Structural Framework Workflows for Petrel 2018

Module 5: Enhanced quality checks and modeling

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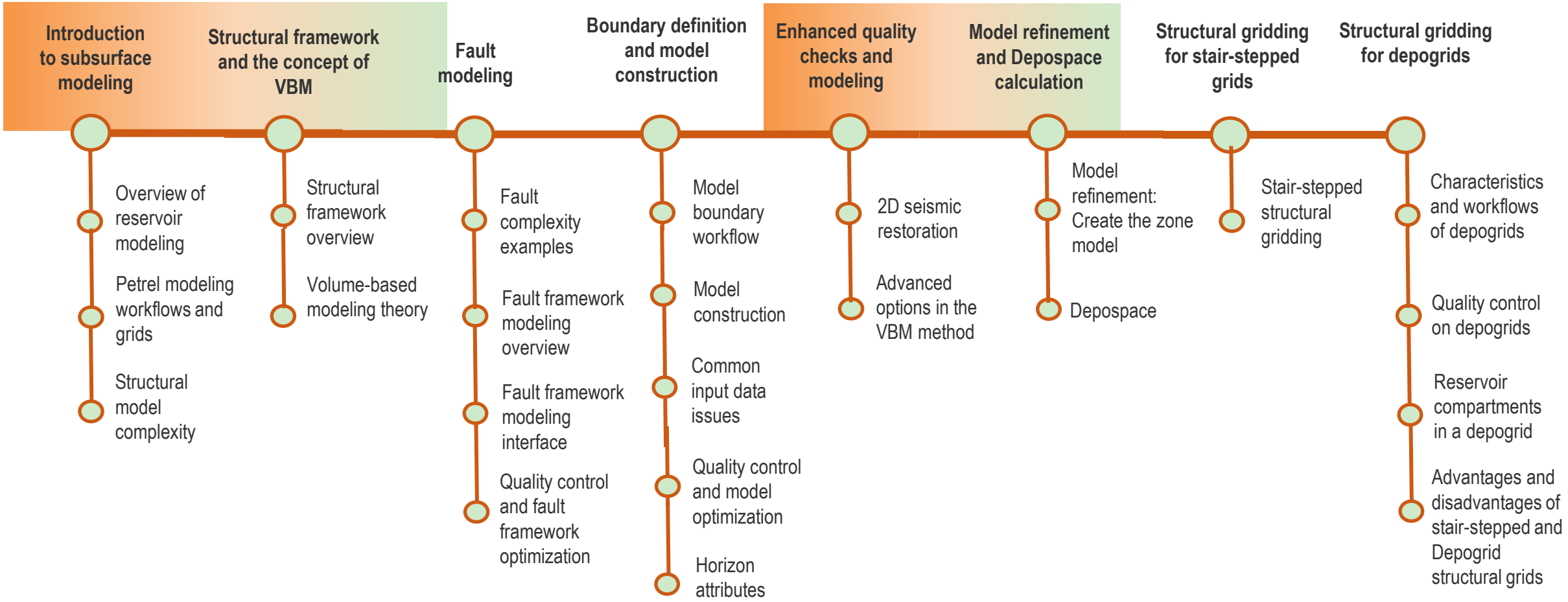
Structural framework with Petrel 2018 – Modeling line



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Agenda
Structural framework– Day 2

9.00-12.00	12.00-12.30	12.30-14.30	14.30-16.45	16.45-17.00
Boundary definition and model construction	Lunch	Enhanced quality checks and modeling	Model refinement and Depospace calculation	Review

KEYWORDS

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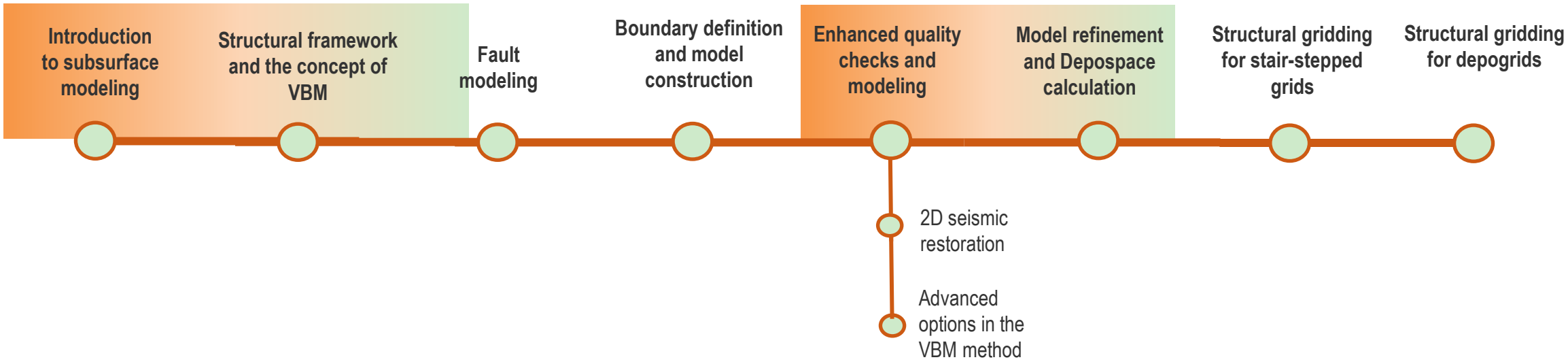
Structural framework with Petrel 2018 – Modeling line



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Learning objectives

When you complete this module, you will understand how to:

- incorporate the 2D reconstruction tool with horizon modeling in the structural framework
- use advanced options of the Volume-base modeling algorithm for horizon modeling

