Petrel Structural Modeling: Corner Point Gridding Workflow

Module 6: Make horizons

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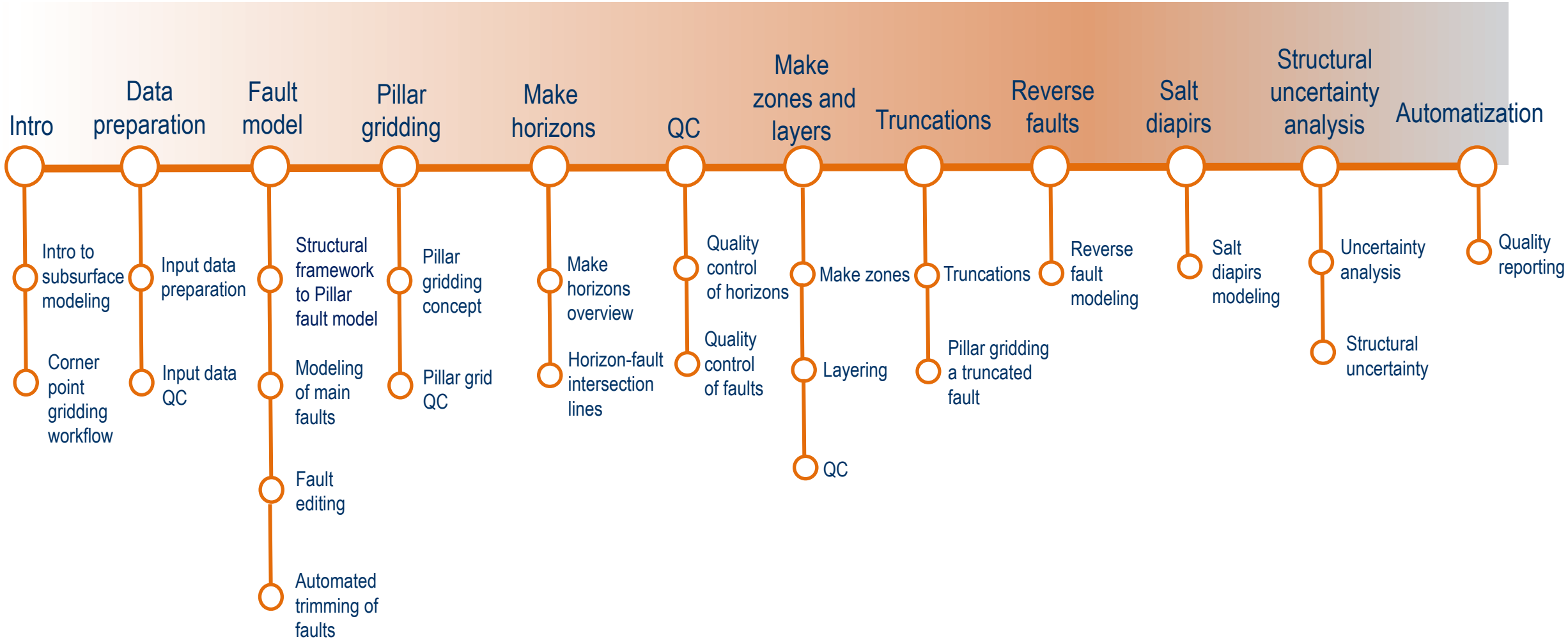
Petrel Structural Modeling: Corner point gridding workflow



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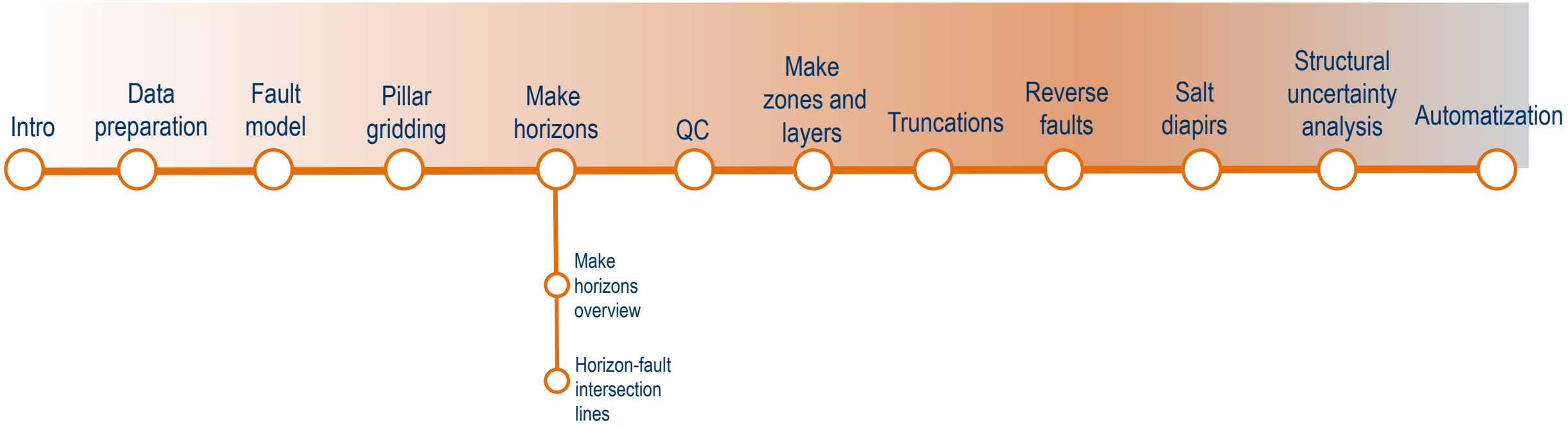
Module 6: Make horizons



Learning objectives

When you complete this module, you will know about:

- the principles of stratigraphic horizons in **Petrel**
- the Make horizons workflow in **Petrel**
- make horizons fault settings
- fault-horizon intersection lines
- ways to edit a 3D grid

