



IT2 – TTI Model

NZ 3D Processing

08 December 2020

cgg.com



INSTITUTE FOR GEOPHYSICS



Passion for Geoscience

- **Objective:**

To convert IT1 ISO model to TTI models.

- **Procedure:**

Based on the well analysis, we constructed delta model with 4% below unconformity surface and 0% above the surface, where unconformity surface was picked on IT1 volume.

Epsilon is $1.25 \times \text{Delta}$, which is 5% based on epsilon scanning result.

Theta and phi was also picked on IT1 volume with depth variant smoothing.

- **Display:**

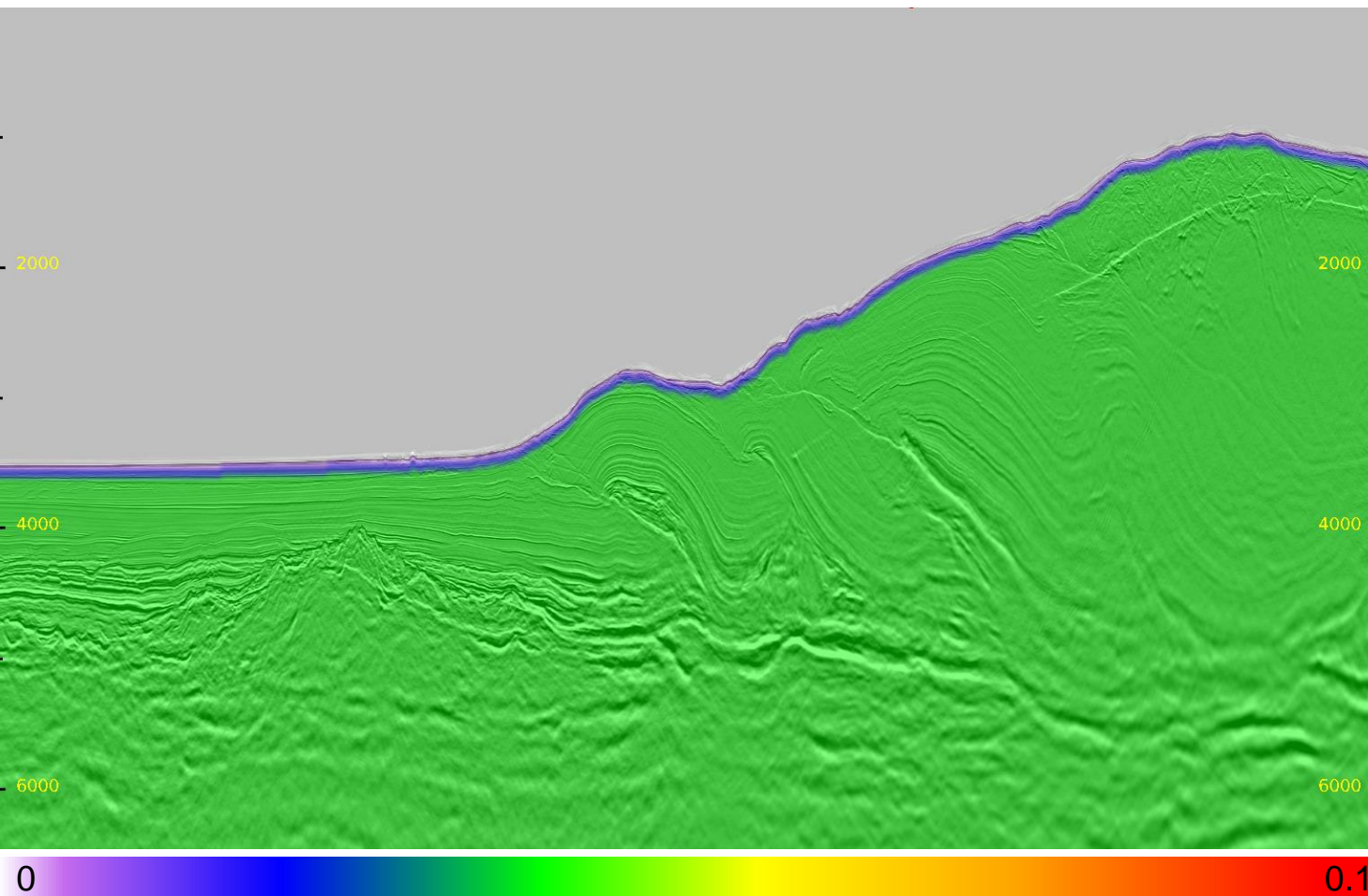
Velocity models, profiles at well locations, and migrated depth full stack & gathers.

- **Observation and Recommendation:**

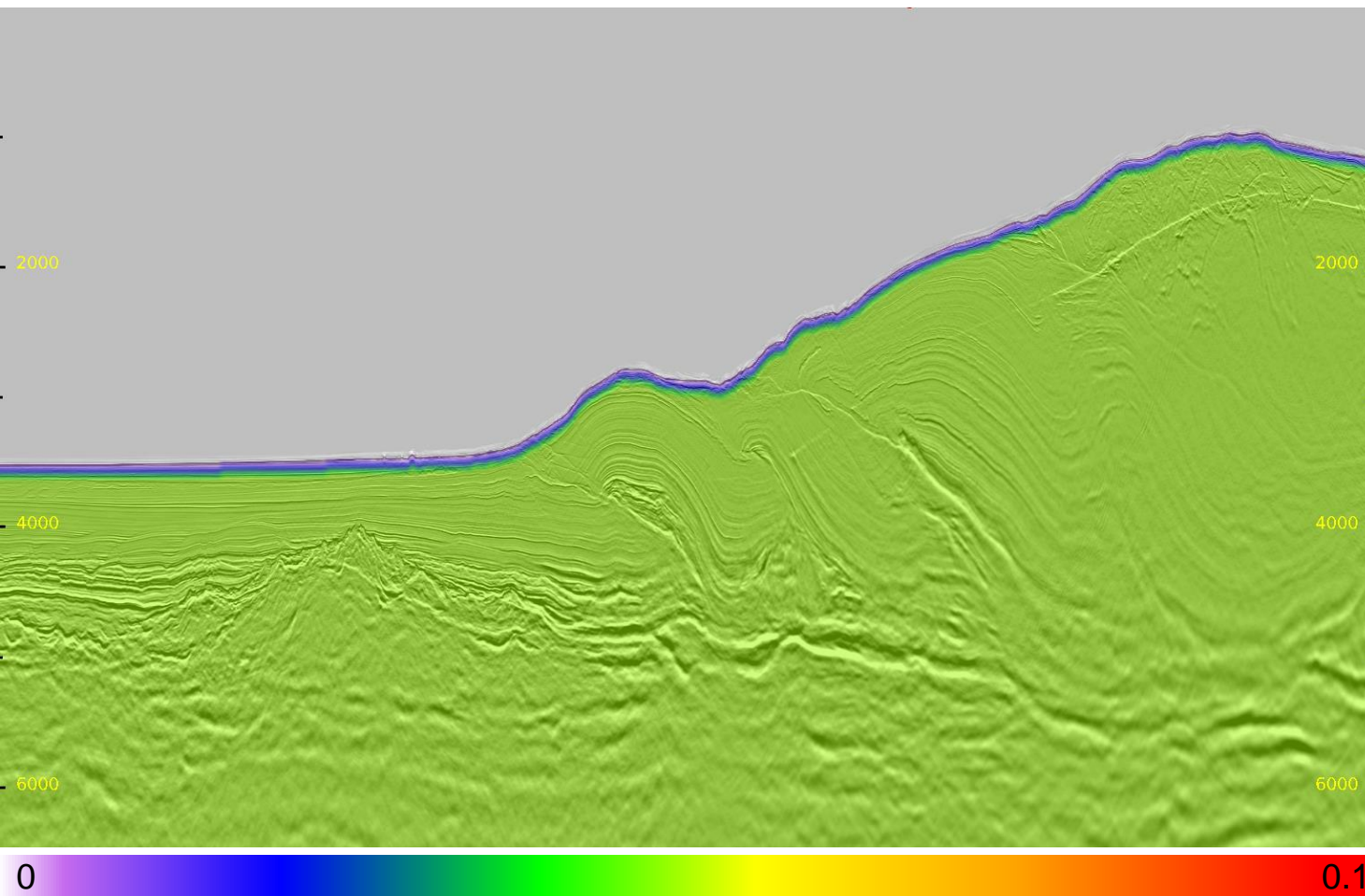
Introducing TTI parameters results in a upward shift of migration result where delta is not 0%. The TTI velocity is now matches well sonic recordings.

Velocity Models

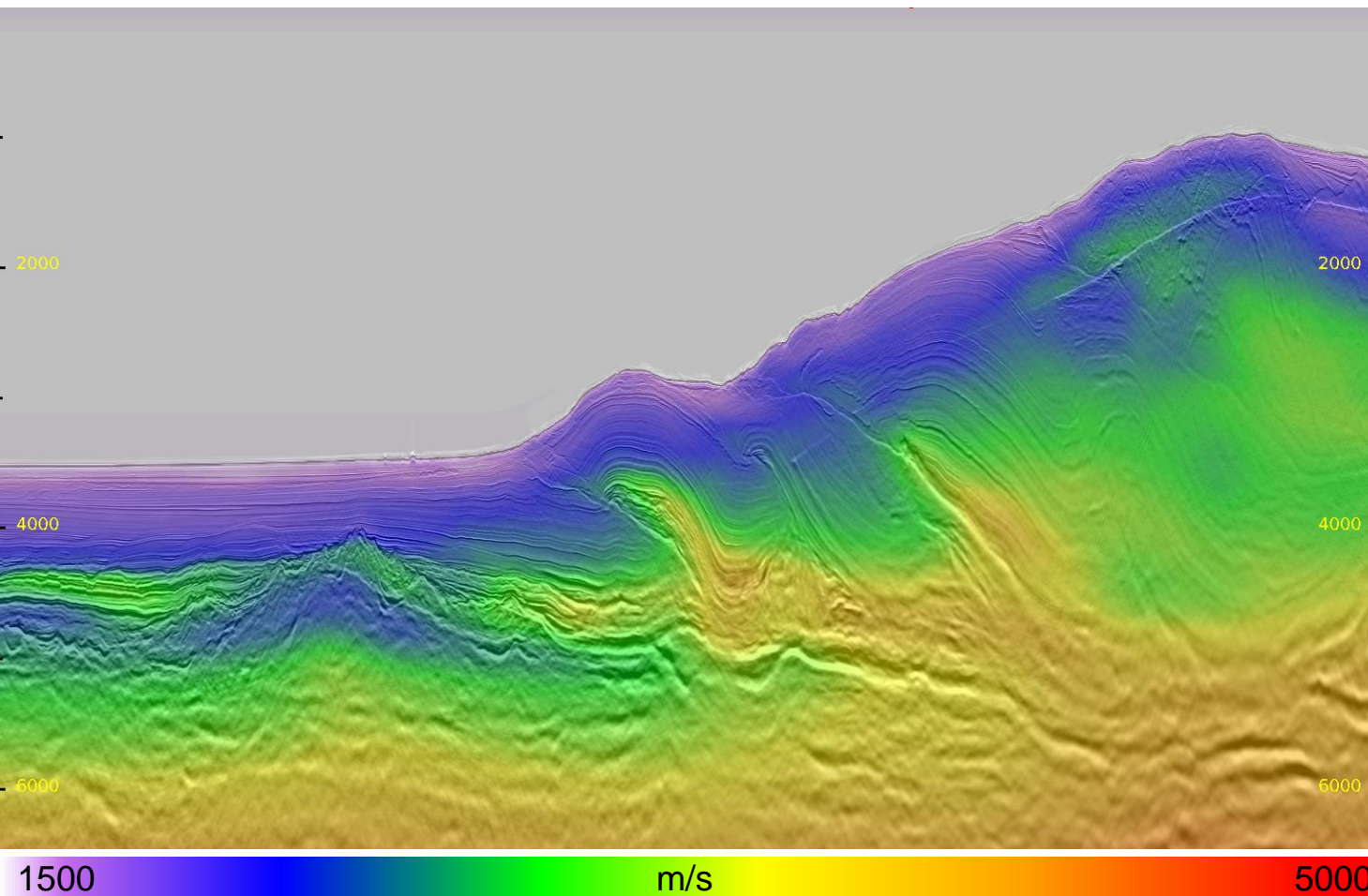




- Below unconformity surface, the delta is 4%, 0% else where, with a 100m taper below the surface.
- TTI migration seismic in the back ground.



- Epsilon is 1.25 times delta, that is 5%, based on epsilon scanning result.
- TTI migration seismic in the back ground.

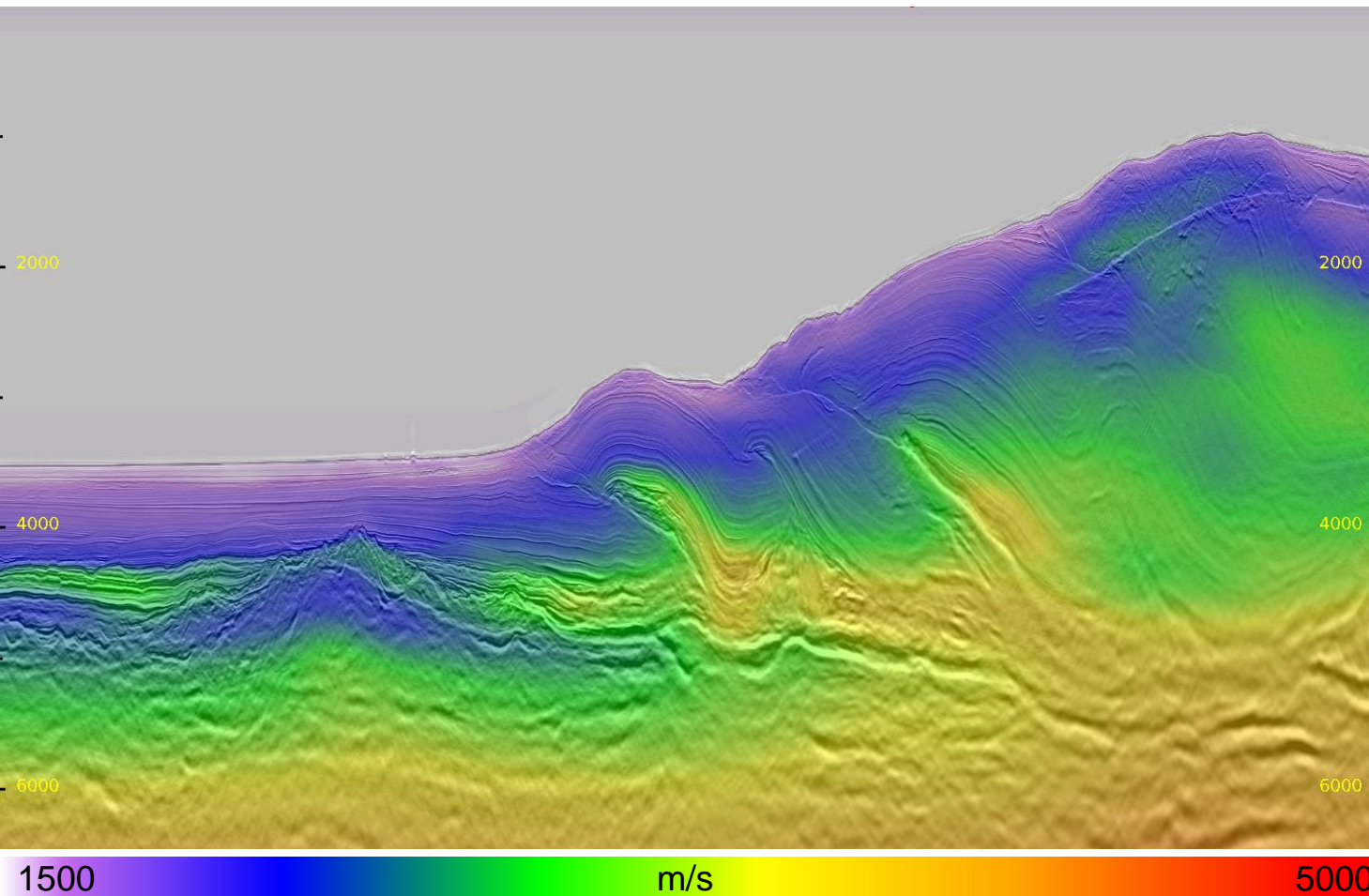


- IT1 ISO migration seismic in the back ground.