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Enhanced quality checks modeling

- 2D seismic reconstruction
  - Structural interpretation quality control
  - Incremental interpretation using reconstructed space (Demo)
- Advanced options in the VBM method

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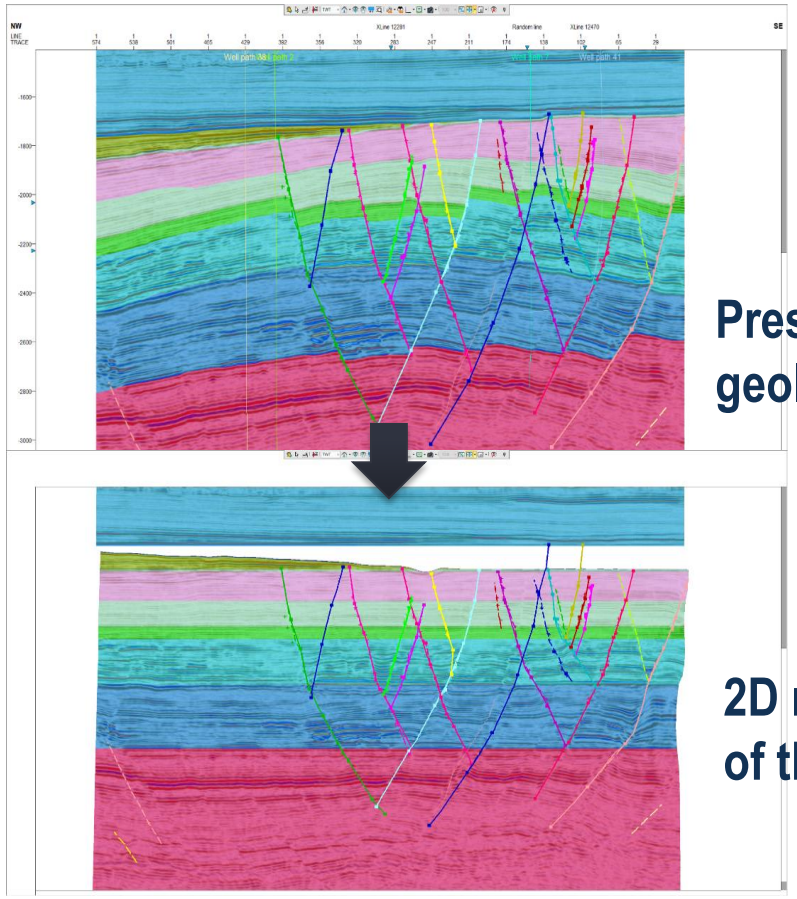
2D Seismic reconstruction

- Assess the fault and horizons input data
- Mechanically slide, stretch, squeeze to align horizons
- Use principles of unfaulting to determine the correct seismic wavelet
- Identify wrong sided data



Present day geological space

2D reconstruction of the seismic line

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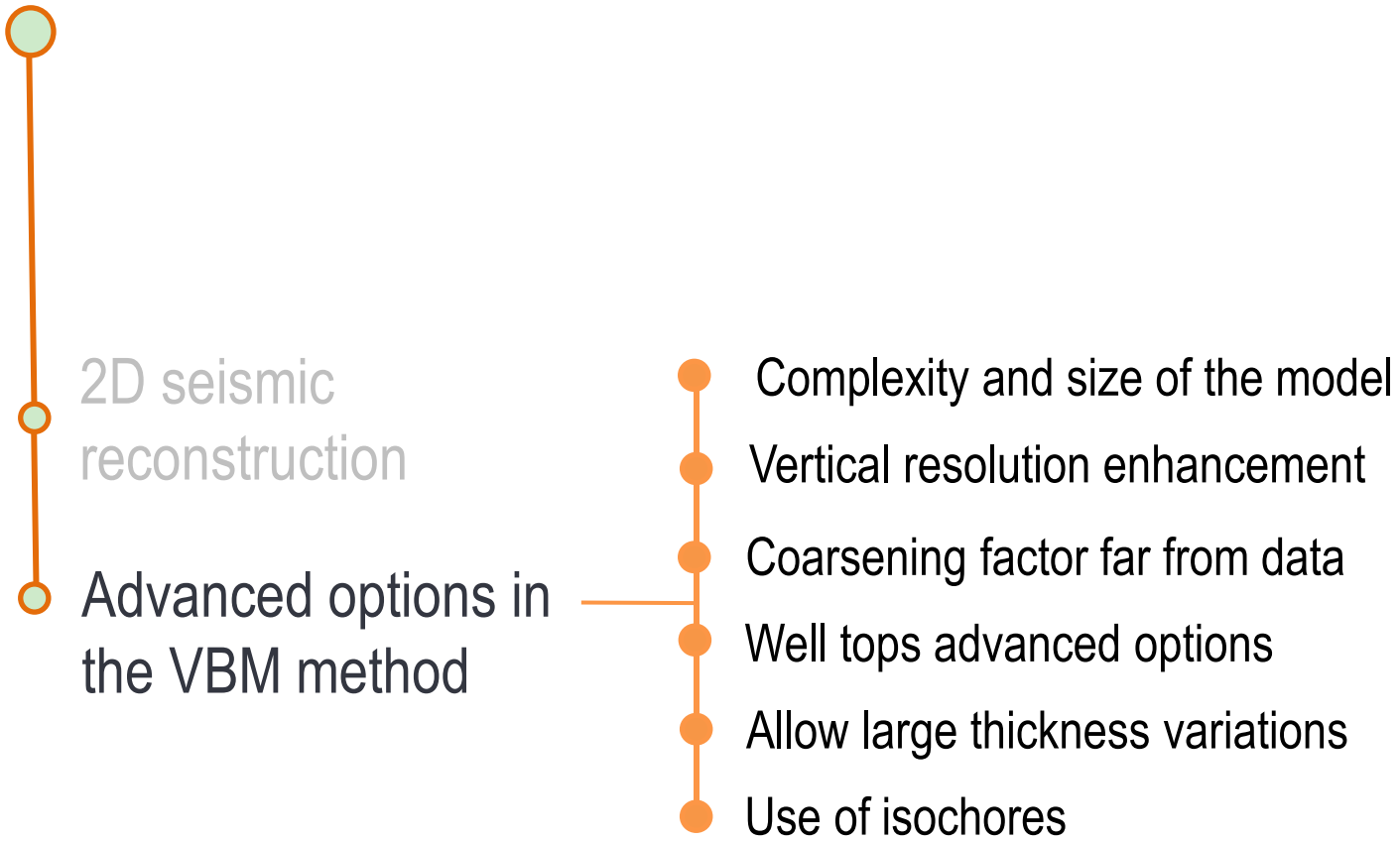
Enhanced quality checks modeling