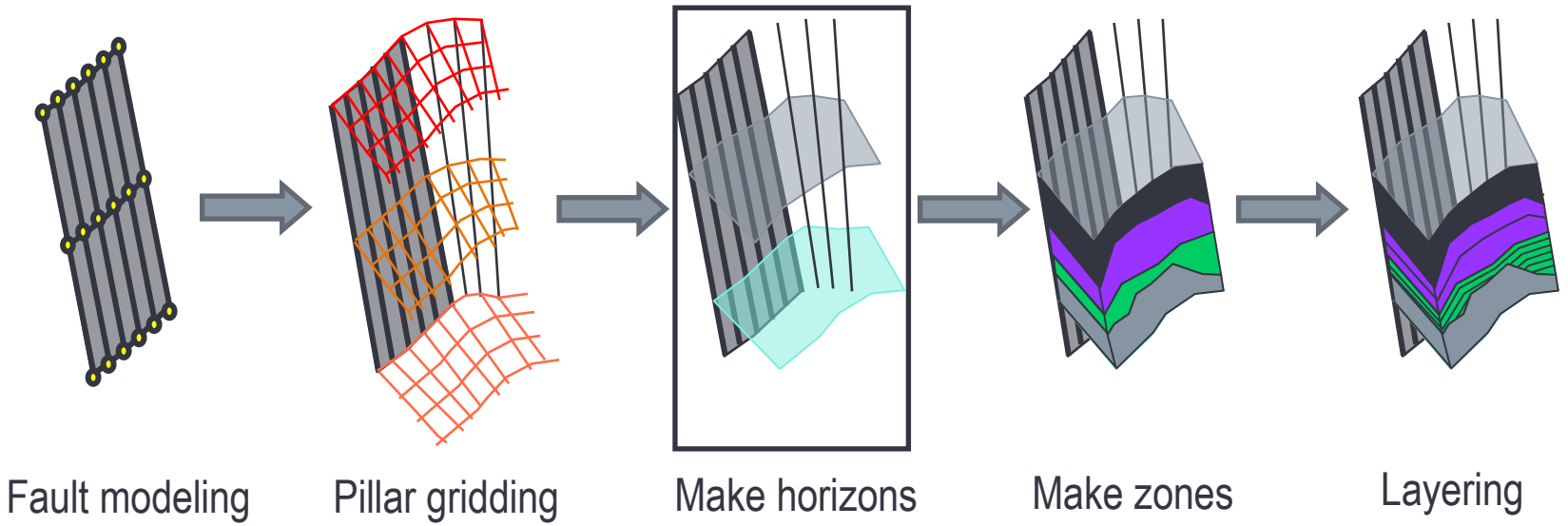
Make horizons

Make horizons overview

Horizon-fault intersection lines

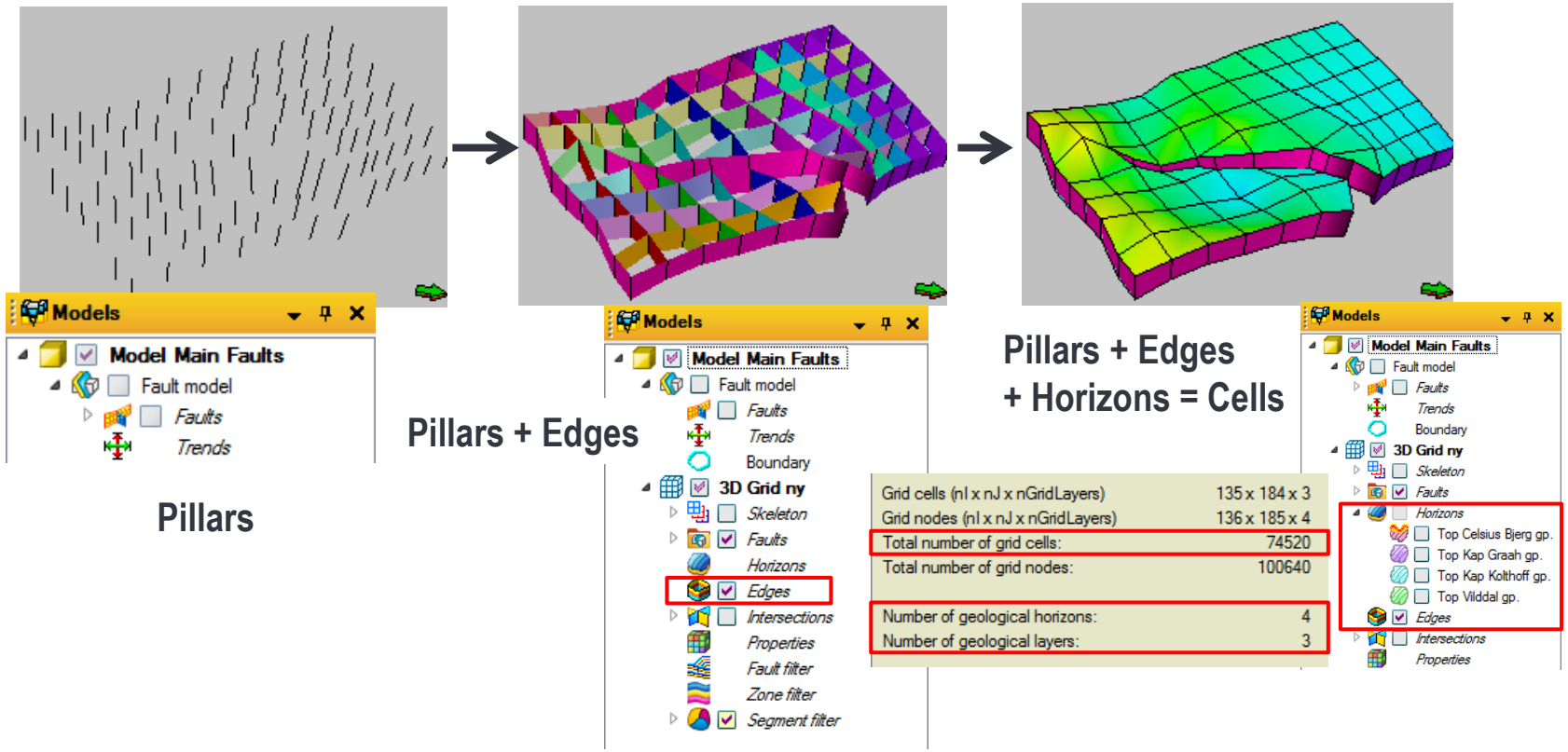
Corner point gridding: Make horizons

Based on the faults and the grid increment, insert horizons into the pillar grid.