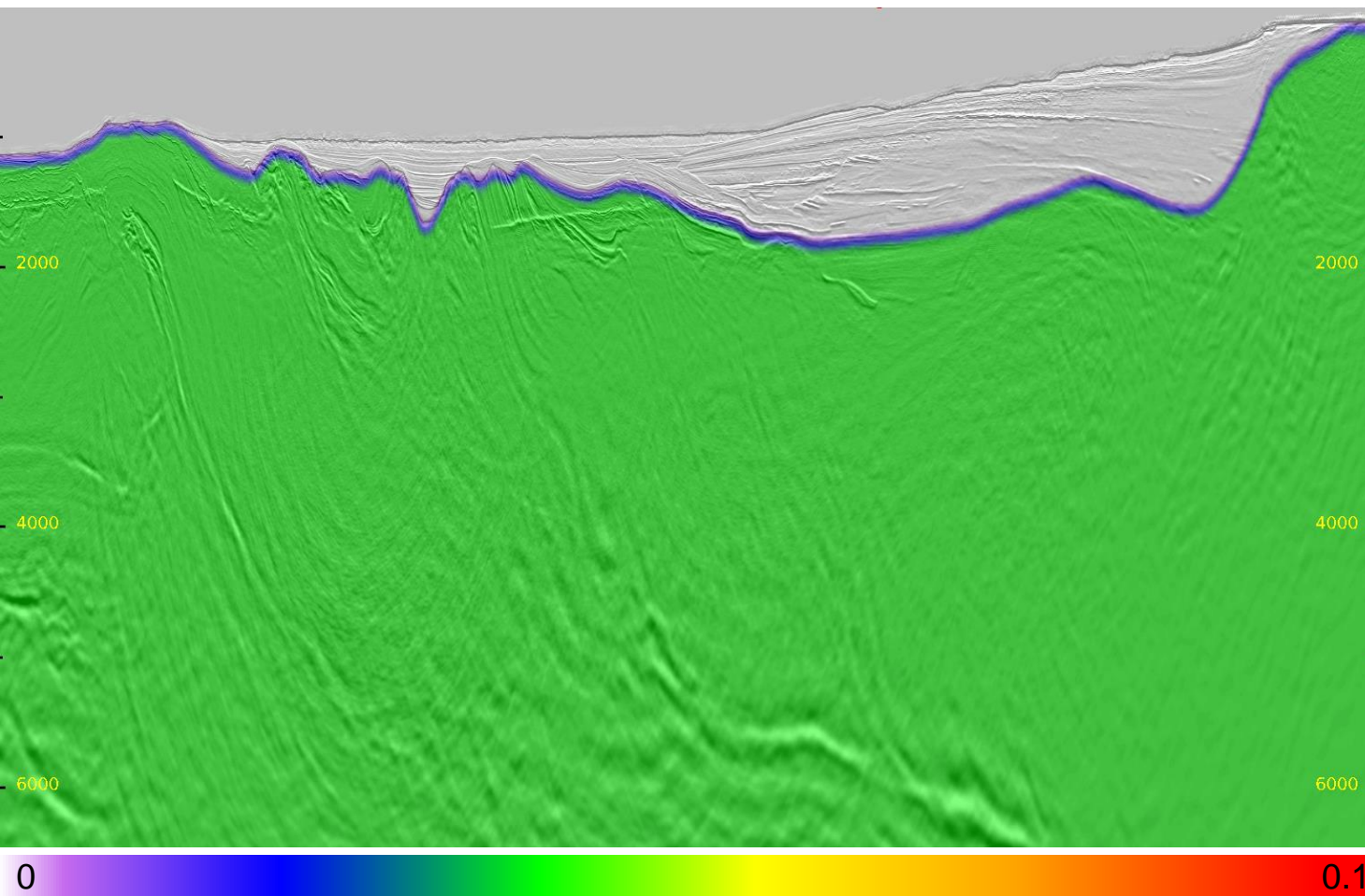


Inline 436 East: TTI Velocity

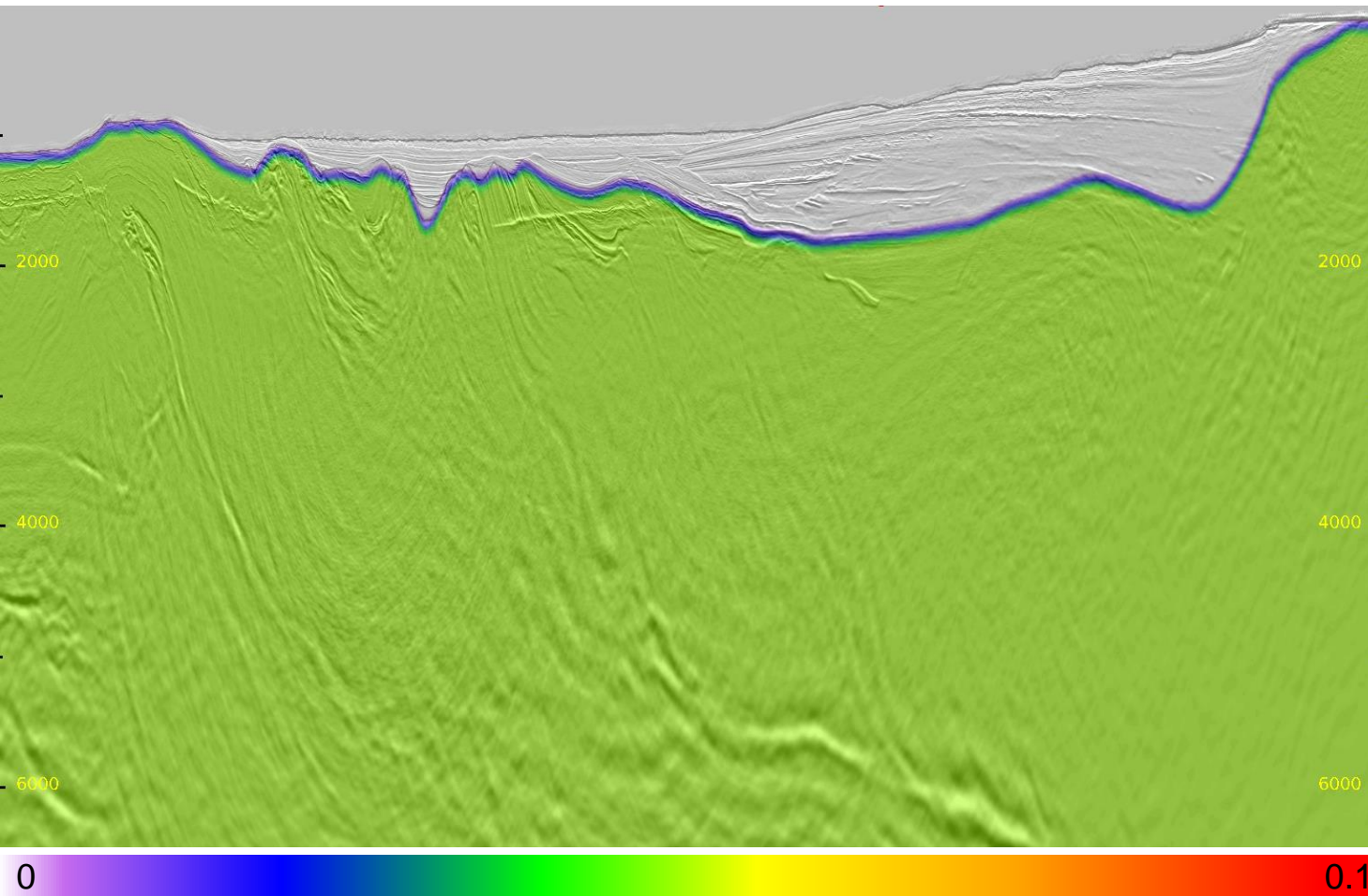
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- IT2 converted TTI velocity shows slow down below unconformity surface due to 4% delta.
- TTI migration seismic in the back ground.



- Below unconformity surface, the delta is 4%, 0% else where, with a 100m taper below the surface.
- TTI migration seismic in the back ground.

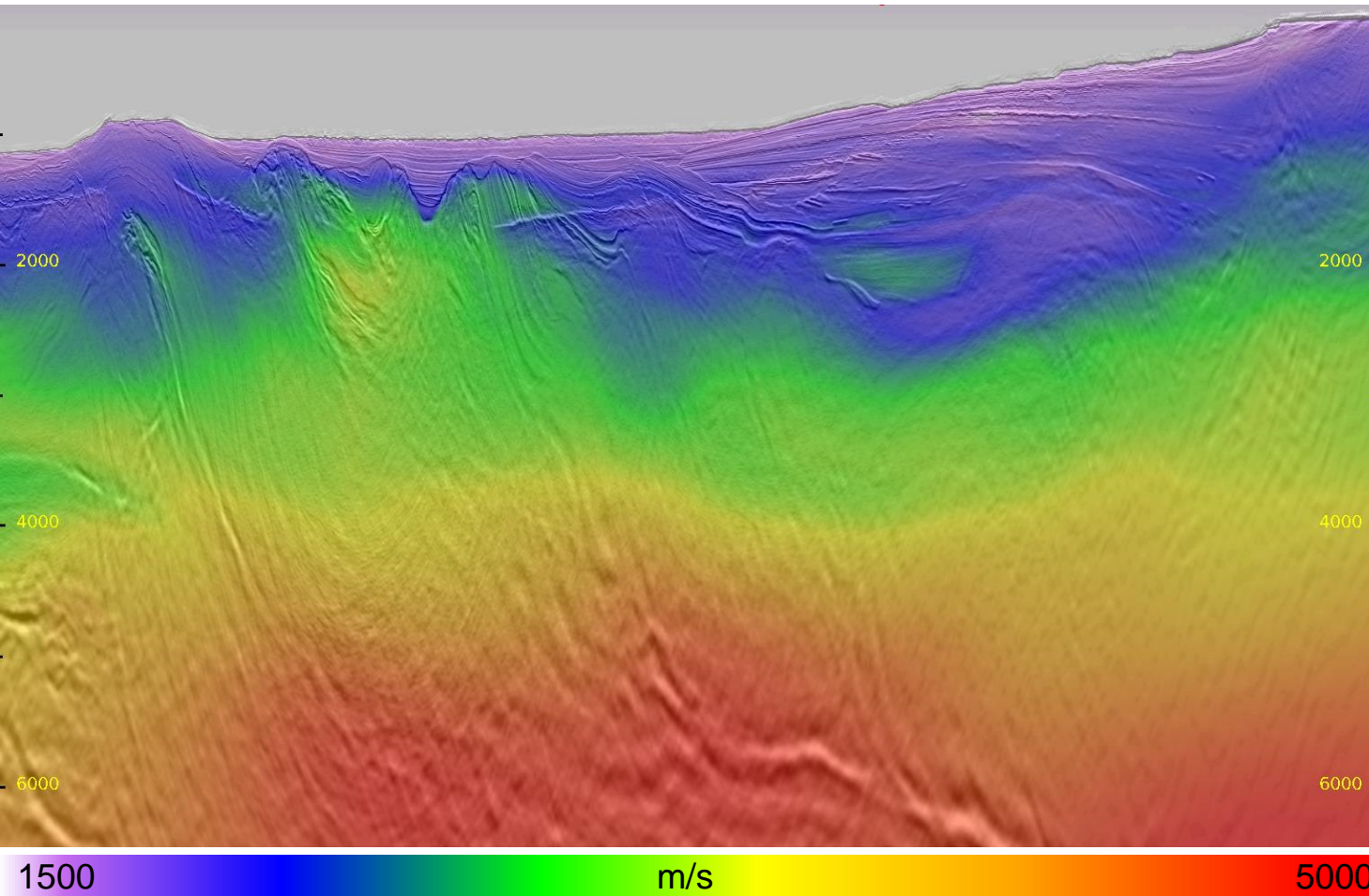


- Epsilon is 1.25 times delta, that is 5%, based on epsilon scanning result.
- TTI migration seismic in the back ground.

