



IT3 – 12Hz TTI FWI

NZ 3D Processing

20 January 2021

cgg.com



INSTITUTE FOR GEOPHYSICS



Passion for Geoscience

- **Objective:**

To QC 12 Hz TTI FWI result.

- **Procedure:**

TTI FWI was run with both streamer and OBS data from 2.5 Hz to 12Hz. Refraction energy is used in both data sets and reflection energy of streamer data is also included in the inversion. An updated migration input was used with less residual multiples and artifacts, mainly due to the change from 2D deghost to 3D deghost and common offset denoise.

- **Display:**

Velocity, migrated depth full stack & gathers.

- **Observation and Recommendation:**

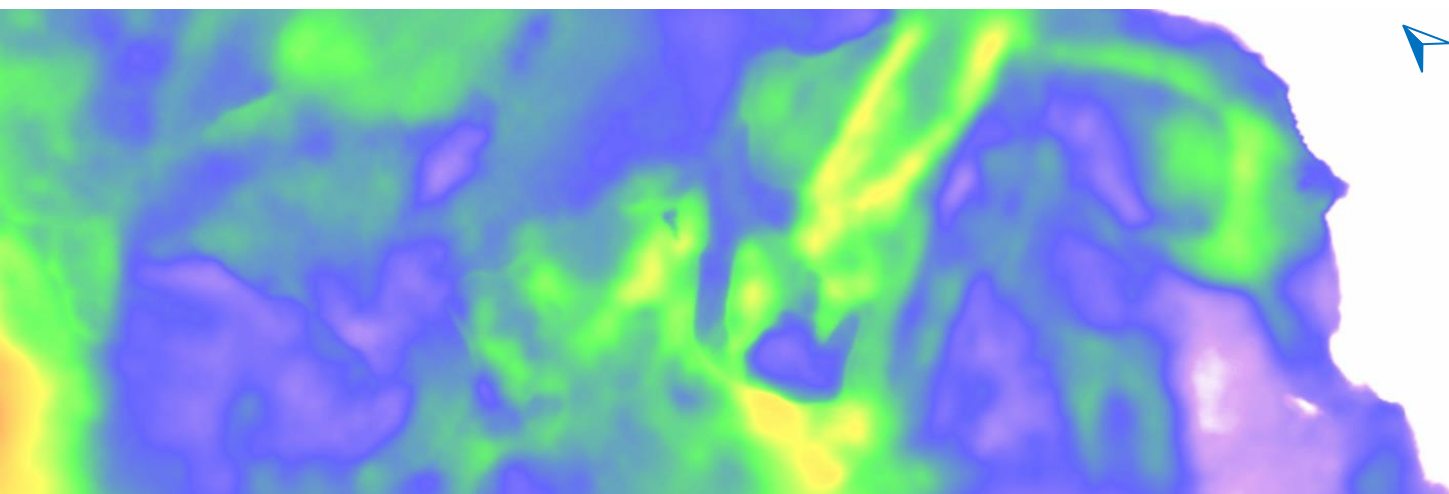
12Hz TTI FWI gives more detailed velocity that aligns more with geology, compared with IT2 TTI tomographic velocity. Migration with FWI velocity shows overall improvement, especially dipping events in the target area.

Velocity Model



Depth 1400m: IT2 Velocity

4

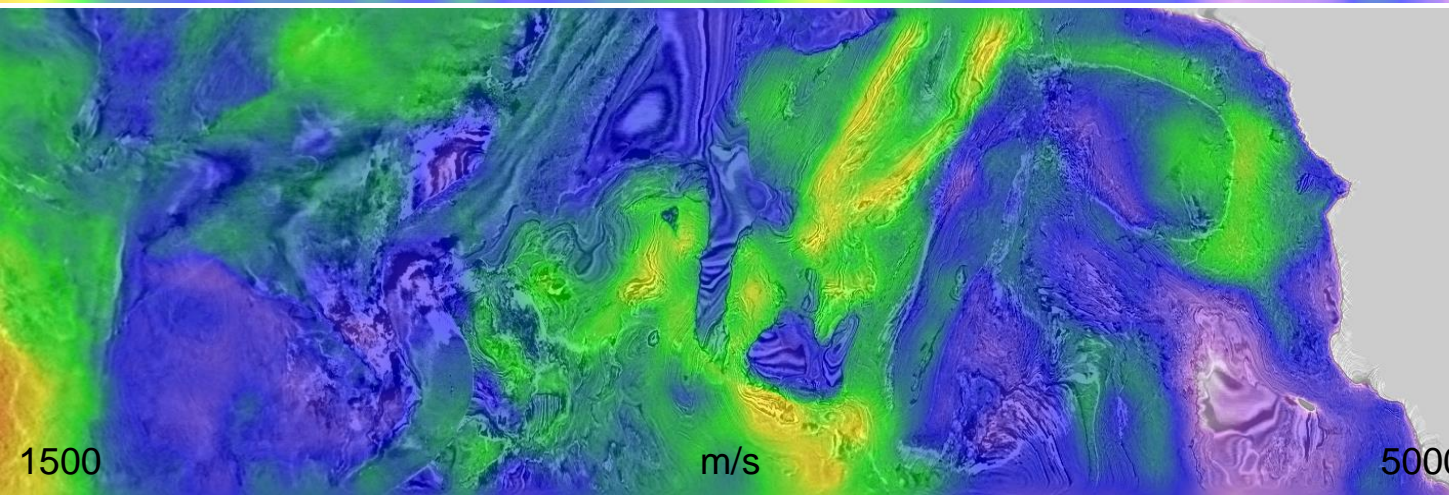


1500

m/s

3500

Starting velocity is from IT2 TTI tomography.