Make horizons: Overview

Physical cells are created at this stage.



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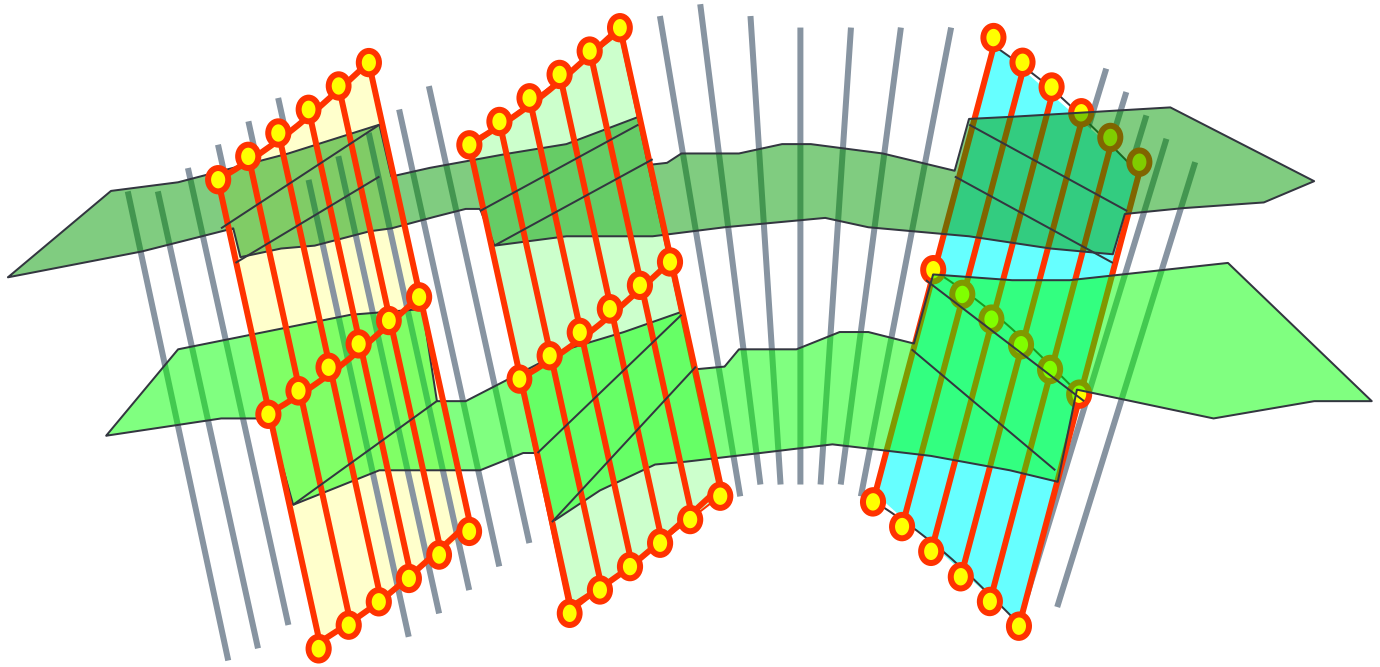
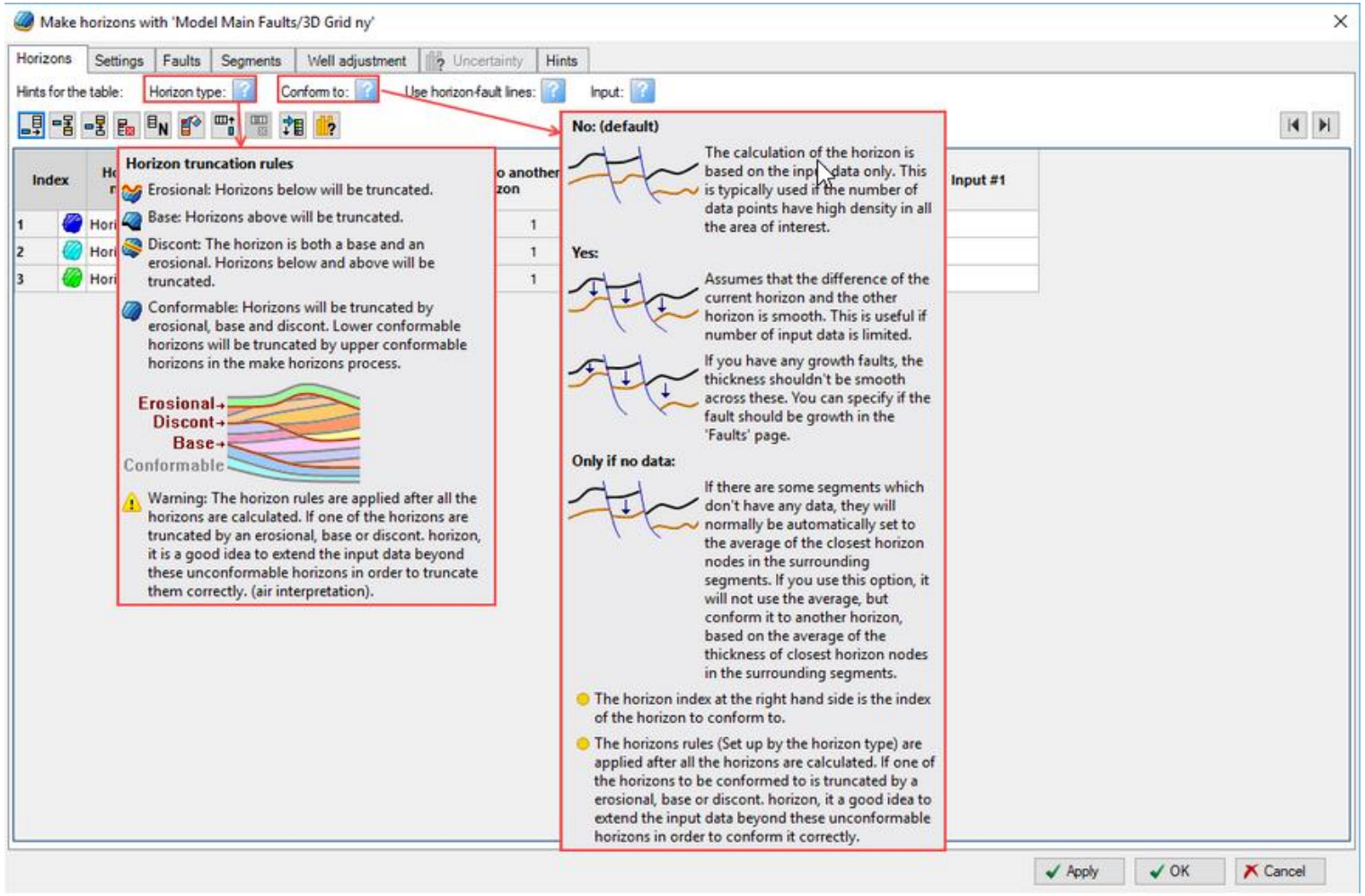
Make horizons: Result

