NExT
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Petrel Geophysics Module 7: Synthetic seismogram generation

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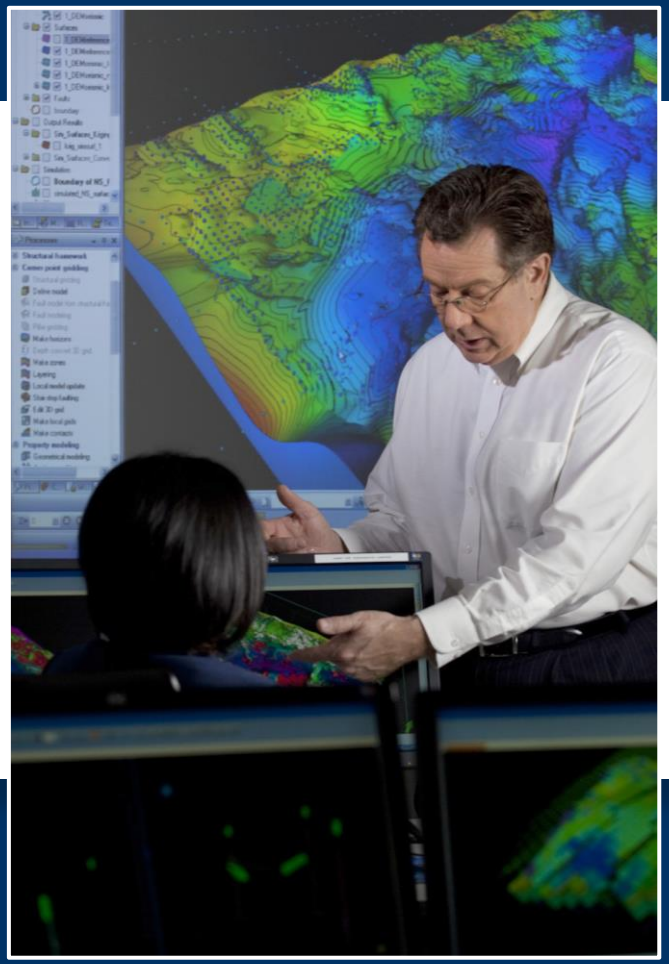
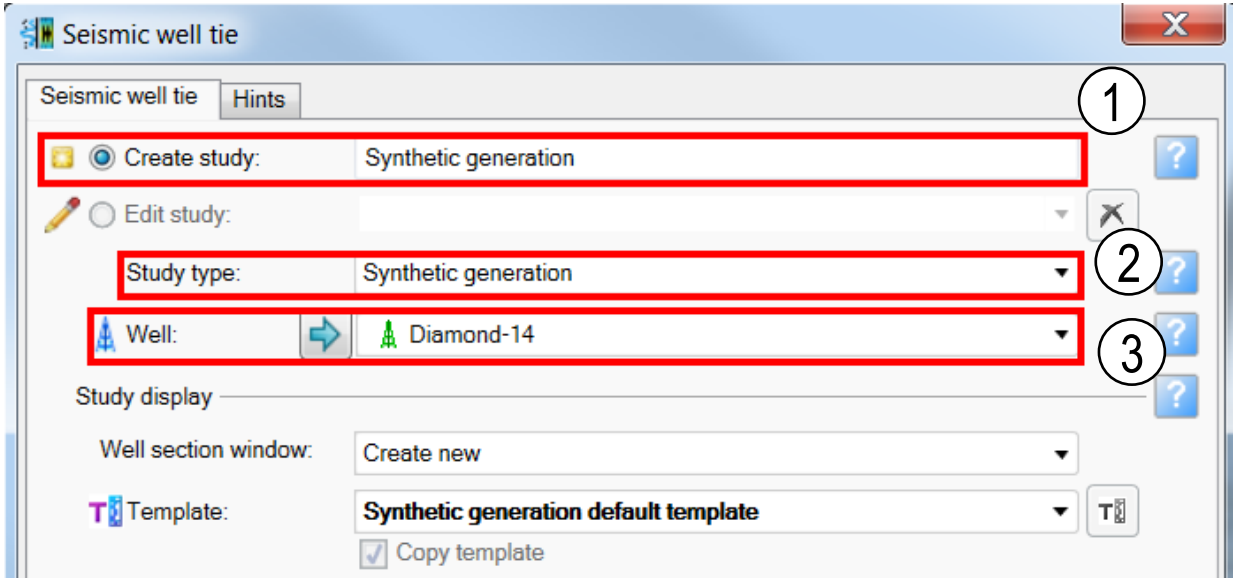
Lesson 1: Synthetic seismogram generation workflow