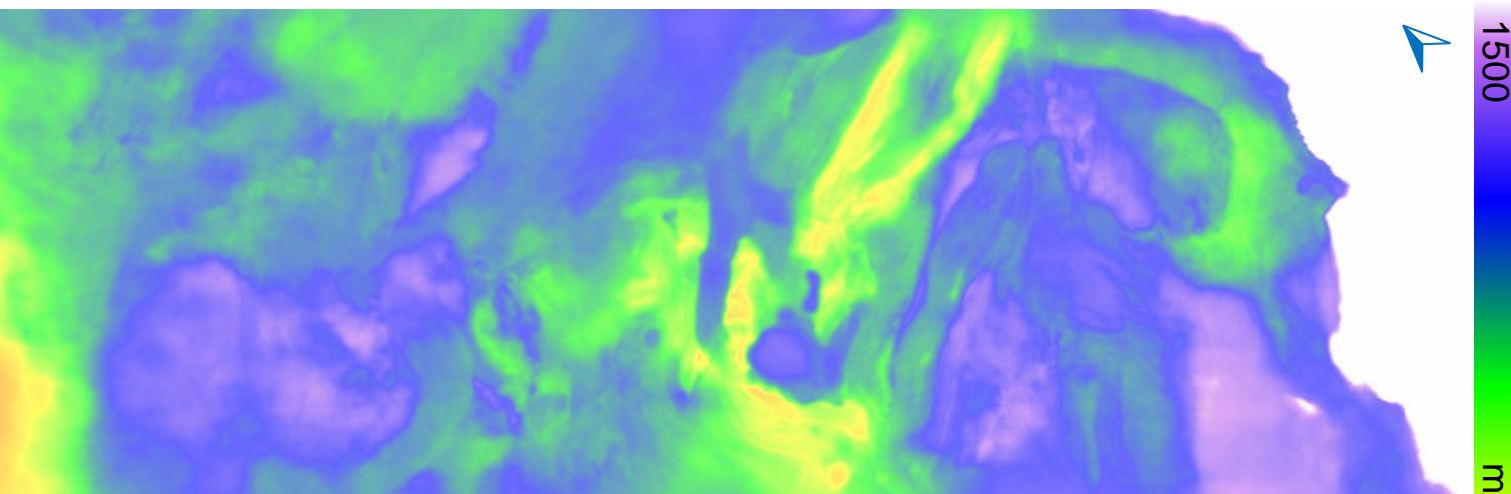
1500

m/s

5000

Depth 1400m: IT3 12Hz TTI FWI Velocity

5

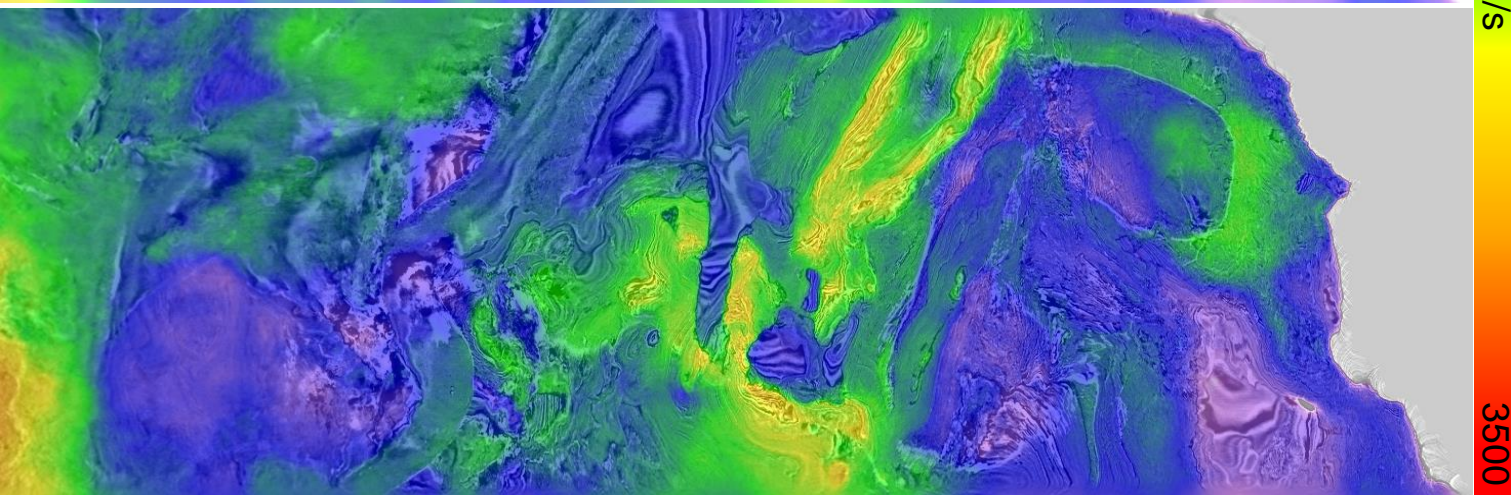


1500

m/s

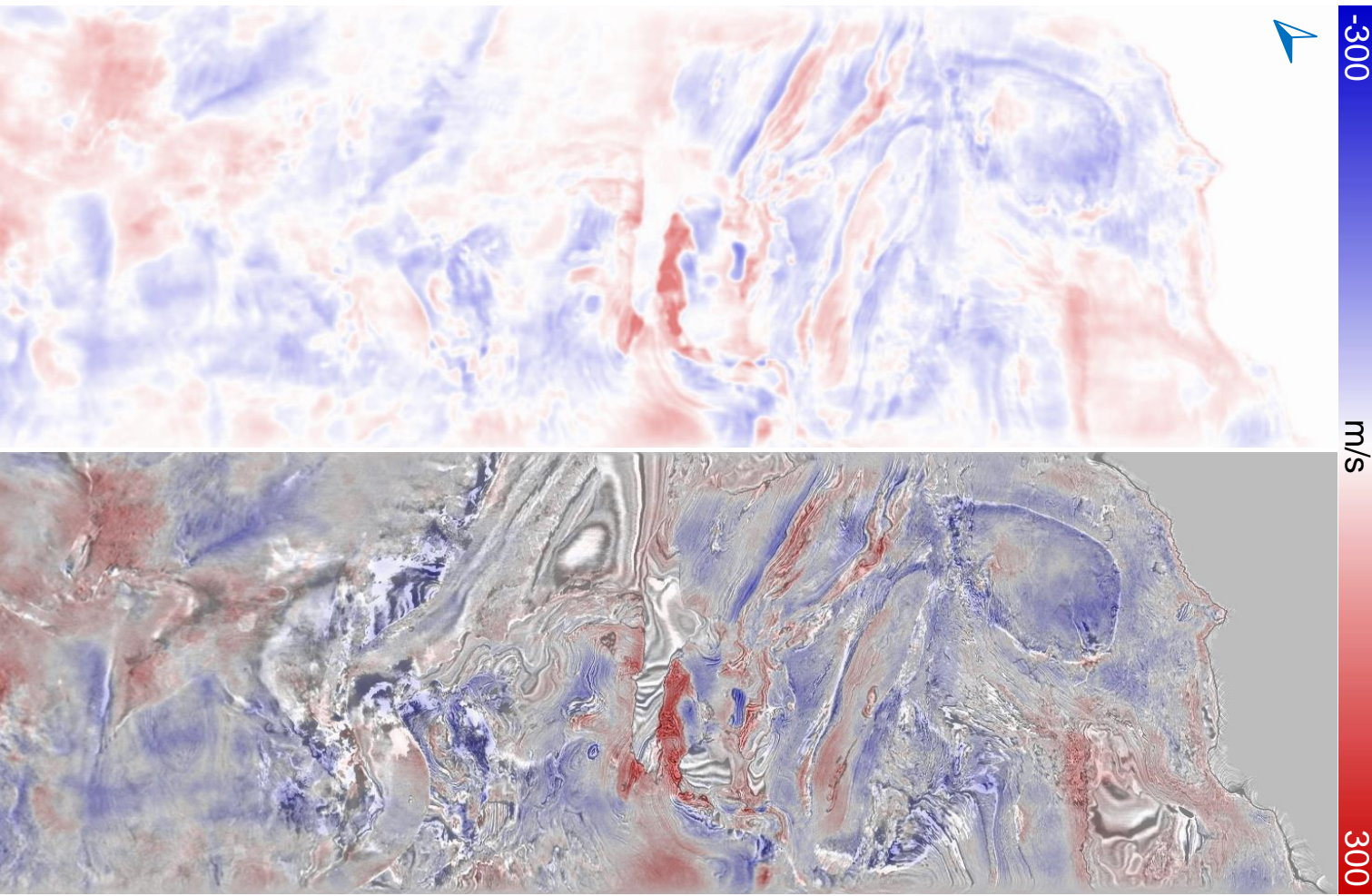
3500

TT FWI velocity aligns more with geology and provides more details.



Depth 1400: Velocity Perturbation

6



-300

m/s

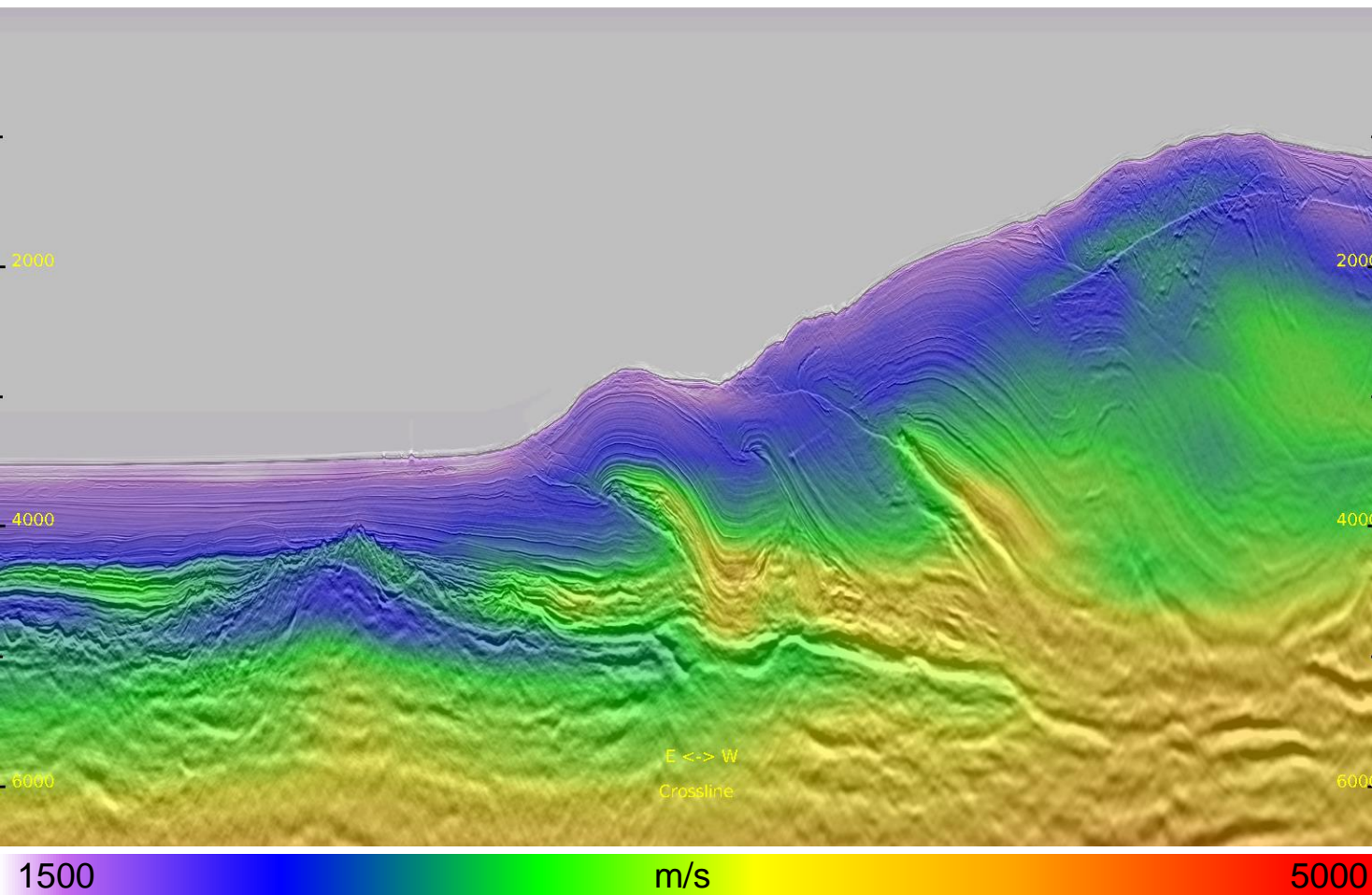
300

TTI FWI give detailed velocity perturbation.



Inline 436 East: IT2 Velocity

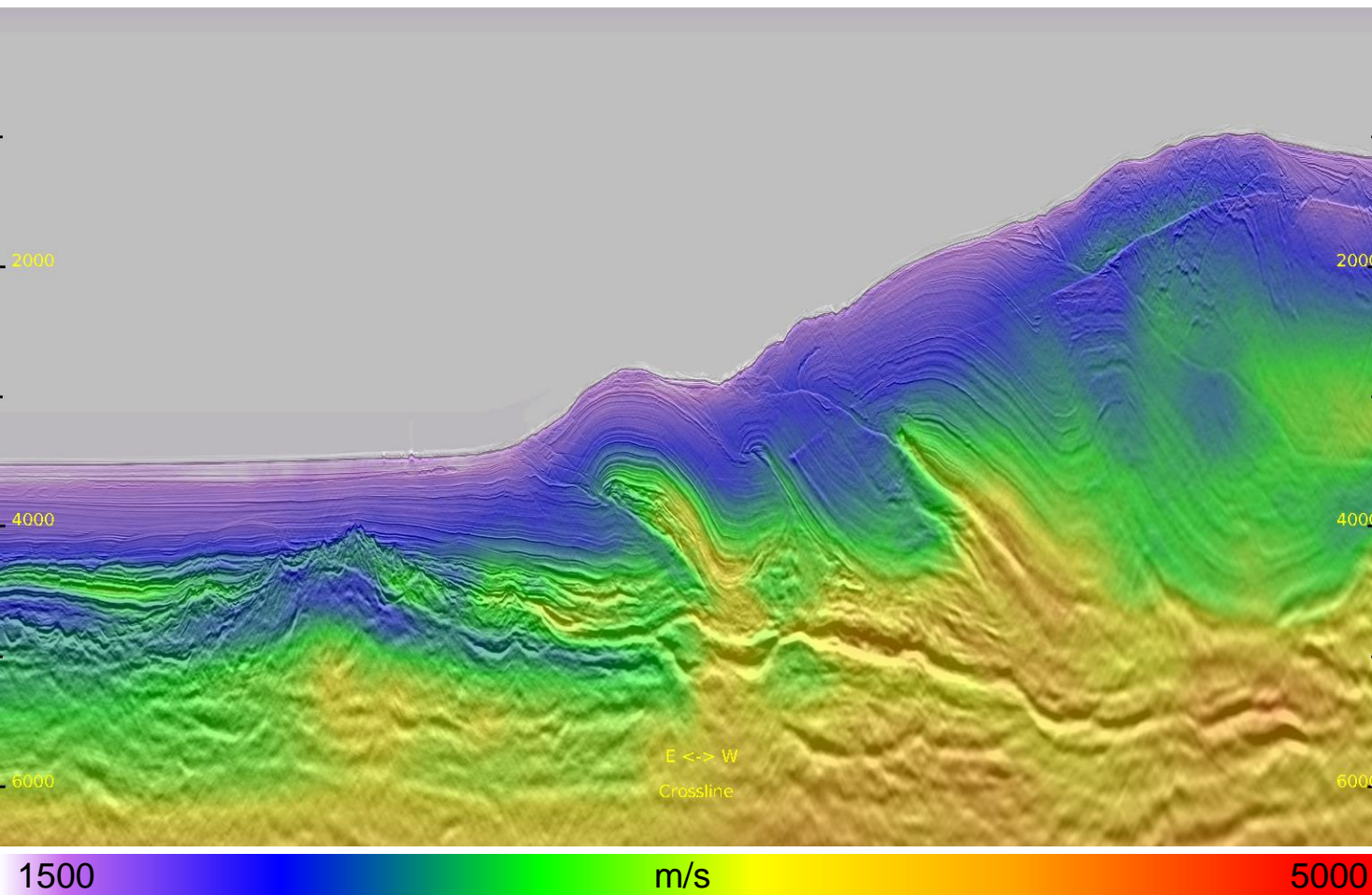
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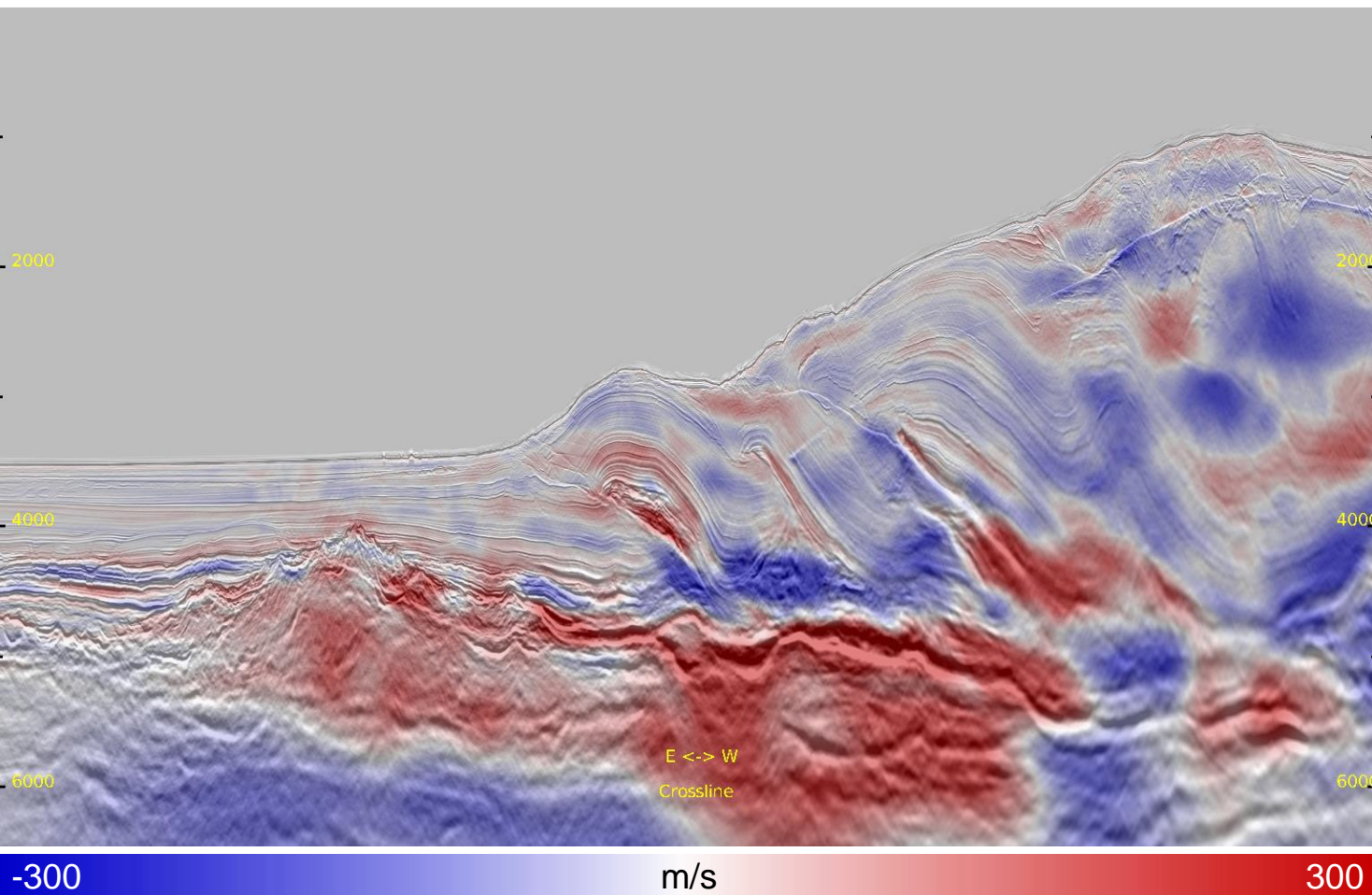
- Starting velocity is from IT2 TTI tomography.

