GVERSE® GeoGraphix®

WHITEPAPER

Automatic Fault Extraction

GVERSE Geophysics

GVERSE GeoGraphix Support

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Extracting Faults from Seismic Data Automatically

This functionality allows you to generate a fault attribute volume which can then be used in automatic fault extraction workflows. The fault volumes must be associated with surveys to enable auto-picking of faults. The output file is generated with a **_AFV** extension.

Segment Auto Pick Mode

1. Open **3D view**.

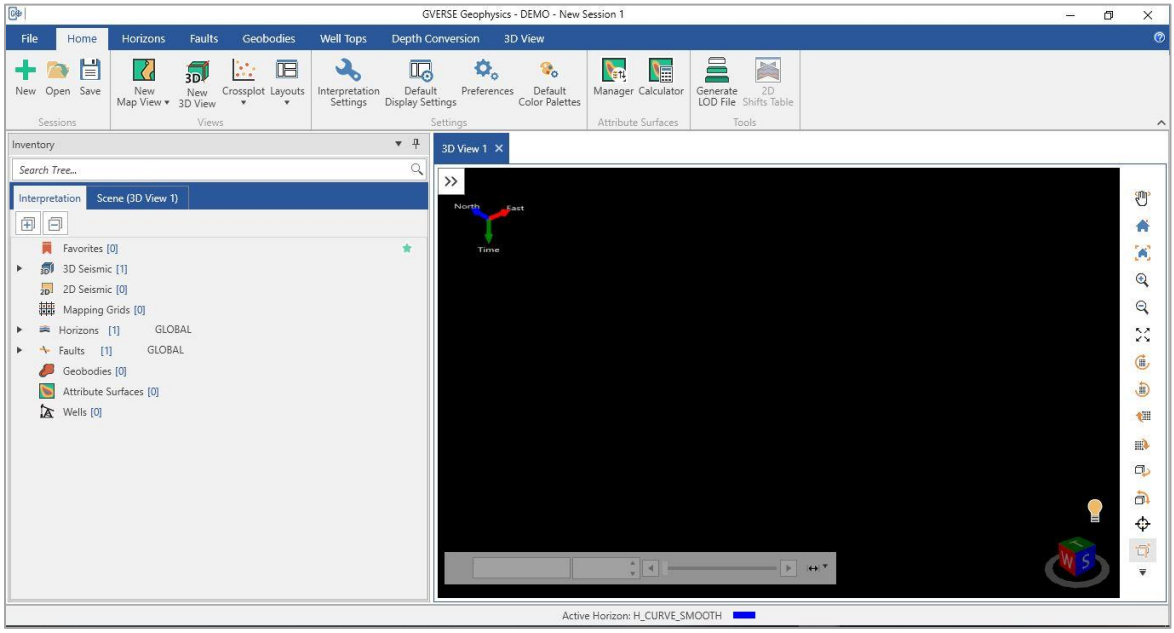

Figure 1: 3D view in GVERSE Geophysics.

2. Select the **Automatic Fault Extraction** from the **Faults** tab

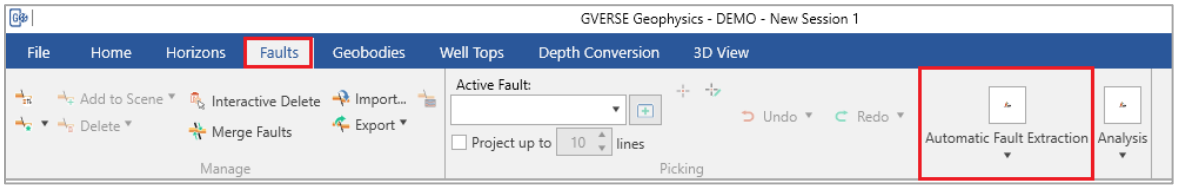

Figure 2: Select Automatic Fault Extraction option.

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3. Click the **Create Volume** to launch **Generate Fault Attribute Volume** wizard.

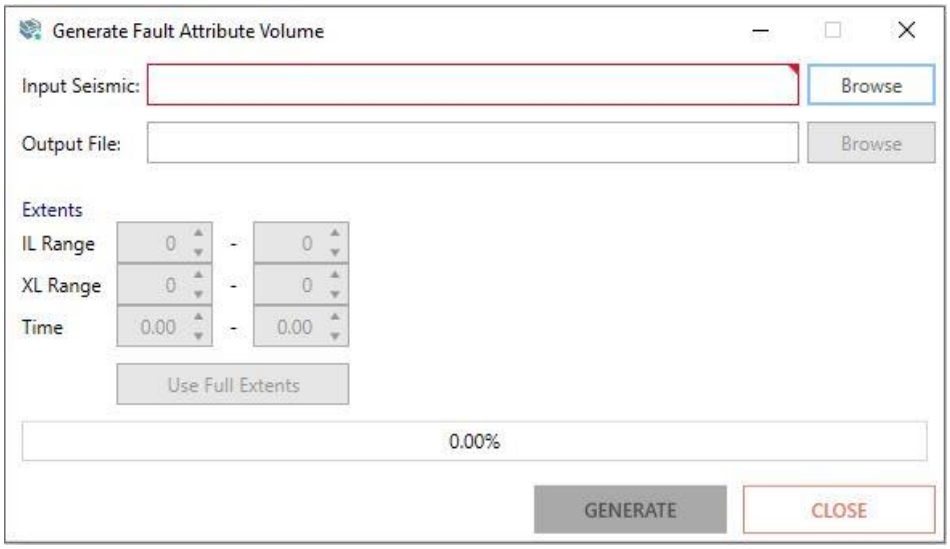

Figure 3: Generate Fault Attribute Volume dialog box.

4. Select input volume (SEG-Y) in the **Input Seismic** field and start generating volume. (As this is a time-consuming process, it runs independently and can be minimized)

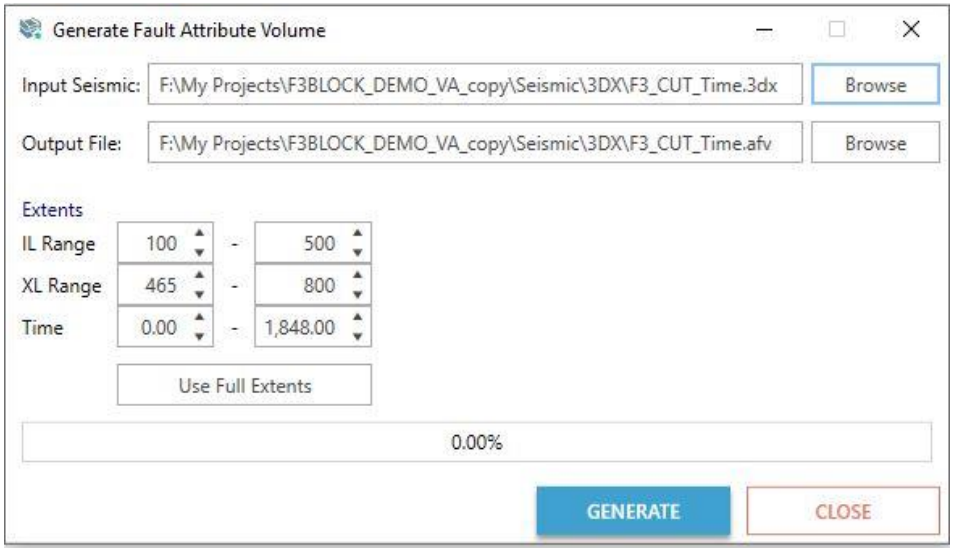

Figure 4: Input SEG-Y selected to generate fault volume.

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5. Next, click on **Link Volumes** option in the **Automatic Fault Extraction** under the **Faults** tab to attach survey.