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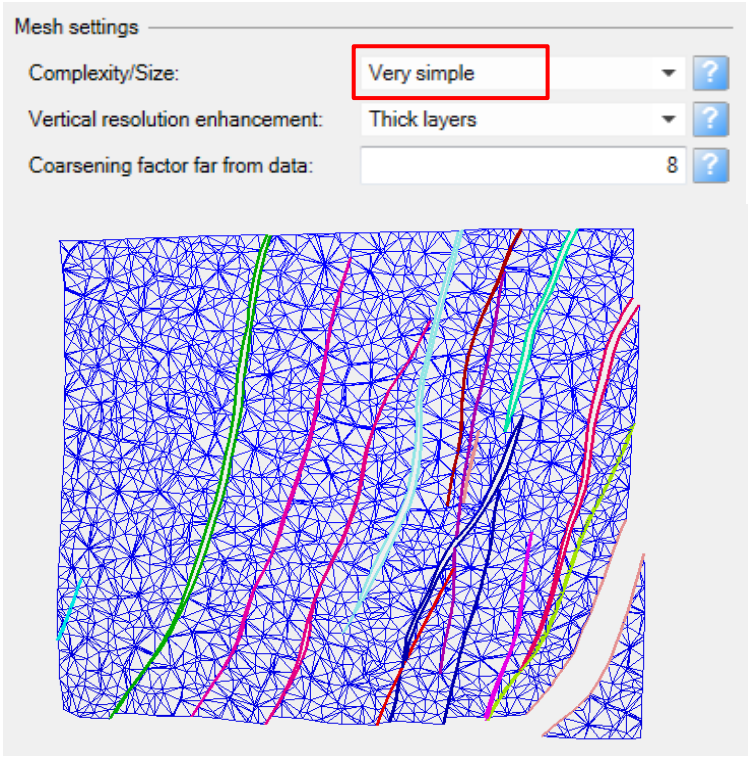
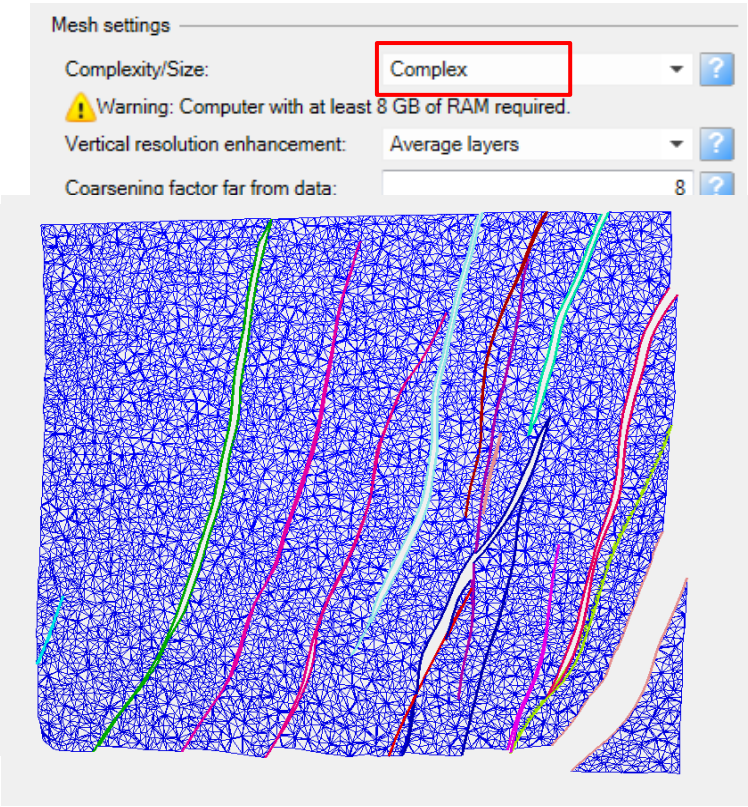
Complexity and size of the model

- For initial investigations, select a lower complexity and then refine your model as needed.
- Reduced computation time during initial input data and parameters validation.