Inline 436 East: IT3 12Hz TTI FWI Velocity

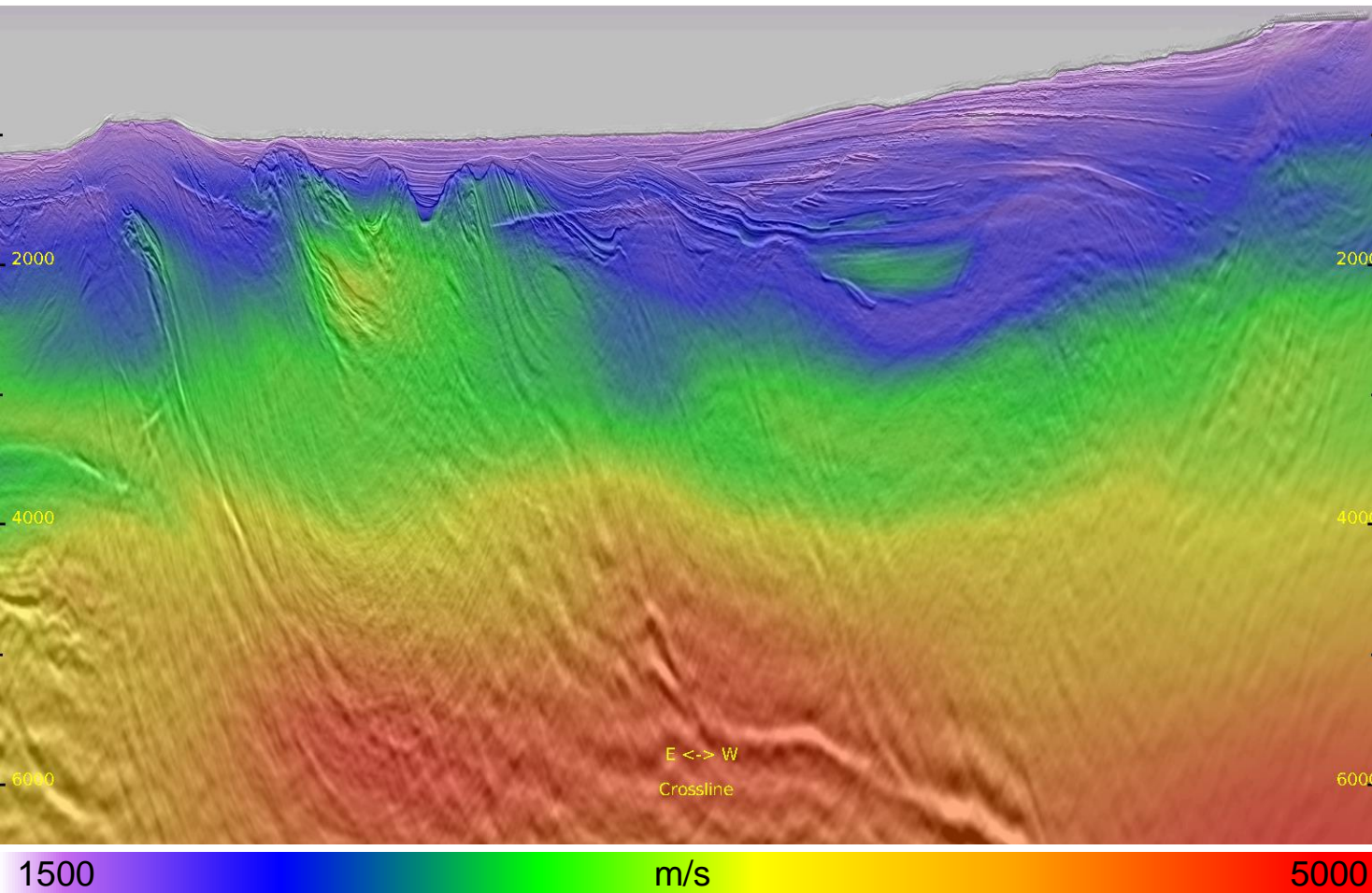
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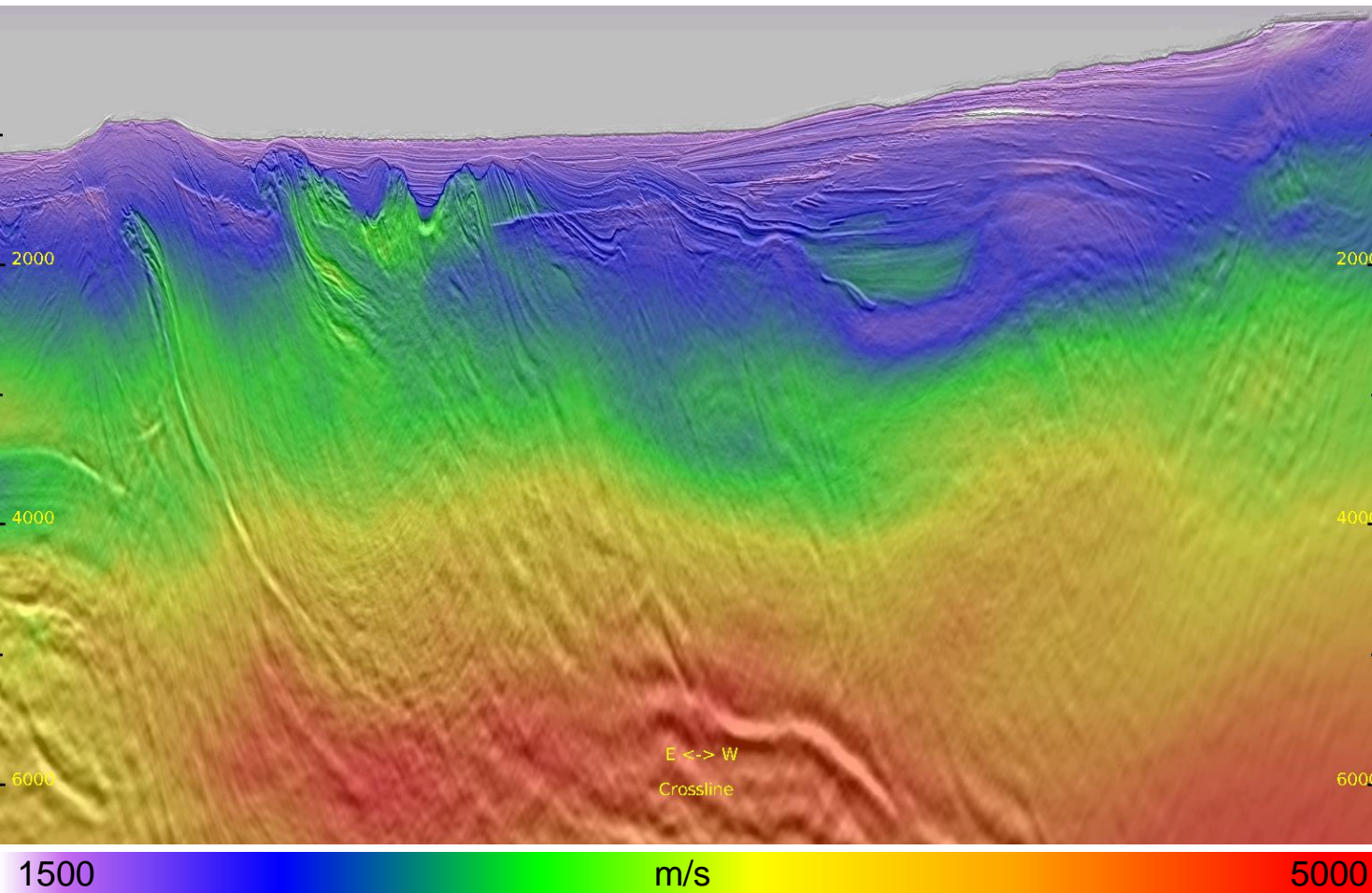
- TT FWI velocity aligns more with geology and provides more details.