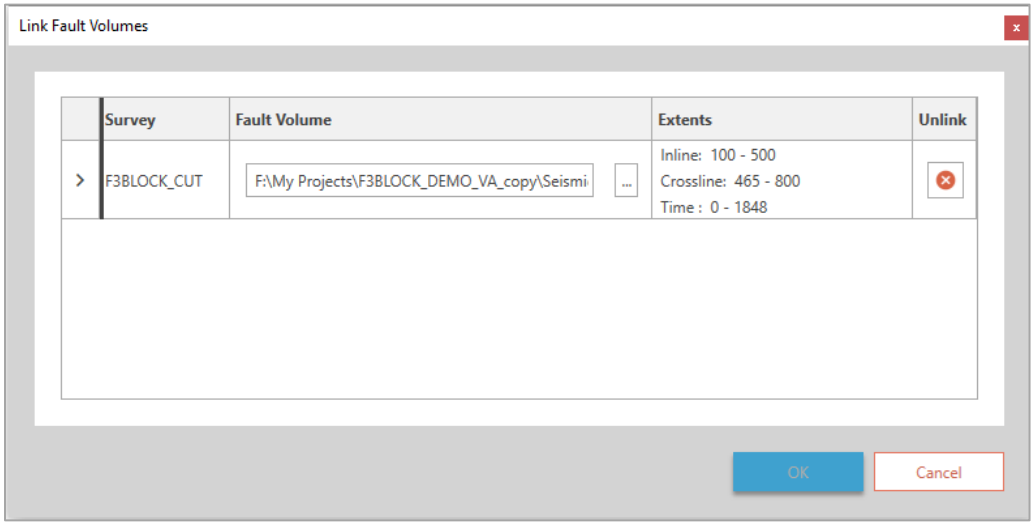

Figure 5: Linking the fault volume to attach to the survey.

6. From the **Faults** tab, select **Fault Manager**. Add faults manually if not predefined.

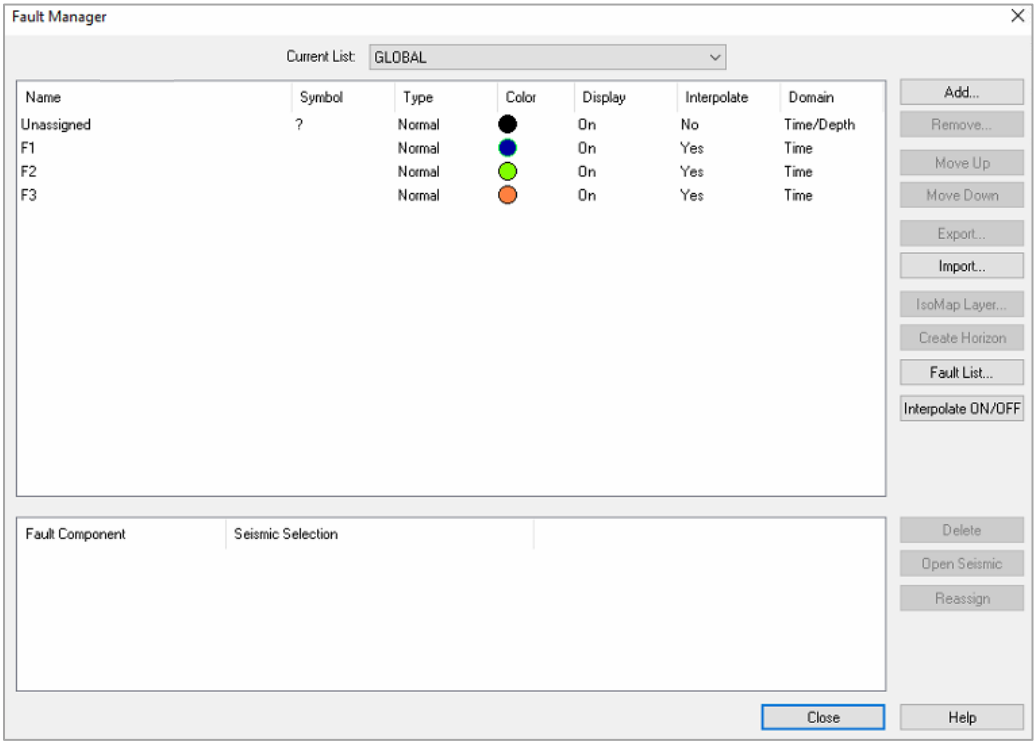

Figure 6: Fault Manager wizard/dialog box.

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7. Select **Segment Auto Pick** to highlight faults based on generated volume.

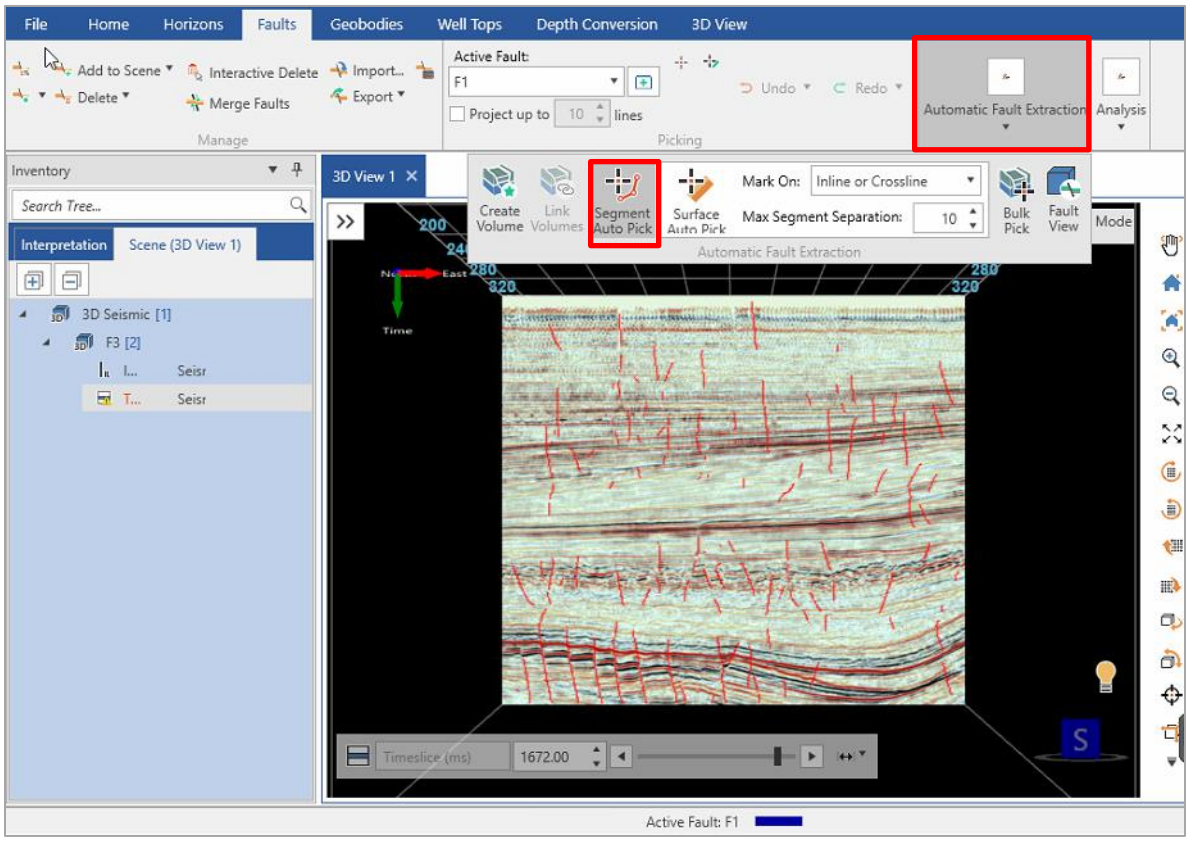

Figure 7: Select Segment Auto Pick under Automatic Fault Extraction tab.

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8. Click on the generated faults (in red) to add the auto picked fault to the scene. Assign **F1** to this fault.