The surfaces are trimmed near the faults and reprojected up to the faults, yielding a fault displacement defined by the inputs.



Stratigraphy



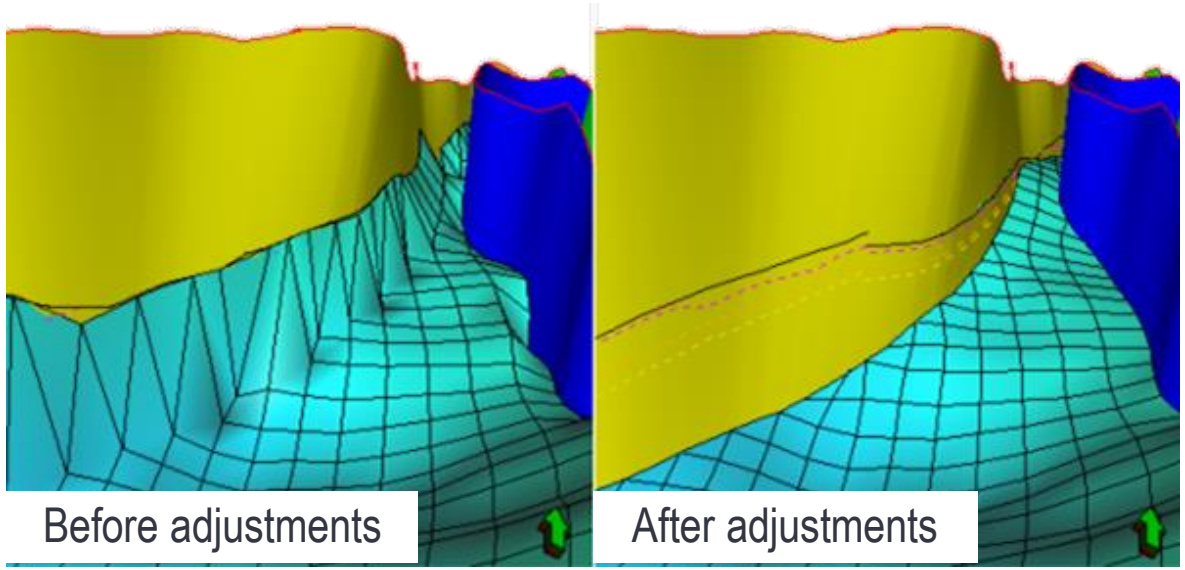
Horizons extrapolation: QC

Problem:

- False drag
- Pinch out cells

Solution:

- Set distance to fault.
- Use fault horizon-intersection line.
- Edit 3D grid



Tip: Adjust input data (horizon interpretation) or key pillars.