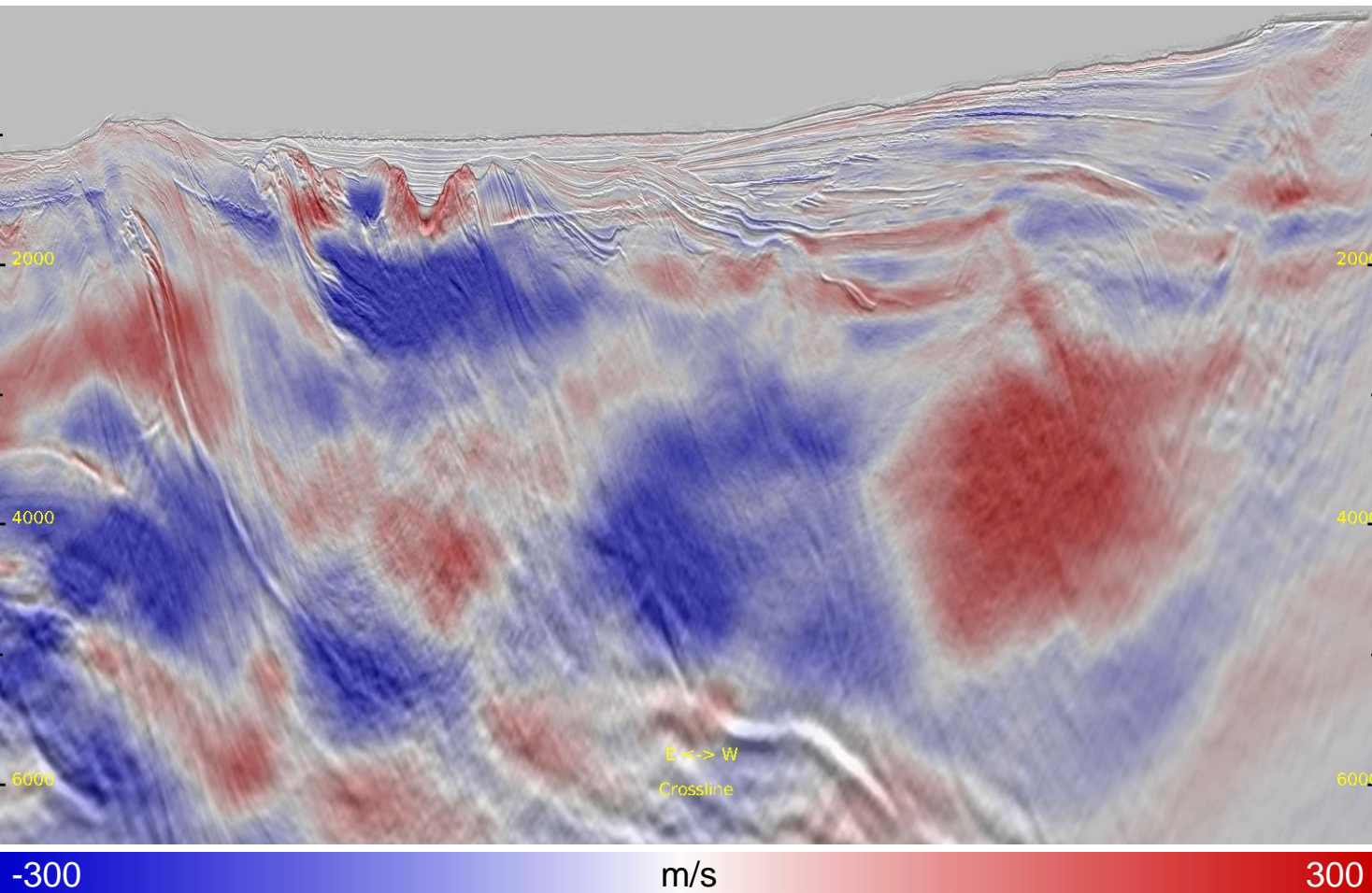
- TTI FWI give detailed velocity perturbation.



- Starting velocity is from IT2 TTI tomography.



- TT FWI velocity aligns more with geology and provides more details.



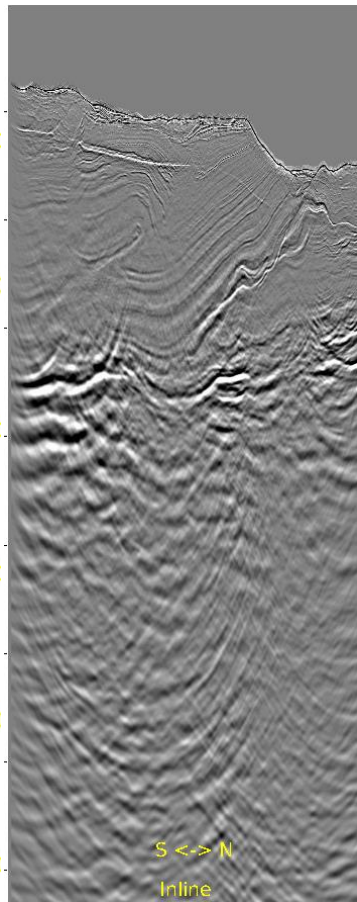
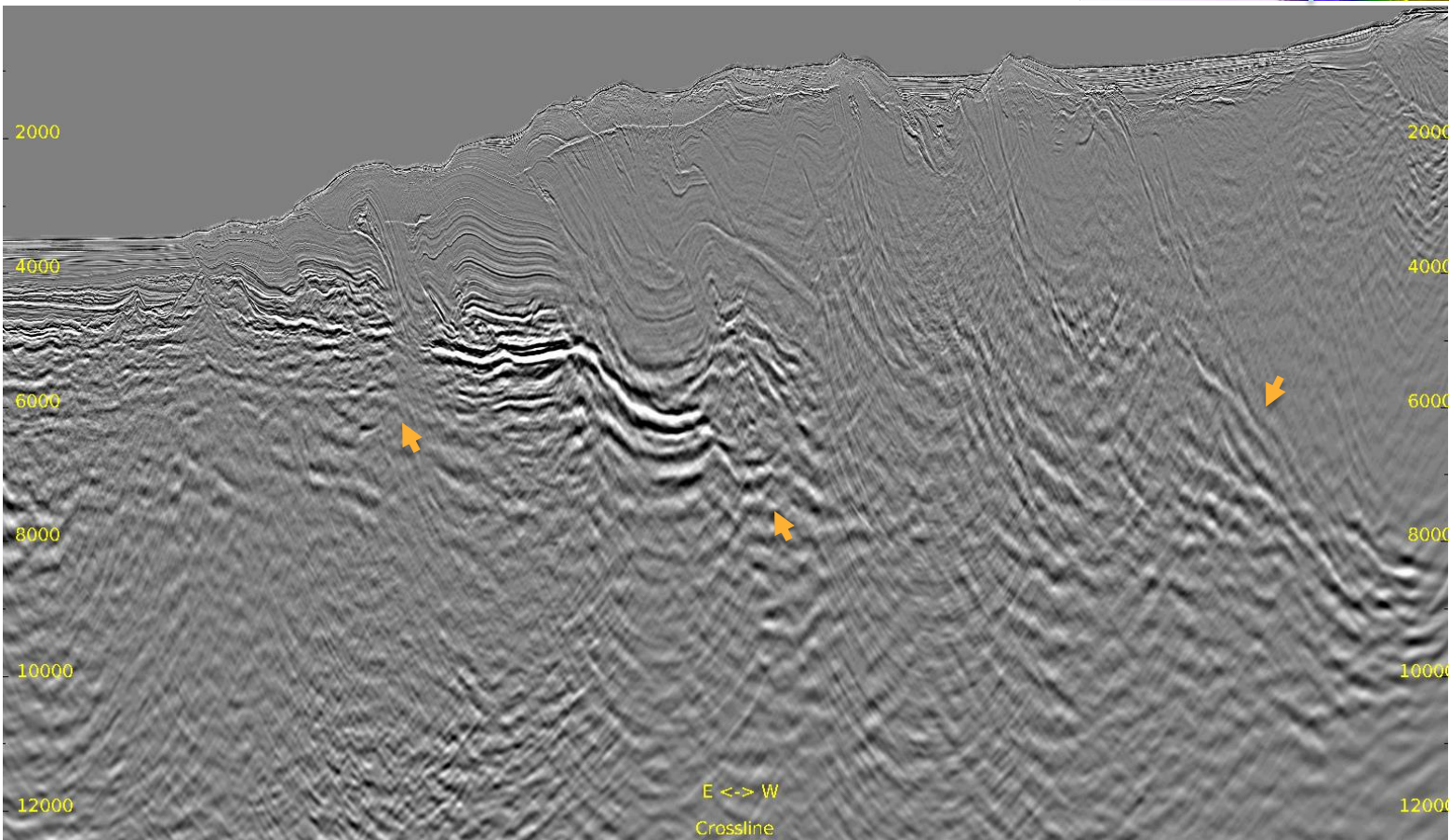
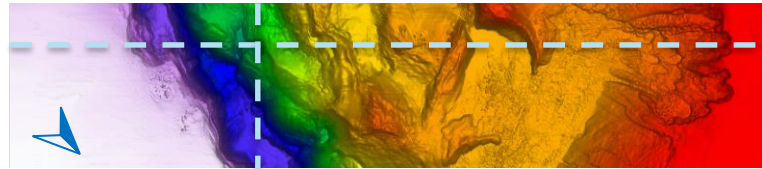
- TTI FWI give detailed velocity perturbation.

Kirchhoff Depth Migration



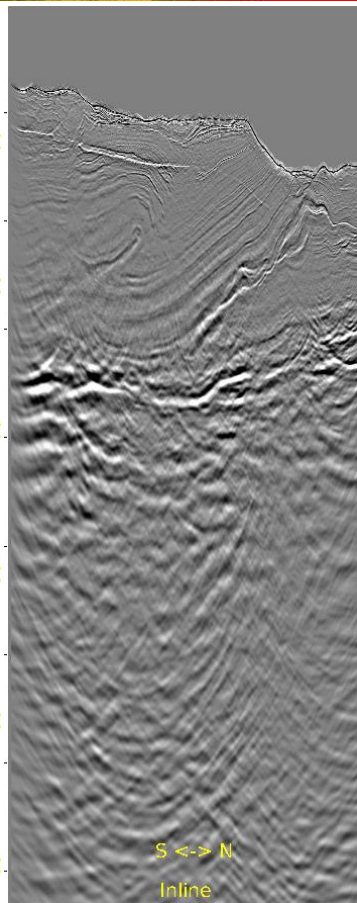
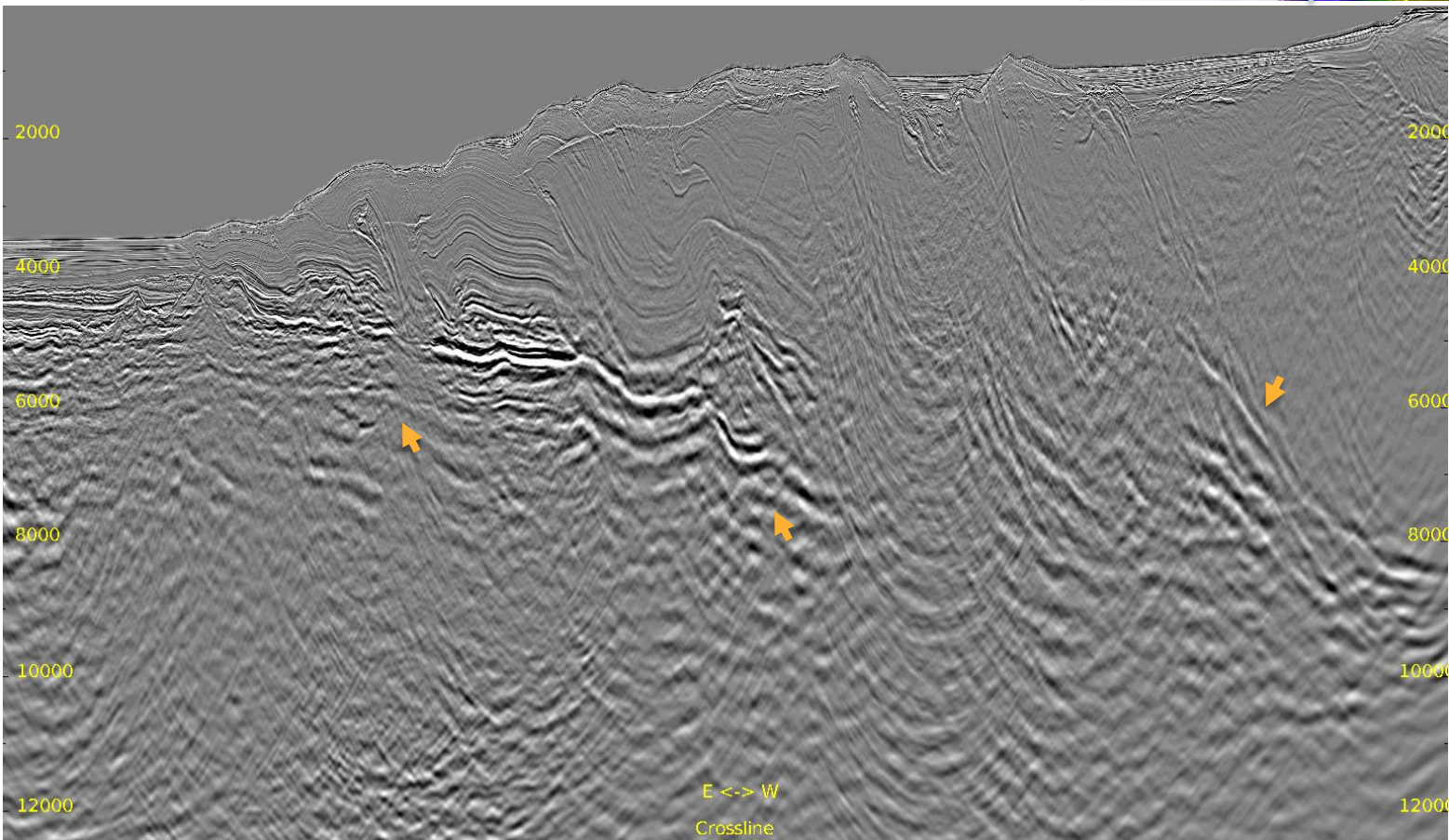
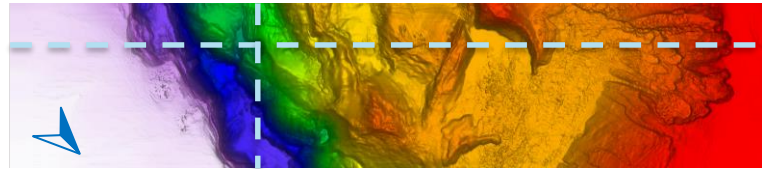
Full Stack: before TTI FWI