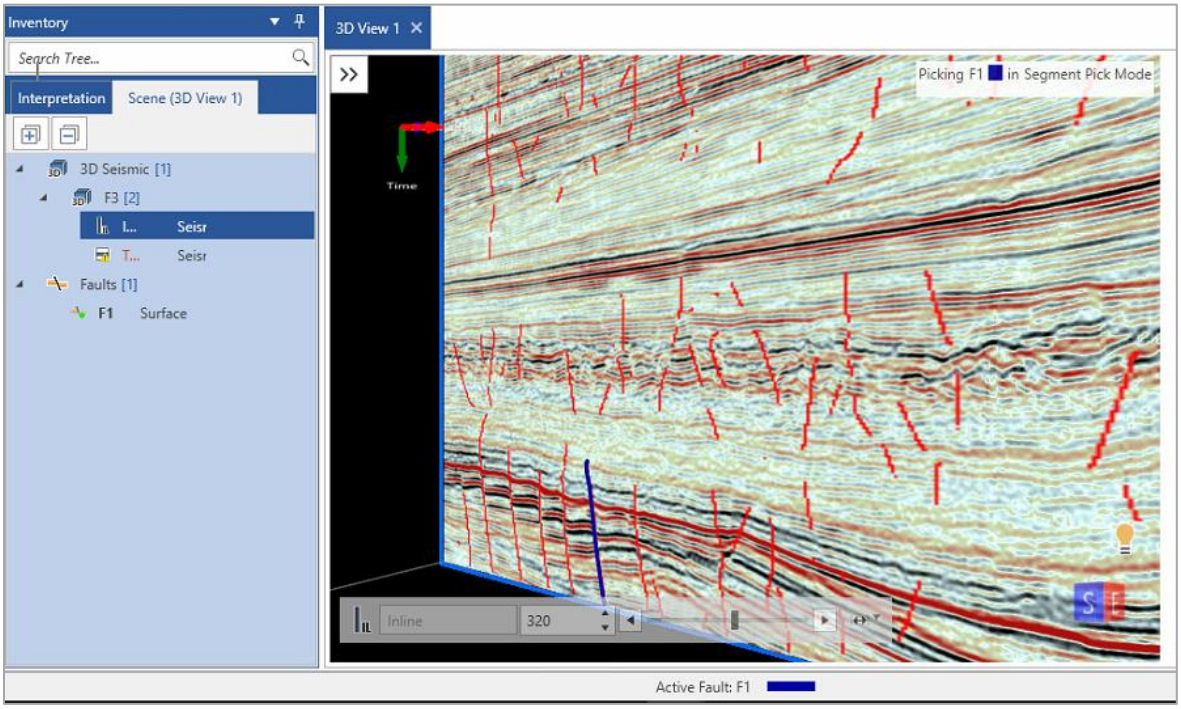

Figure 8: Volume based generated faults.

9. Scroll though the IL/XL and continue to pick faults using the **Segment Auto Pick** option.

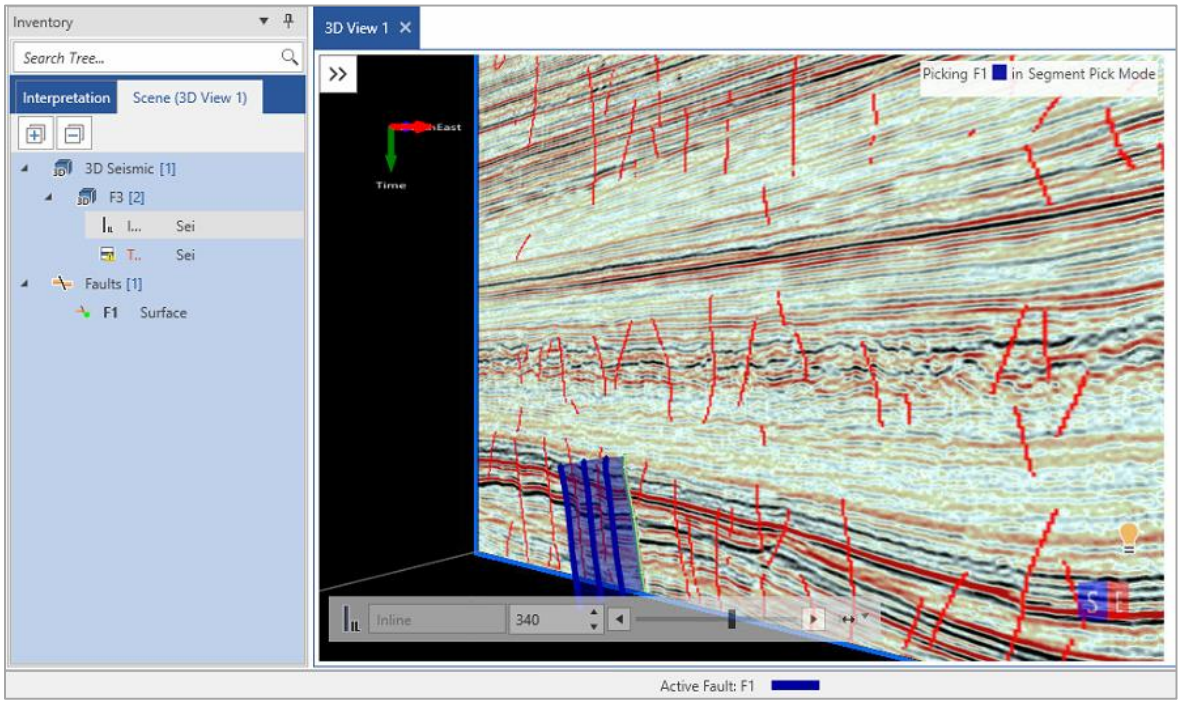

Figure 9: Select faults using Segment Auto Pick option.

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10. To edit/modify fault, right-click on the fault. Select **Fault Segment** > **Edit Fault Segment**. Using the nodes, edit the fault based on desired requirements.

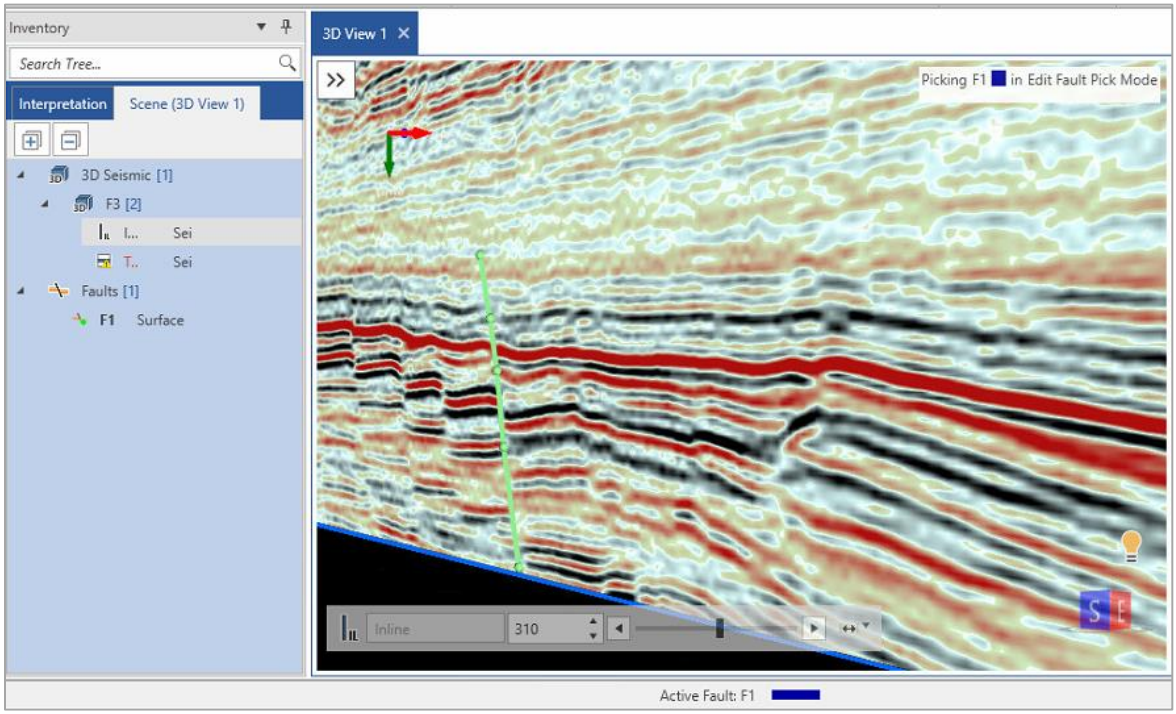

Figure 10: Edit Fault mode.