Generate a Synthetic seismogram (1)

1. Create a new study.
2. Select Synthetic generation as Type of study.
3. Select the well.



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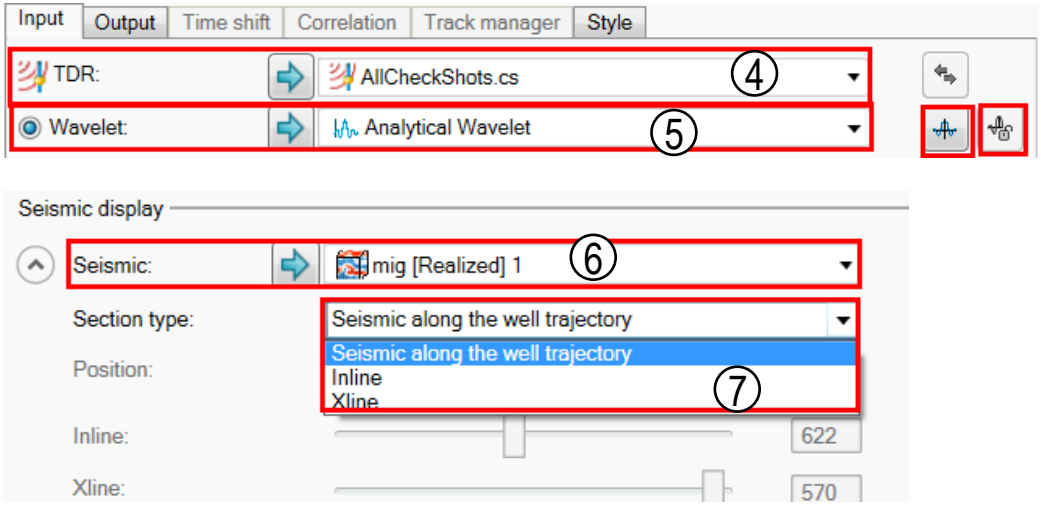
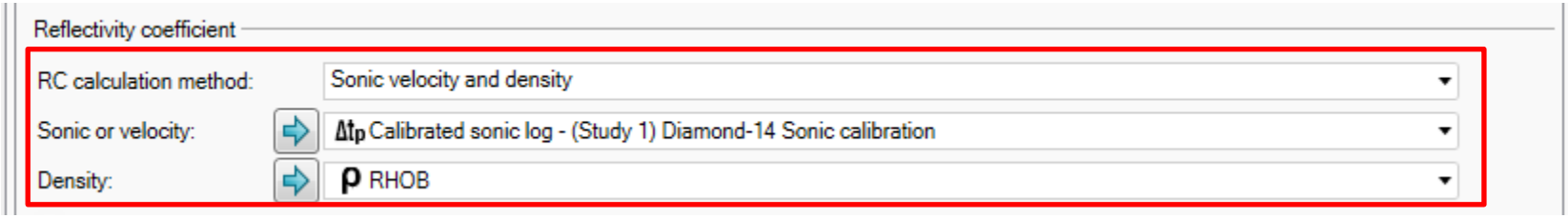
Generate a Synthetic seismogram (2)

4. Select the time depth relationship i.e. TDR.
5. Drop in an existing wavelet or open the **Wavelet toolbox** to create a new wavelet. After extraction, lock the Input settings associated with the wavelet.
6. Drop in seismic data.
7. Specify the seismic display position.