Inline 236 & Crossline 2368



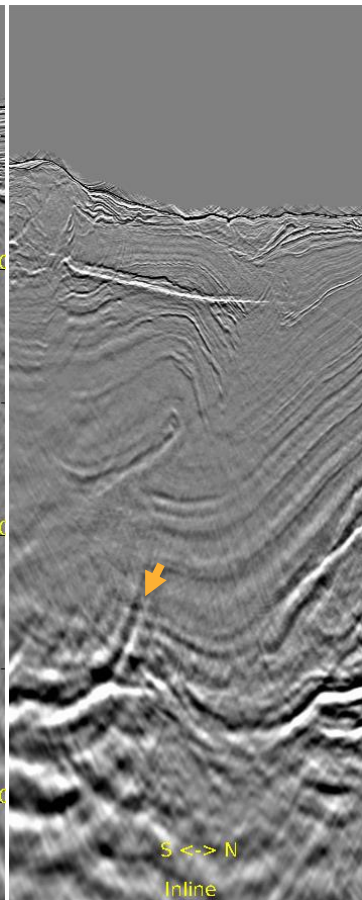
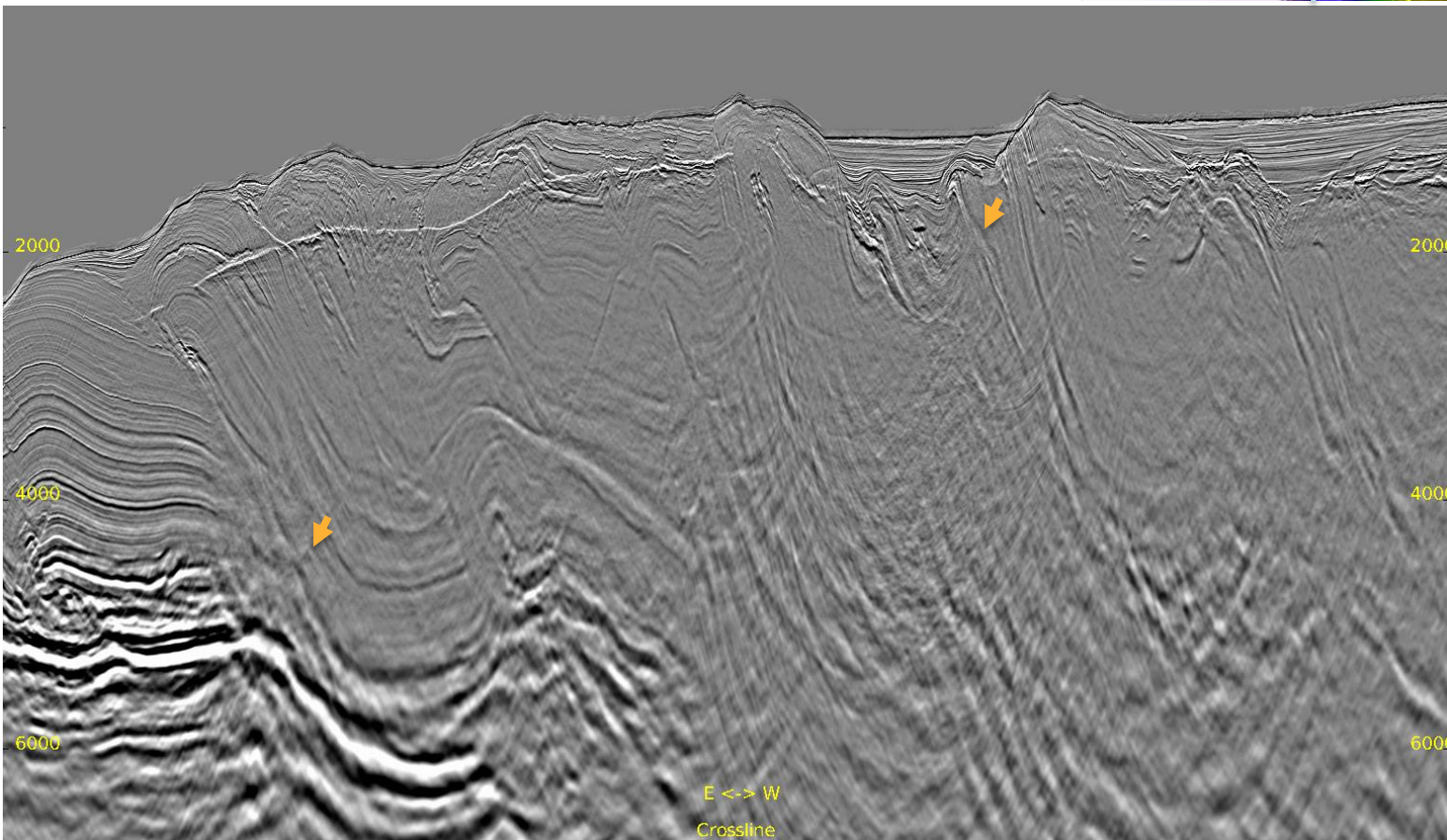
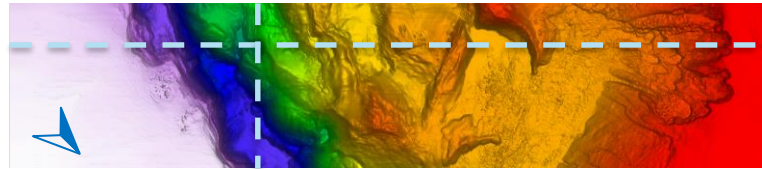
Full Stack: after TTI FWI

Inline 236 & Crossline 2368



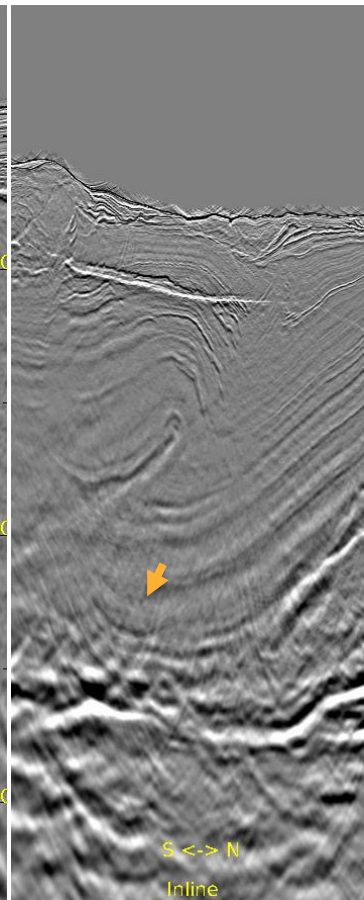
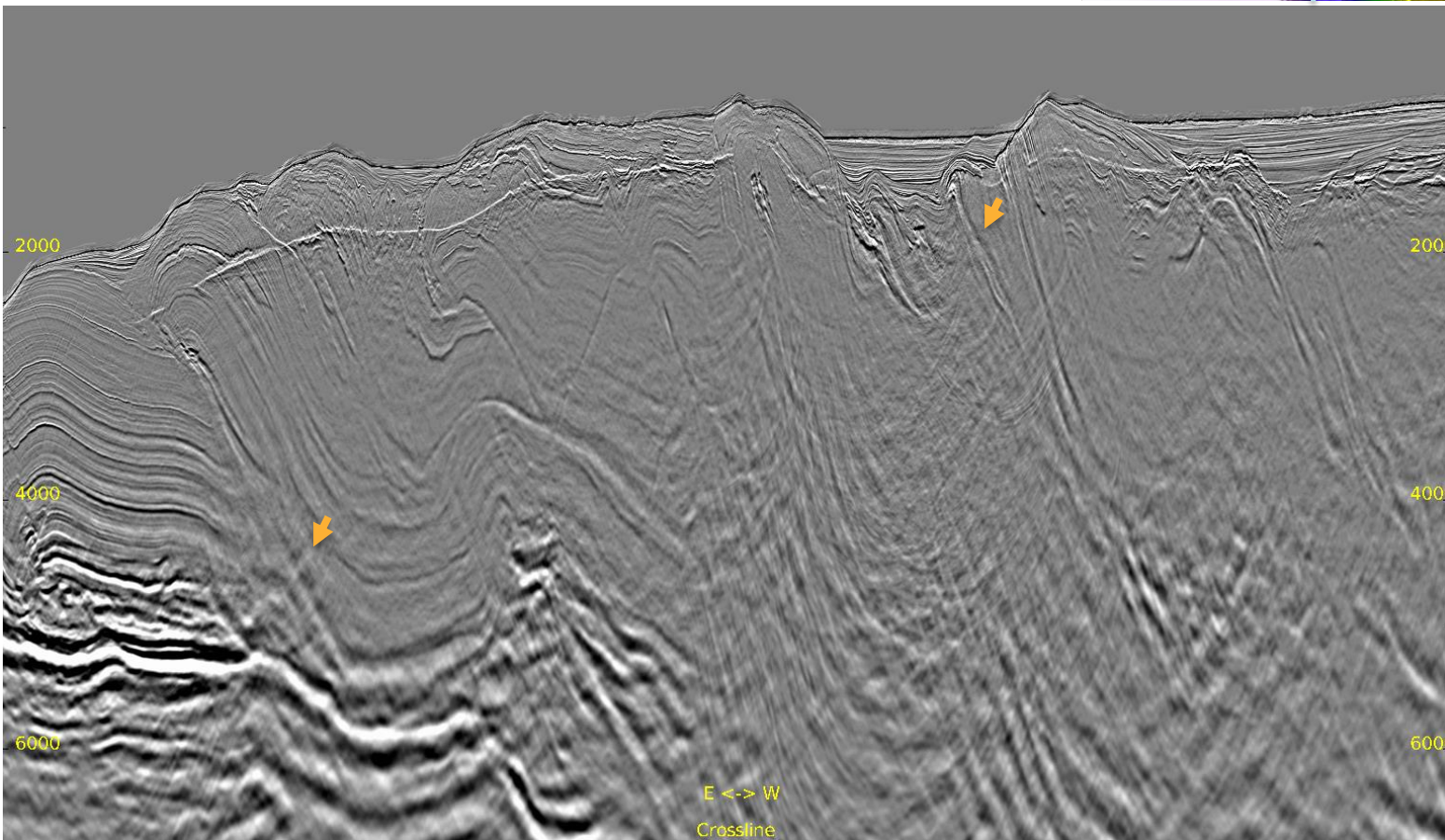
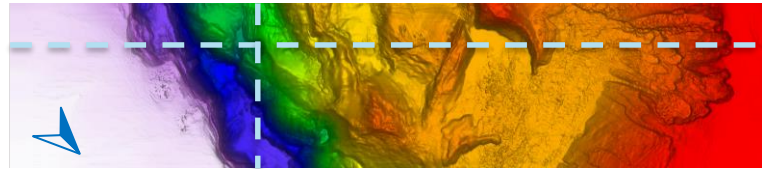
Zoomed Full Stack: before TTI FWI