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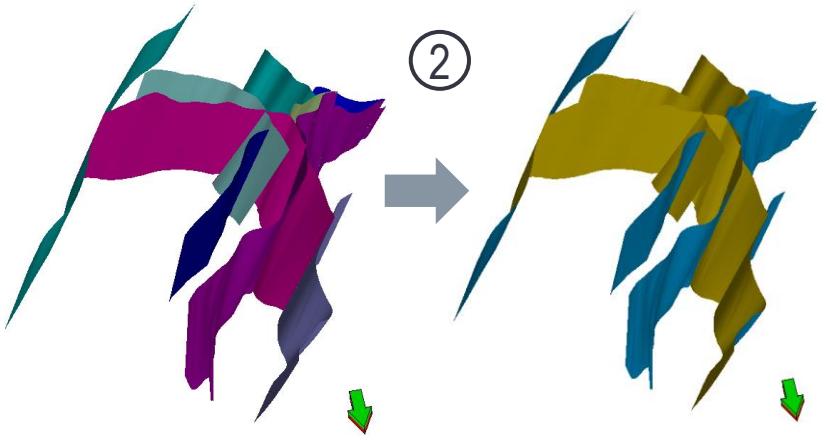
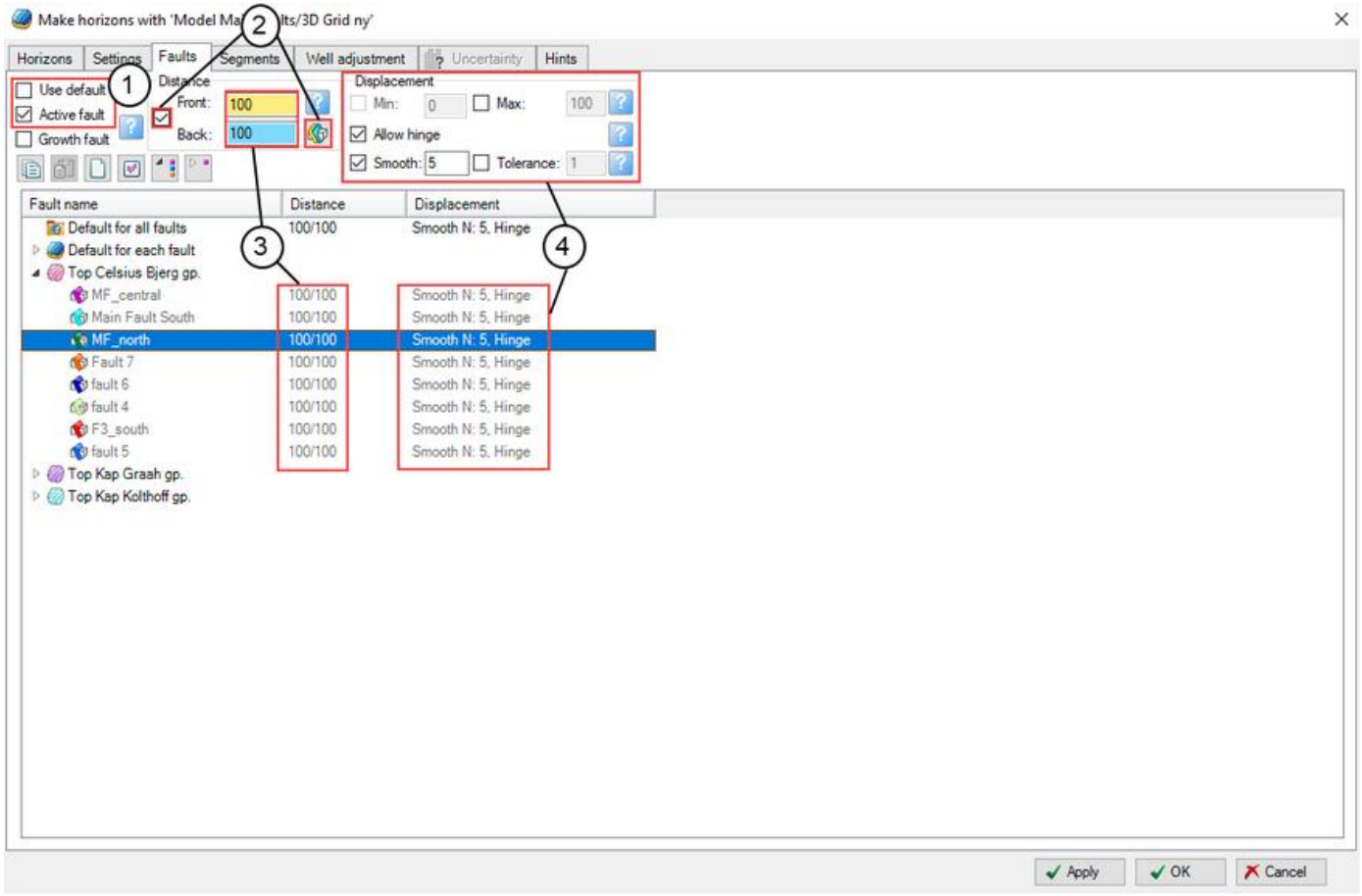
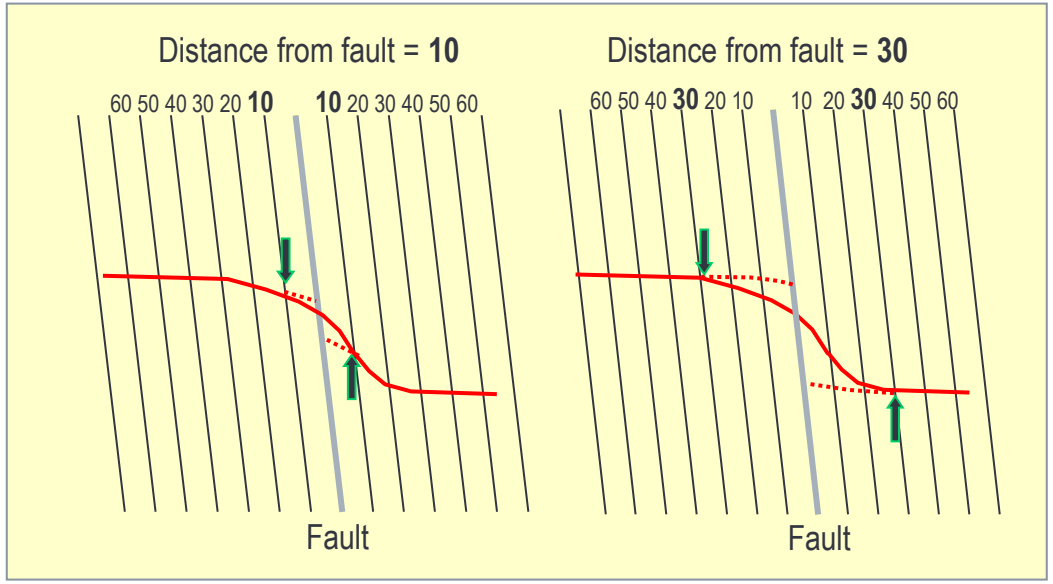
Make horizons: Faults settings

1. Select *Use default* or *Active fault*.
2. Display the *Front* and *Back* of the faults.
3. Specify distance.
4. Specify displacement.