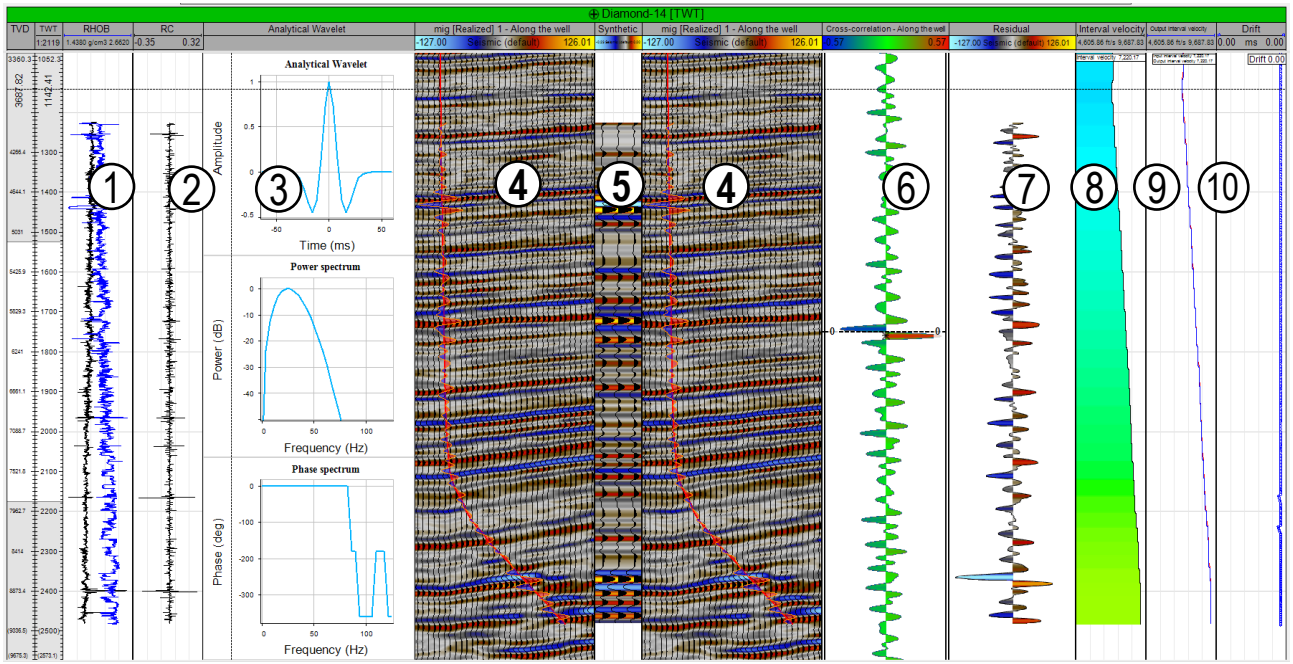
Generate a Synthetic seismogram (3)

8. Choose a Reflectivity coefficient calculation method and associated input data.



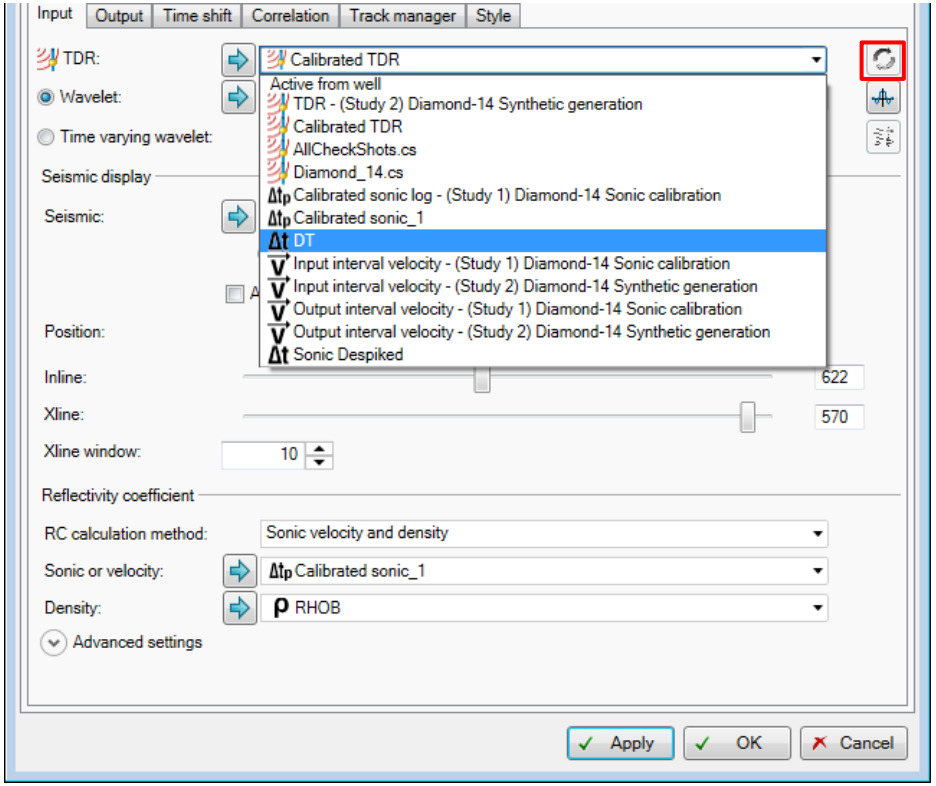
Generate a Synthetic seismogram (4)