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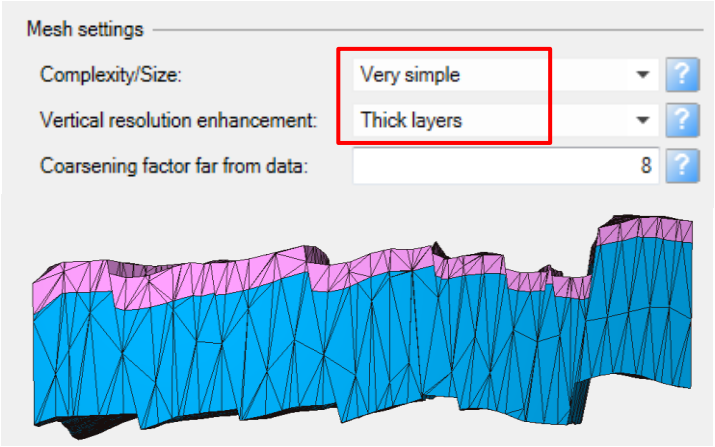
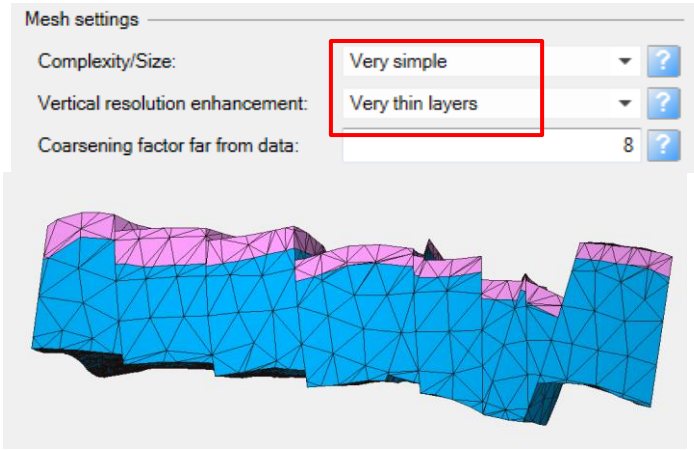
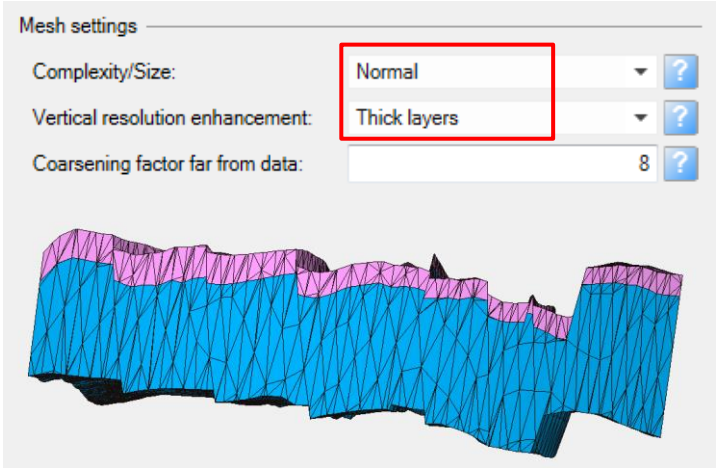
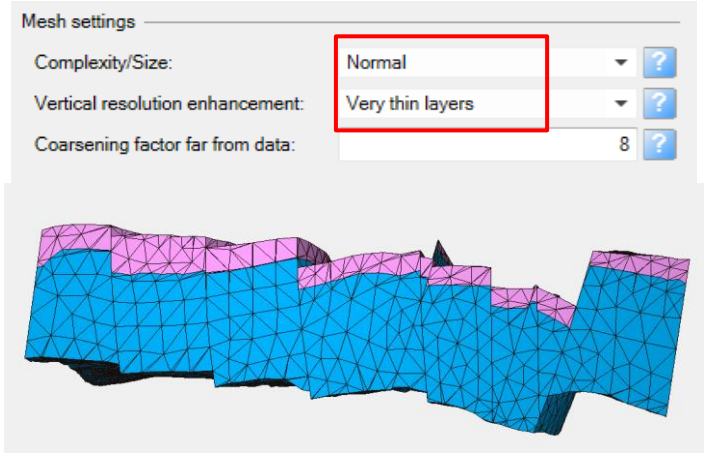
Vertical resolution enhancement