Inline 236 & Crossline 2368



Zoomed Full Stack: after TTI FWI

Inline 236 & Crossline 2368

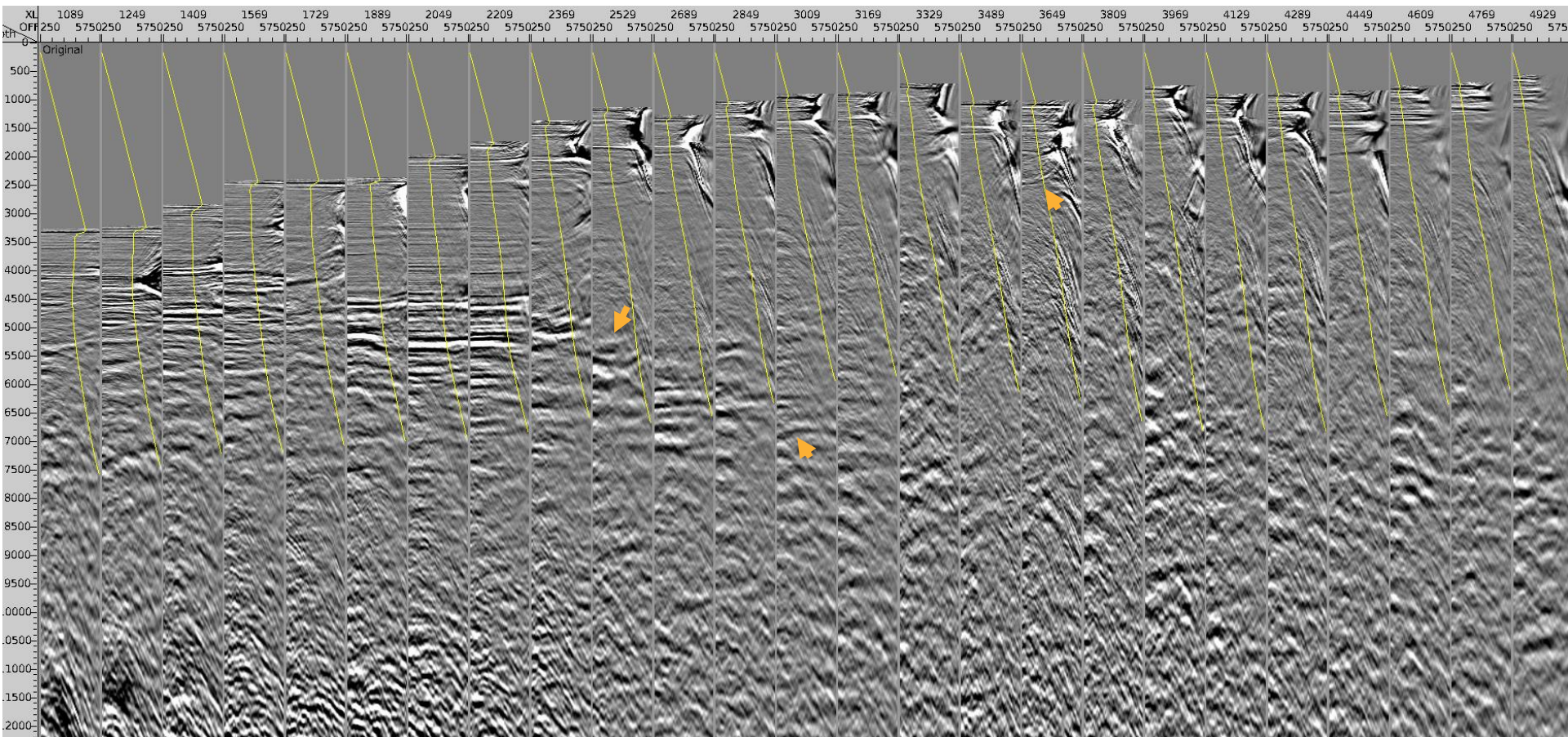




Inline 236 CDP Gathers: before TTI FWI

— 35° Mute

18

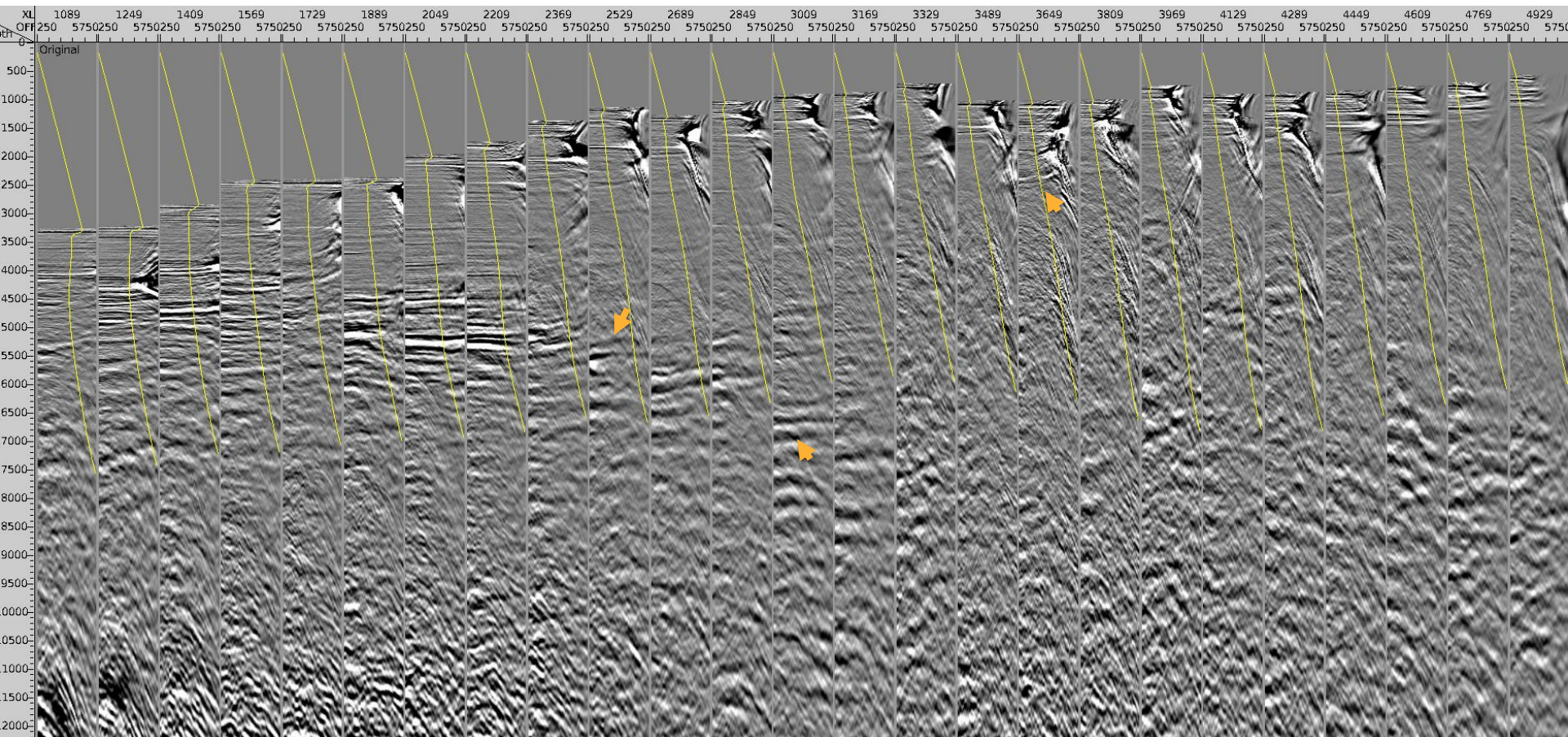




Inline 236 CDP Gathers: after TTI FWI

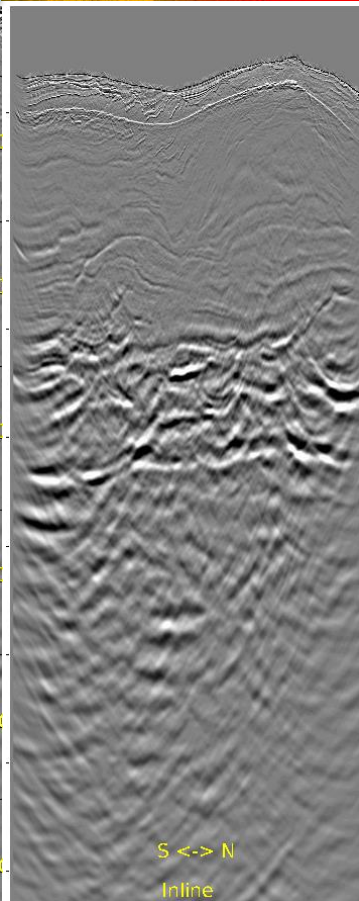
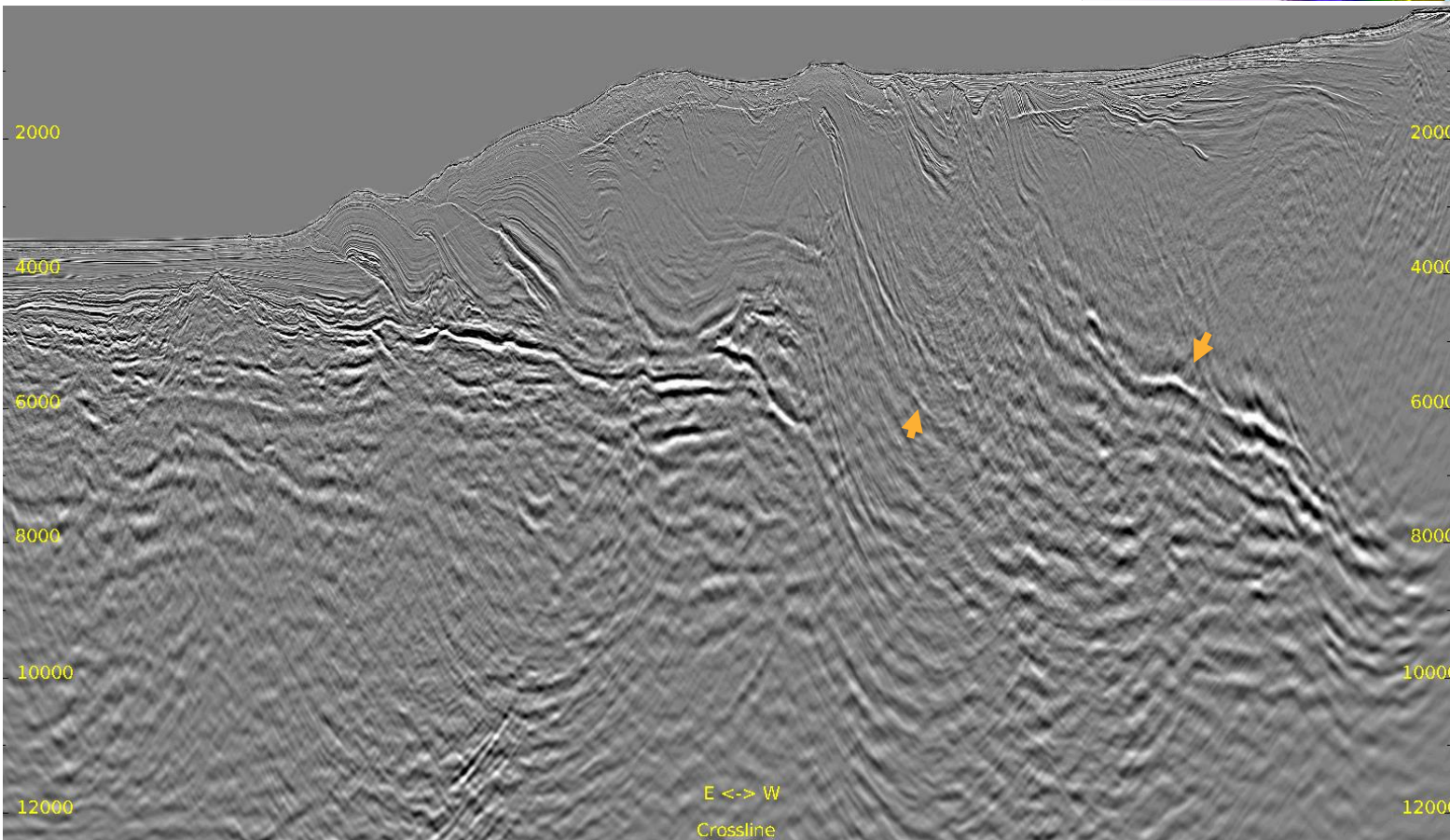