Surface Auto Pick Mode

1. Using the **Surface Auto Pick Mode**, detected fault shows up.

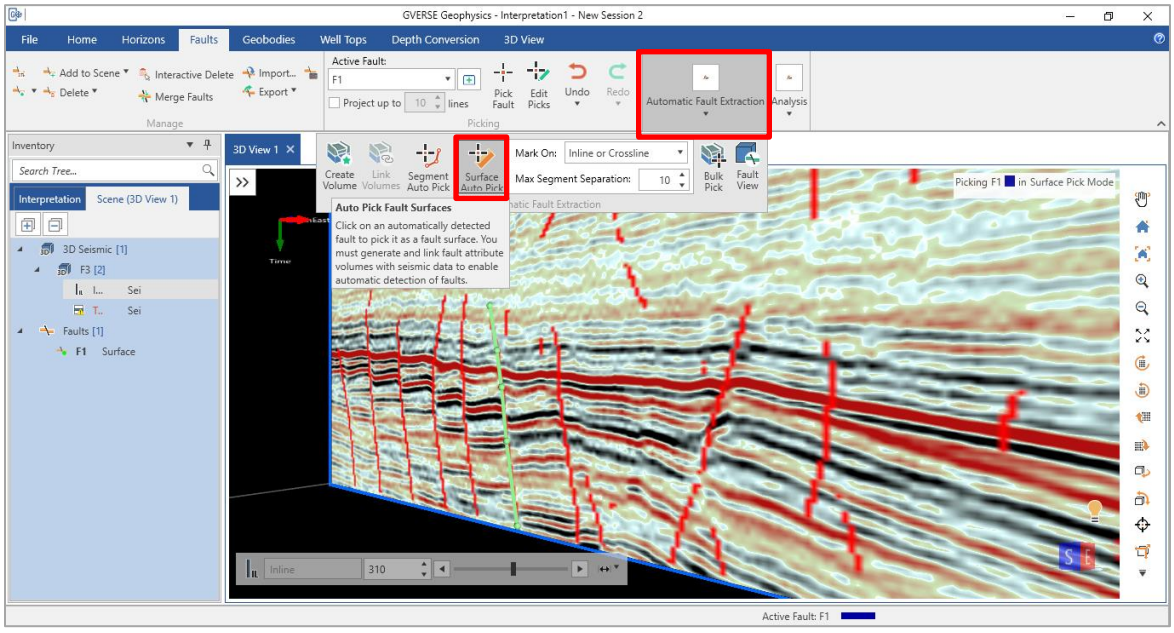

Figure 11: Surface Auto Pick option under Automatic Fault Extraction tab.

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2. Select the fault to be picked. This option lets you pick the fault throughout the seismic volume by creating a surface for the fault area, depending on the fault direction.

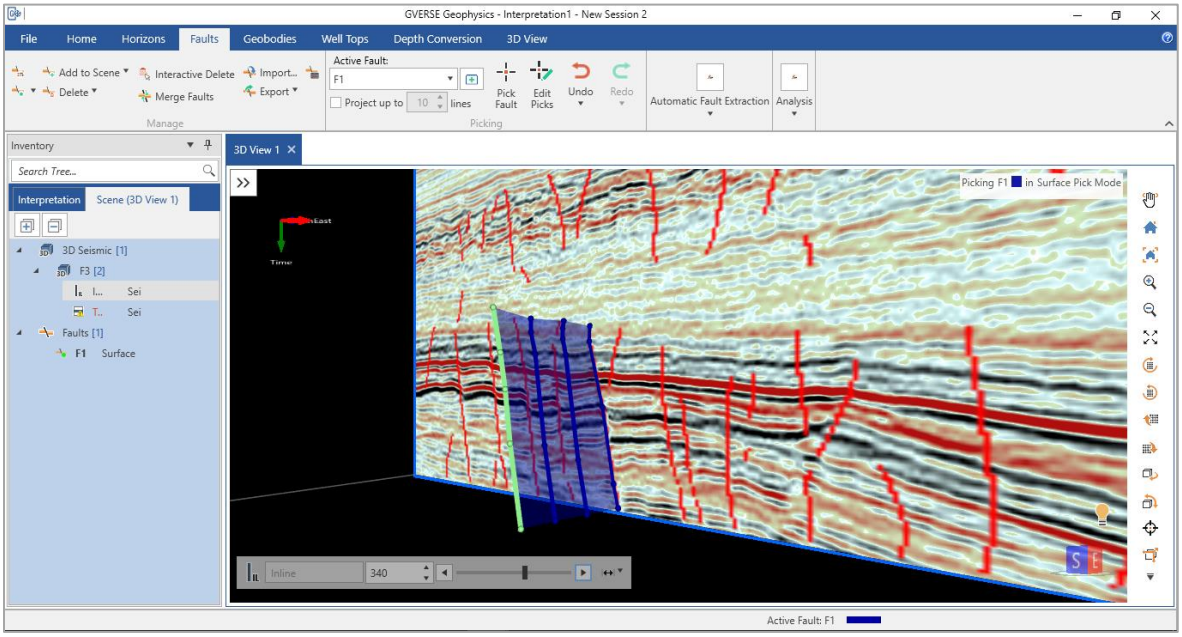

Figure 12: Pick fault throughout the seismic volume.

3. Define segment separation and direction to mark on IL/XL based on defined criteria. Fault segment can be picked on either IL/XL or both. Refer to drop down menu **Mark on.**

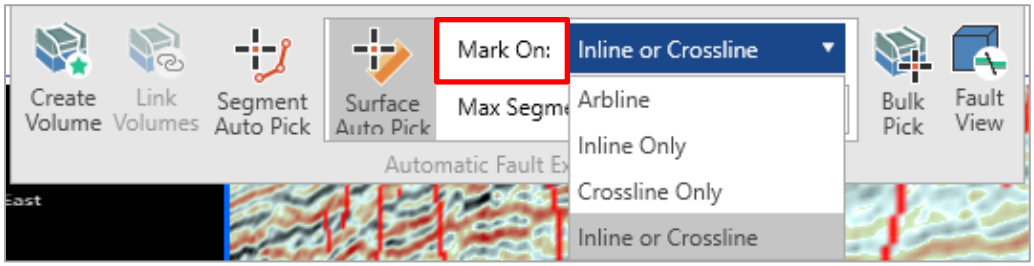

Figure 13: Define direction to pick the Fault.