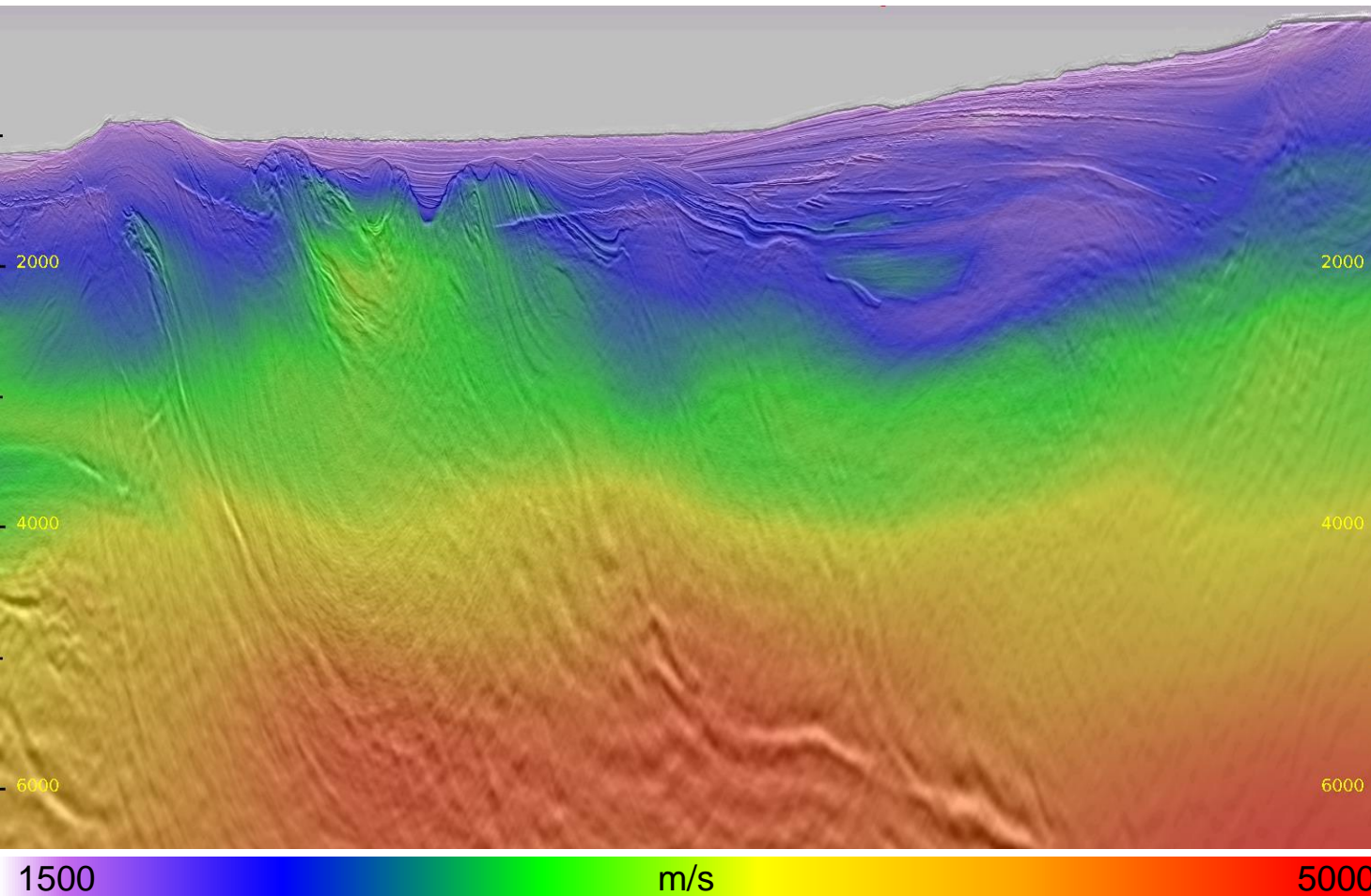


Inline 436 West: ISO Velocity

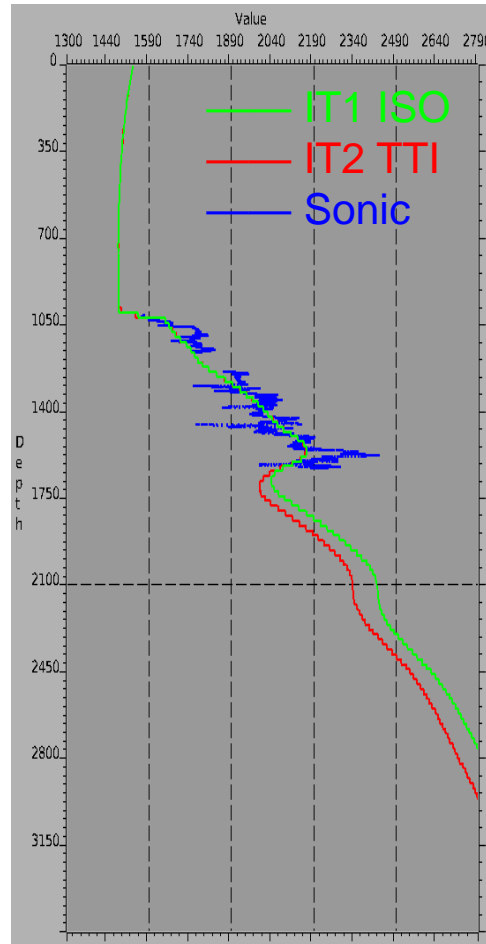
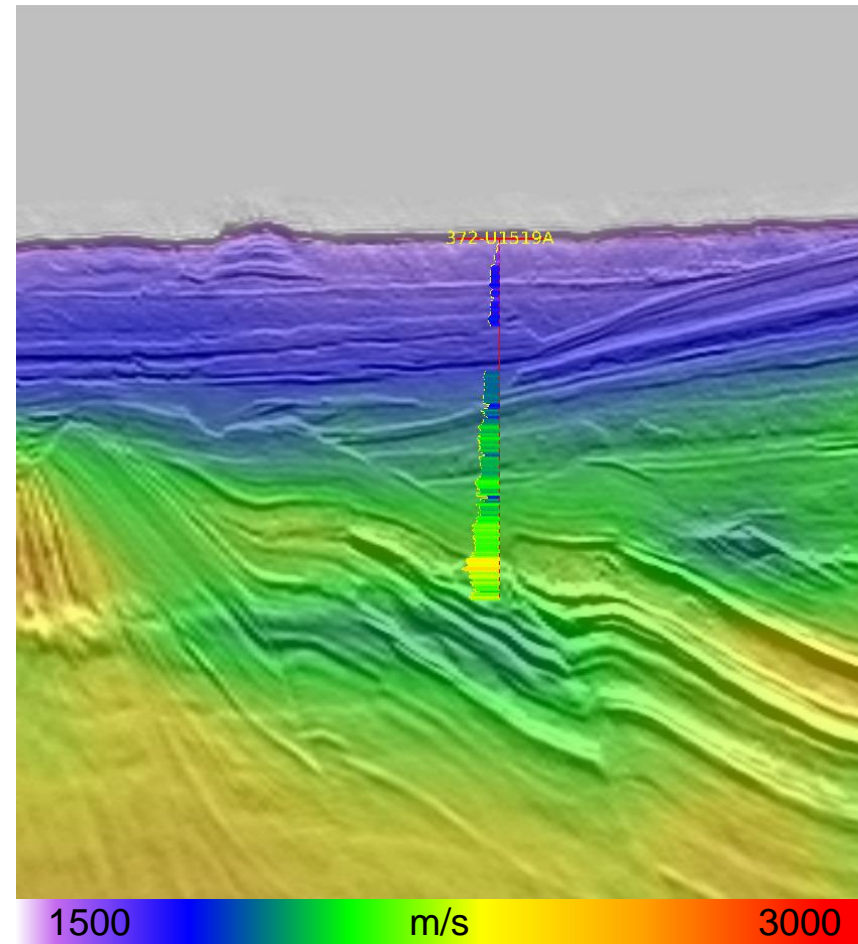
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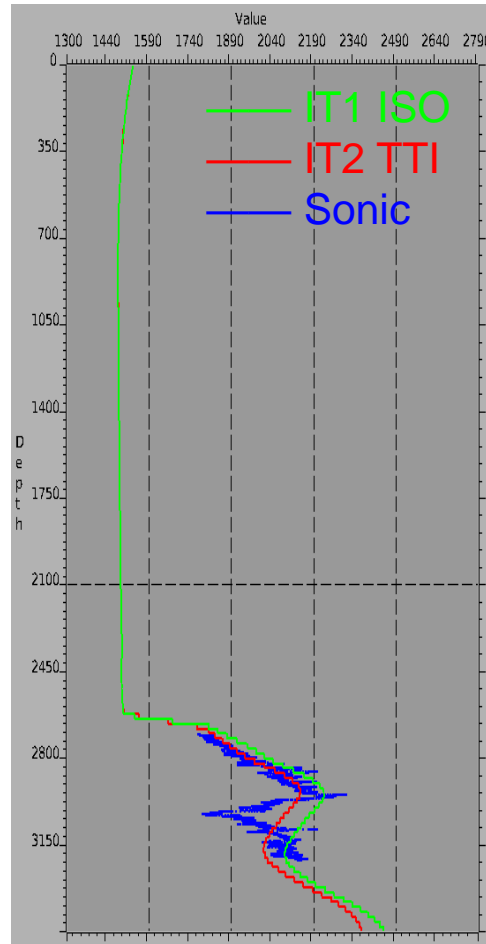
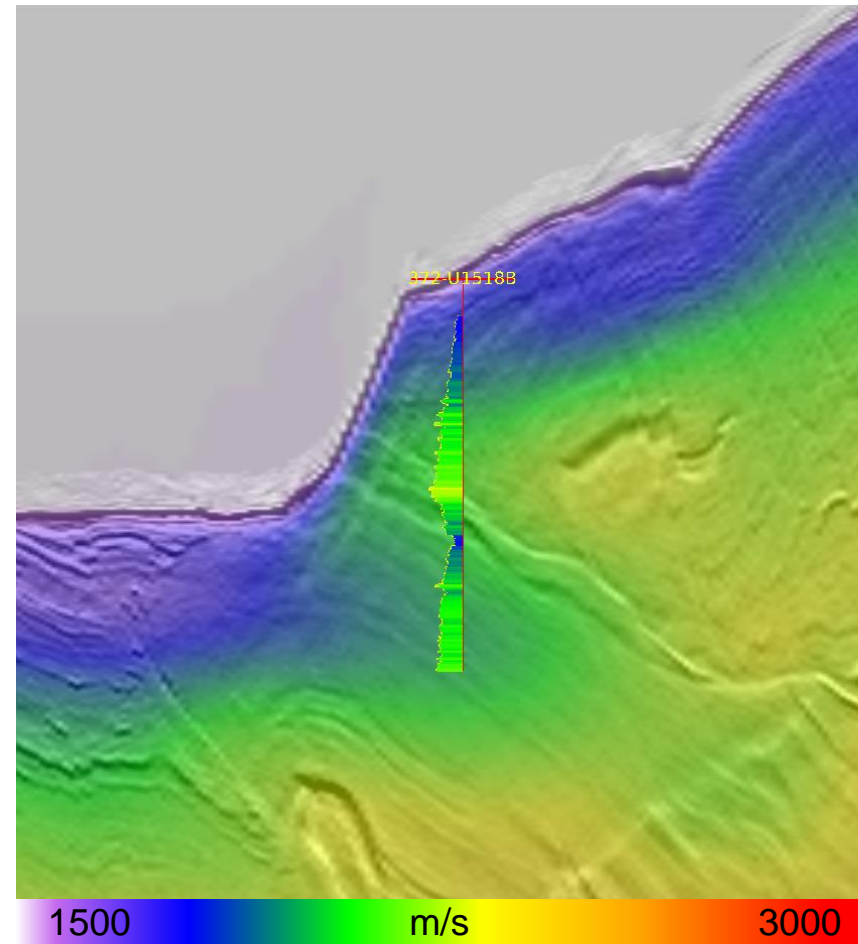
- IT1 ISO migration seismic in the back ground.



- IT2 converted TTI velocity shows slow down below unconformity surface due to 4% delta.
- TTI migration seismic in the back ground.



- At U1519A, both ISO and TTI velocity matches well, since delta is 0% above unconformity.



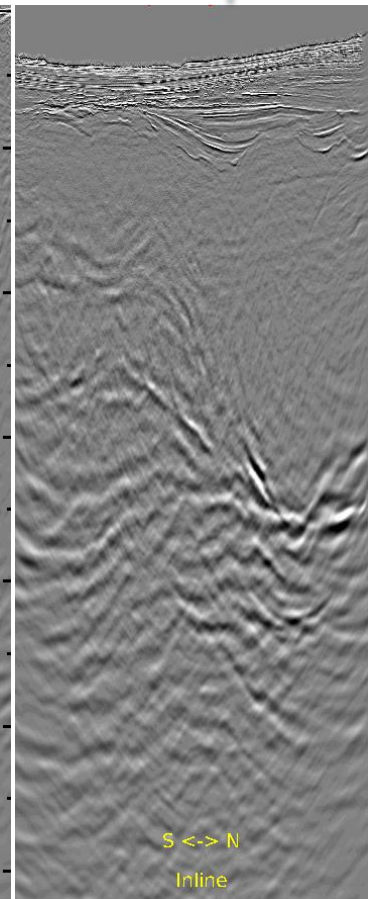
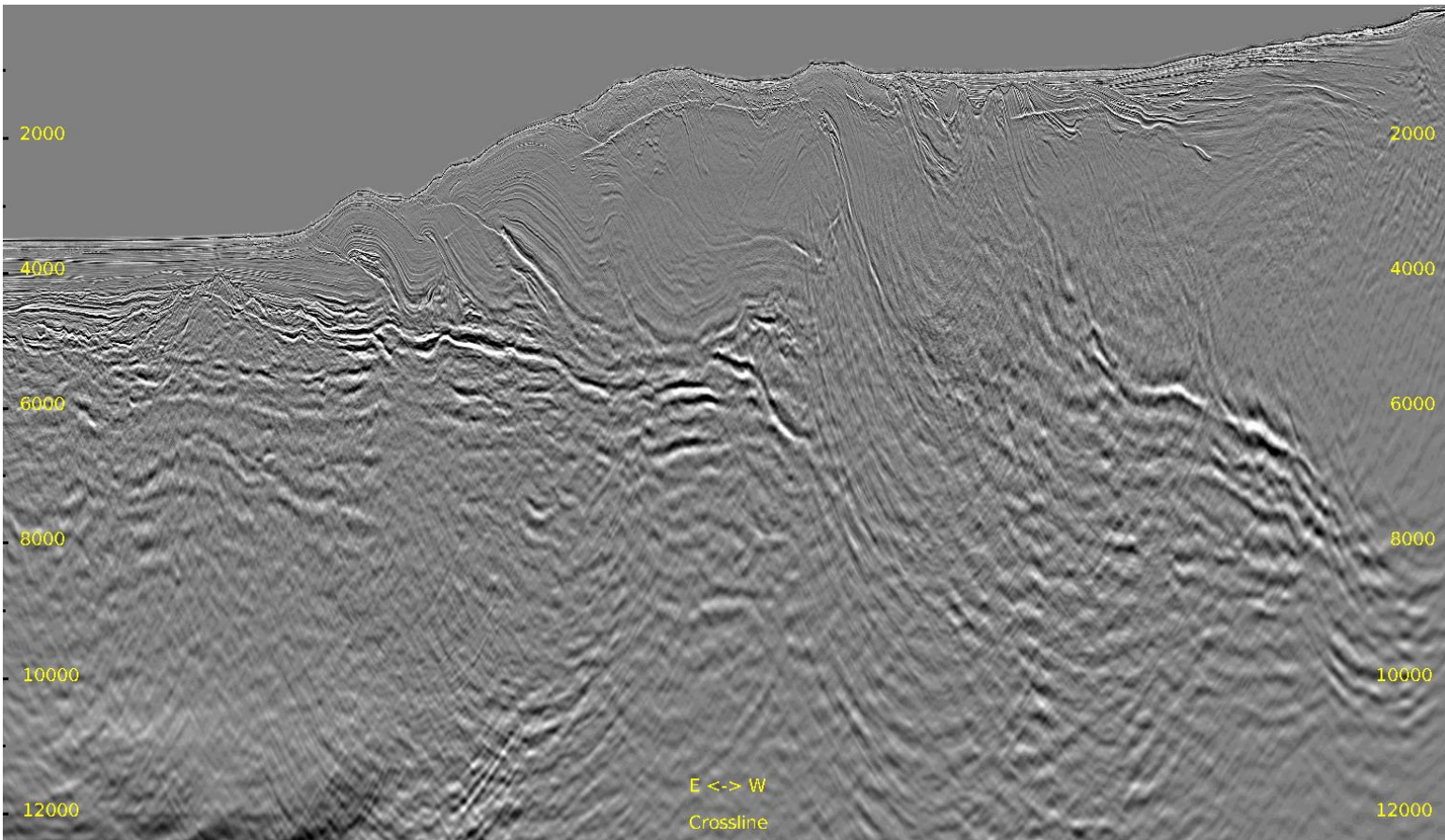
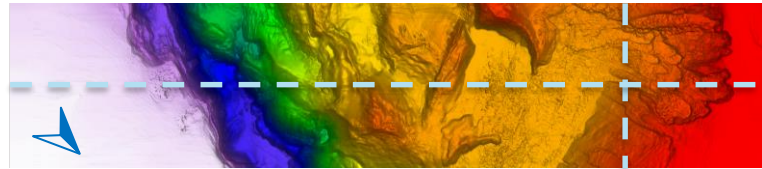
- At U1518B, TTI velocity matches with well after we introduce 4% delta.