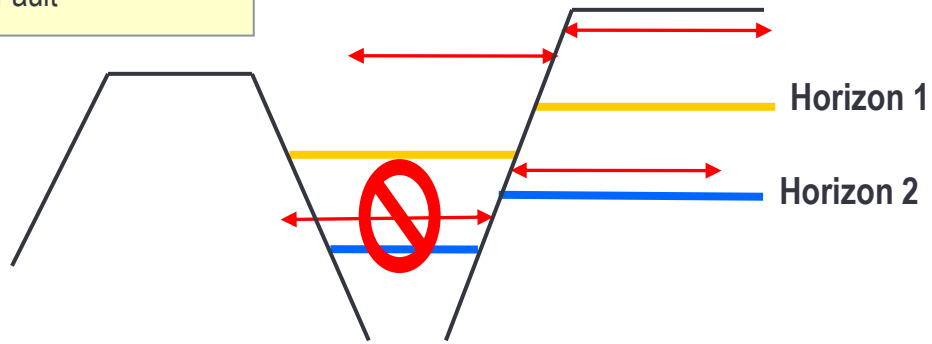


Horizon extrapolation: Distance to fault



Horizon modeled from input data

Horizon extrapolated toward the fault based on the distance to fault specified



Note: The distance must not exceed the influence area for the data, such as the fault compartment.

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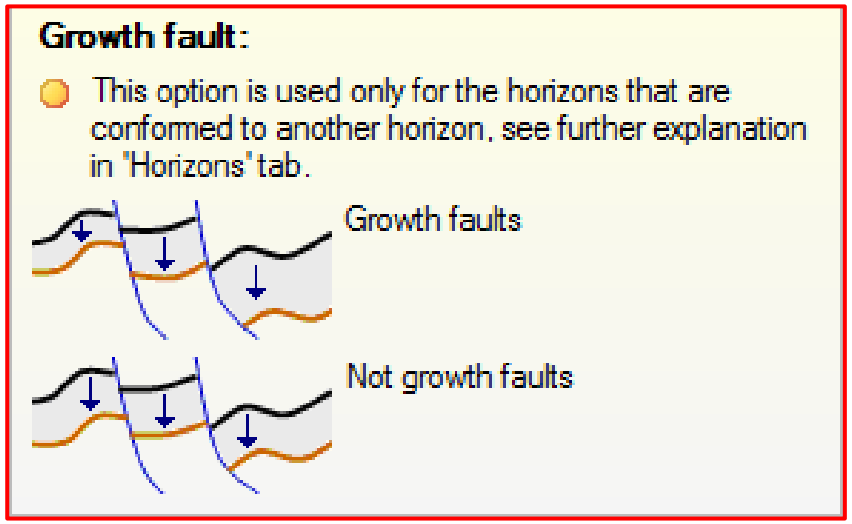
Growth fault option in the Fault settings

The *Growth fault* option is used to preserve thickness variations because of syntectonic sedimentation.

1. On the **Horizons** tab, set *Conform to another horizon.*
2. On the **Faults** tab, select *Growth fault*.



Make horizons

Make horizons overview

Horizon-fault intersection lines

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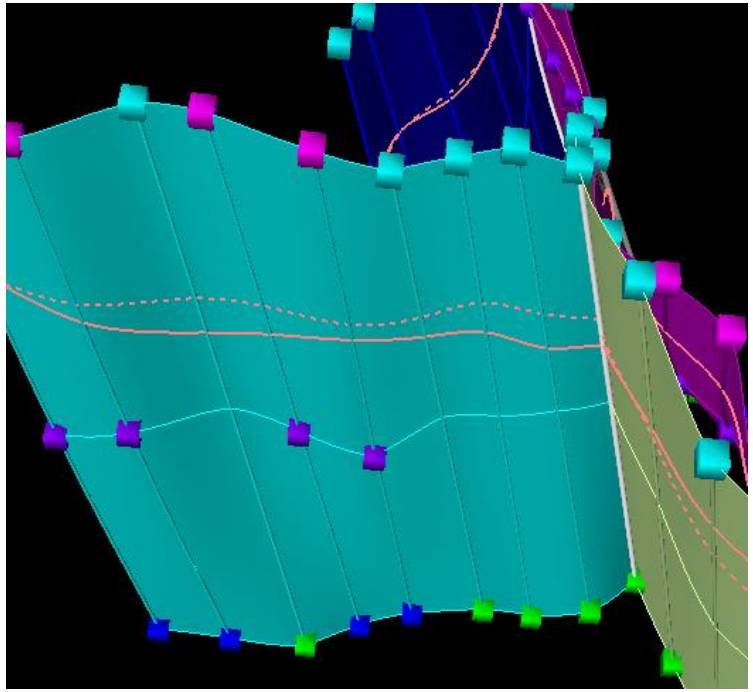
Fault-horizon intersection lines

The fault-horizon intersection lines represent the geometrical relationship between the faults and the horizons. You can use them as input for Make horizons and Scale up zones workflows.

You create them:

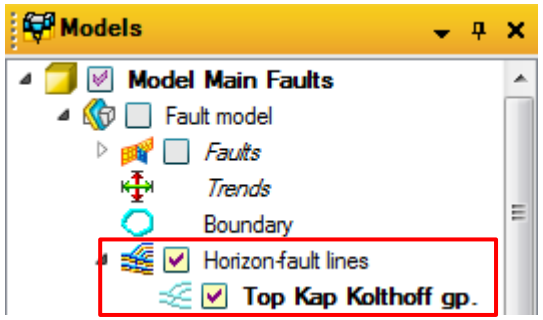
- by resampling from 3D grids
- from input polygons
- by digitizing horizon lines