Images captured in a 3D window with 5X vertical exaggeration

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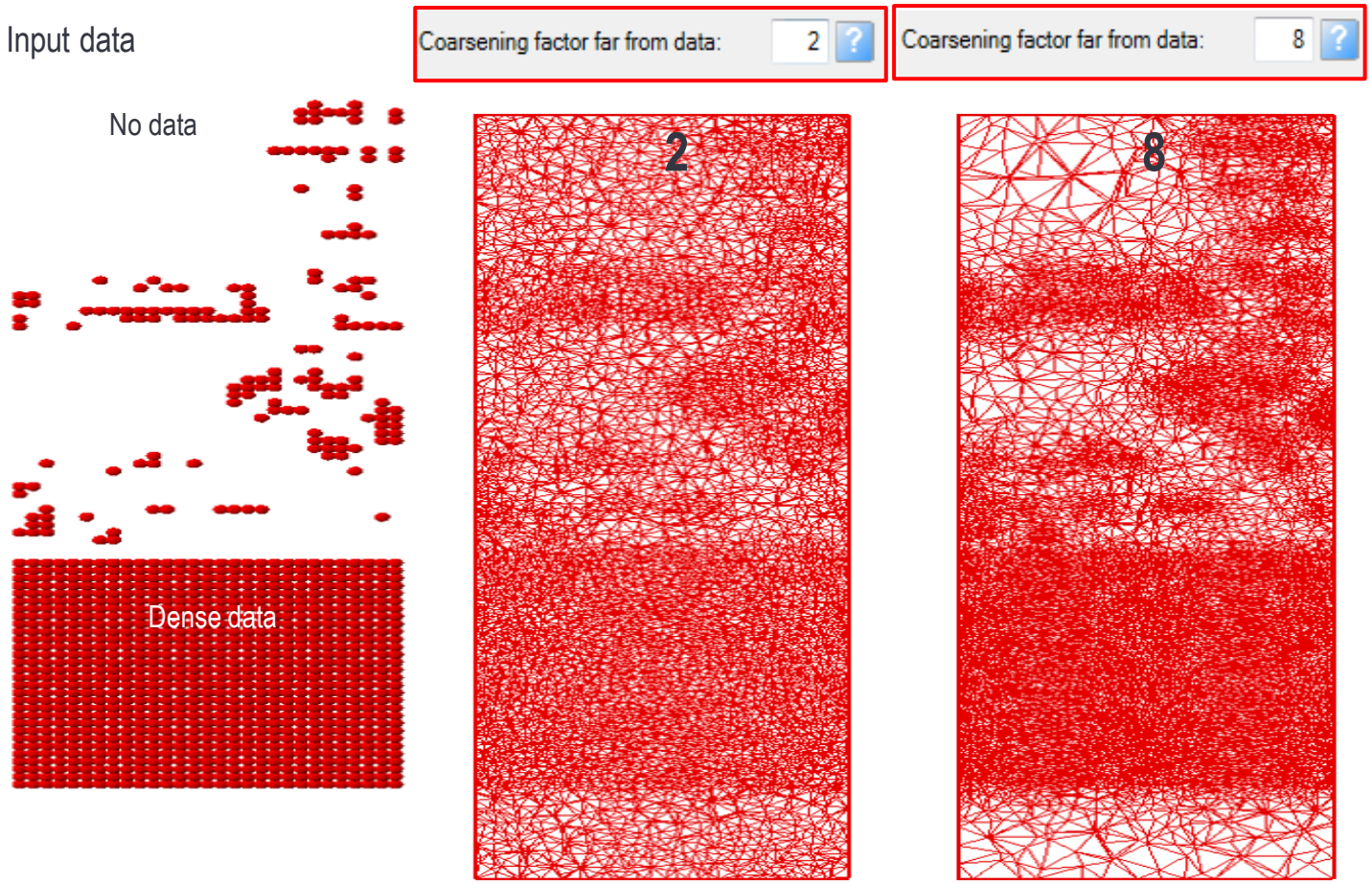
Coarsening factor far from data



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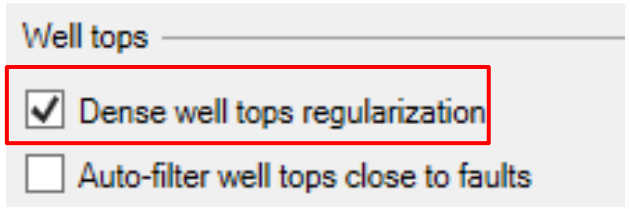
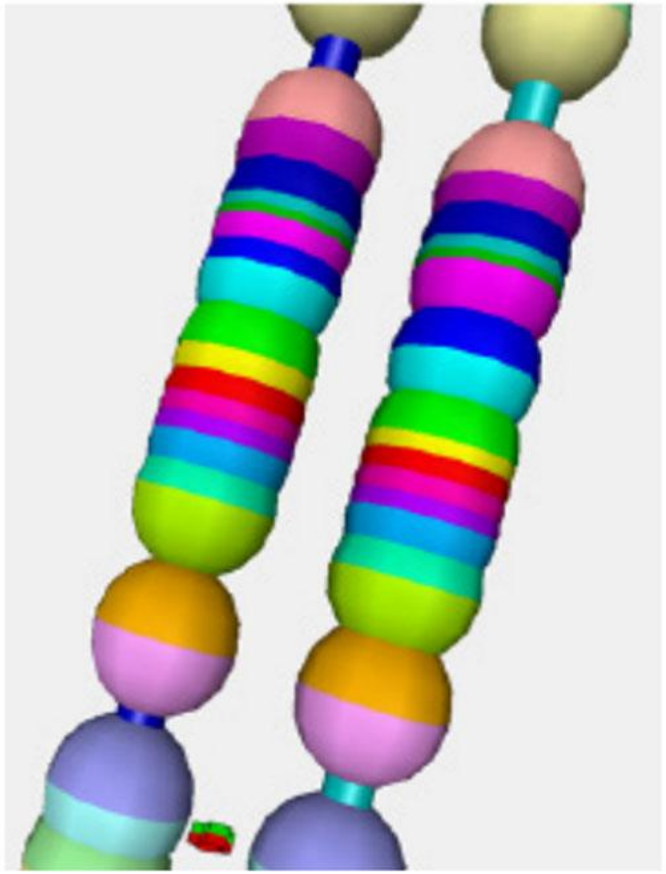
Well tops adjustment options (1)
Dense well tops regularization

- Force the exclusion of well tops from the mesh.
- Use in densely spaced well tops (both vertically and laterally) to minimize the impact of inconsistencies.

  For example, there can be duplication or computation in erroneous locations.





- Only available at the un-refined stage of model construction.