9. Click *Apply* on the **Seismic well tie** dialog box. A **Well section** window opens, showing the output result. You can change the default settings of each of the tracks in the **Well section** window.



Select TDR input

- Seismic to well tie process is very interactive. You can select many types of TDR as input in the study.
- Any TDR, sonic log, or velocity log contained by the well can be selected as TDR input for the synthetics generation study.



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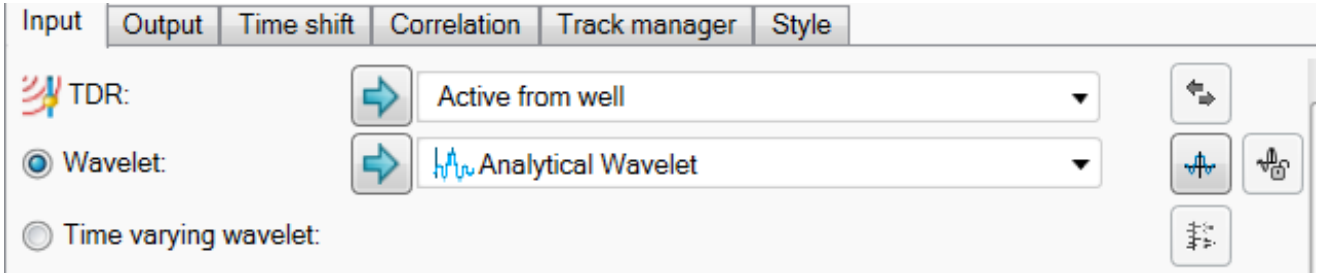
Wavelet

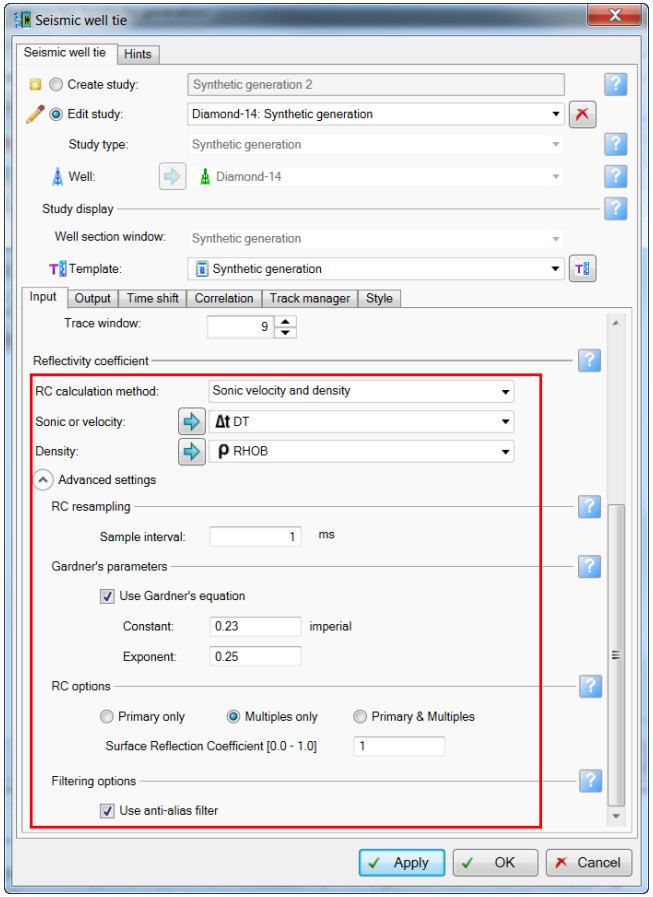
- Insert the wavelet to be convolved with the reflectivity series to create a synthetic seismogram.
- If no wavelet is available in the project, open the wavelet toolbox to create a new one by clicking *Launch wavelet toolbox* .