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4. Right-click on **Segment** > **Edit Fault Segment**

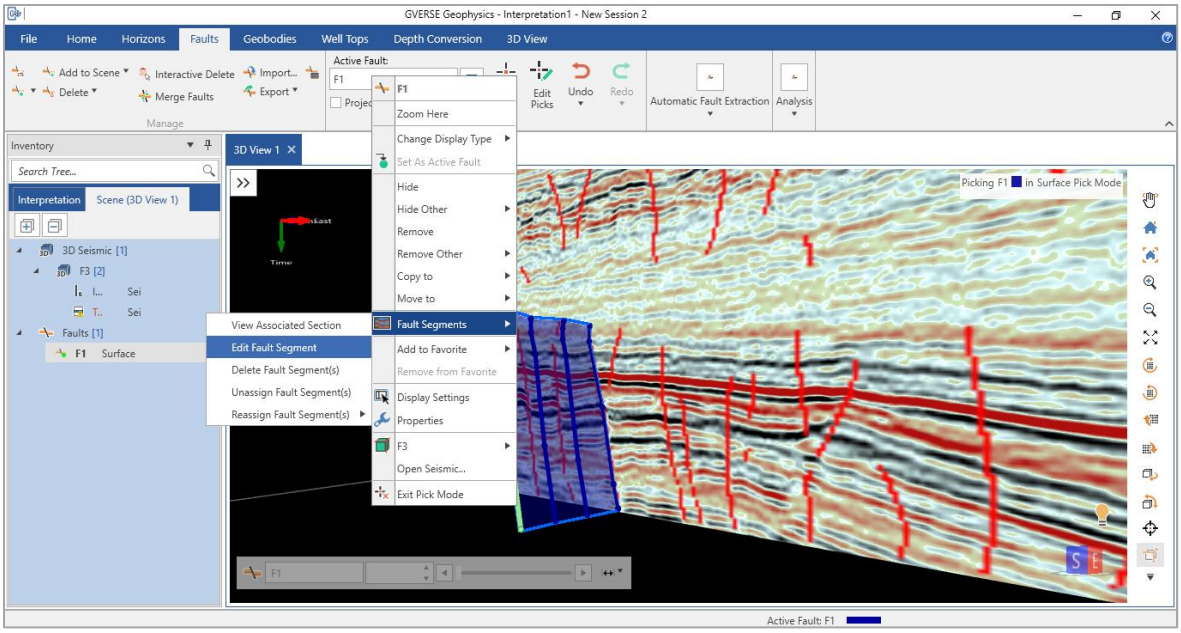

Figure 14: Edit Fault Segment pop-up menu.

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Bulk Pick Faults

This option allows the picking of temporary faults that need to be validated before adding to interpretation.

1. Open **Bulk Pick** wizard, define area to pick faults on.
   a. *Orientation of Faults* defines the azimuth for the faults.
   b. *Minimum Height* refers to the vertical height (search window) for the fault
   c. *Orientation of the Section* can either be IL, XL, Arbitrary Line or Both IL and XL.

   After defining the parameters, click **Start**.

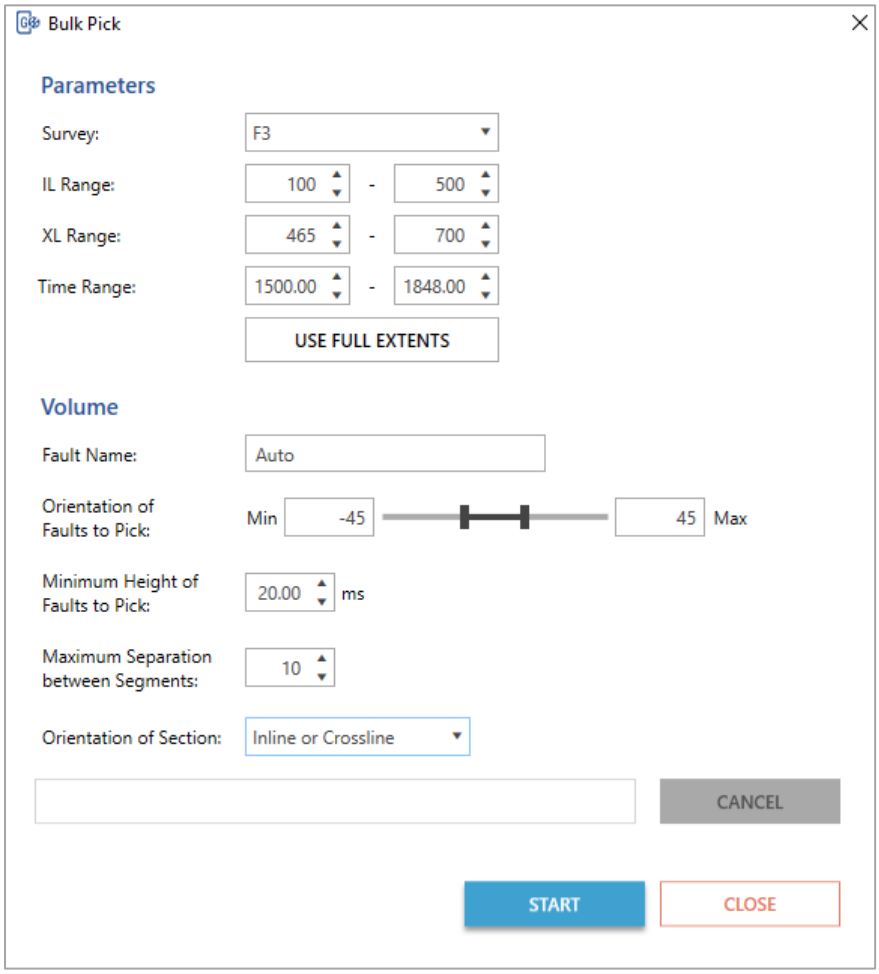

Figure 15: Bulk pick wizard.

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2. When prompted, click **Yes** to add the temporary faults to the scene.

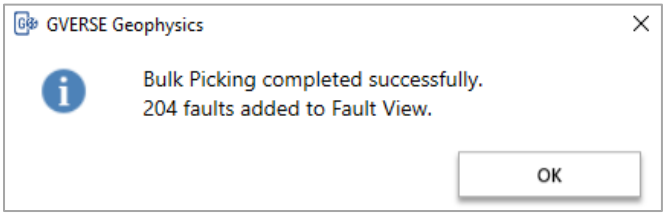

Figure 16: Bulk pick wizard, pop-up message.

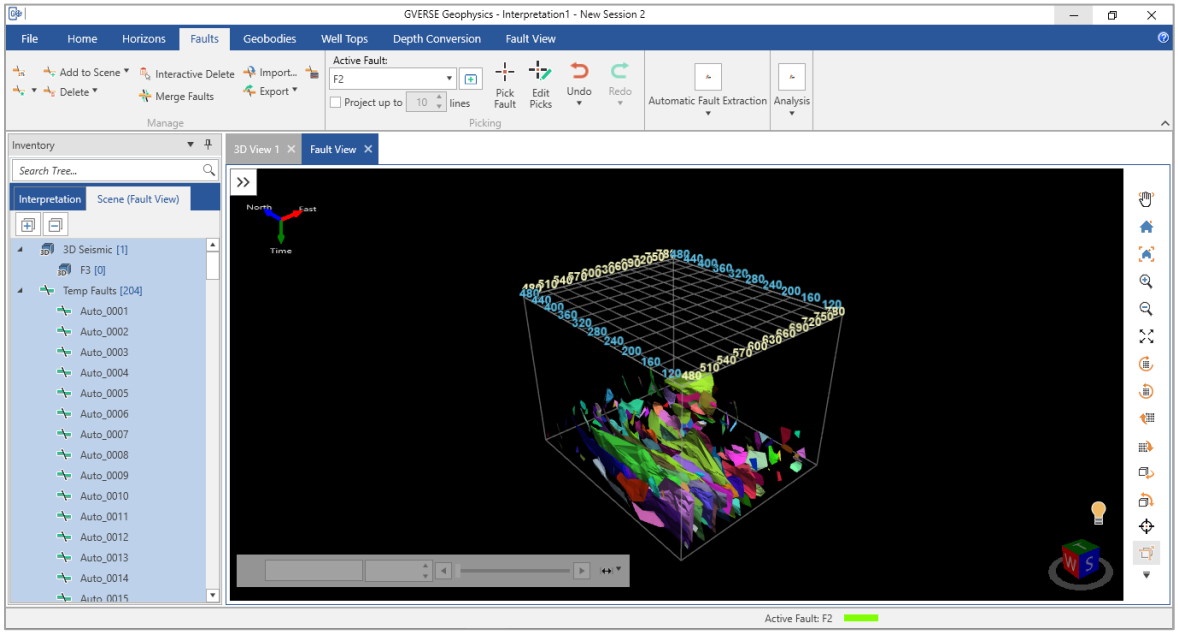

Figure 17: Faults generated using Bulk pick option.

