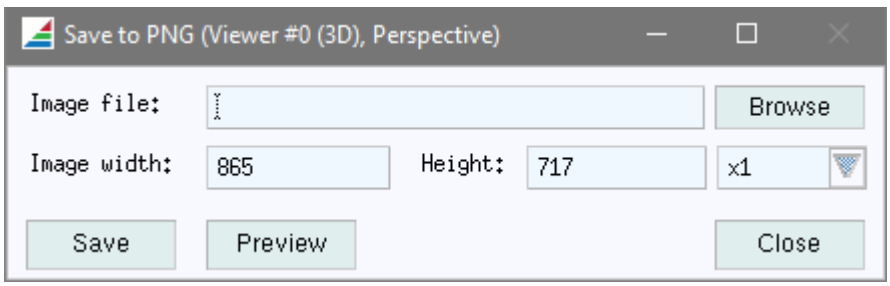
## *Volume Editor Viewer PNG Export*

In addition to the existing Hardcopy feature, Volume Editor now has the ability to save the current viewer contents to a PNG file.

The option can be located in the **Home** tab toolbar and menu bar:




Clicking the icon or menu item displays a dialog that allows the output PNG and image size to be specified:

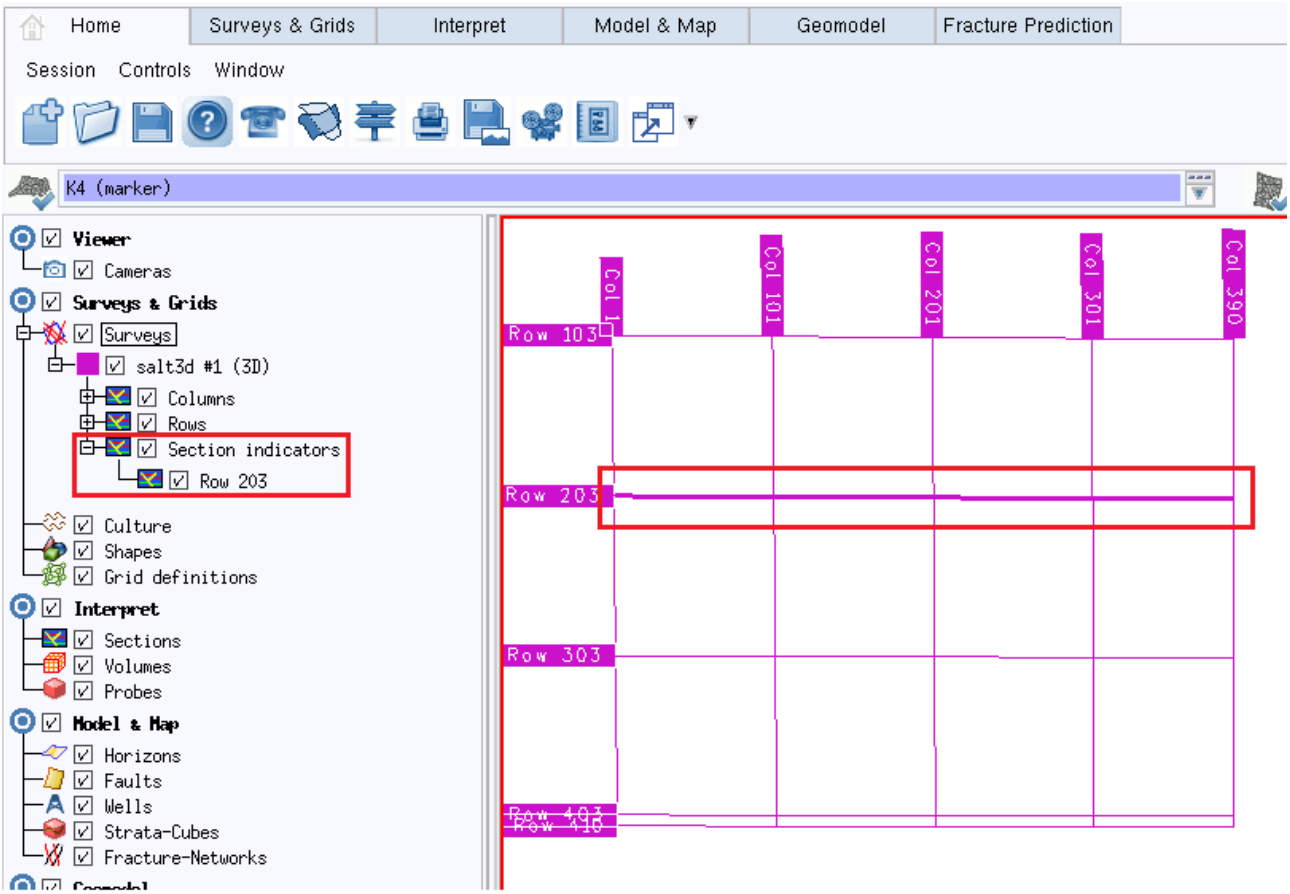



The image size can be changed by typing new values into the width and height fields, or choosing a preset magnification, which will preserve the aspect ratio.