Reflectivity coefficient calculation

Depending on the availability of data, the Reflectivity coefficient can be calculated using these methods:

- Impedance (AI/ EI/ EEI)
- Sonic and density logs
- Shear
- Porosity
- Aki and Richard PP
- Aki and Richard PS
- Any log



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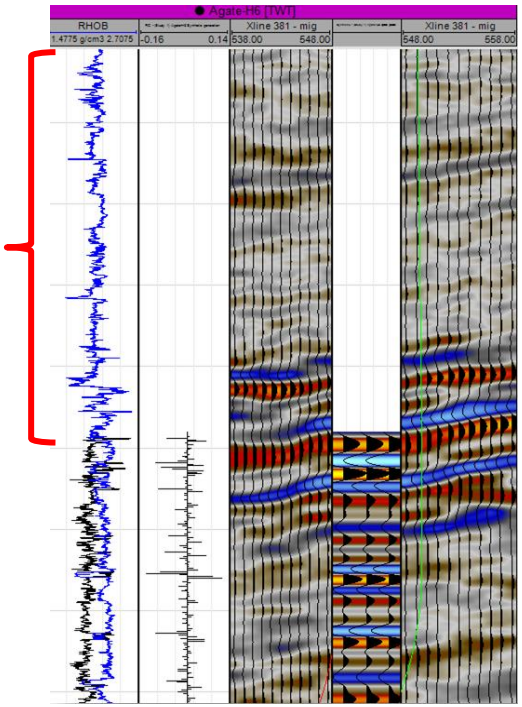
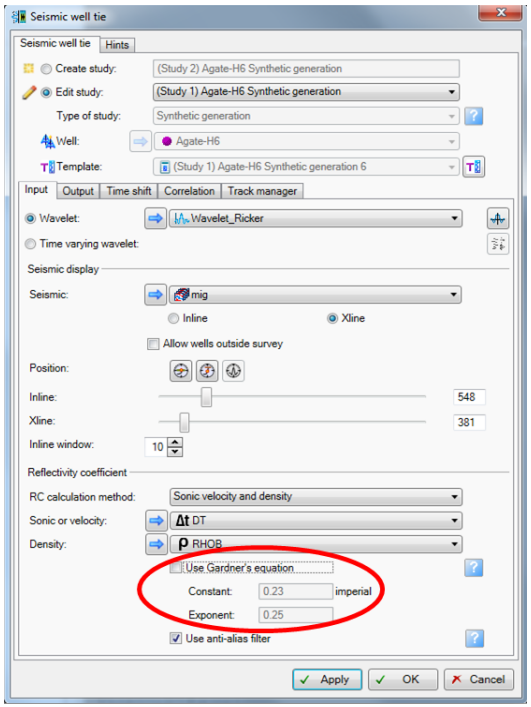
Gardner's patching: Auto-complete reflection coefficient inputs (1)

- On the fly use of Gardner's equation to complete DT or Density log during RC calculation.
- Patch shows missing section of Sonic log for which RC and Synthetic are not calculated.