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3. To remove unnecessary faults, click **On Multi-Select Mode** from **Fault View** menu and click **Delete.**

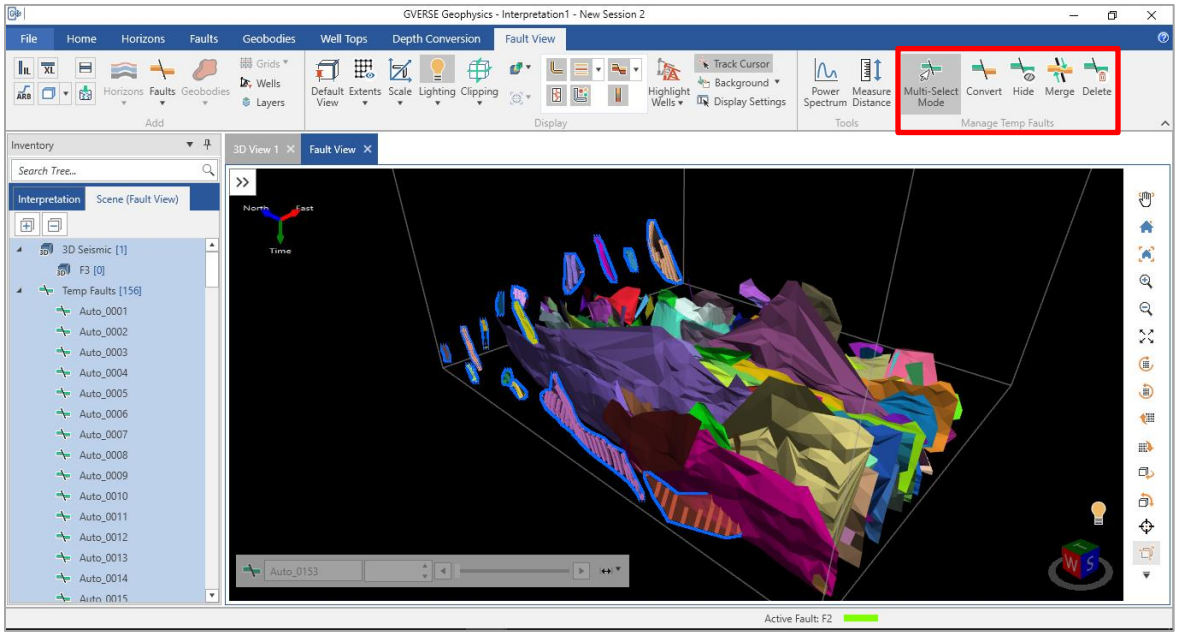

Figure 18: Remove multiple faults using Multi-Select Mode.

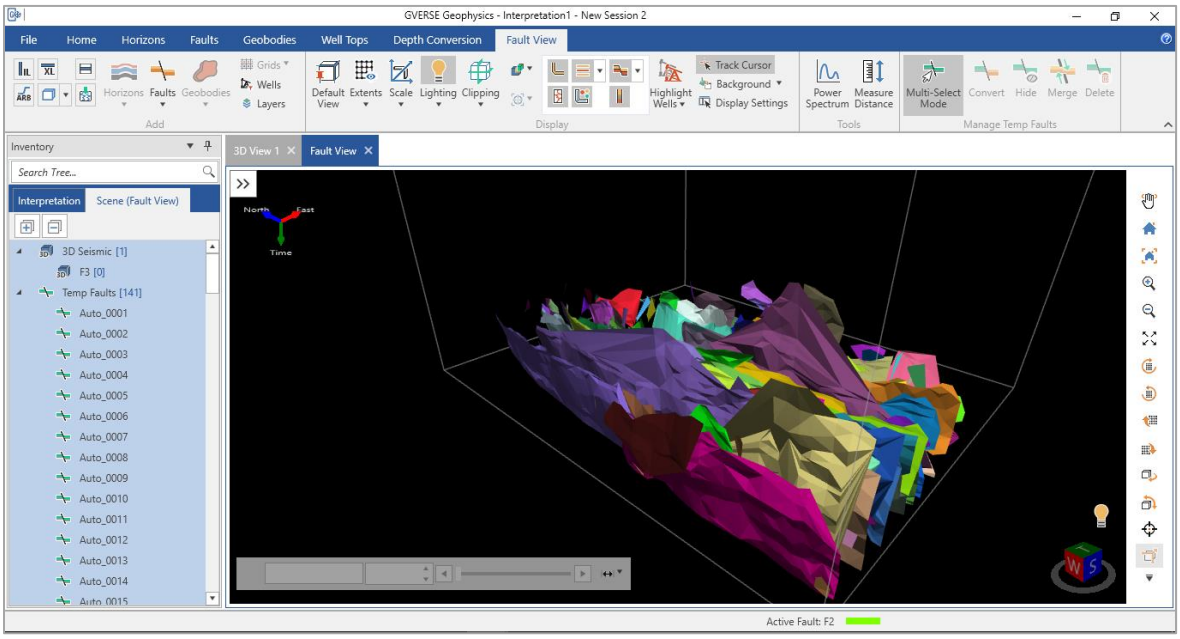

Figure 19: Multiple faults removed from Fault View.

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4. To merge the faults, choose **Multi-Select Mode** > **Merge** to create one fault.

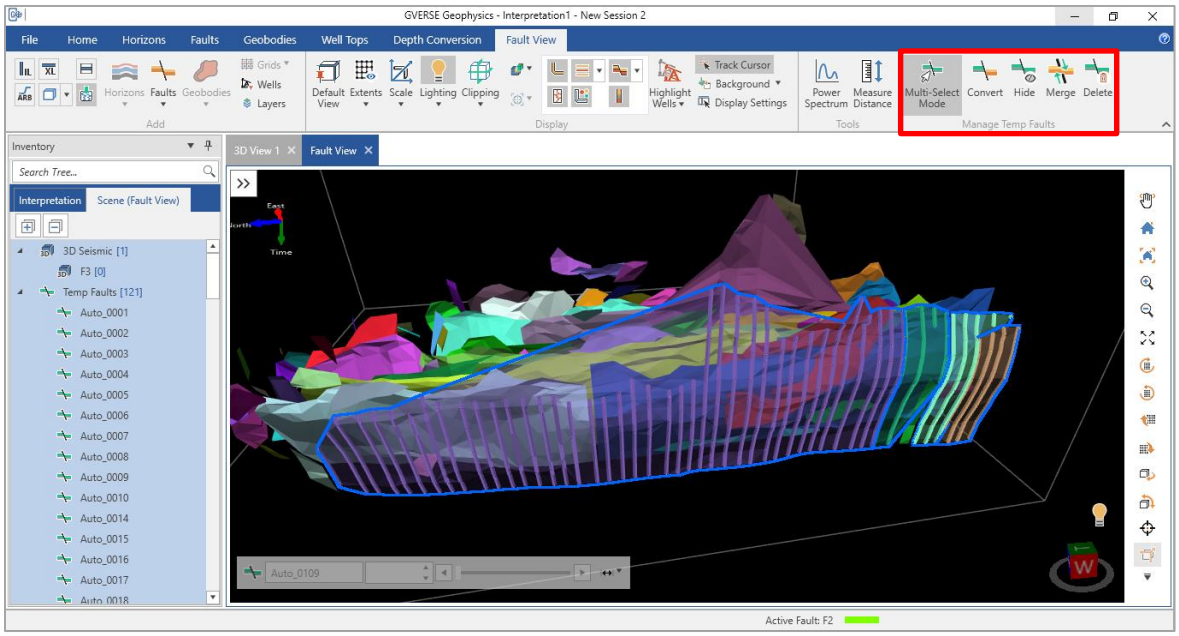

Figure 20: Merge faults using Multi-Select Mode option.