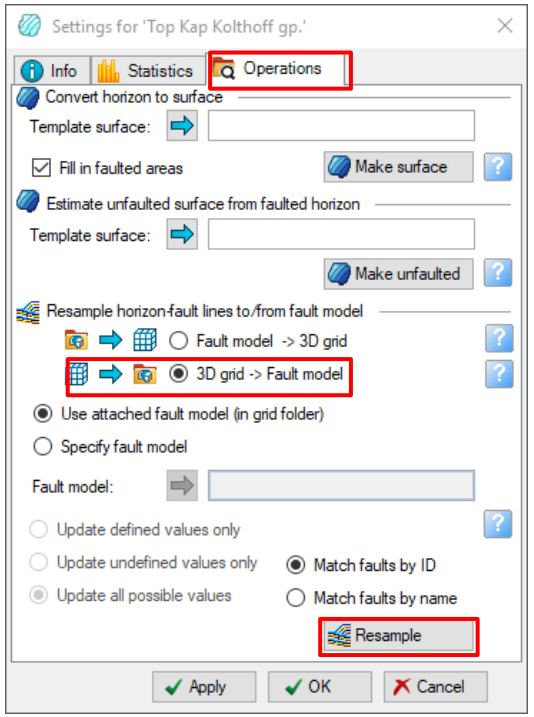


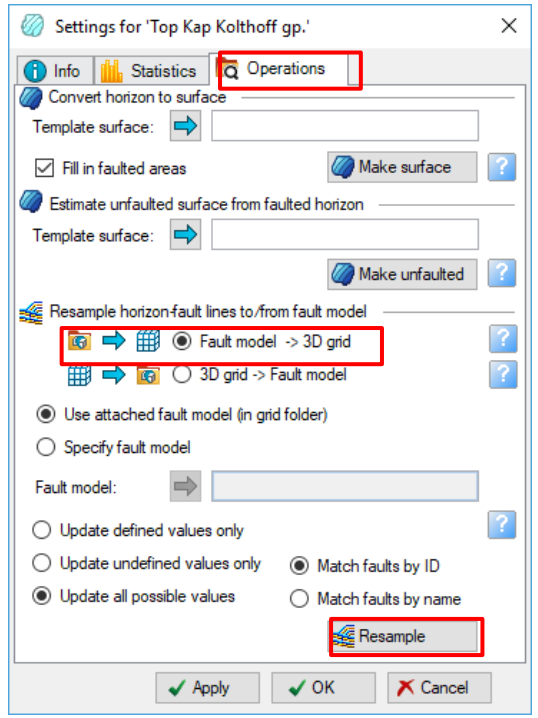
Create horizon-fault lines by resampling

1. On the **Operations** tab for the horizon to be edited, select *3D grid -> Fault model* and click *Resample*.
   A new **Horizon-fault lines** folder is created in the **Models** pane under the **Fault model**. It contains the horizon-fault line you just resampled.
2. Make adjustments to the horizon line with the *Manipulate horizon line nodes* tool.
3. On the **Operations** tab, select *Fault model -> 3D grid* and click *Resample*.

   The geometry from the horizon-fault lines is applied to the 3D grid.







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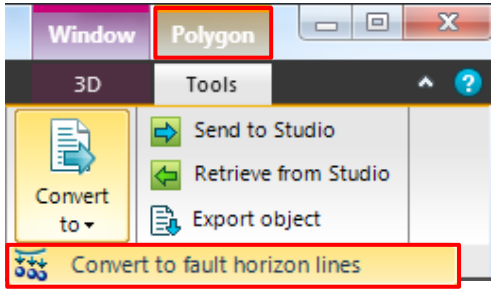
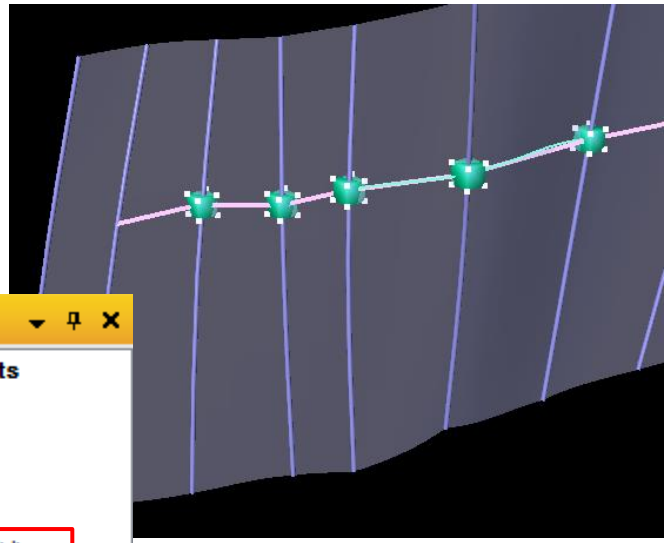
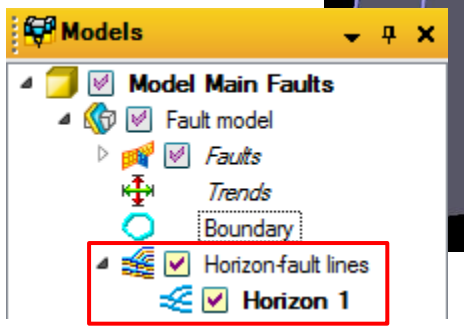
Create horizon-fault lines from input polygons

- You can convert the polygon that represents the offset horizon to fault horizon lines.
- Use the *Convert to fault horizon lines* tool. The new horizon line appears on the fault. It is stored in the **Horizon-fault lines** folder.