Kirchhoff Depth Migration



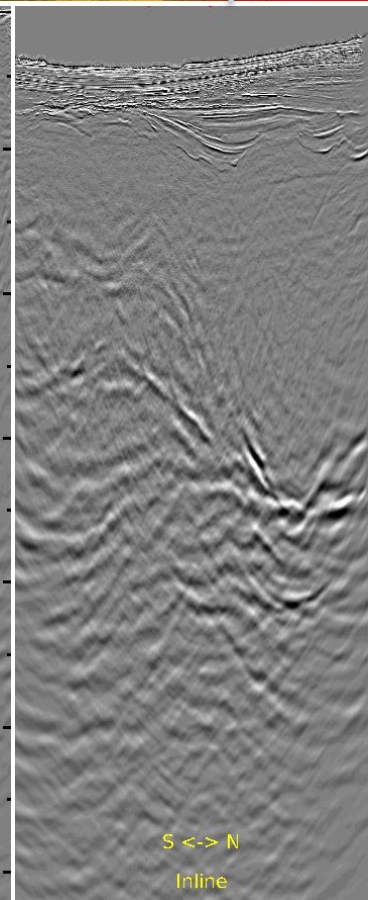
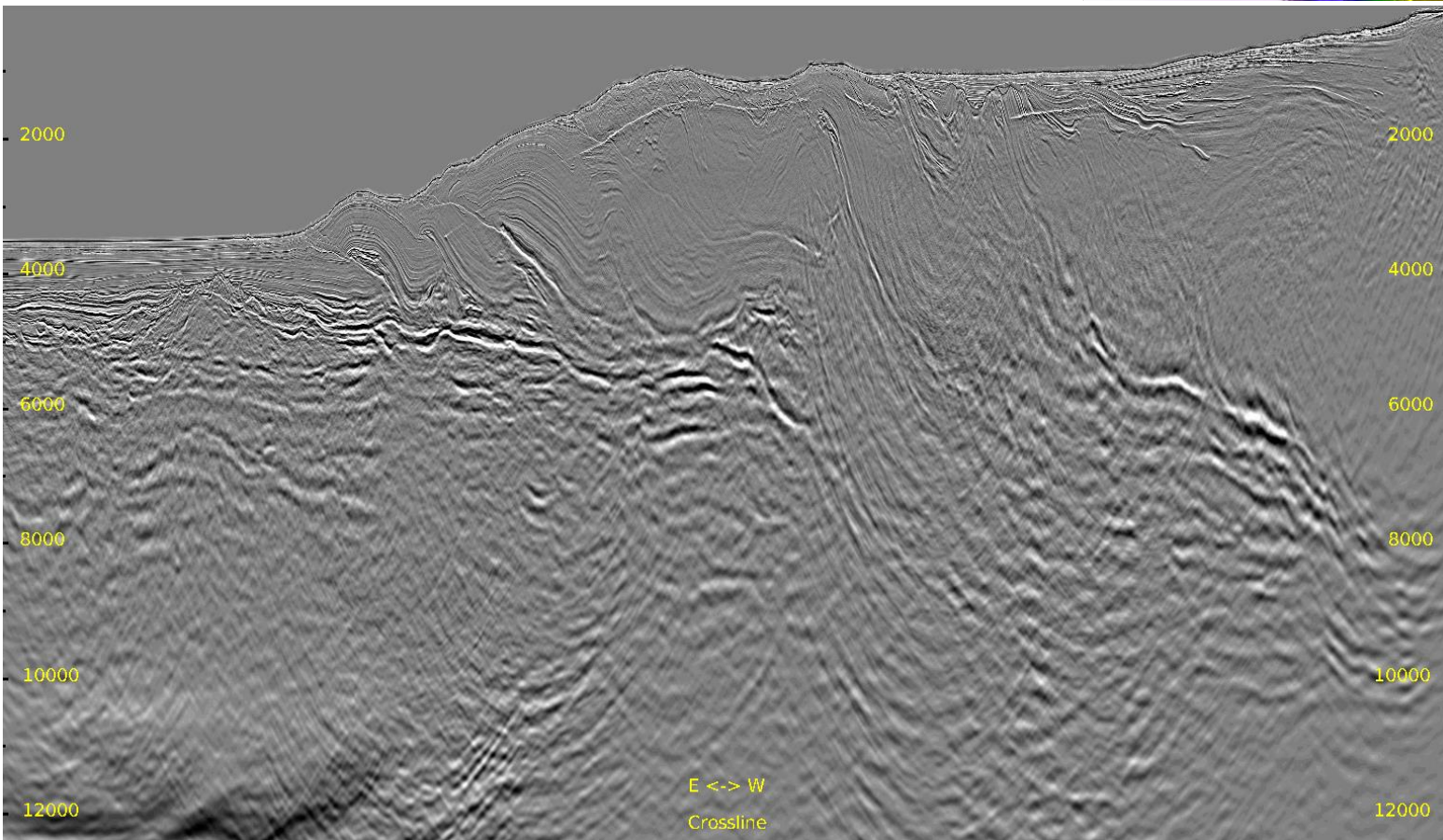
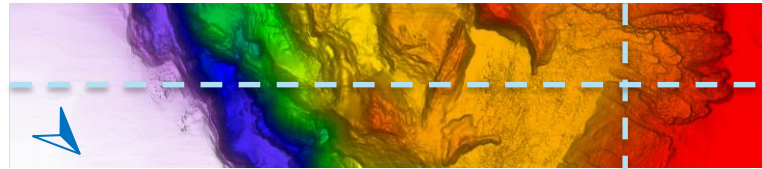
Full Stack: IT1 ISO

Inline 436 & Crossline 4540



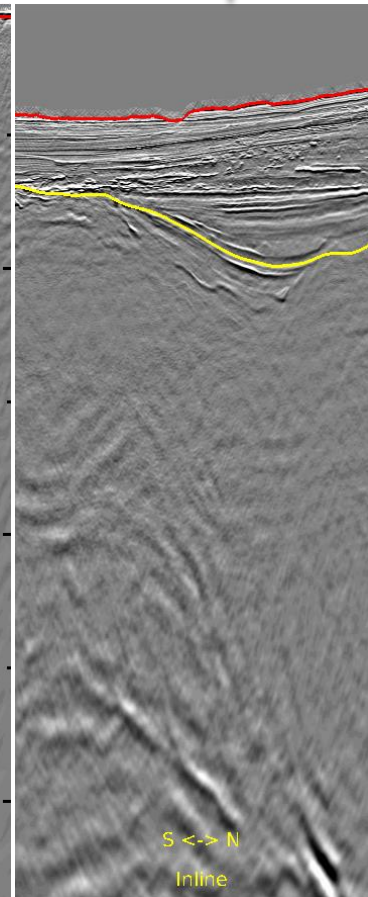
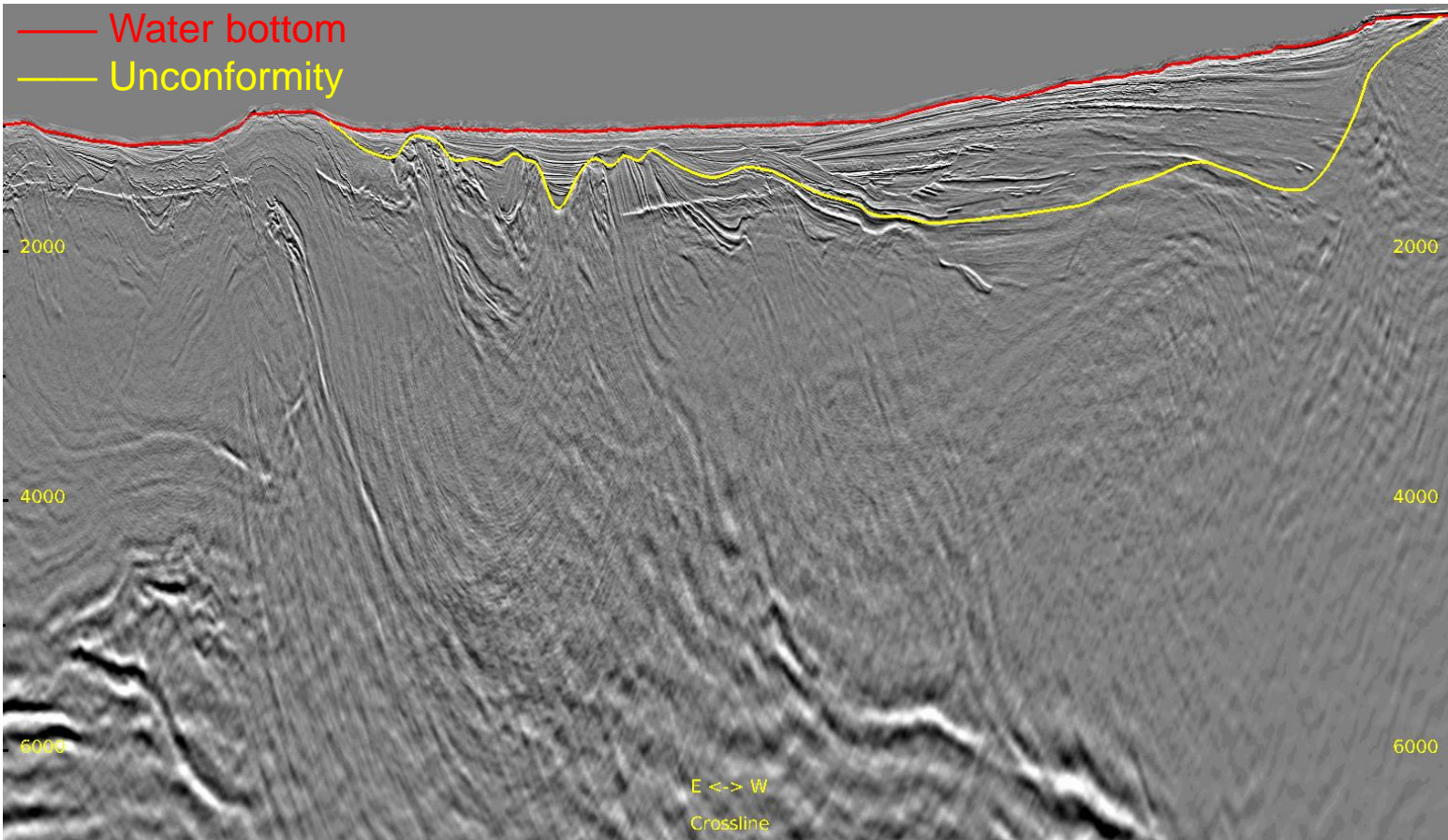
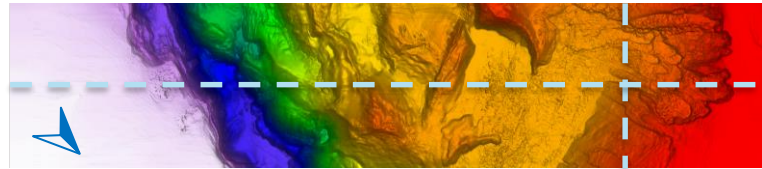
Full Stack: IT2 TTI

Inline 436 & Crossline 4540



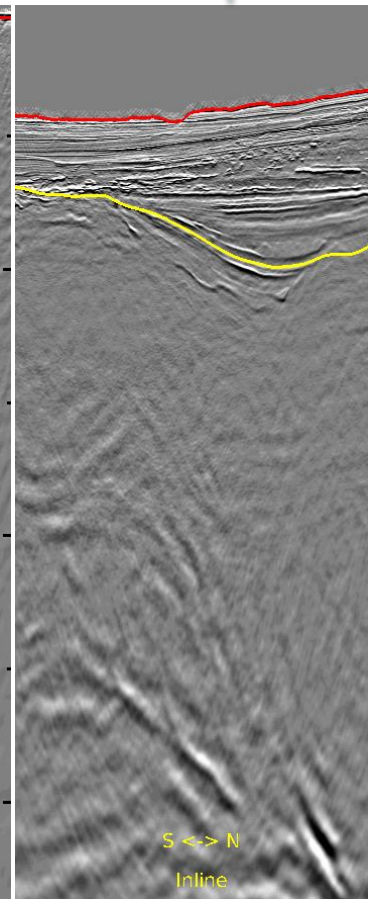
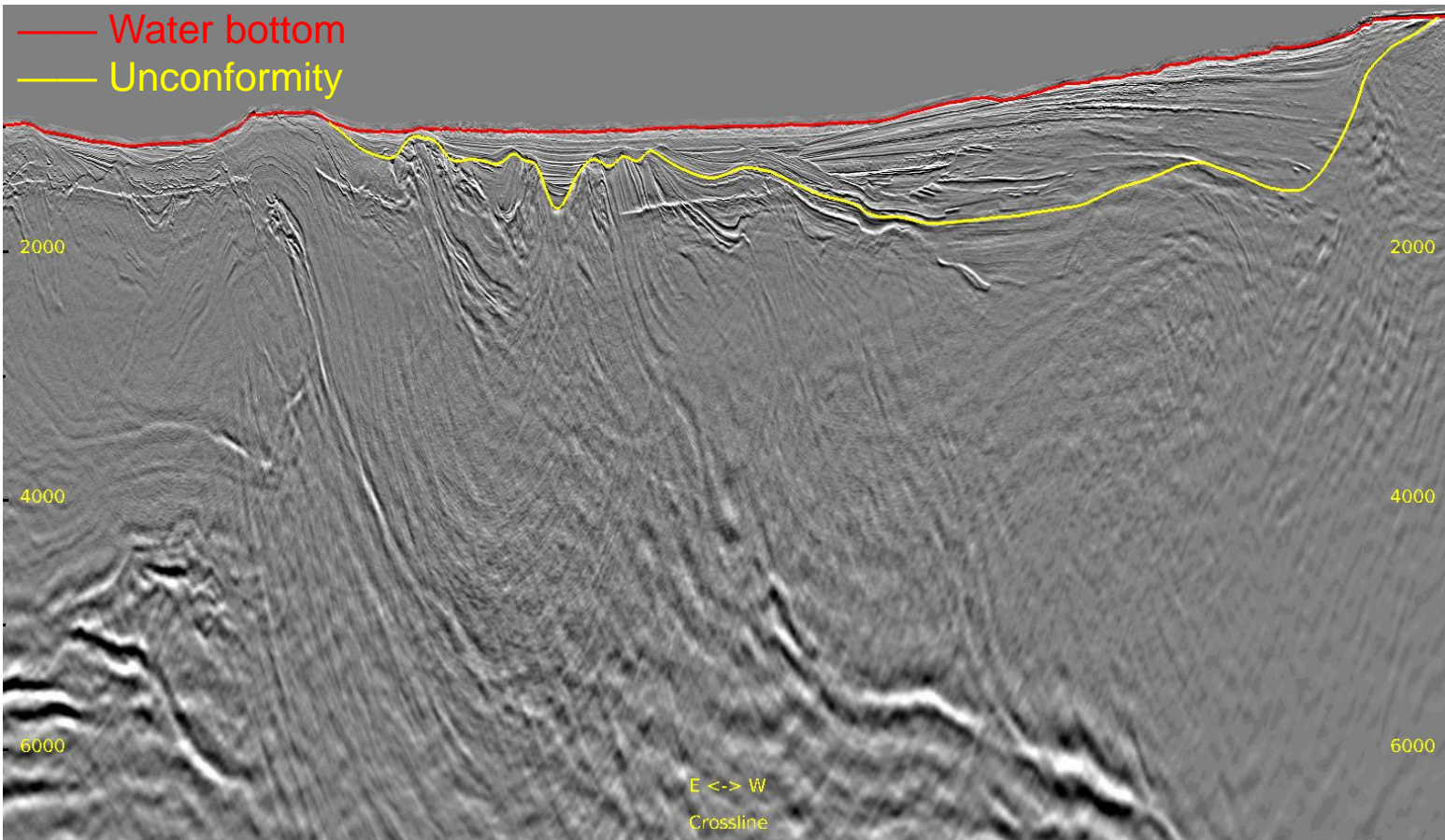
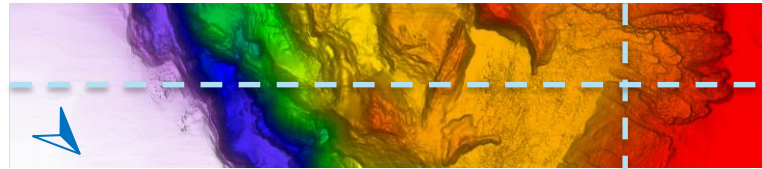
Zoomed Full Stack: IT1 ISO