Note that the option to modify the image size is only available for viewers in **Isometric** mode.

## *Surveys & Grids Loaded-Section indicators*

The basemap grid displayed for loaded surveys in the Surveys & Grids module has been extended to show indicators for sections loaded into the Interpret module:



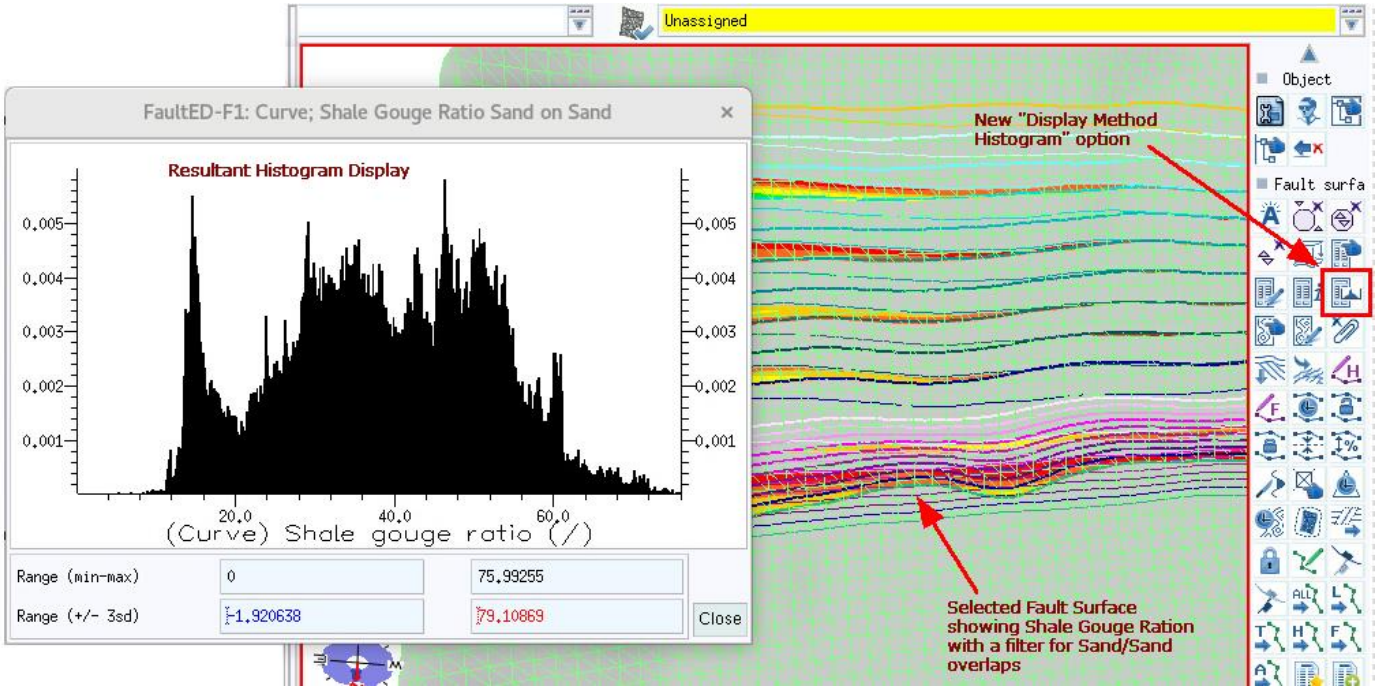

In the above screenshot, Row 203 has been loaded into the Interpret module in another viewer. The indicator is shown as a bold line in the viewer and appears under the “Section indicators” group in the object tree.

The object tree and viewer provide a context menu item on the indicator to allow the section to be unloaded from all viewers.

## *Display Method Attribute Histogram*

T7 provides various means of creating data distribution plots for its many attribute types. However, an additional tool has been added to create quick histograms of any data displayed in the Volume Editor that uses a Display Method. If this Display Method defines a filter then this will be used to condition the histogram so that only the filtered data is used.