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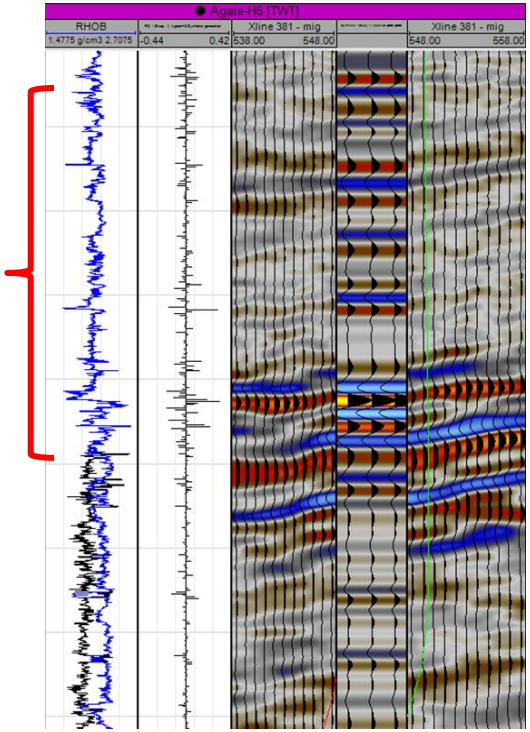
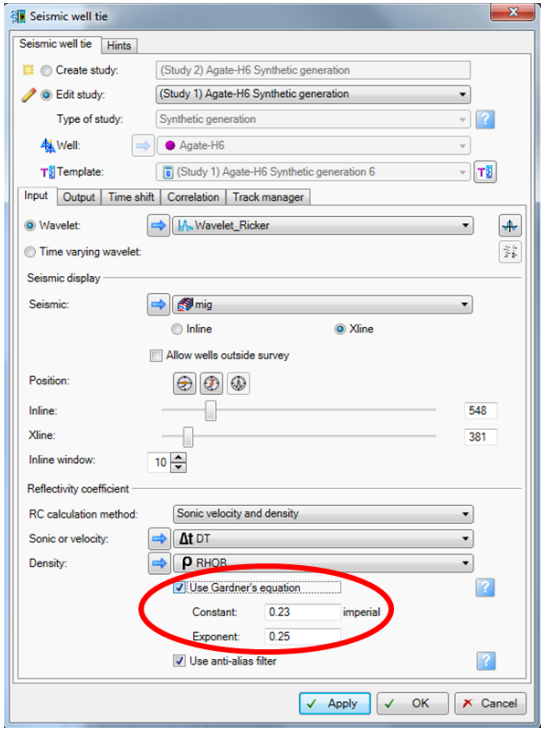
Gardner's patching (2)

The patch shows that RC and Synthetic can be calculated for a missing section of the Sonic log by using the Gardner's equation option.





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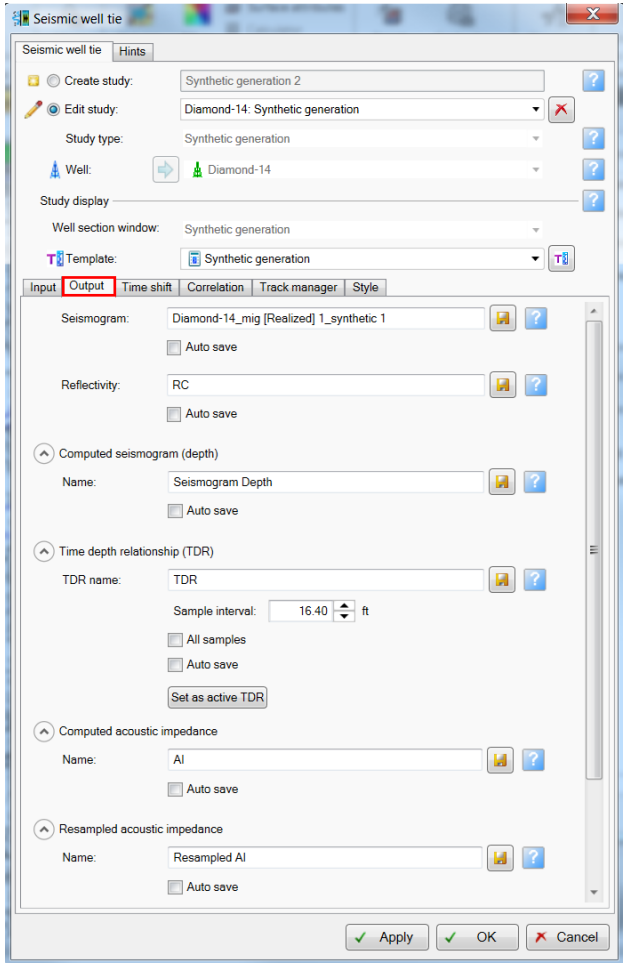
Output tab

- Use the **Output** tab in the Synthetic generation study to control the output results from the workflow.

- To change the name of any output and save it in the **Input** pane, click *Save* 💾.