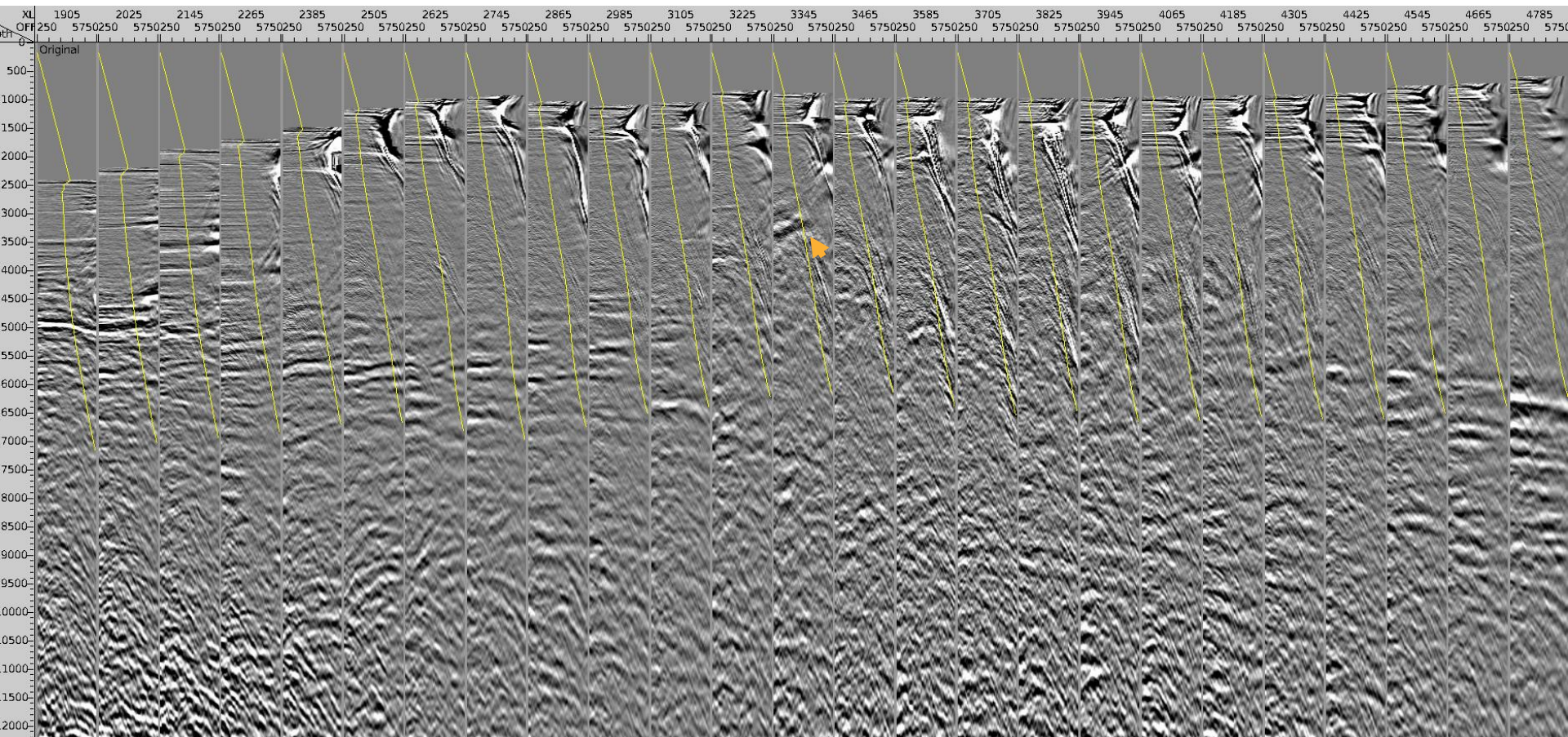
Inline 436 & Crossline 4540

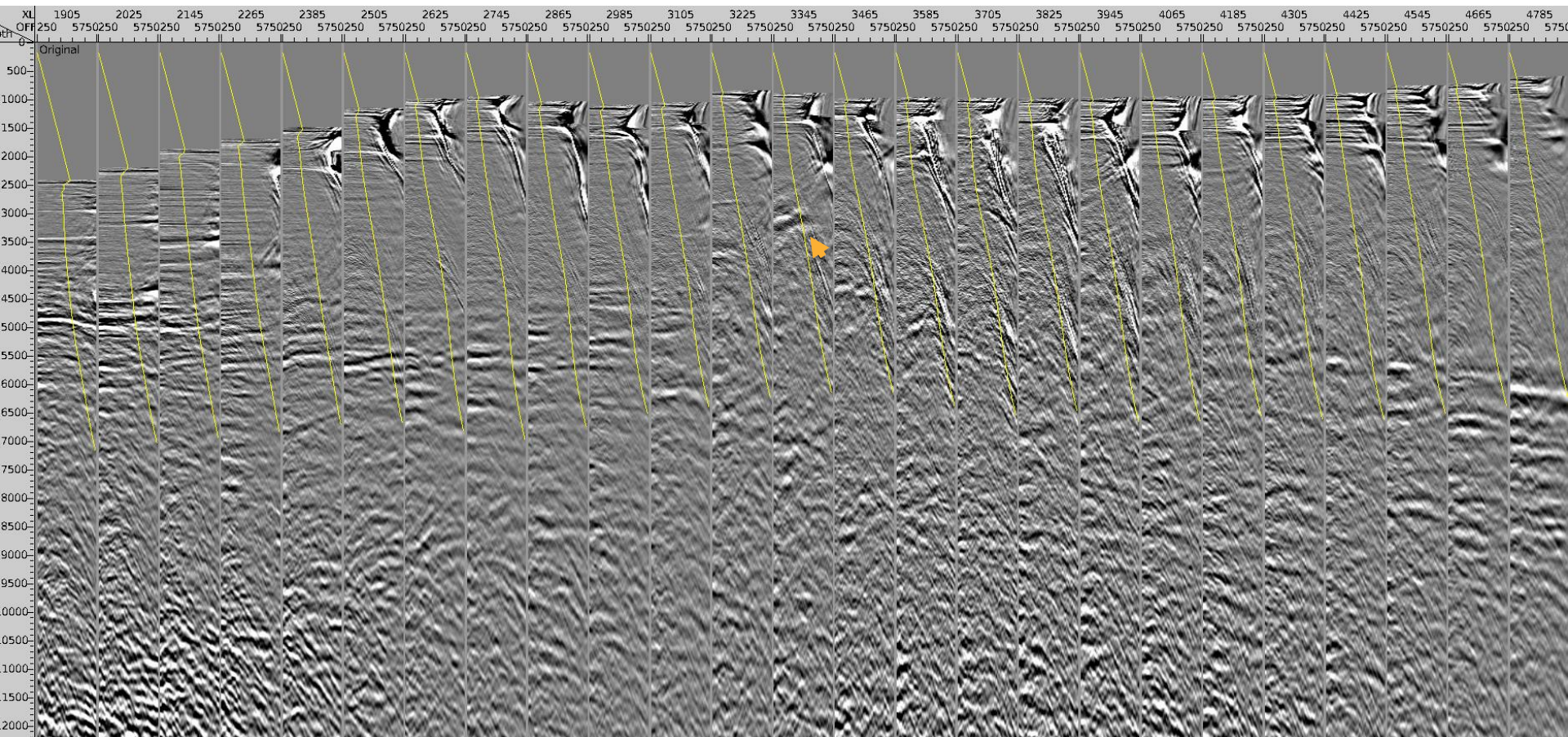


Zoomed Full Stack: IT2 TTI

Inline 436 & Crossline 4540

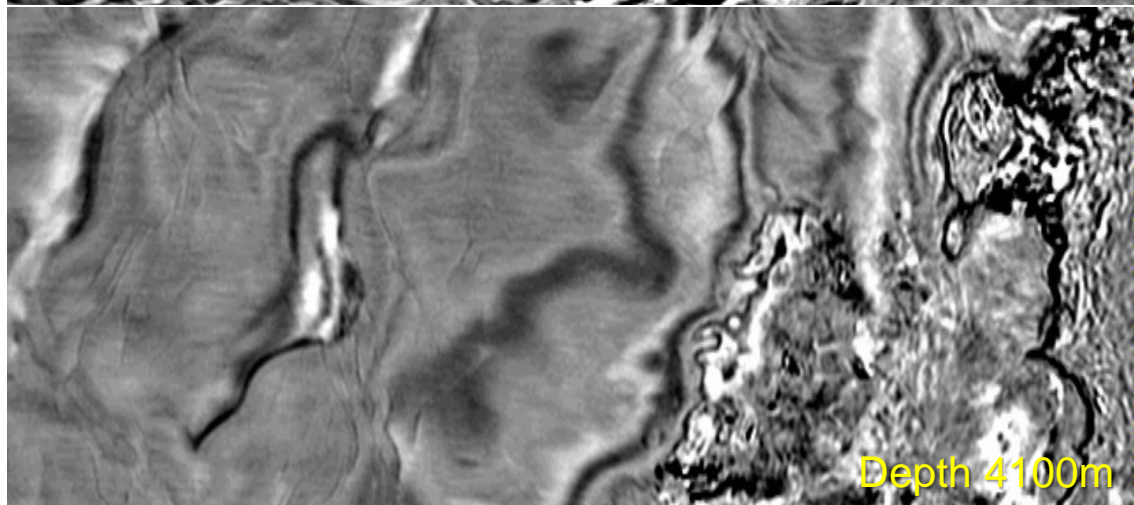
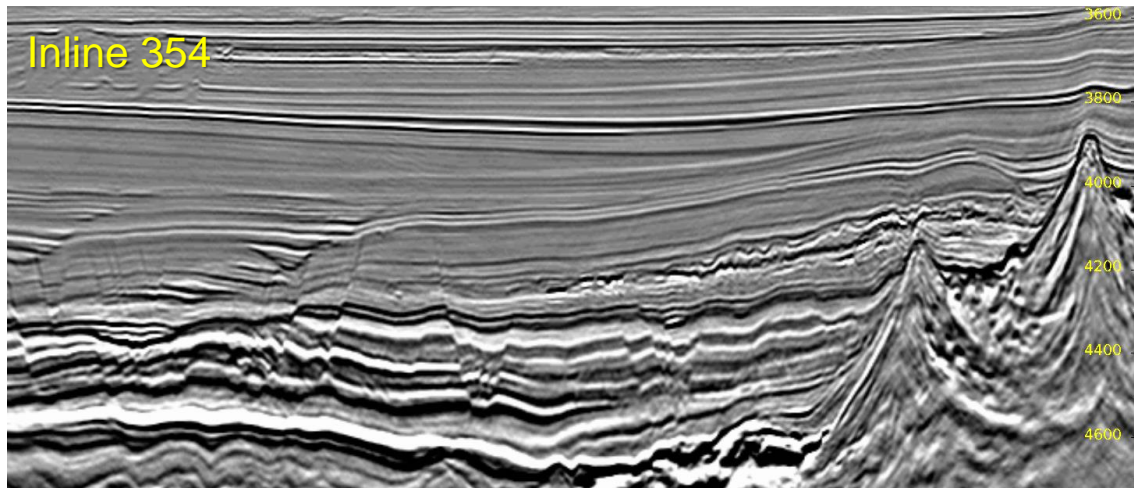
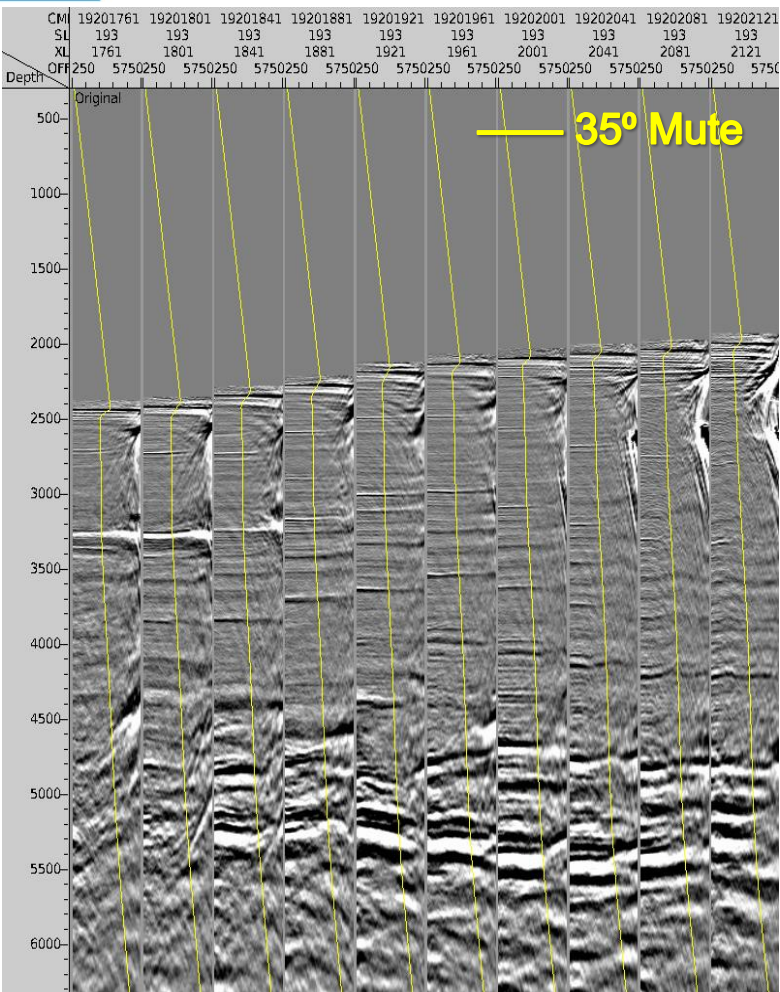






Epsilon Scans

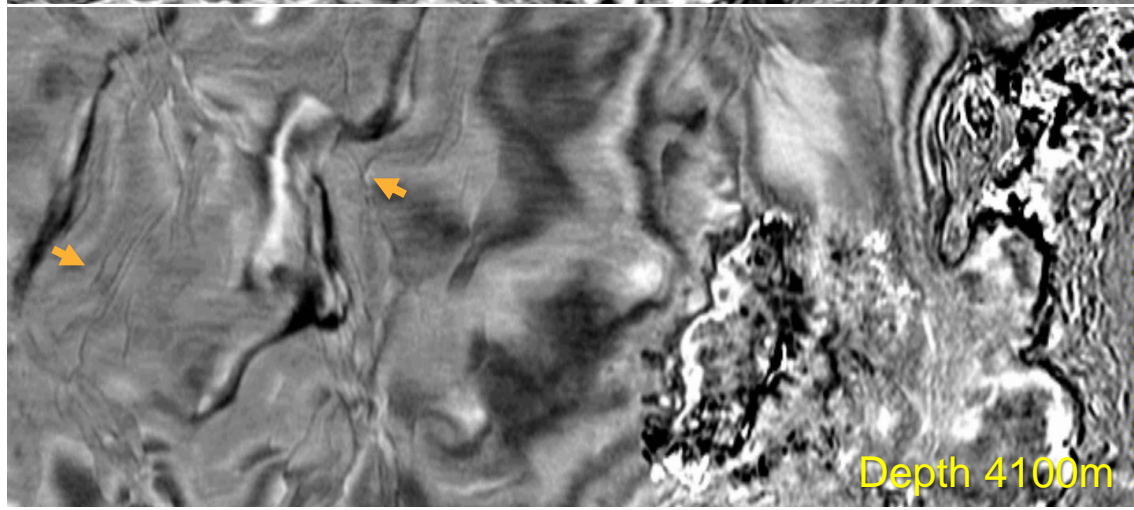
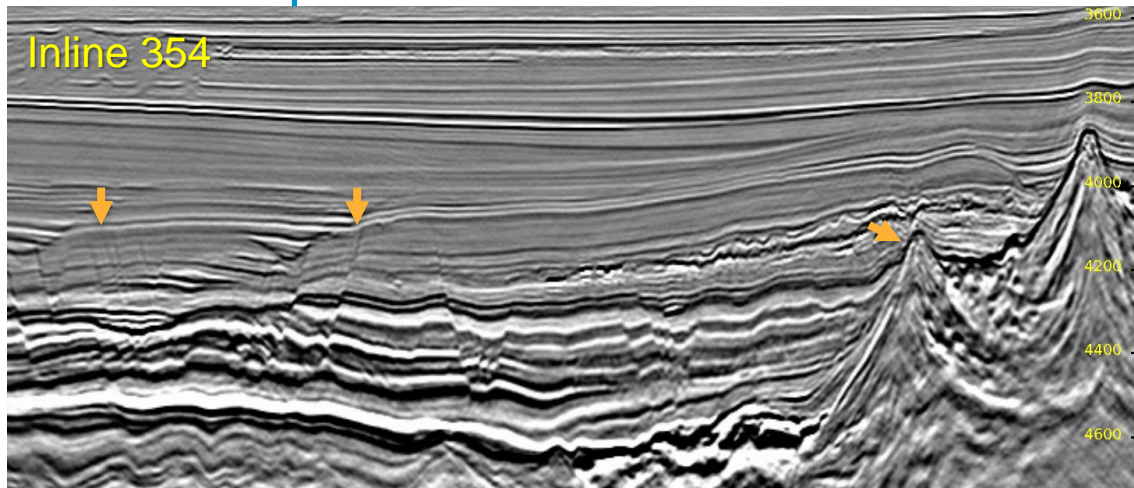
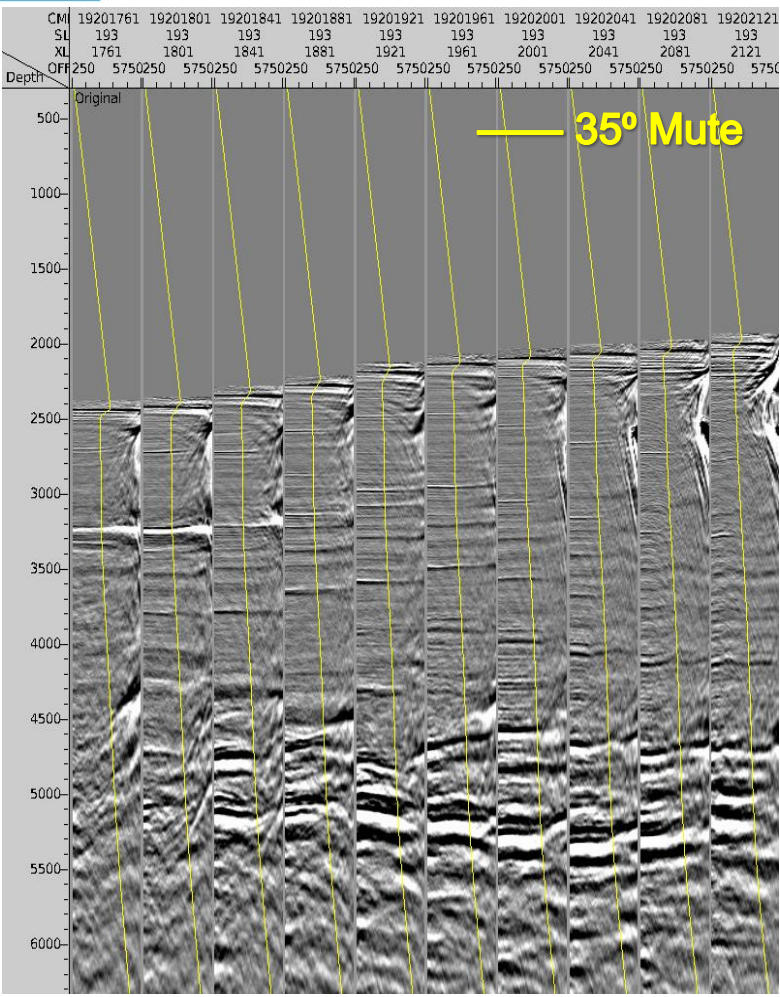