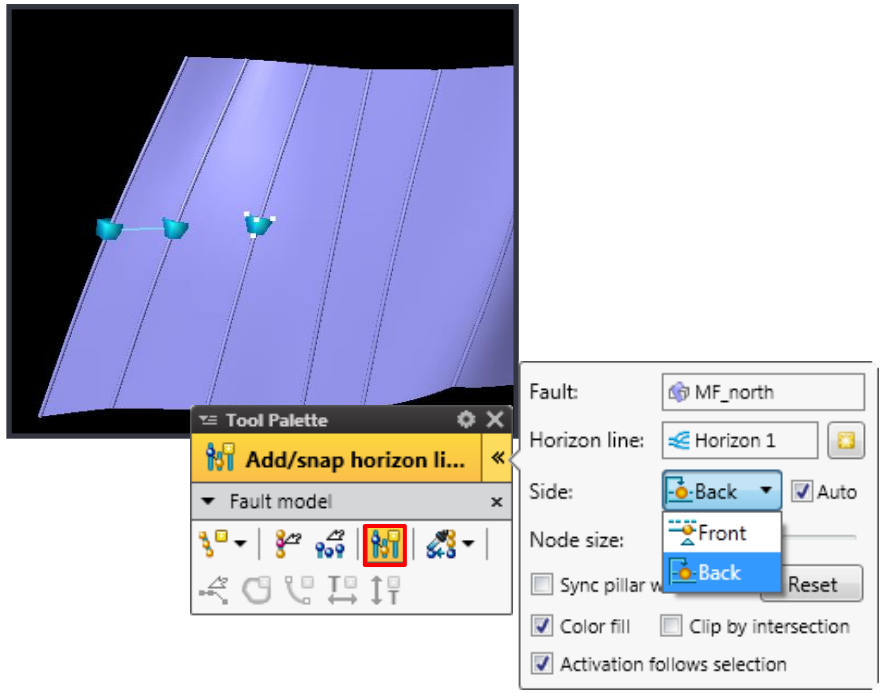


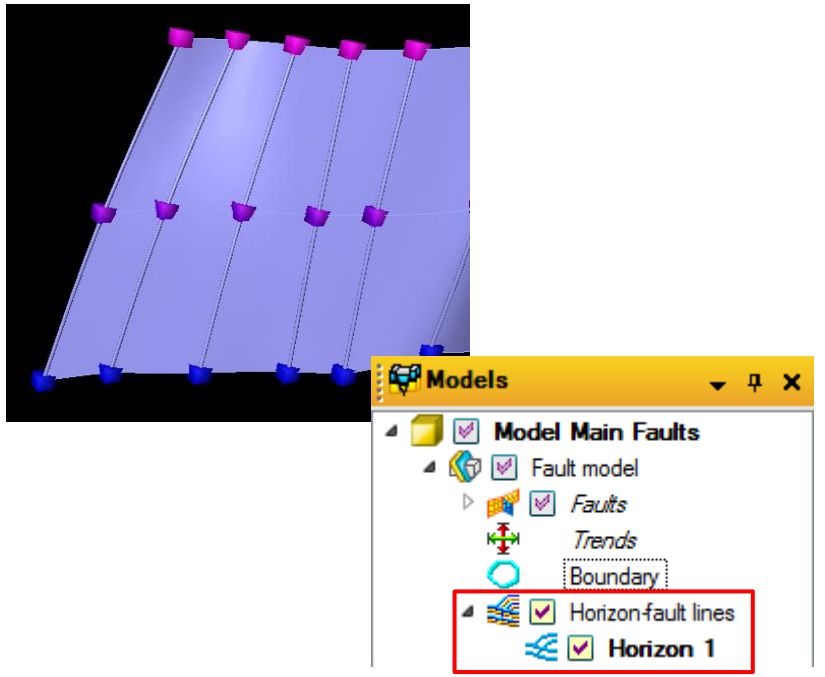




Create horizon-fault lines by digitizing

You can digitize the horizon line on the fault using *Add/snap horizon line node* tool on the *Front* or the *Back* of the fault.





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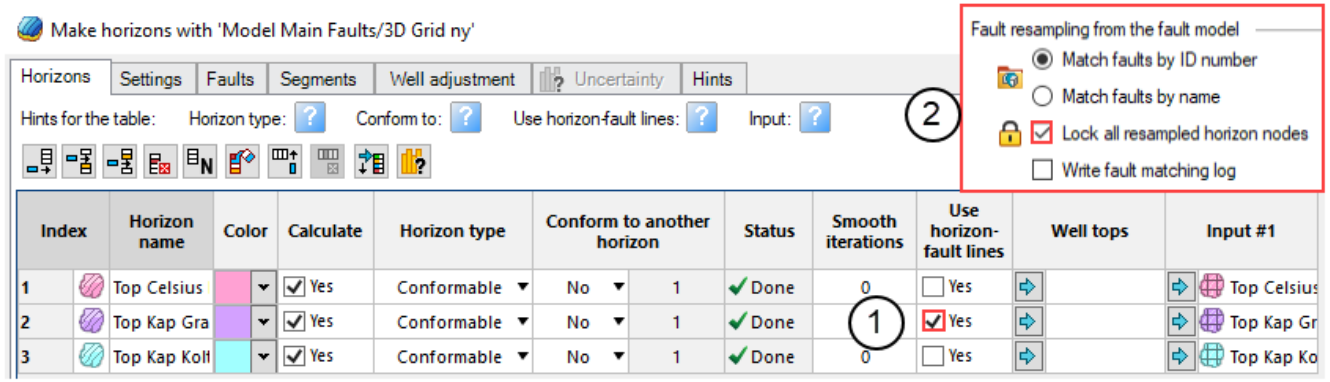
Use the horizon-fault intersection lines in Make horizons

For the edits to take effect after you create or edit horizon-fault intersection lines, rerun Make horizons.

1. In the **Make horizons** dialog box, on the **Horizons** tab, select the *Use horizon-fault lines* check box.
2. On the **Settings** tab, select *Lock all resampled horizon nodes*.



3. Click *OK* or *Apply* to update the 3D grid.

Summary

In this module, you learned about:

- stratigraphic principles in **Petrel**
- inserting horizons into the pillar grid
- using a variety of settings in the **Make horizons** dialog box to optimize the horizons with respect to fault geometry

Learning game: Make horizons (1)

Instructions:

- Several questions
- Multiple answers, only one correct

Learning game: Make horizons (2)

What is created after the Make horizon process?

a. Grid mesh and faults

b. Horizons in the model and the 3D grid cells

c. Additional layers in the grid

Learning game: Make horizons (3)

Can you use horizon-fault intersection lines in the Make horizons process?

a. No, it's not possible

b. Yes, you can

c. Only after you run the Make zones process