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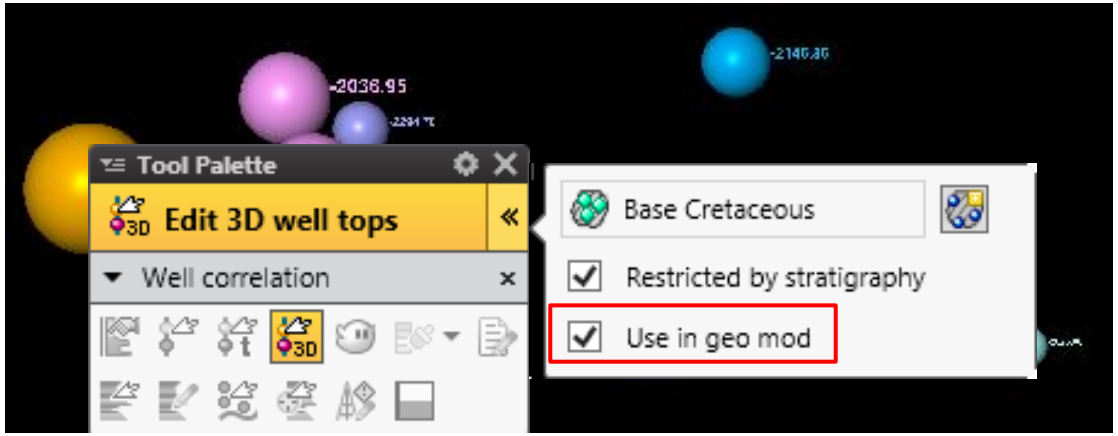
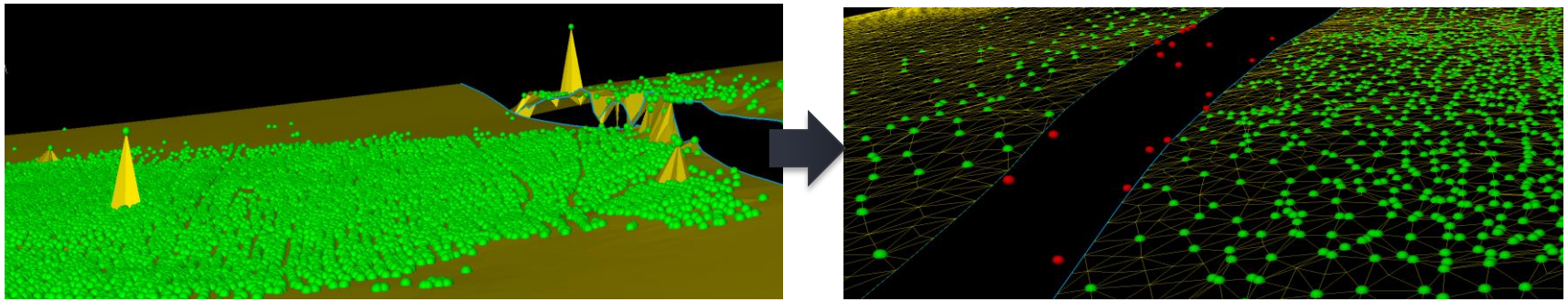
Well tops adjustment options (2)
Use in geo mod

- Precise control over the well tops
- Allow to include the top in your model
- Auto-filter well tops close to faults



Dense well tops; some are wrong sided



Spikes are removed with the 'Use in geo mod' option

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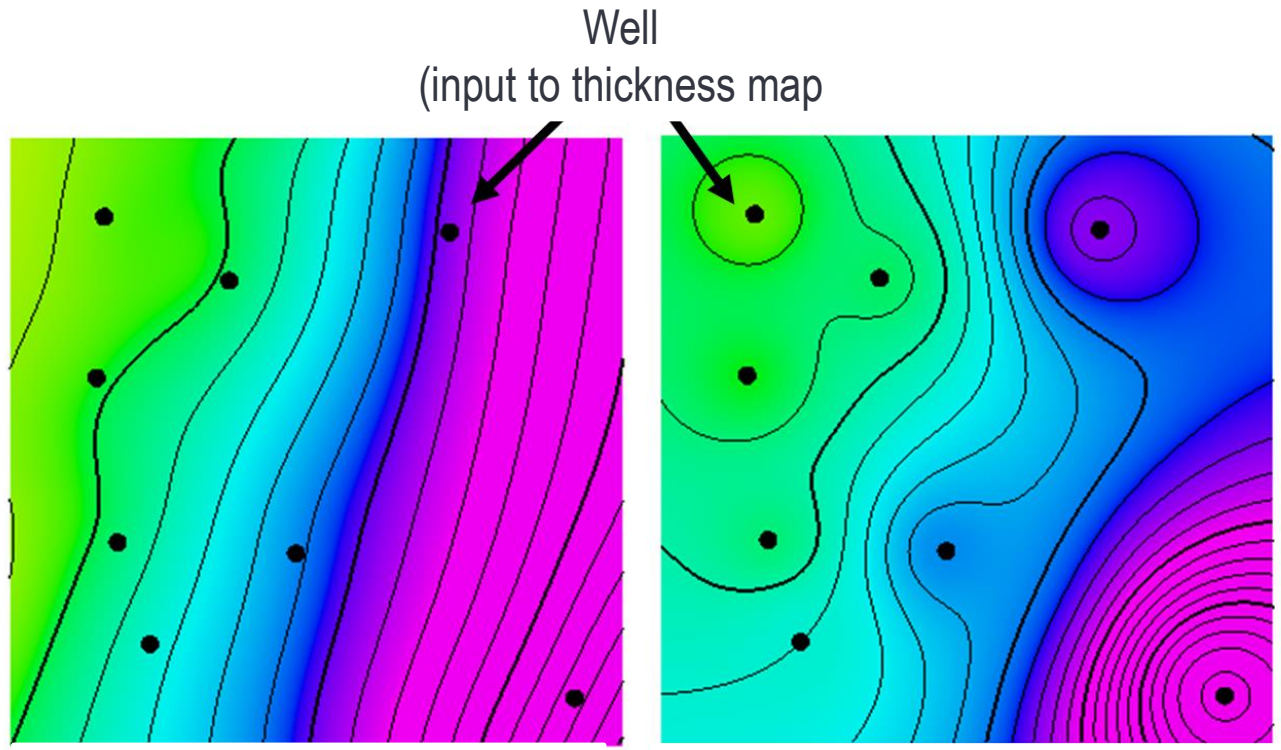
Allow large thickness variations (1)

Where does it make sense?