TTI CDP Gathers & Full Stack: 4% Epsilon

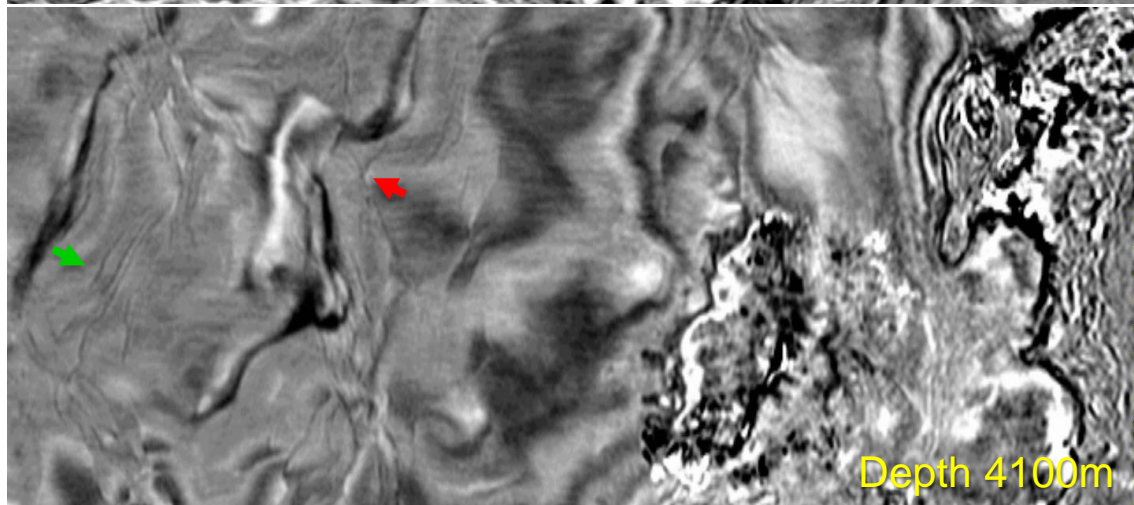
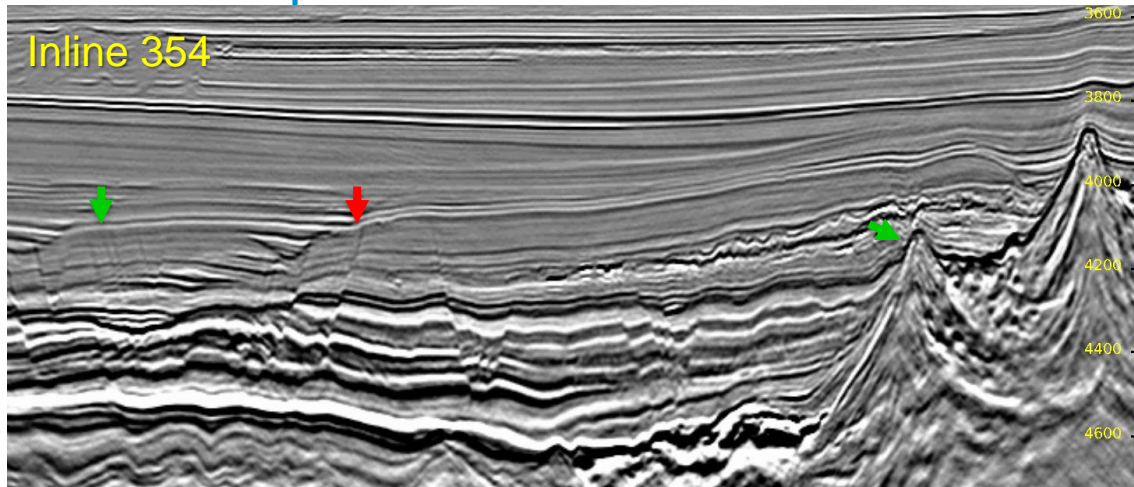
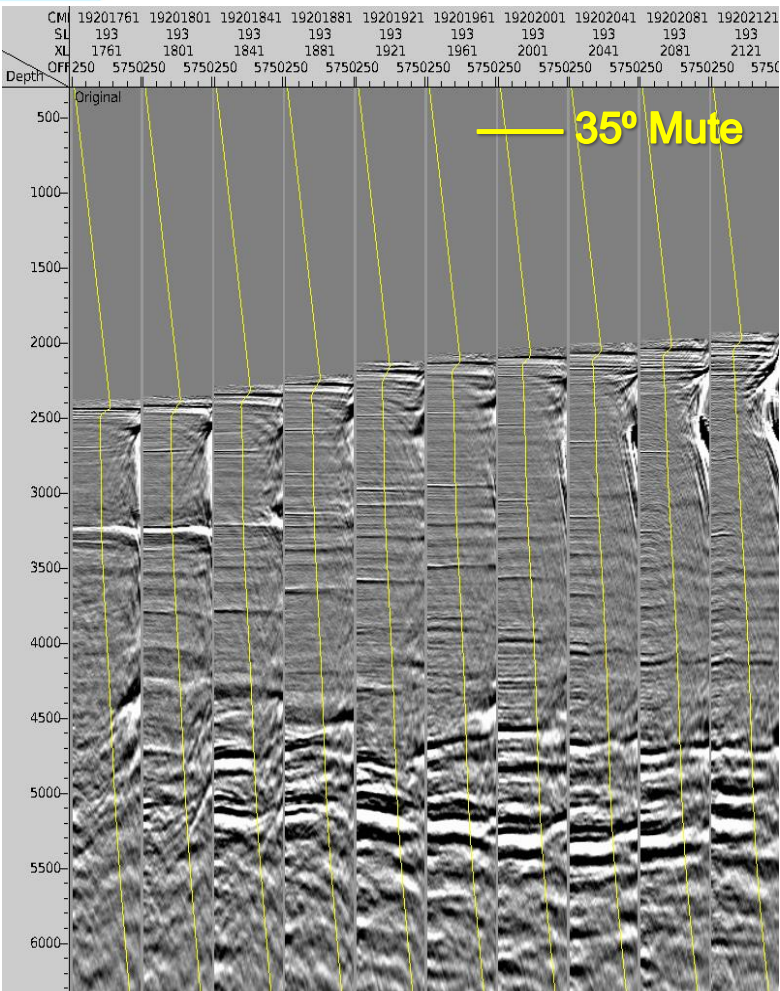
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TTI CDP Gathers & Full Stack: 5% Epsilon

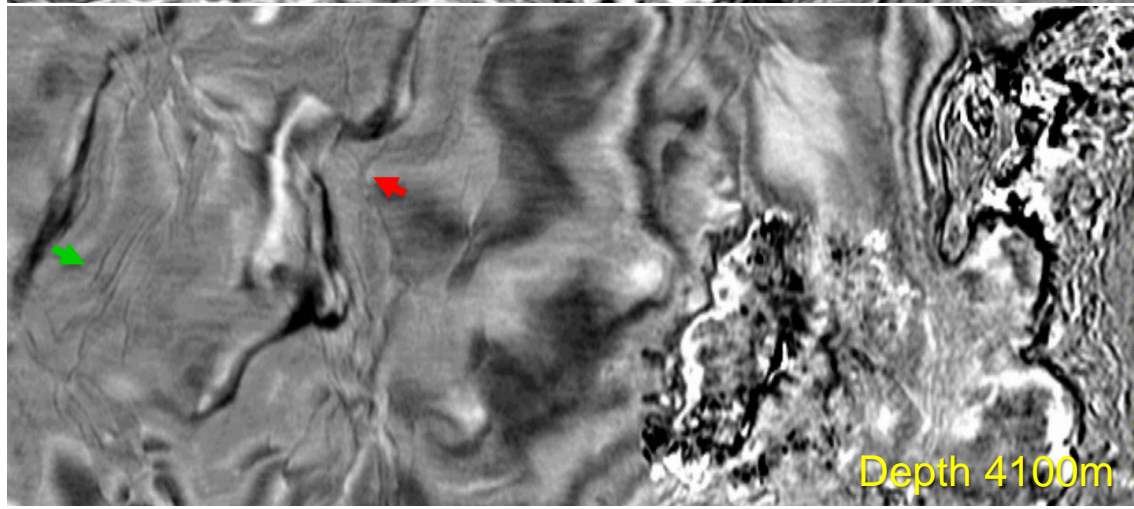
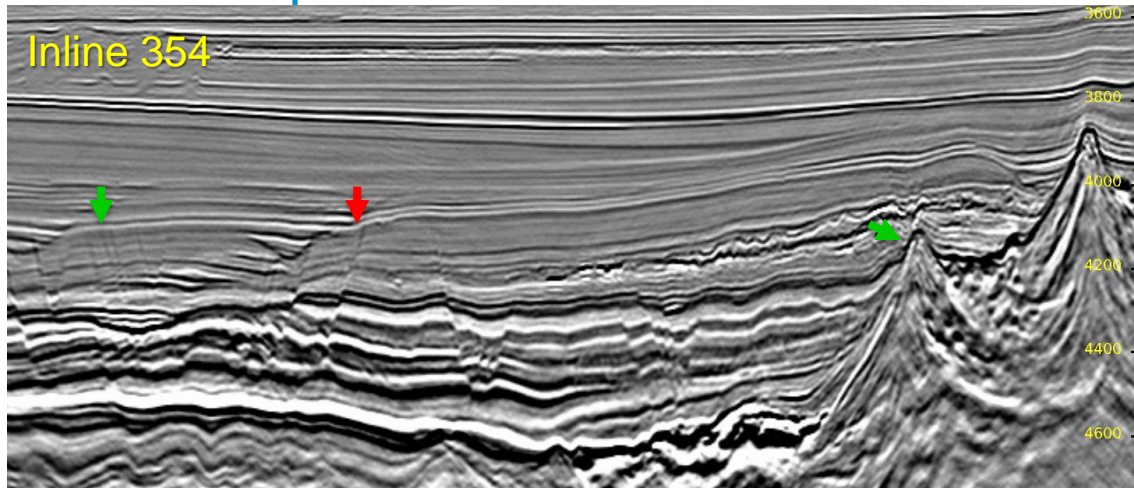
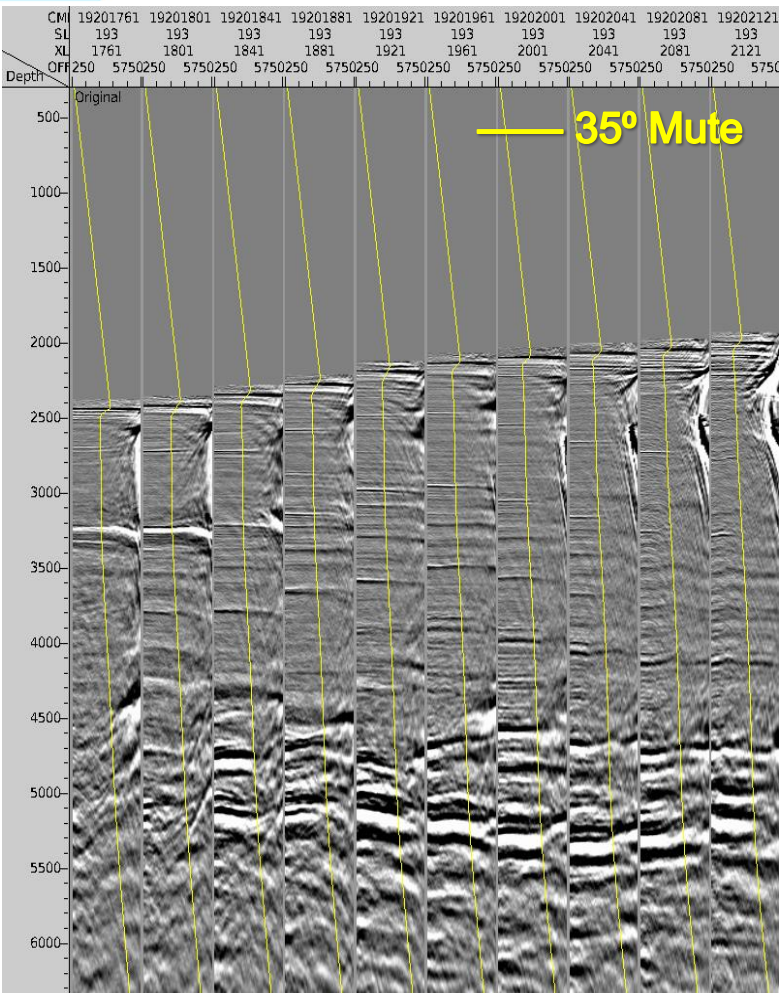
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TTI CDP Gathers & Full Stack: 6% Epsilon