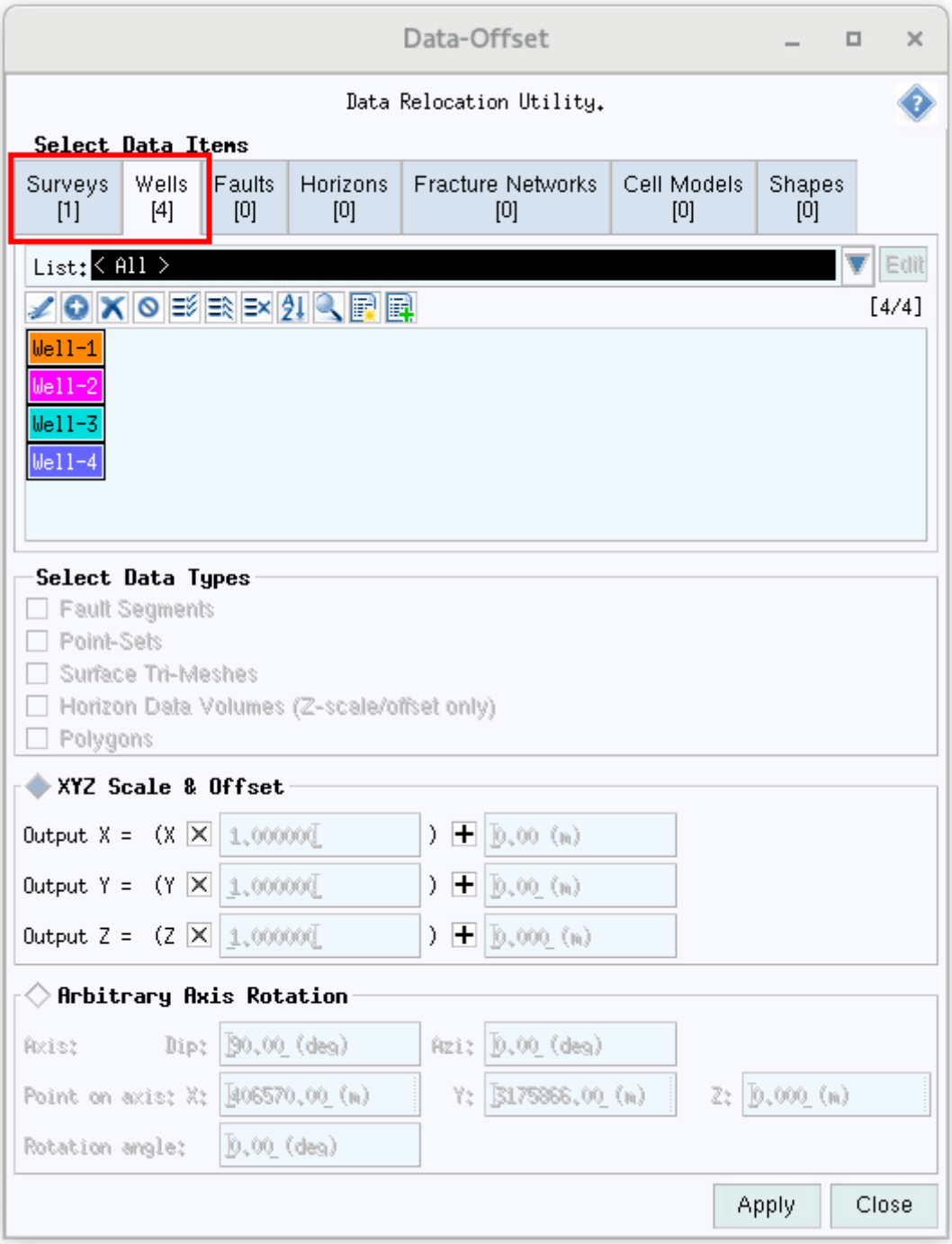
The below example shows the new tool in action.




The new histogram tool is accessed in the Volume Editor by first selecting the relevant object in the viewer (a Fault Surface in the above example), and then using the <MB3> Popup Menu option "*Fault surface -> Display method -> Attribute histogram*", or using the equivalent context tool-bar option, as shown above. The histogram displayed here is actually the same as that which is available in the Viewer Colour Bar for the chosen object type (e.g. Fault, Horizon etc), but the new histogram option is displayed in more detail in its own window which will persist until closed. Multiple histograms can be displayed together for comparison purposes. Zoom and pan options are available in the graph area using <Shift>+MB2 or <Ctrl>+MB2.