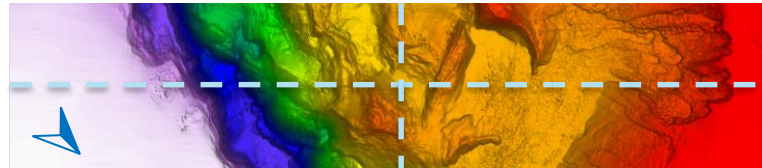
— 35° Mute

19



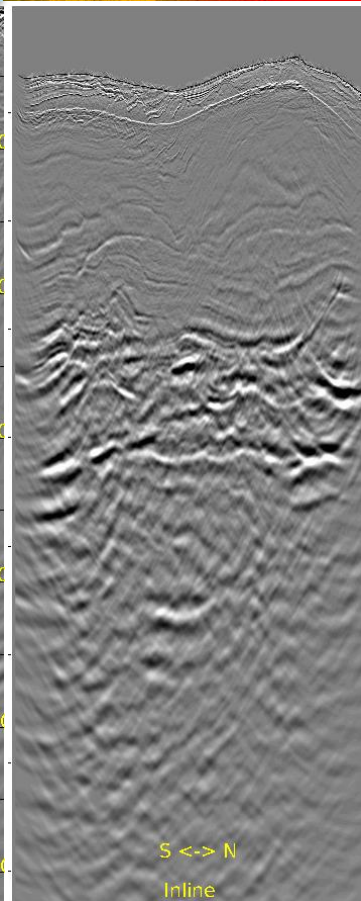
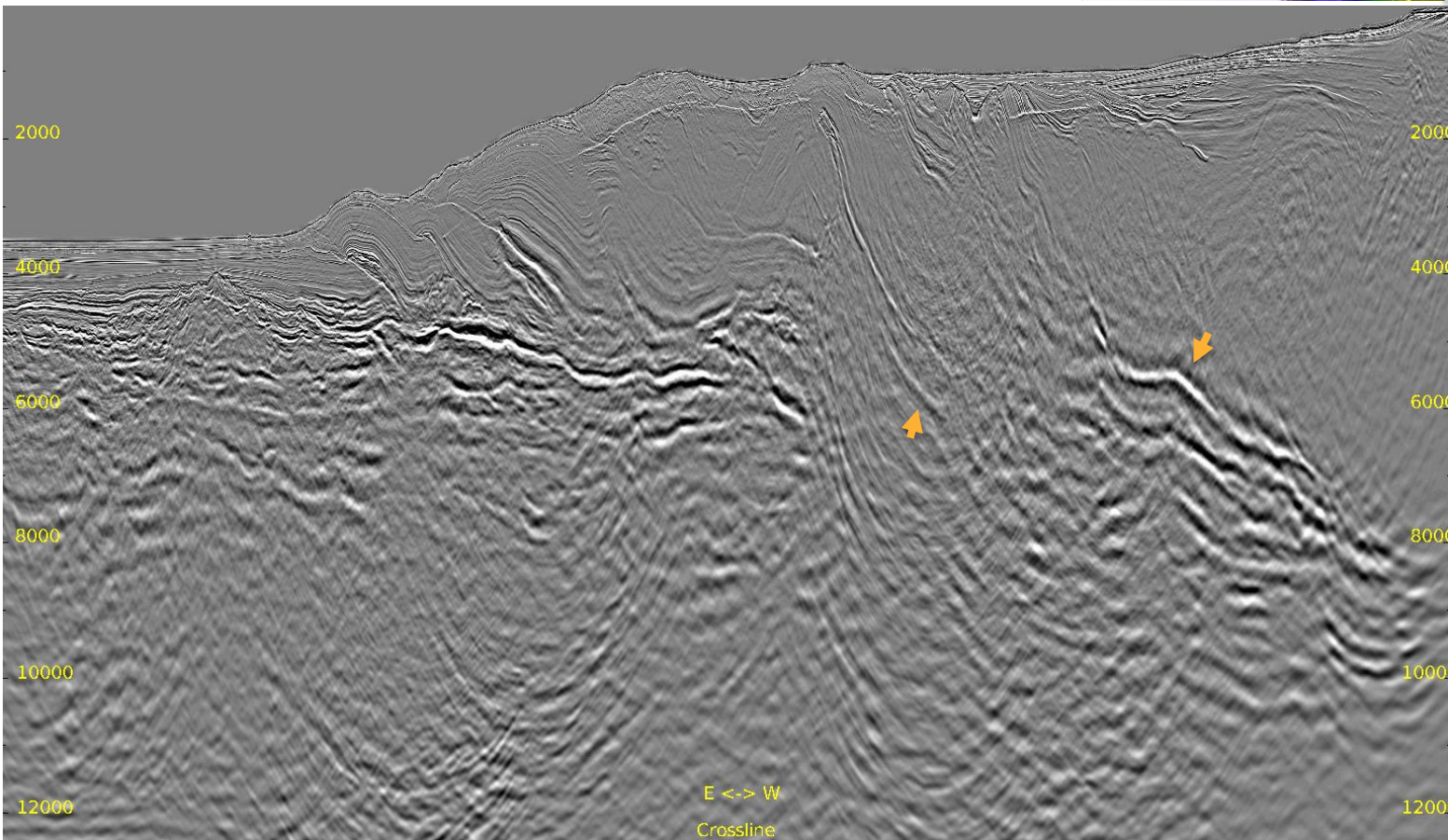
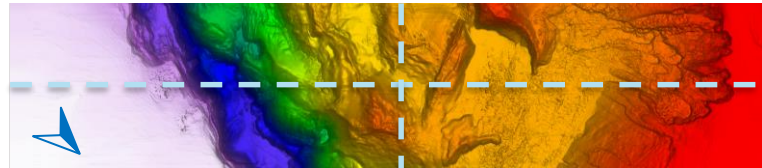
Full Stack: before TTI FWI

Inline 430 & Crossline 2889



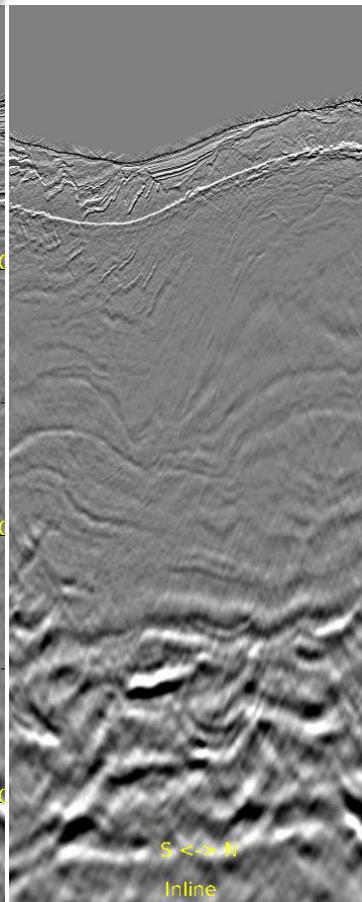
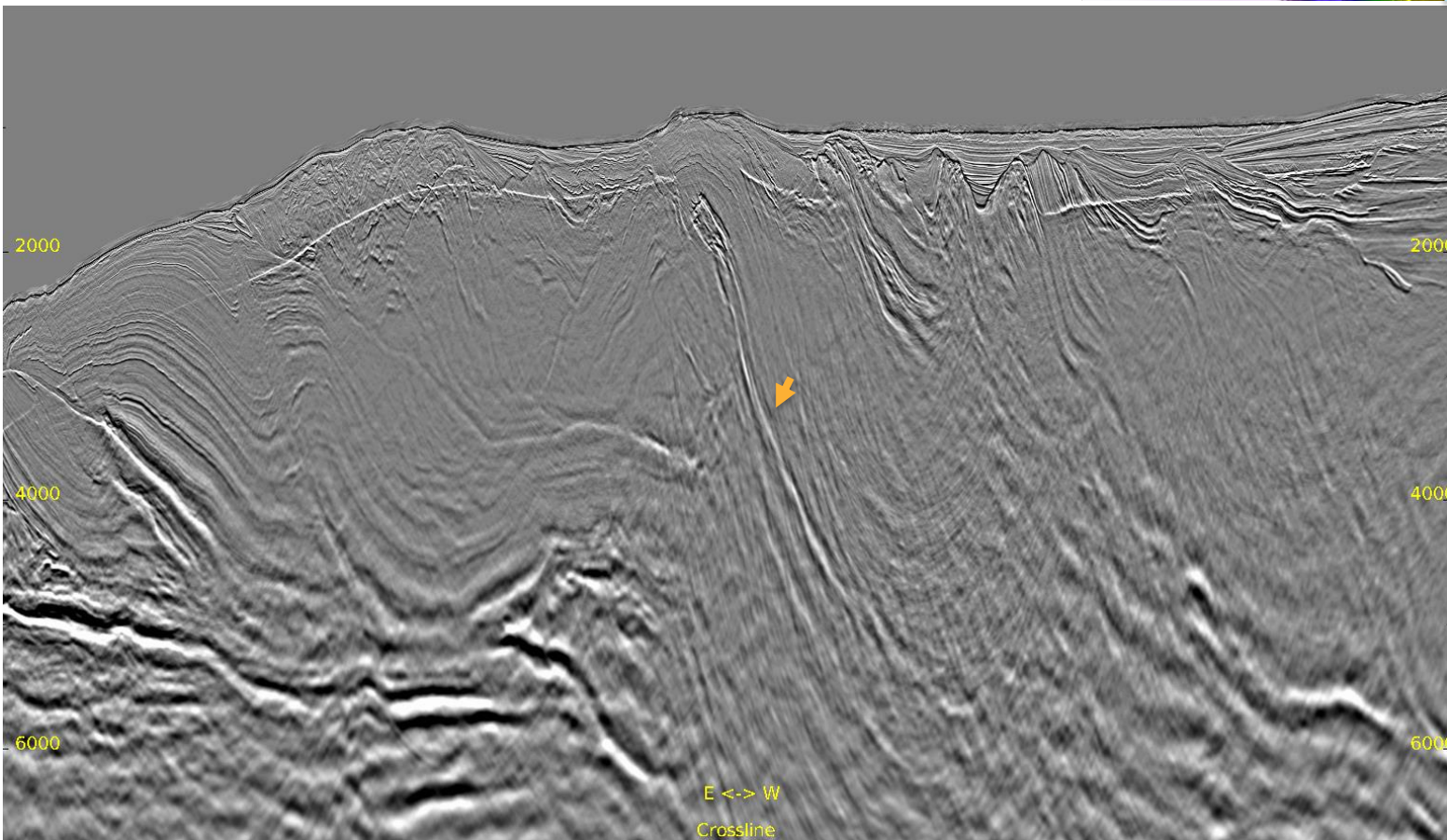
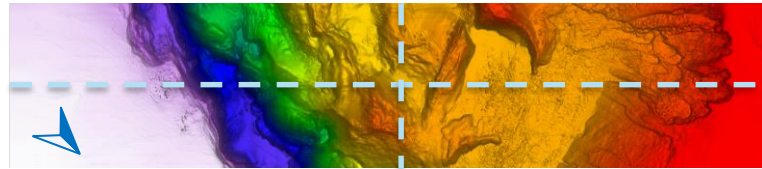
Full Stack: after TTI FWI