5. When prompted, click **Yes** to merge the temporary faults together.

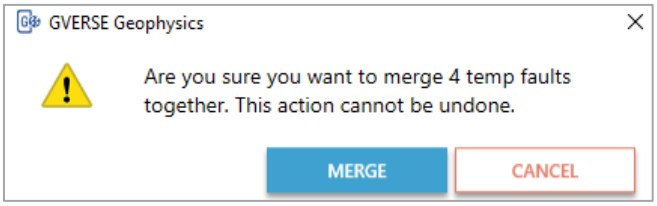

Figure 21: Merge faults pop-up window message.

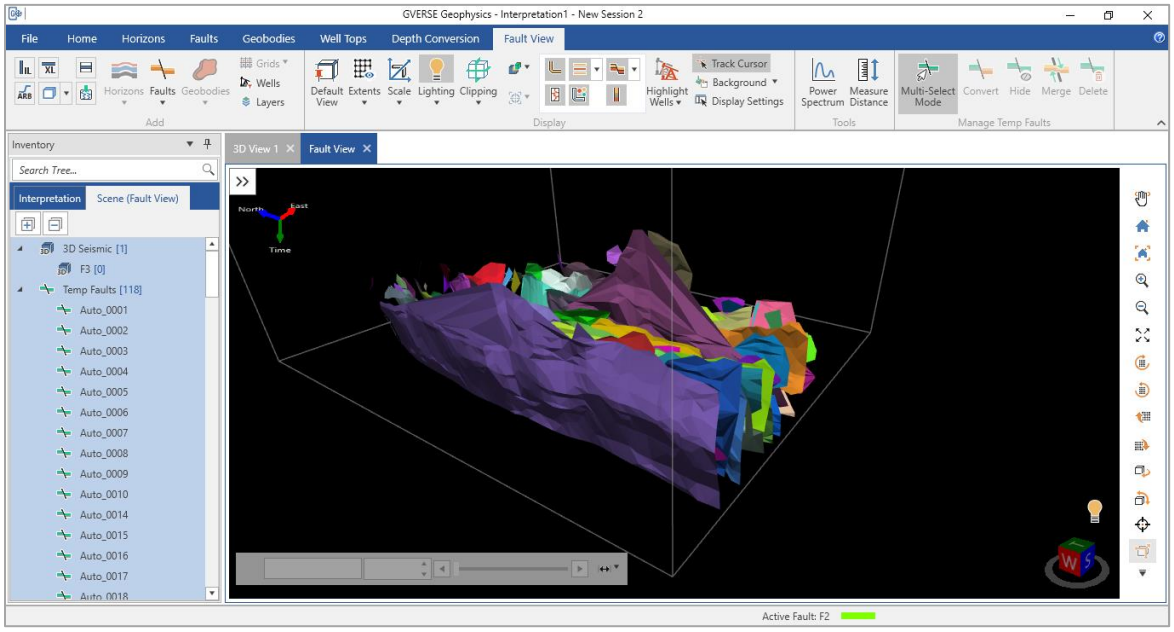

Figure 22: Fault view displaying merged fault.

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6. To add correctly interpreted faults, choose **Multi Select Mode** option > **Convert** to add to the scene and interpretation.

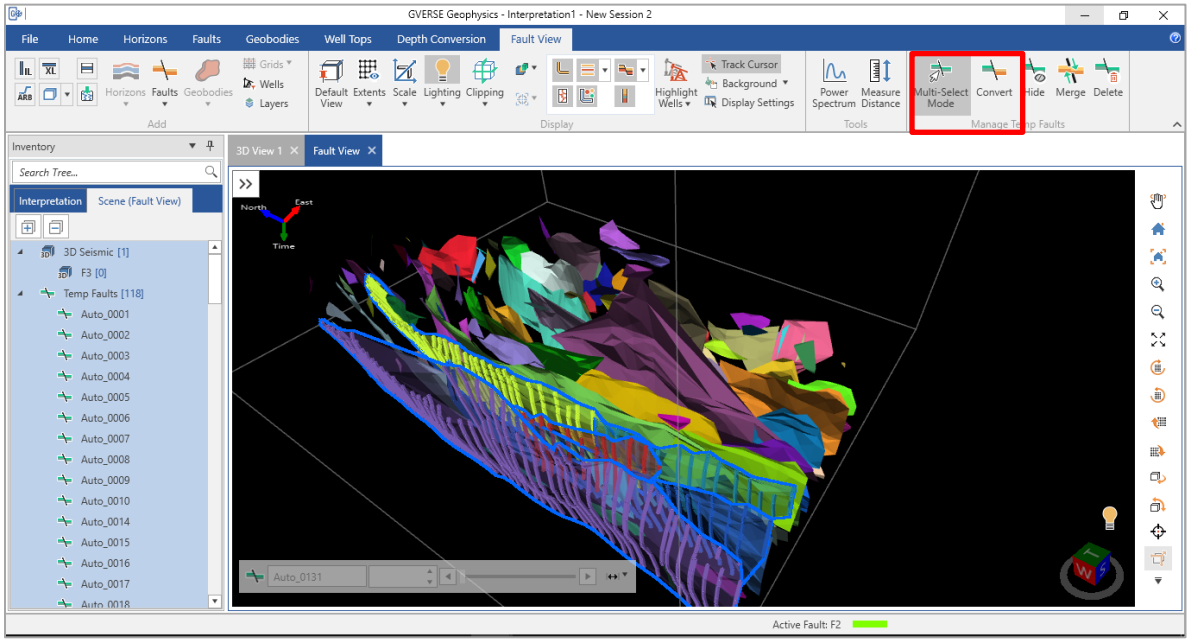

Figure 23: Convert faults to add to scene and interpretation.

7. When prompted, click **Yes** to convert the temporary faults together and add to scene.

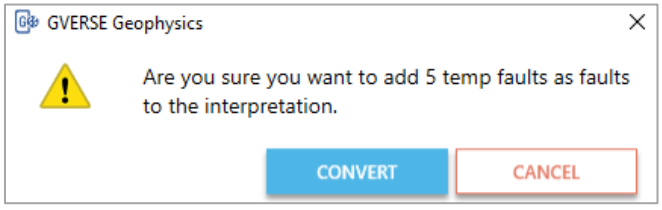

Figure 24: Convert faults pop-up window message.

Temporary faults converted start to show under the **Faults** tree in the **Inventory**.

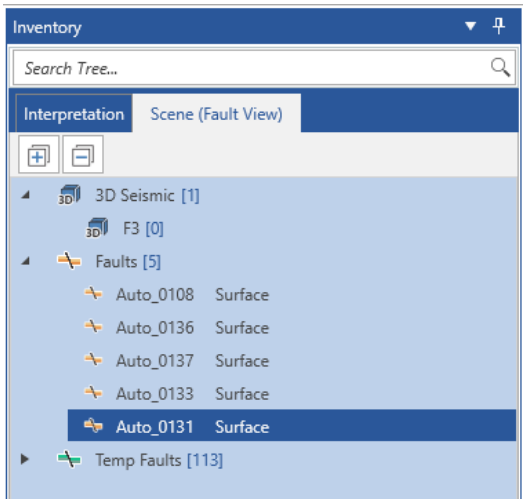

Figure 25: Faults add to scene under Inventory.

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8. Select **Rose Diagram** to view all the faults in the interpretation. Switch between interpreted and temp faults.

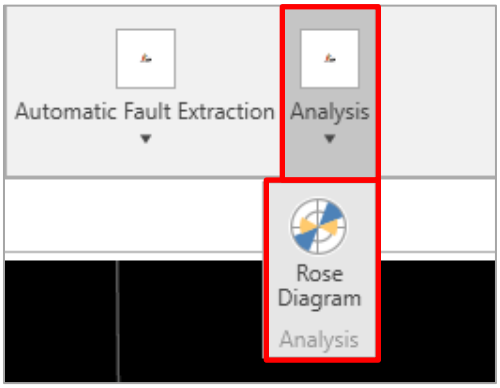

Figure 26: Rose Diagram option.