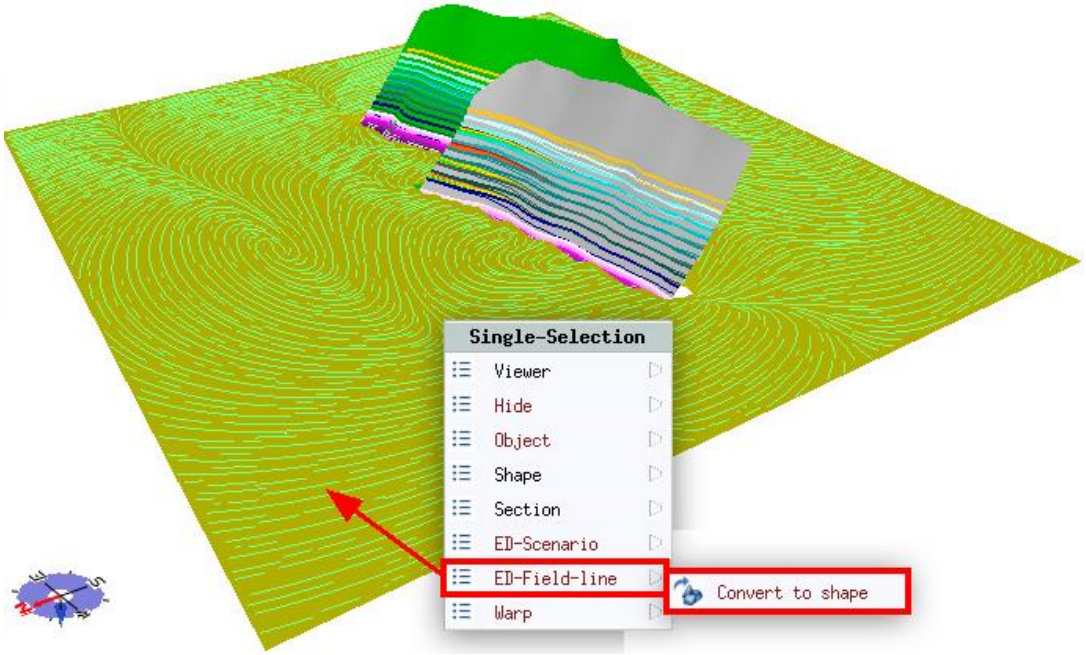
## *Data-Offset for Wells and Surveys*

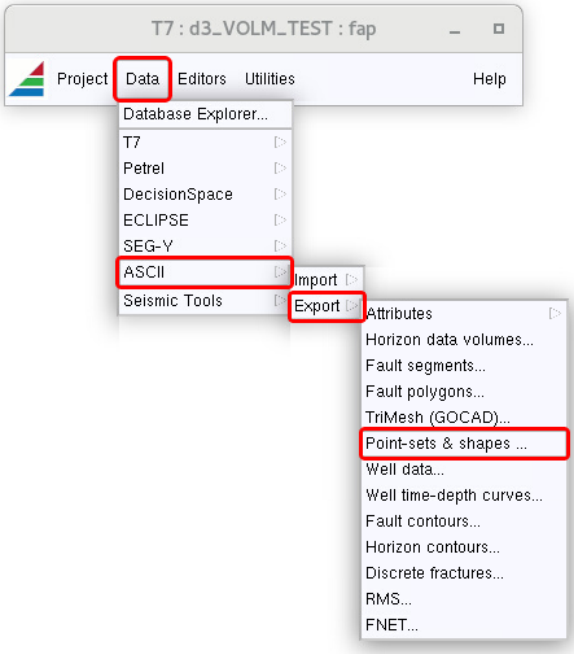
The T7 Data Offset utility provides a means of applying geometric transformations to many T7 data types. The transformations that can be applied include simple XYZ offsets or scaling to more advanced arbitrary axis rotations. This tool has now been extended so that transformations can be applied to Well and Survey data (ie well paths & picks, 3D survey grids & 2D line navigation). This can be useful if data has been imported in the wrong units or at the wrong position or it can be used to move copied data to a different location from the original.

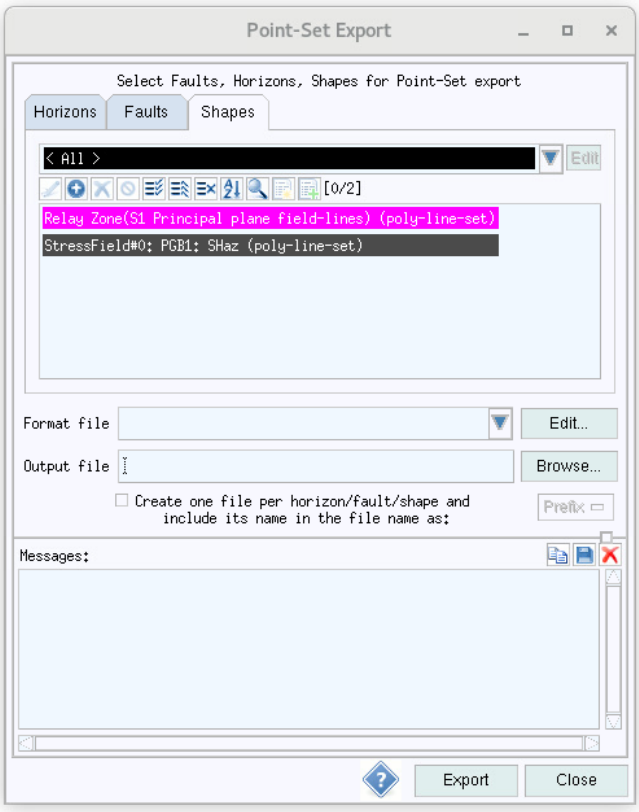


## *Convert Field-Lines to Shapes*

T7.3 introduced the new Field-Line properties in the Fracture Prediction system – these lines represent the orientation of fracture planes where they intersect observation surfaces. Though these properties are exportable via the Petrel Link, the support for this data on the Petrel side is limited. Now being able to convert the Field-Lines to T7 Shapes means that, when required, the data can benefit from improved export functionality. In particular, T7 Shapes can be exported to Petrel as Shape data. Also, T7 poly-line Shapes can be exported in ASCII format using the "*Point-set & shape*" export tool accessed from the T7 Main Menu and Database Explorer.