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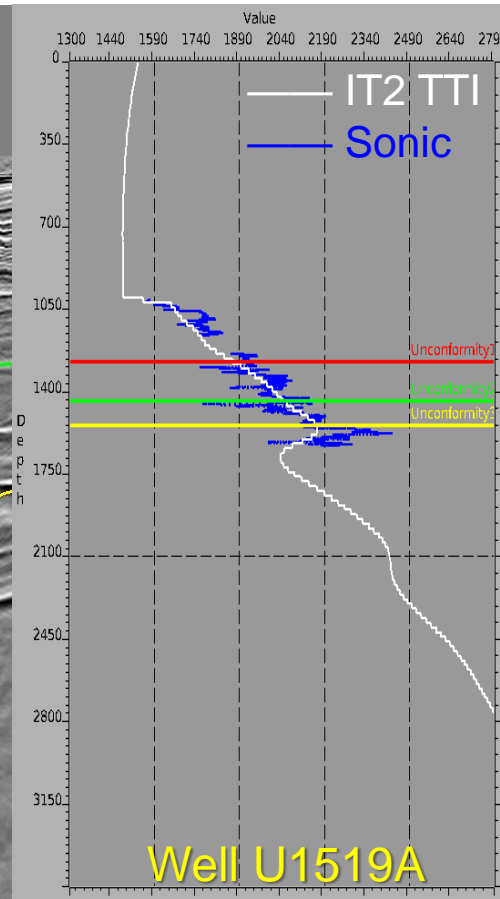
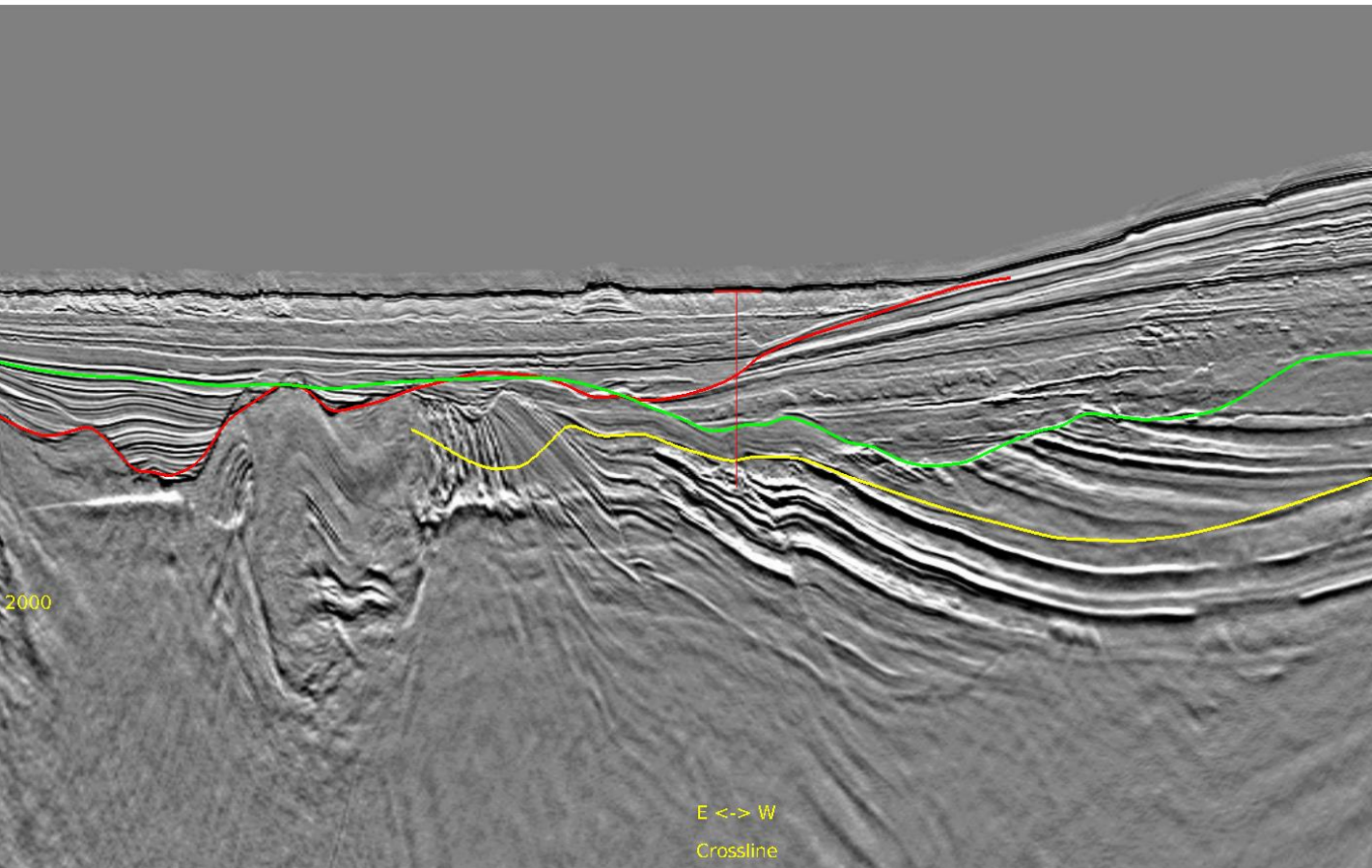


Unconformity Surfaces



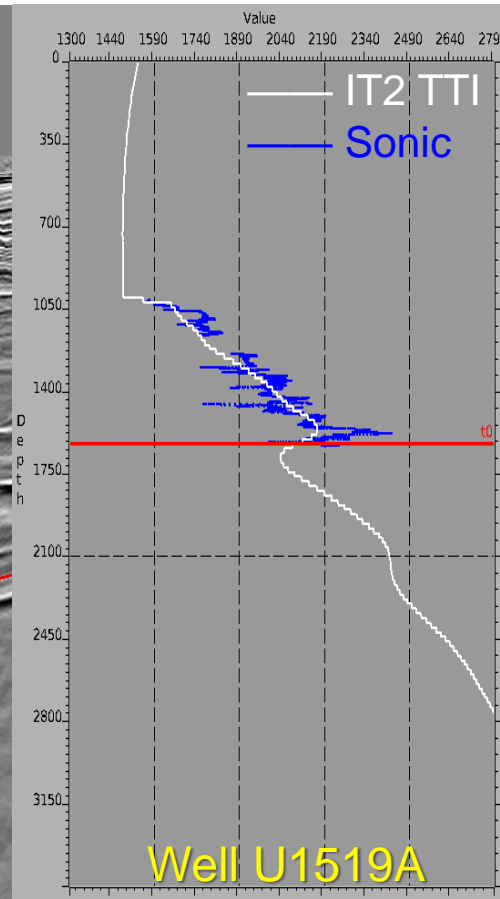
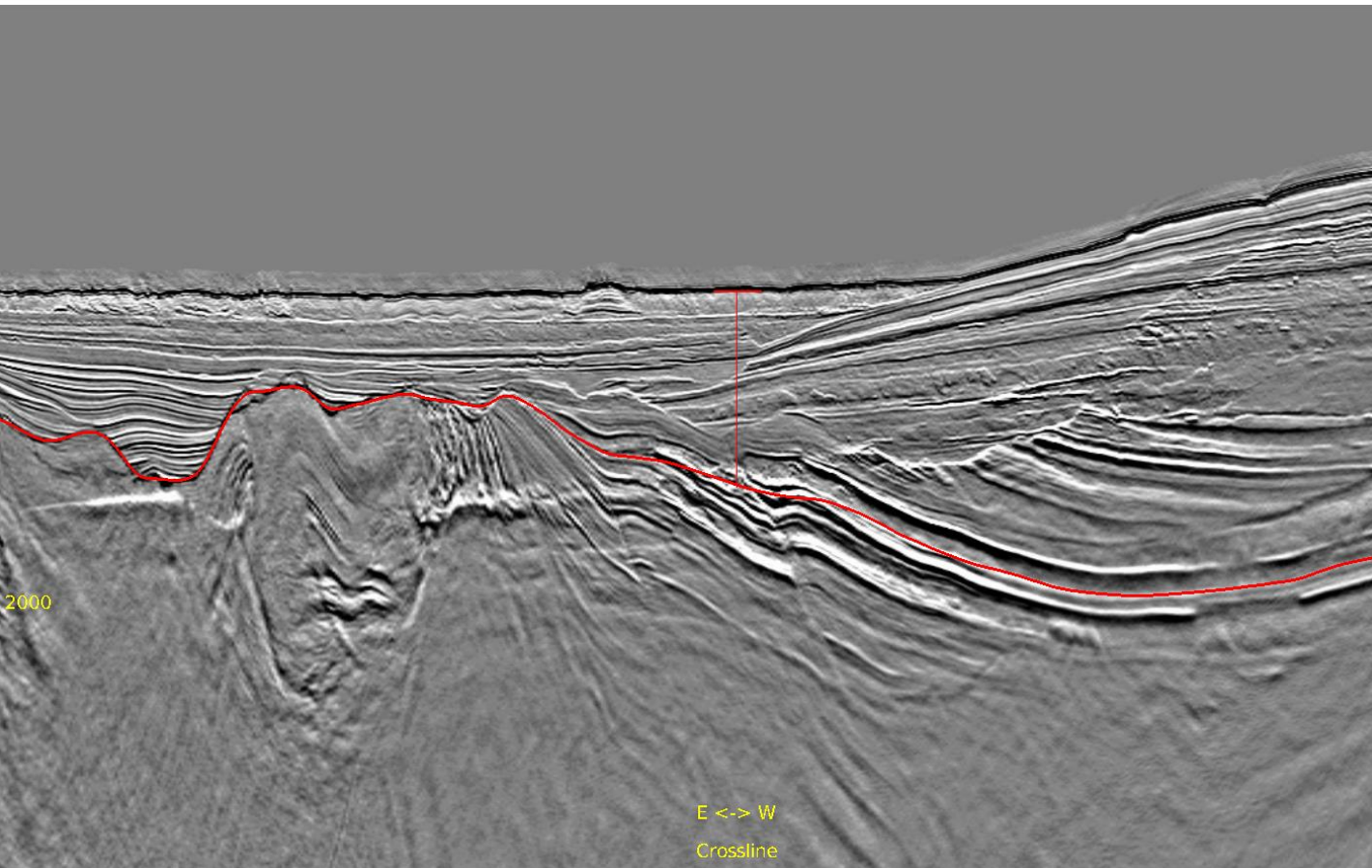
Well U1519A Inline 501: UTIG Surfaces

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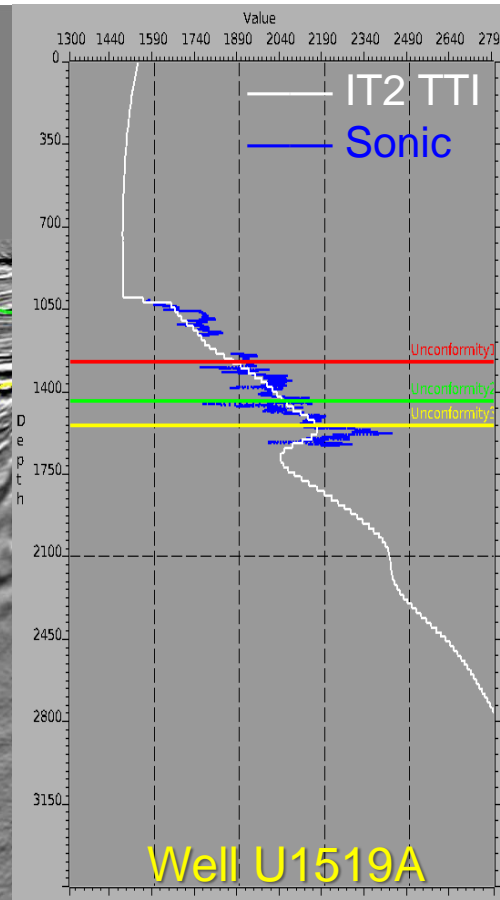
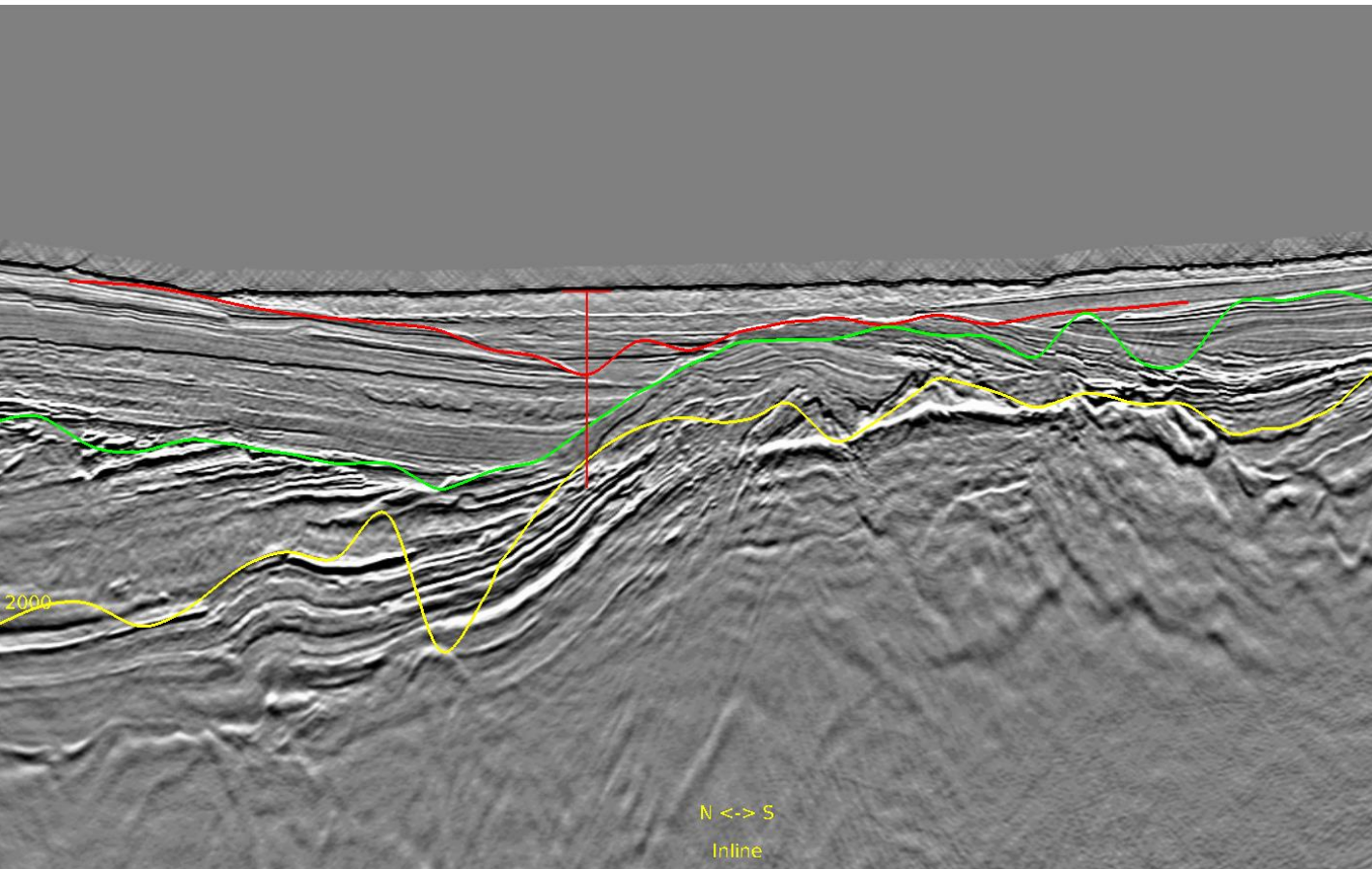
Well U1519A Inline 501: CGG Surface

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Well U1519A Xline 4199: UTIG Surfaces