- Many horizons
- Well-top only horizons
- Thin layer models



Convergent interpolation:
Use for sparse data

Inverse distance:
Use for dense and noisy data

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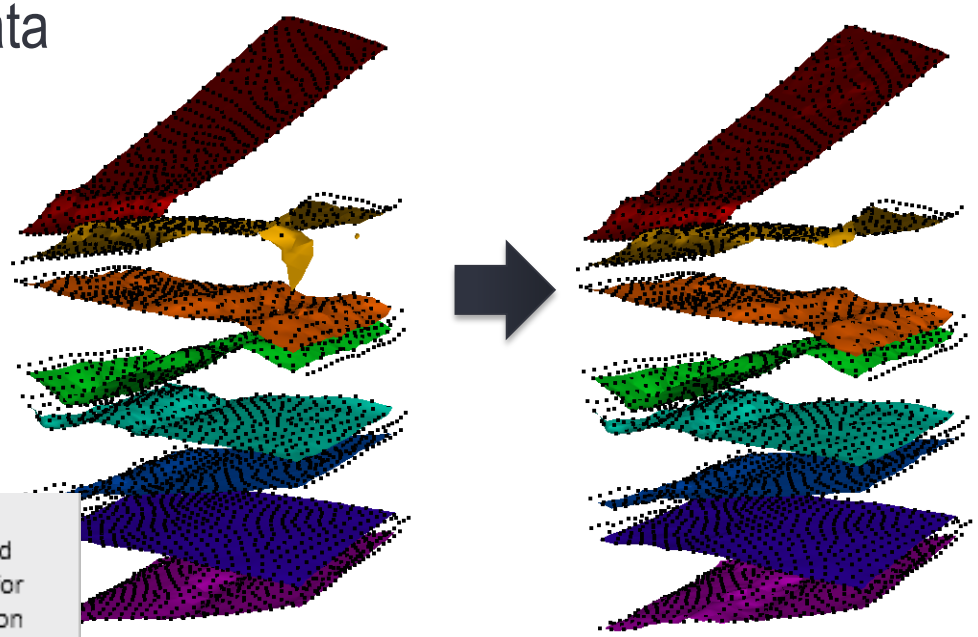
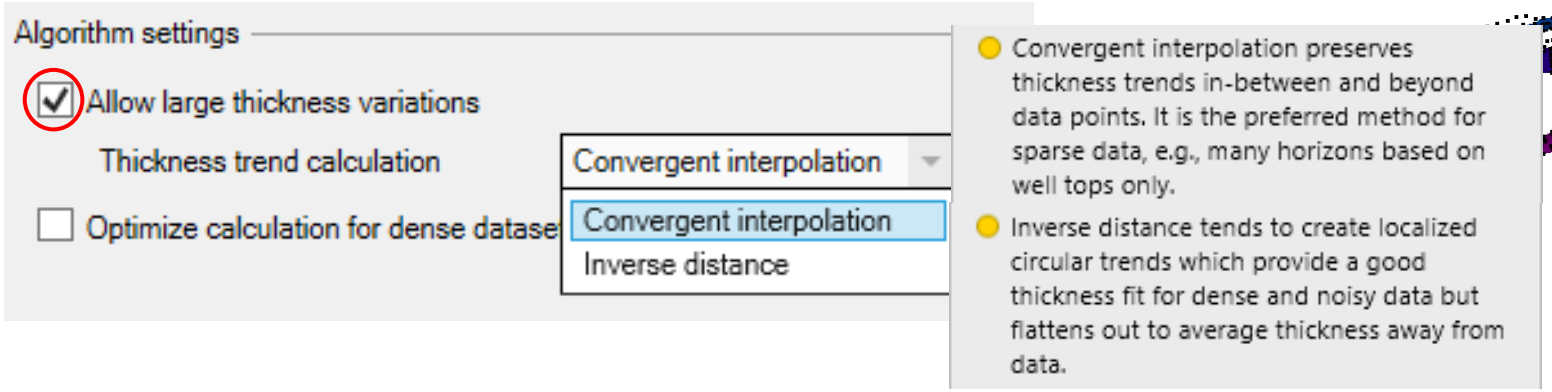
Allow large thickness variations (2)

- Account for global thickening or thinning trends in the data
- Generate a consistent thickness across all faults in the model to prevent inconsistencies in the final model
- Calculate internal TVT thicknesses from input