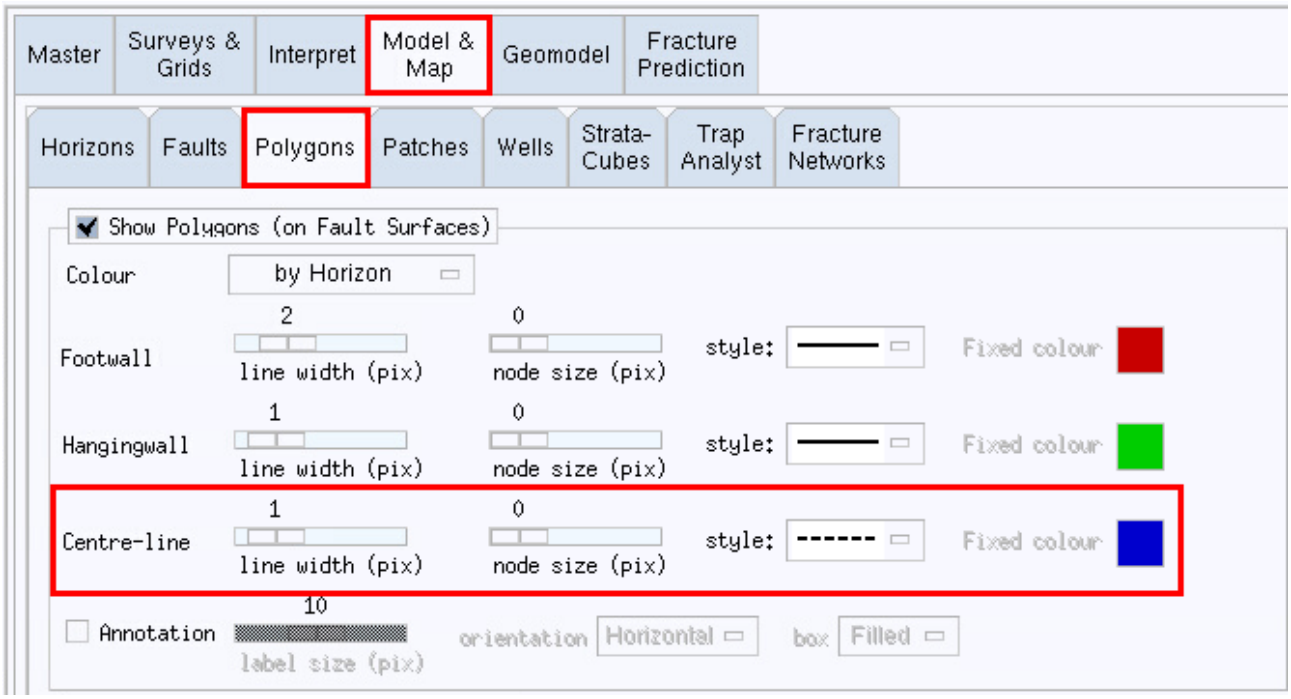



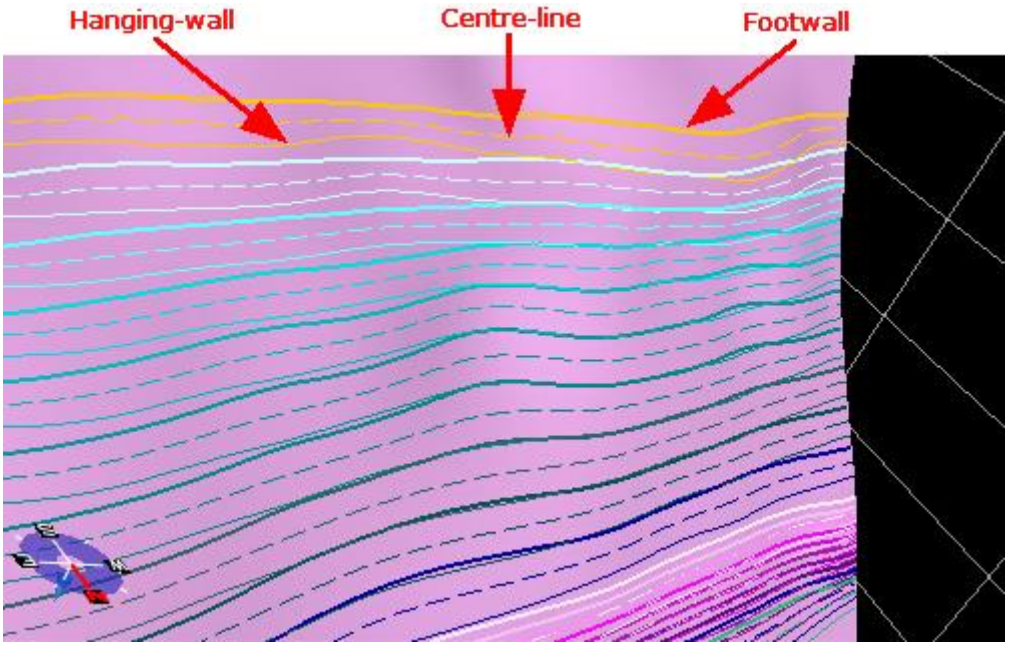



## *Polygon Centre-Lines*

Polygon centre-lines are poly-lines that form the central (or average) path between the footwall and hanging-wall components of a fault/horizon intersection polygon. These can be useful to show the locations of faults when displayed in map-view.