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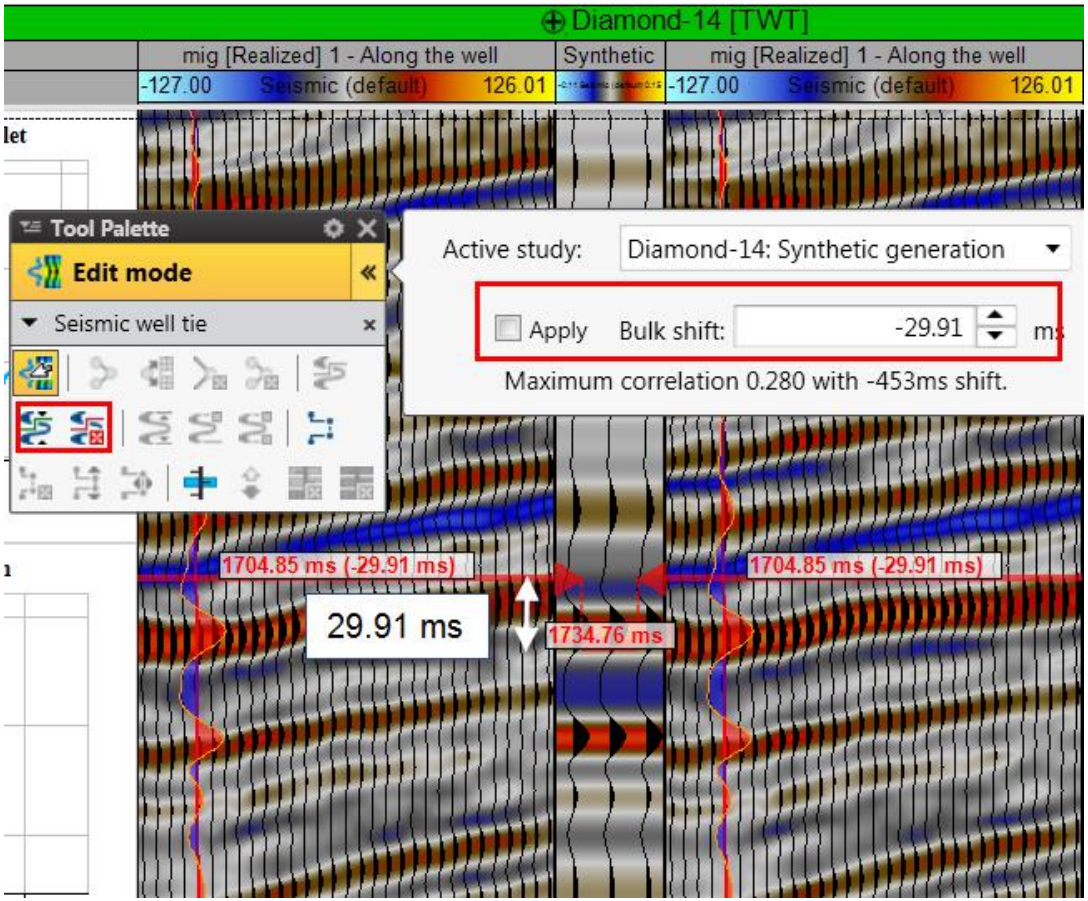
Use interactive bulk shift

The next step is to do a bulk shift in the synthetic to get a closer match between the synthetics and the seismic.

If the quality of the tie is good enough, a stretch and squeeze will NOT be necessary. (Stretch and squeeze is not recommended as the first approach.)