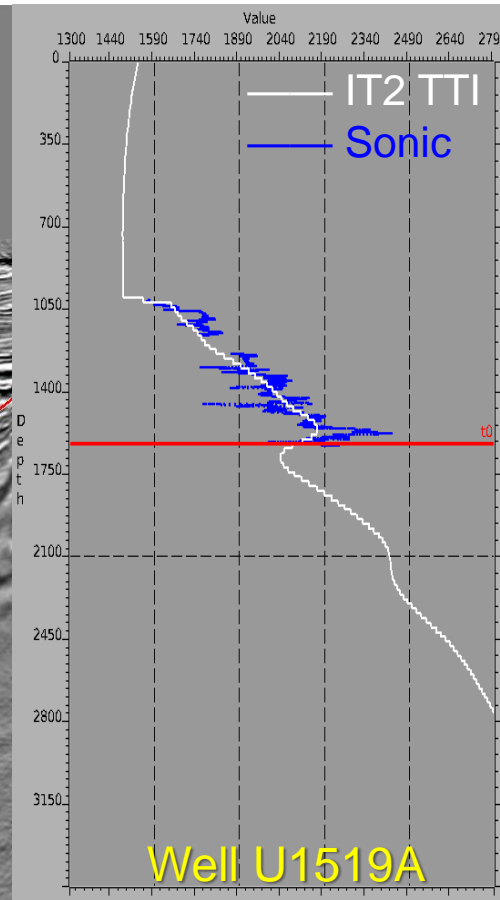
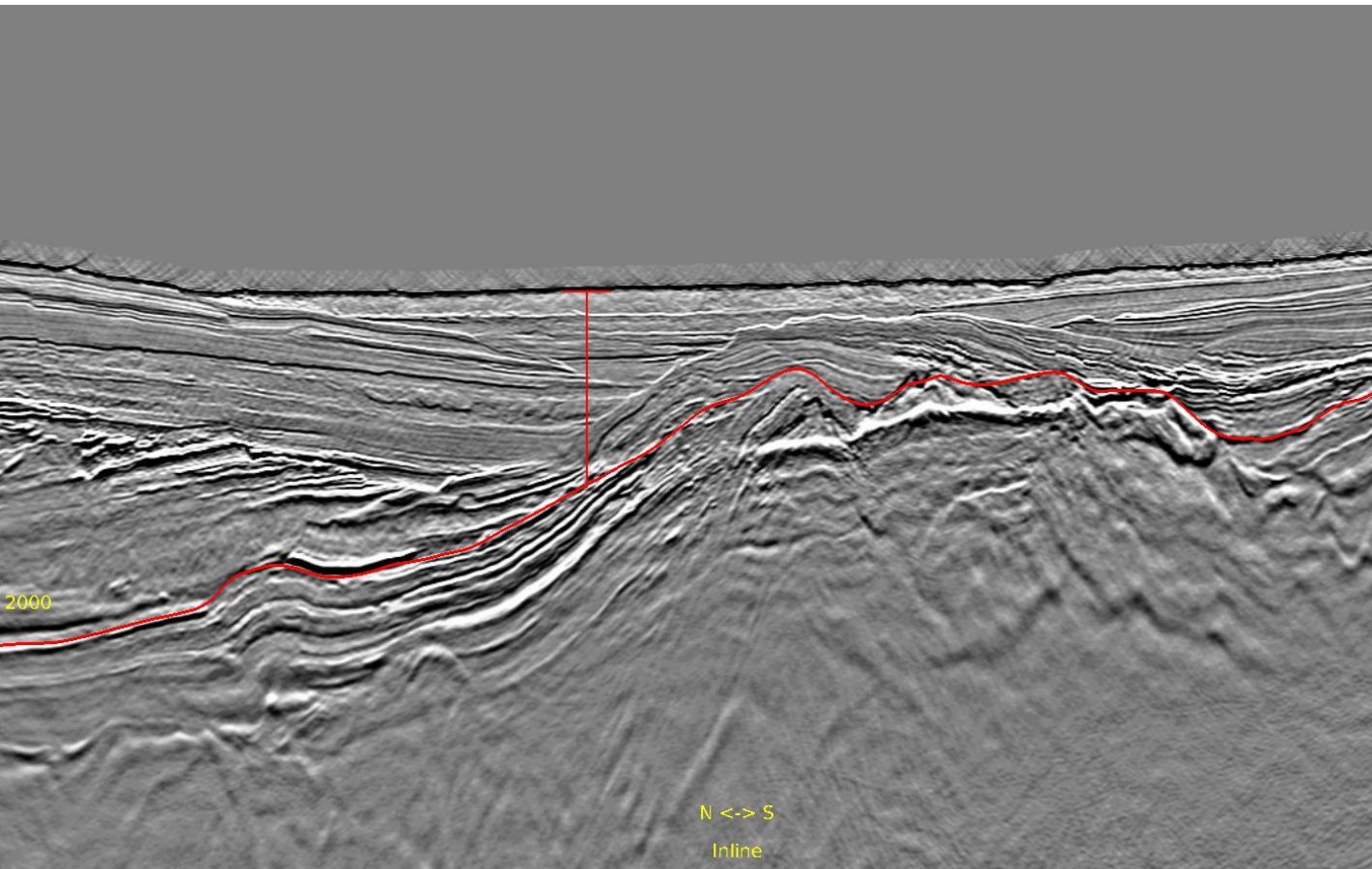
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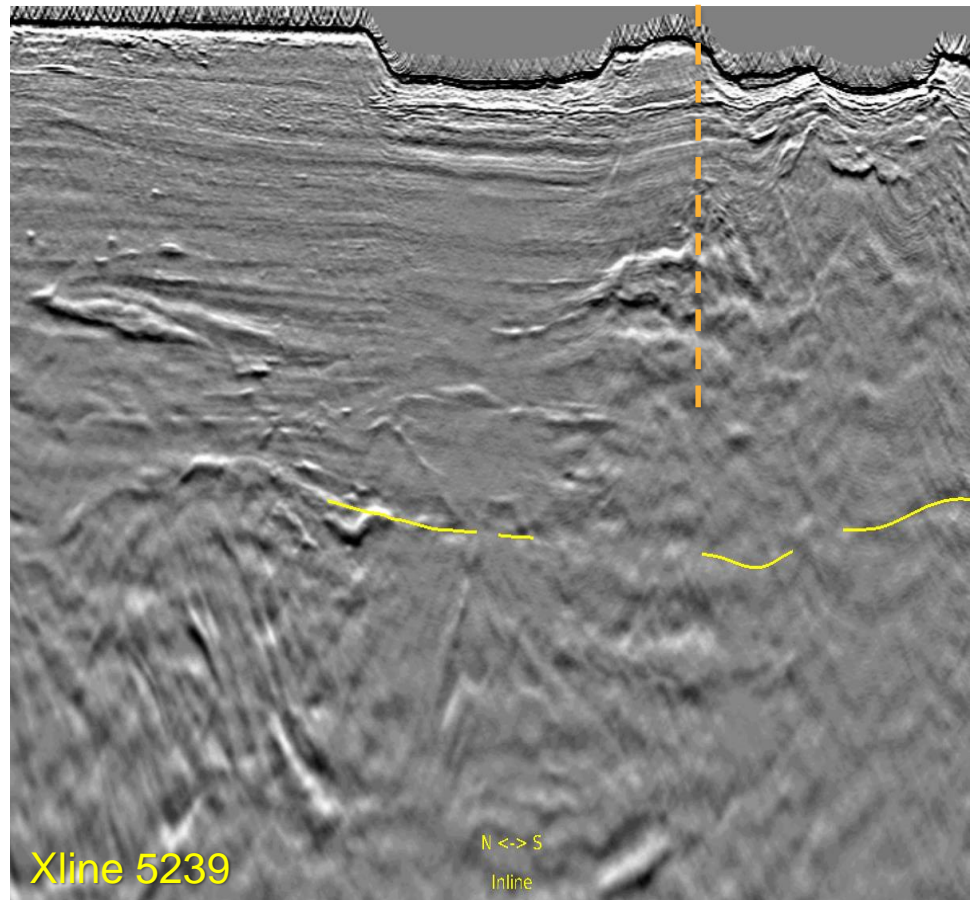
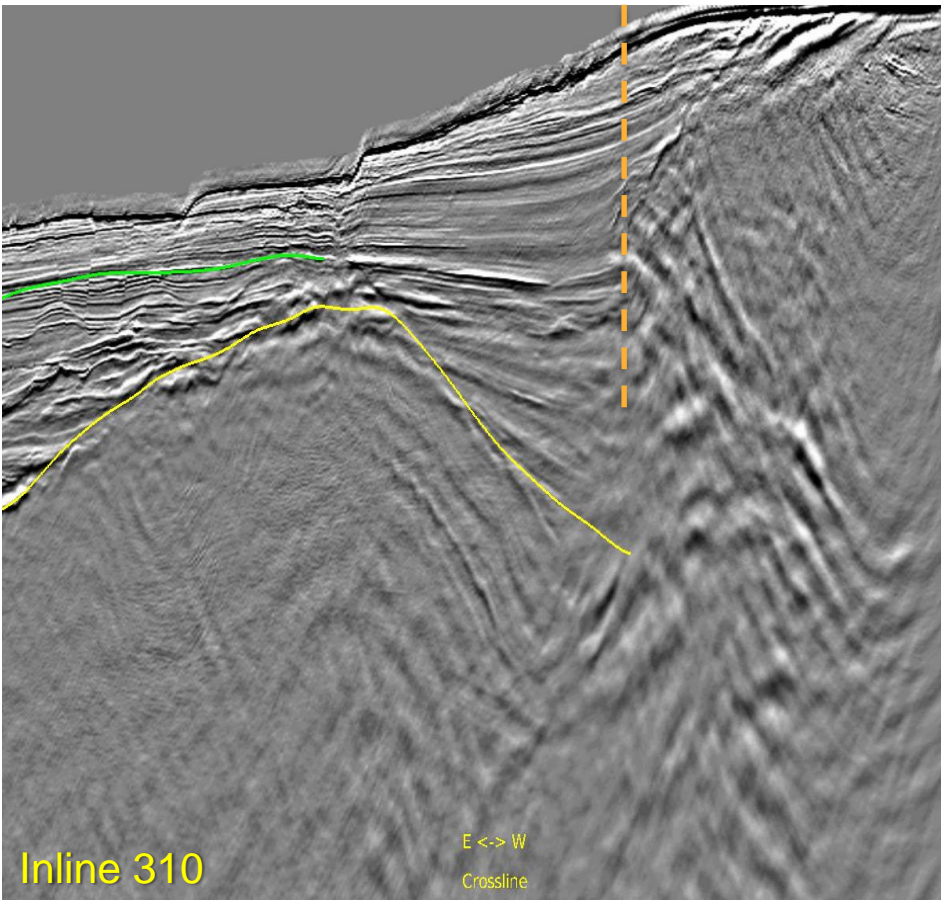


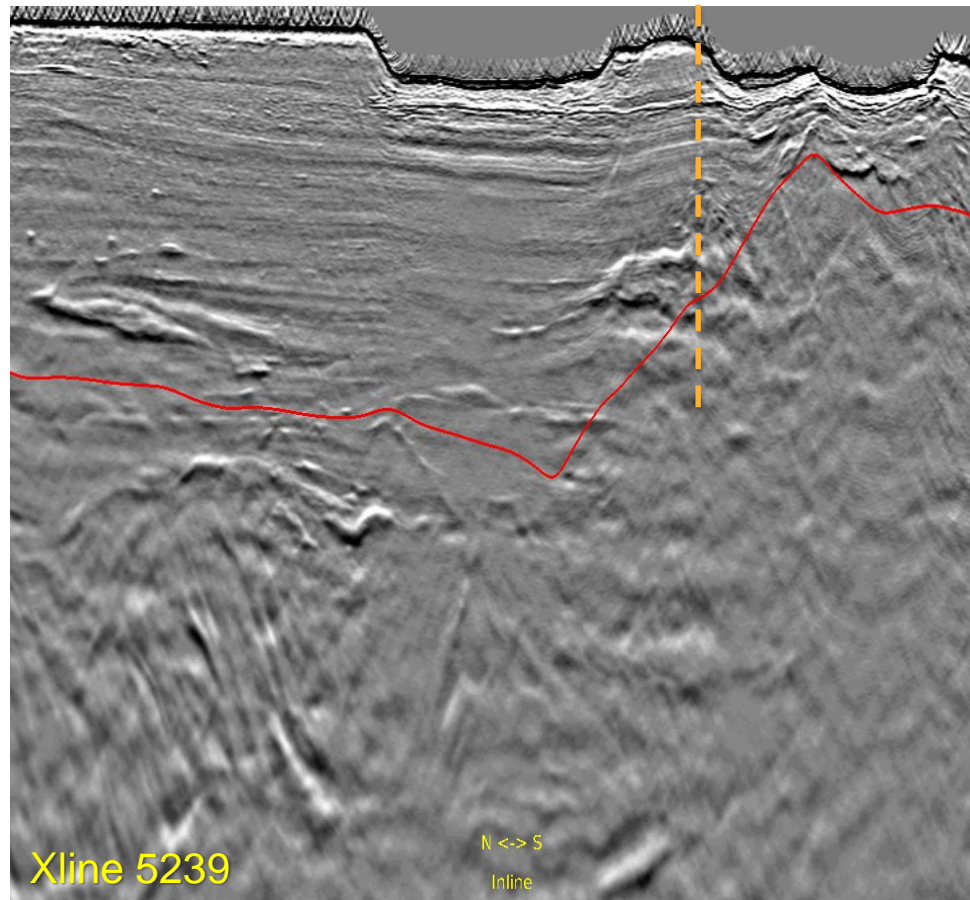
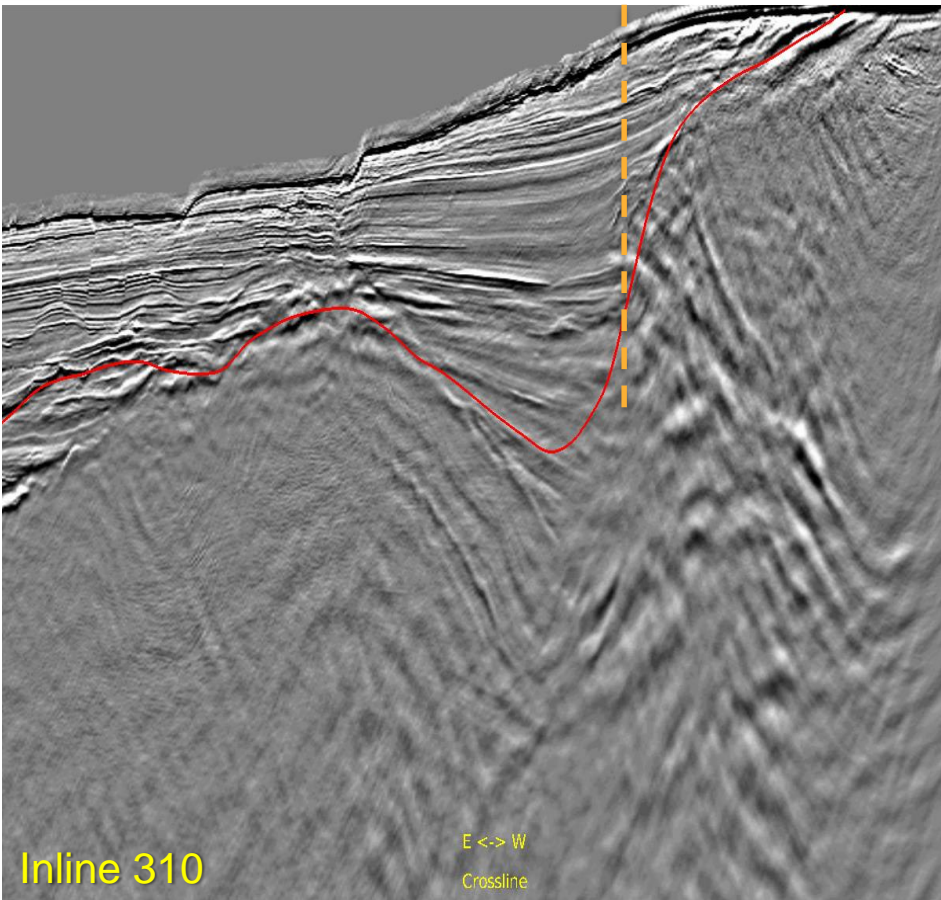


Well U1519A Xline 4199: CGG Surface

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- TTI conversion seems reasonable. And it's recommended to use one round of TTI tomography to fine tune the velocity, before TTI FWI.
- There's still a need to adjust unconformity surfaces to get more geological transition from 0% delta to 4% delta. This adjustment will not bring significant changes to the current result.