It is now possible to control the display of polygon centre-lines in the Volume Editor's Model & Map module. The images below show the new Style Editor controls and a number of centre-lines displayed on a fault surface.

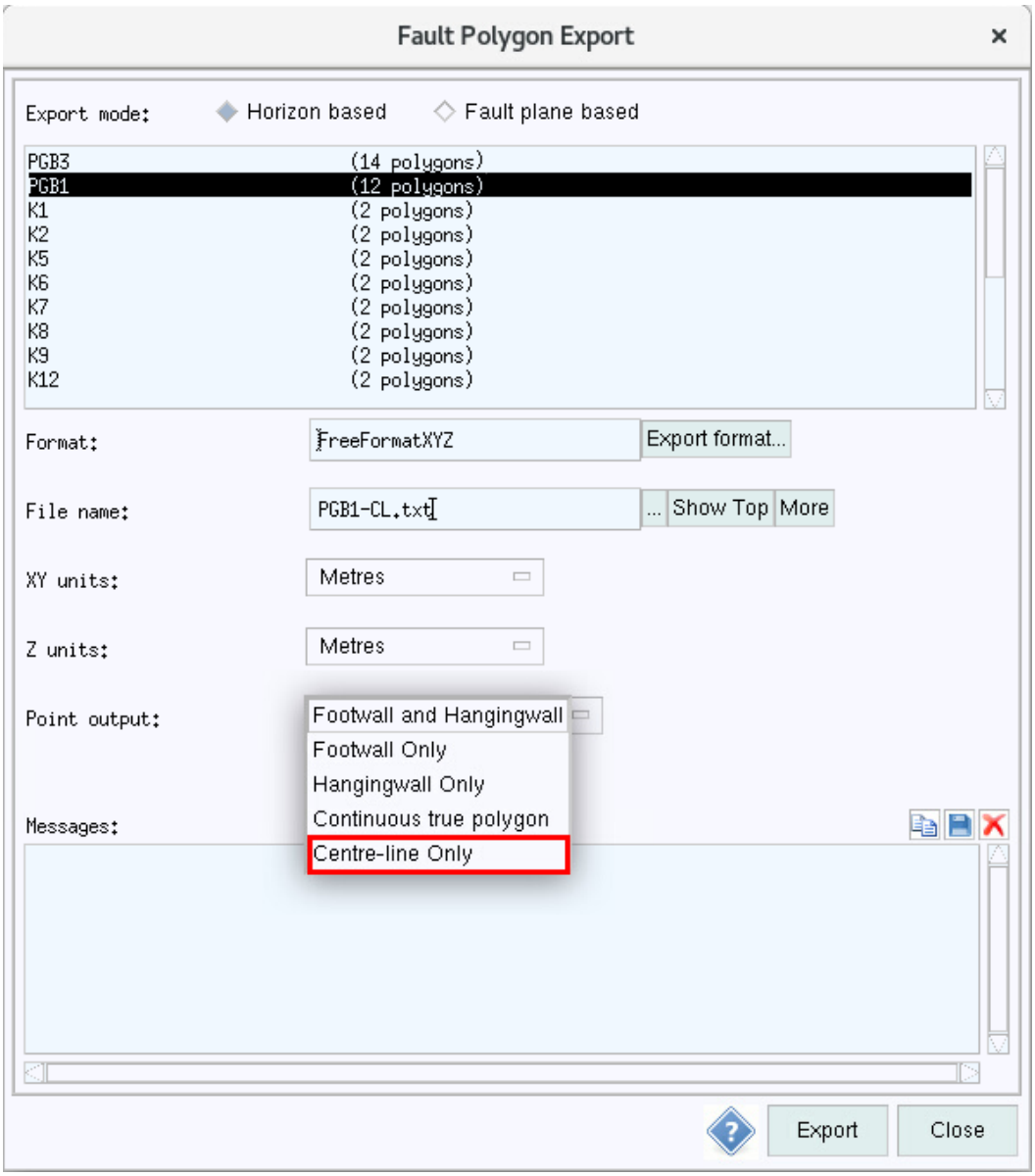



NOTE: Polygon centre-lines are not stored in the T7 database – moreover, they are computed as required at run-time from the fault polygon data.