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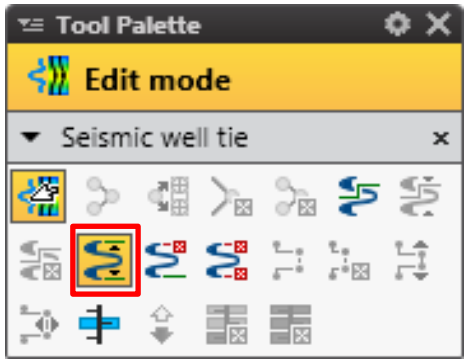
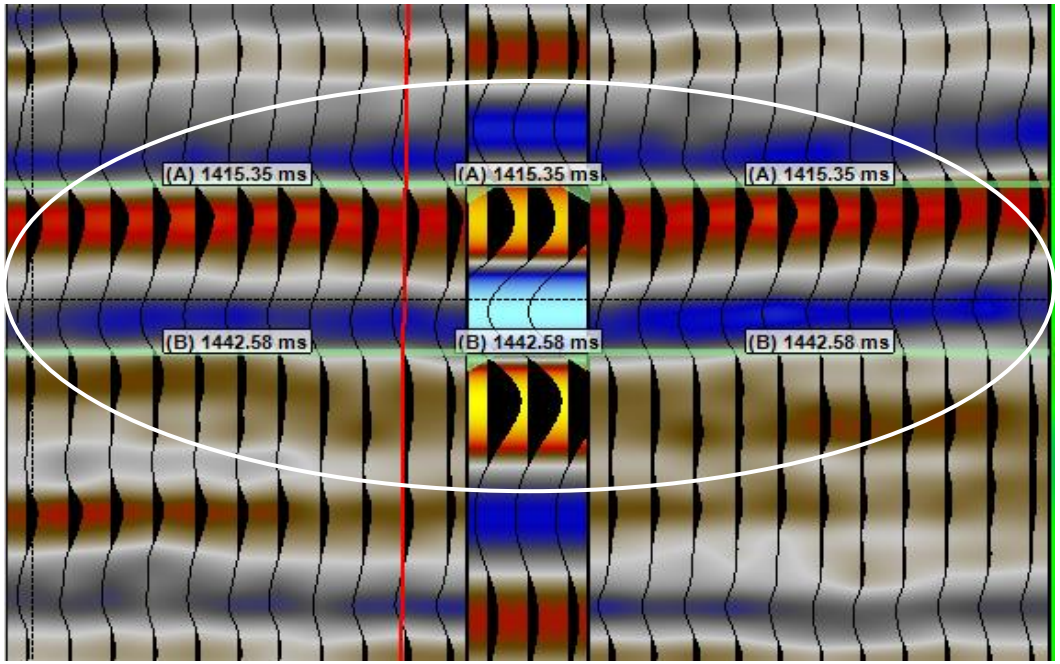
Use continuous alignment

Sometimes, small adjustments must be made to match the synthetics with the seismic after the bulk shift is implemented. To perform these adjustments, use the alignment functionality; the process is interactive.



Note: You can add as many alignment points as required.



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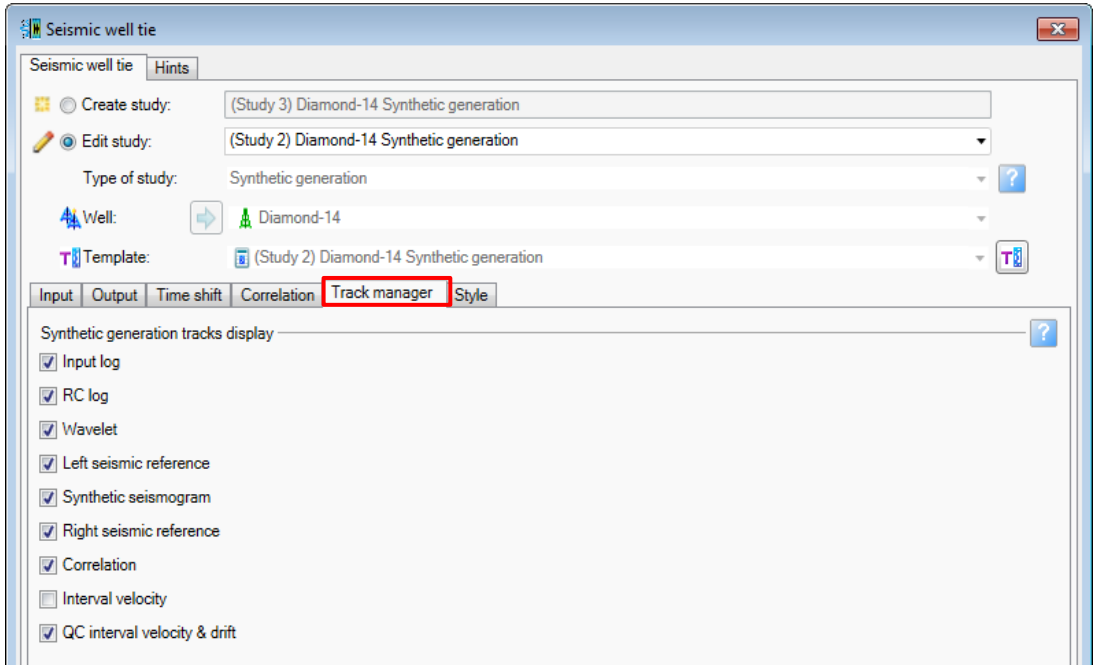
Track manager

The **Track manager** tab provides a shortcut to help you manage the tracks that you want to display in the study.



Exercises