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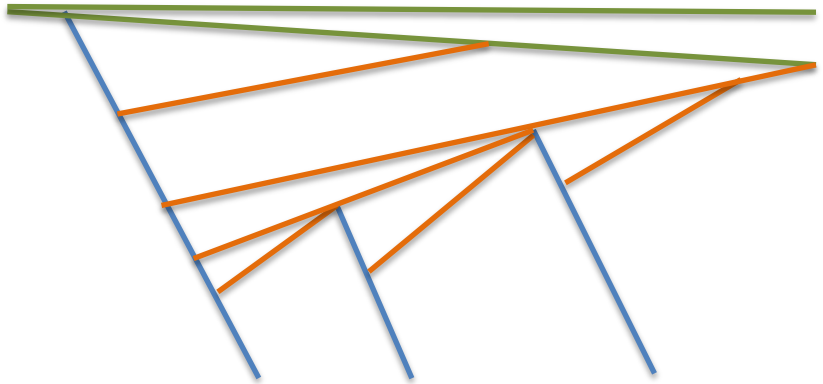
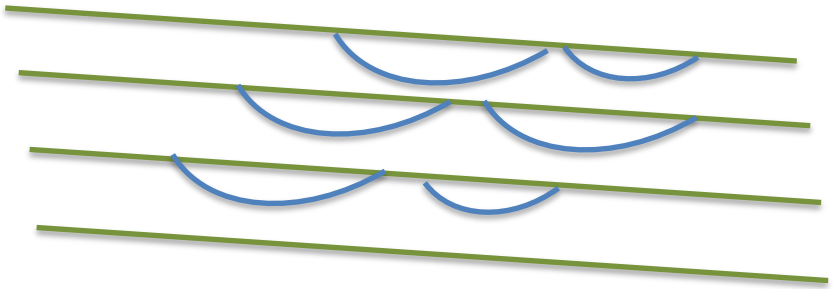
Allow large thickness variations (3)
Examples



Syn-rift tectonic environment



Fluvial or delta top depositional systems

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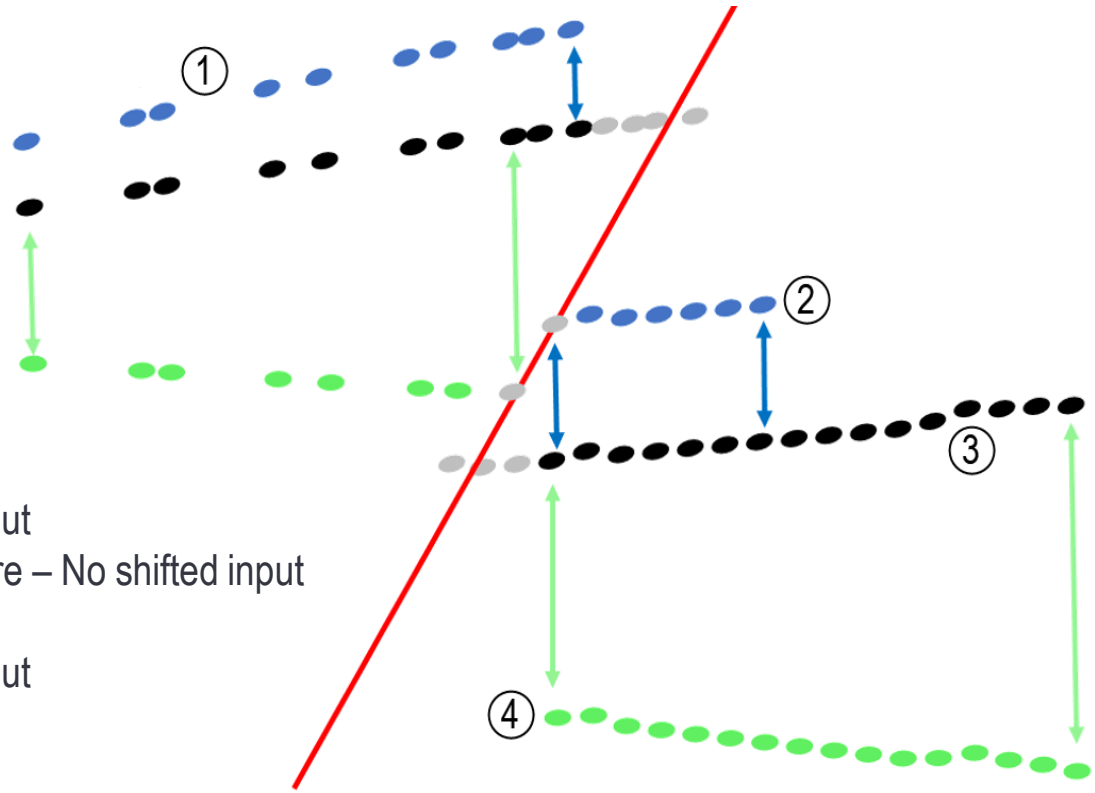
Use of isochores

- Create shifted input data
- Use in Model construction as any other input
- Original or shifted data close to faults (gray points) are filtered out



1. Shifted input
2. No isochore – No shifted input
3. Reference
4. Shifted input

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Exercises:

- Exercise: Construct a 2D reconstruction and update the interpretation using flattened and un-flattened workspace
- Exercise: Add extra horizons to the 2D reconstruction model
- Exercise: Add non-well-tied horizons to assist interpretation and model QC

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Summary

In this module, you learned about:

- the 2D seismic reconstruction workflow
- advanced options for horizon modeling of the VBM method

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Learning game: Enhanced quality checks and modeling (1)

Instructions:
There are several questions. Select the correct answers.

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Learning game: Enhanced quality checks and modeling (2)

Which mesh setting can help you improve the modeling of closely spaced horizons?

a. Complexity/Size
b. Allow large thickness variations
c. Vertical resolution enhancement
d. Coarsening factor
e. Optimize calculation for dense dataset

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Learning game: Enhanced quality checks and modeling (3)

How can I ensure that well tops from wells close to the fault are used in my horizon model?

a. Edit the *Use in geo mod* option for the well tops on that well
b. Enter the well tops in the Input column in the **Model construction** dialog box
c. The use of well tops from wells next to the fault is not recommended
d. Both a. and b. are correct

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Learning game: Enhanced quality checks and modeling (4)

Which thickness trend calculation option should you use for sparse well top data?

a. Inverse distance

b. Convergent interpolation

c. Divergent interpolation

d. Direct distance

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