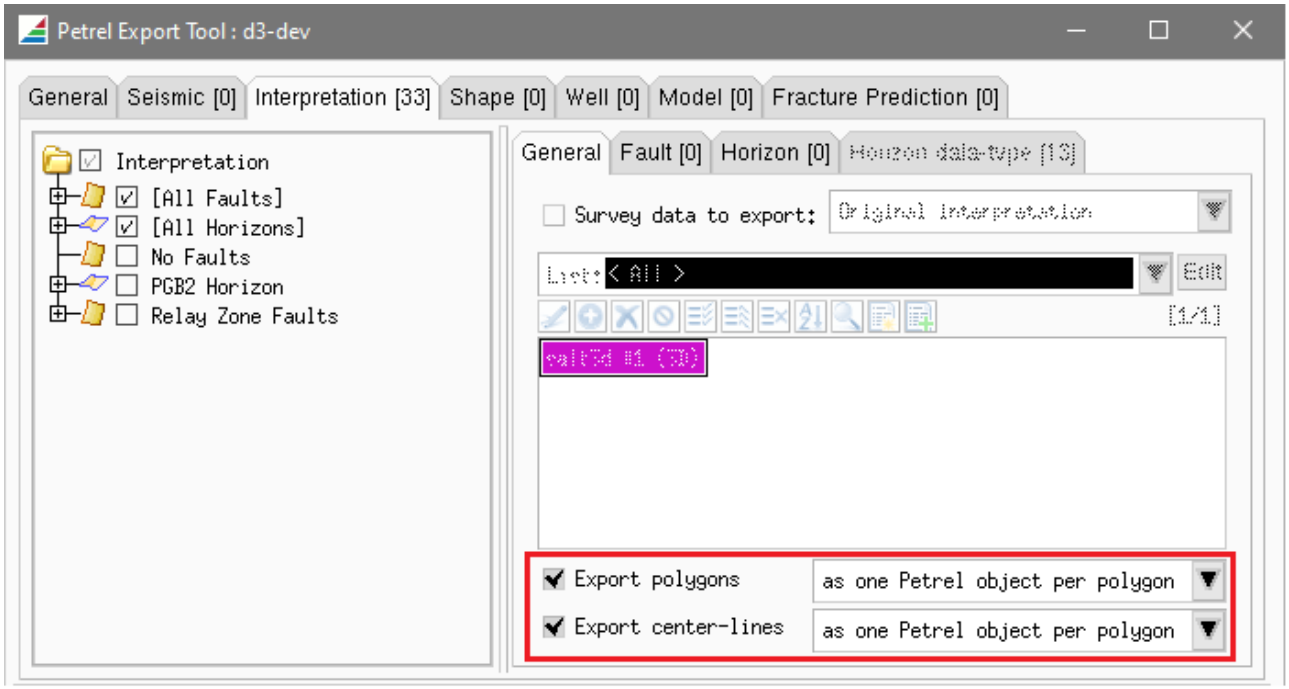
### *ASCII EXPORT*

Polygon centre-lines can now be exported using the Fault Polygon ASCII Export tool. This is accessed from the T7 Control Menu (*Data -> ASCII -> Export -> Fault polygons*) or from the Database Explorer (*File -> ASCII Export -> Fault polygons*).

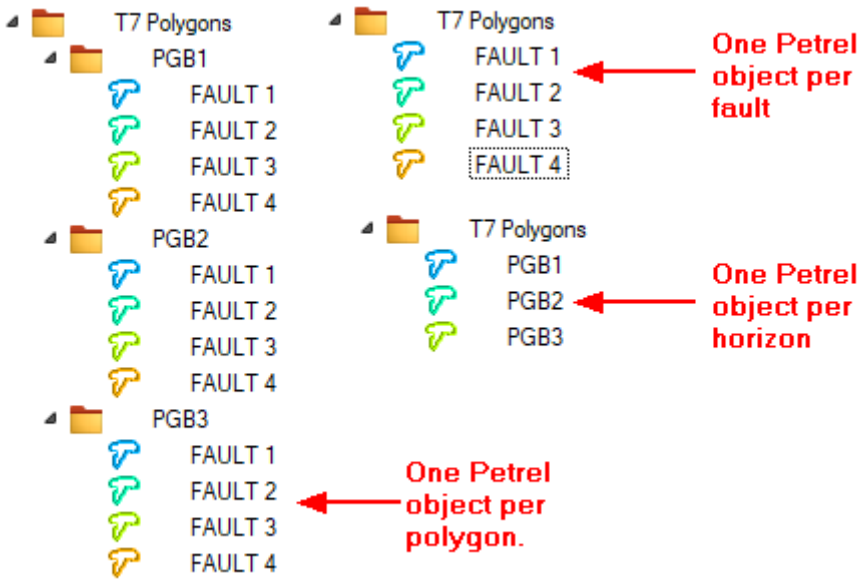


***PETREL EXPORT***

The Petrel Export tool has also been extended to permit the export of polygon centre-lines to Petrel:

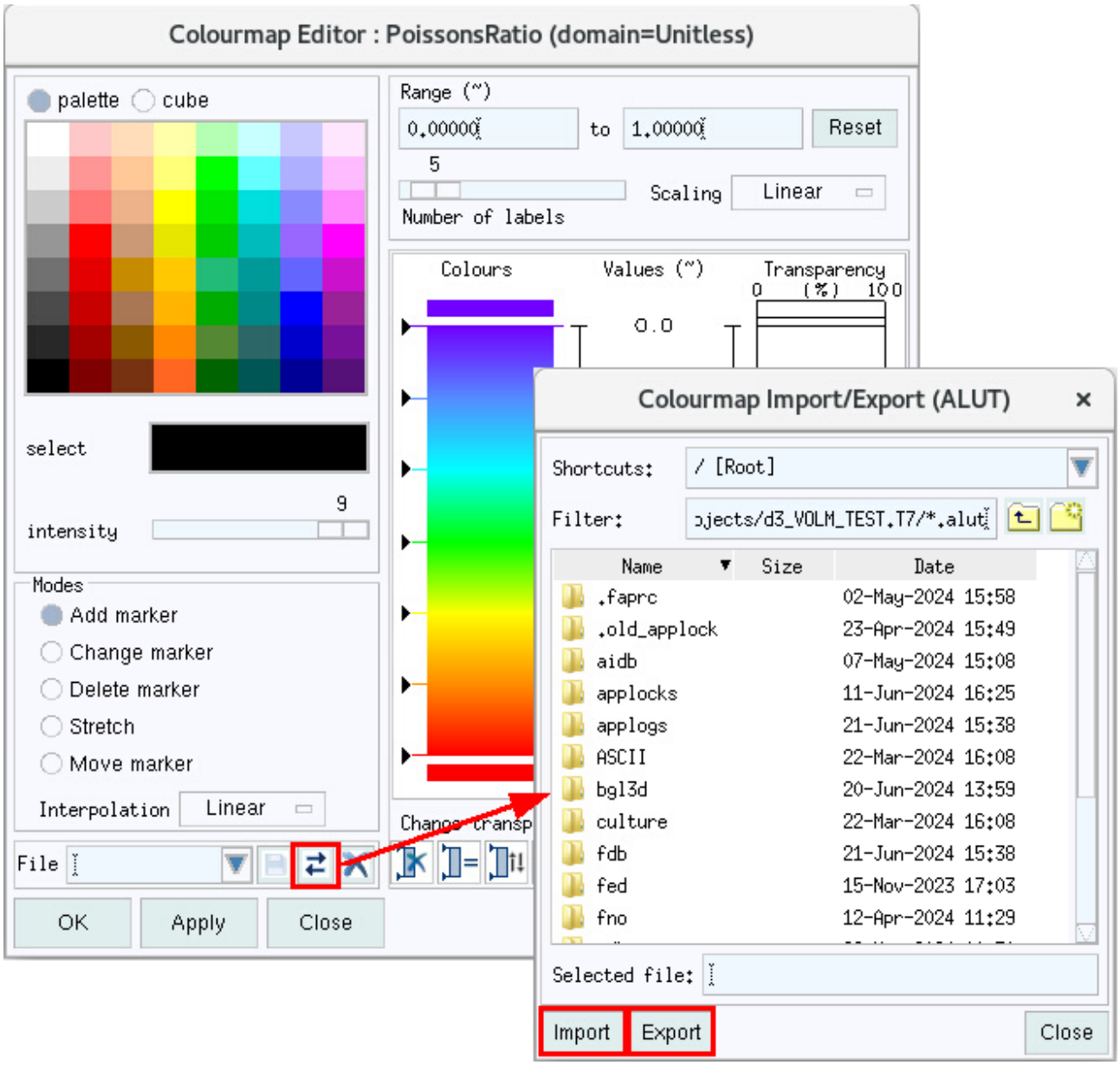



In addition, when exporting polygons and center-lines, options have been added that specify the relationship between T7 polygons and the resulting Petrel polyline-set object.



## *Colourmap Import/Export*

The T7 Colour Map Editor utility now supports the import and export of ALUT files. ALUT files are a simple list of 256 comma-separated RGBA colours. Access the Import/Export option via a new icon in the Colour Map Editor (as shown below).




**To export**: set an appropriate filename (or choose an existing file to replace) and click on *Export* to create a new ALUT file from the currently defined colour map.

**To import**: select an existing ALUT file using the file selection tool and click on *Import*. This will load the colour data from the chosen ALUT file and display its content in the Colourmap Editor. It will also save the imported data as a new colourmap resource available in the *File* drop-down list.