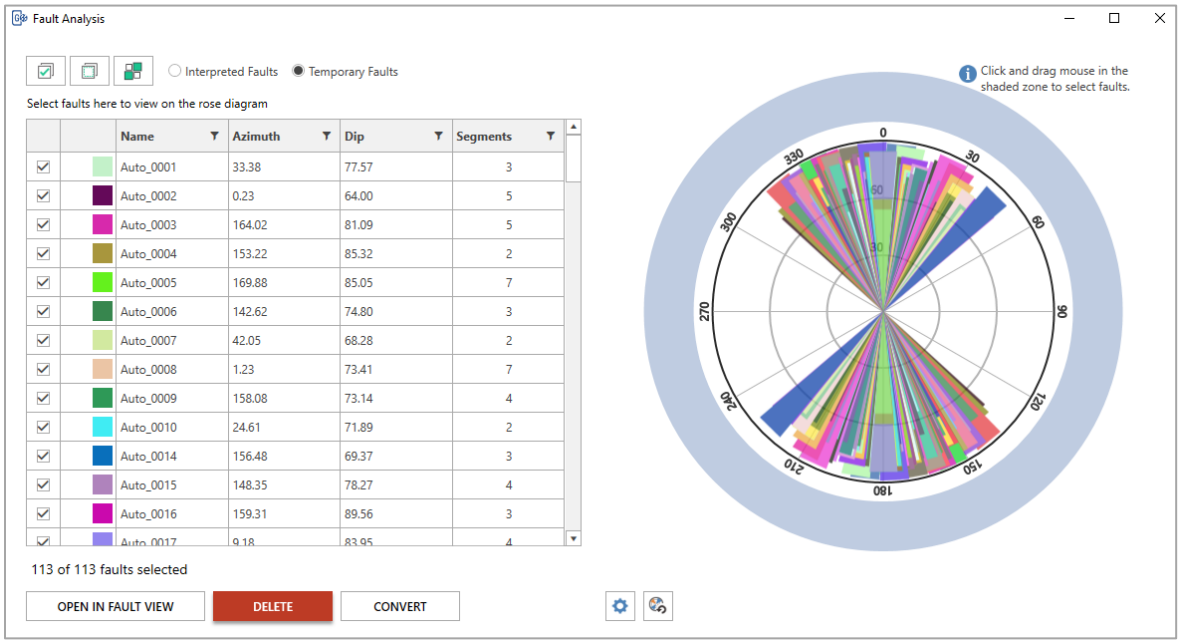

Figure 27: Rose Diagram showing all available faults in the data set.

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9. Click and drag the mouse in the shaded region to select the desired faults. Once satisfied with the selection, select **Convert** to change faults from temporary to interpreted.

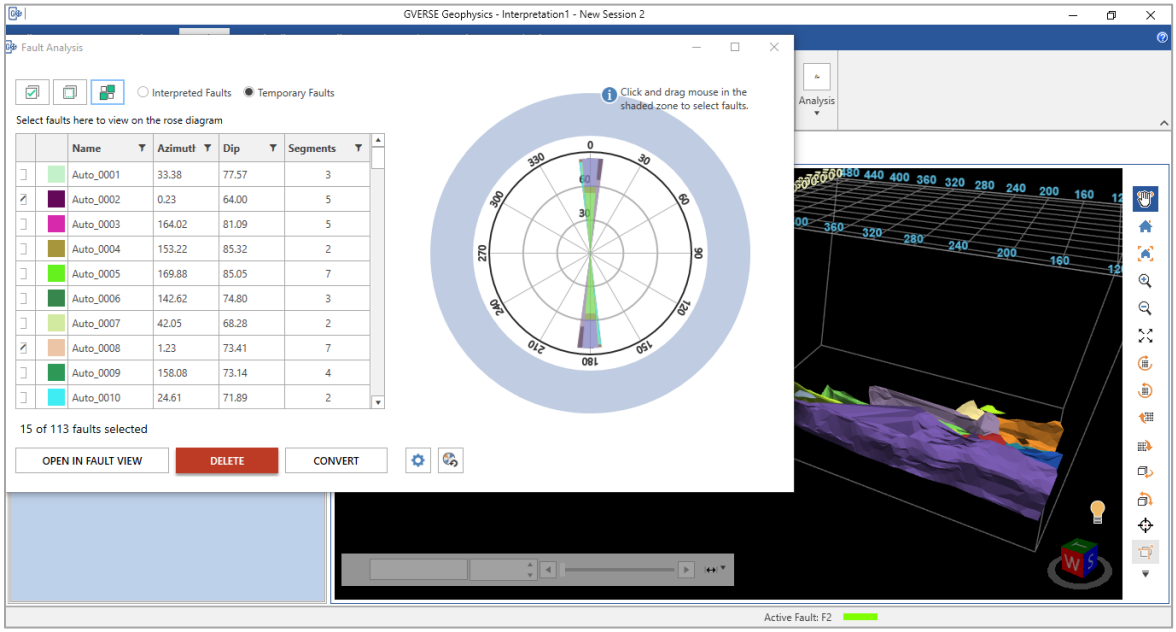

Figure 28: Selected faults to Convert.

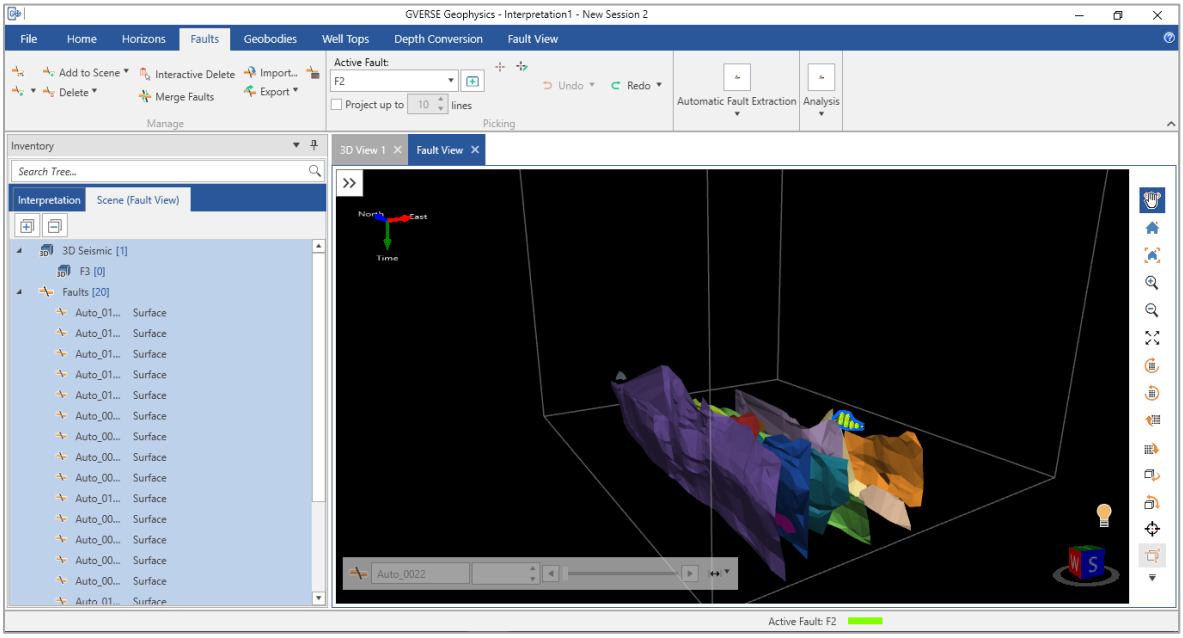

Figure 29: Converted faults displaying in Rose Diagram.

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