Inline 430 & Crossline 2889



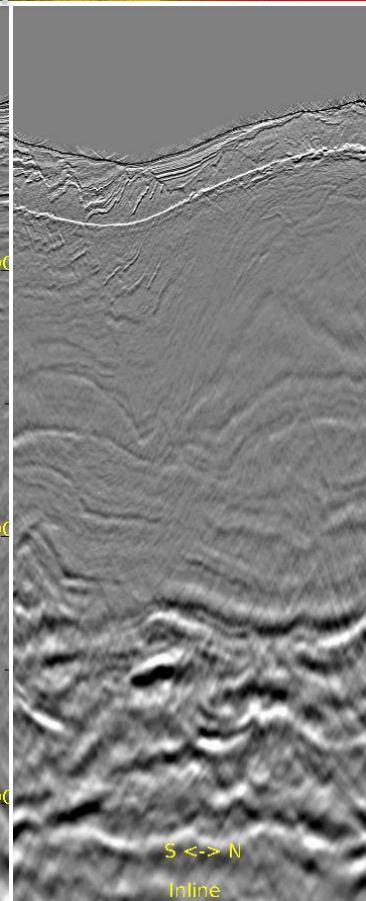
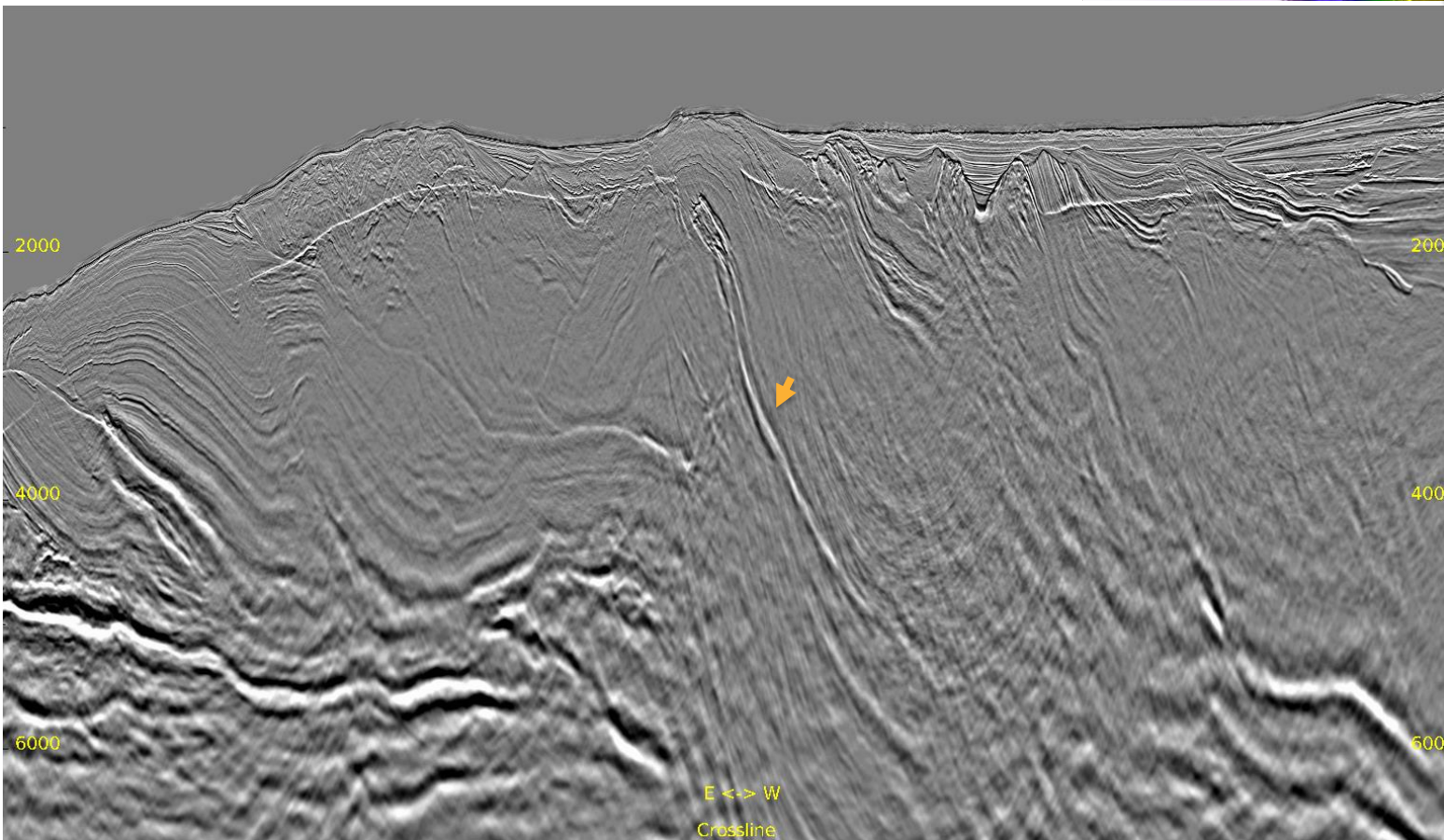
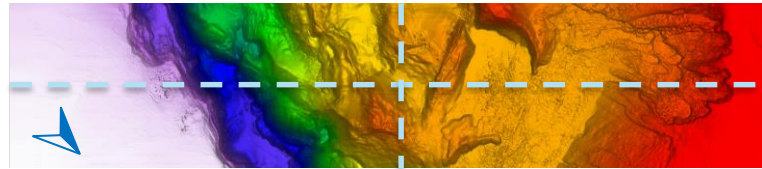
Zoomed Full Stack: before TTI FWI

Inline 430 & Crossline 2889



Zoomed Full Stack: after TTI FWI

Inline 430 & Crossline 2889

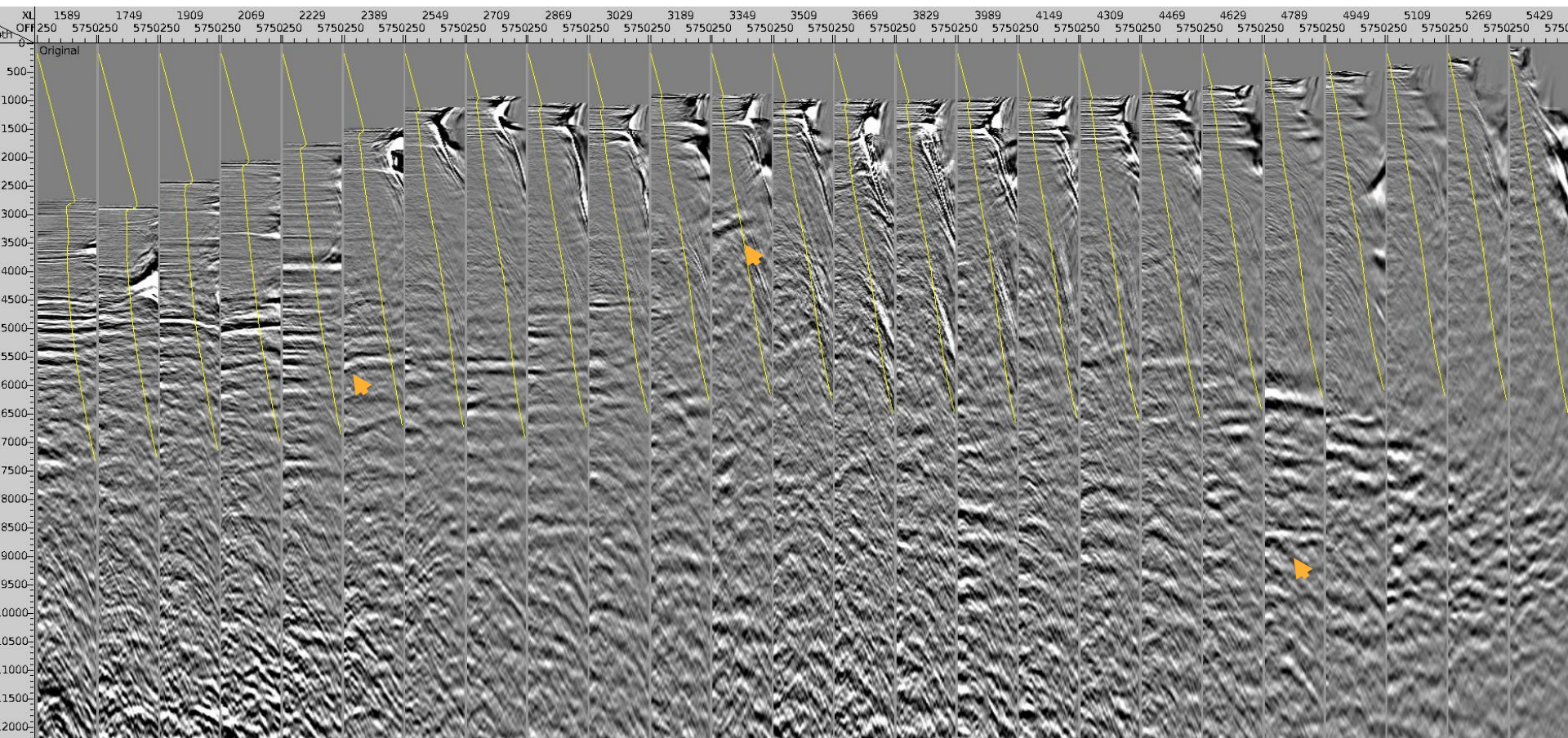




Inline 430 CDP Gathers: before TTI FWI

— 35° Mute

24

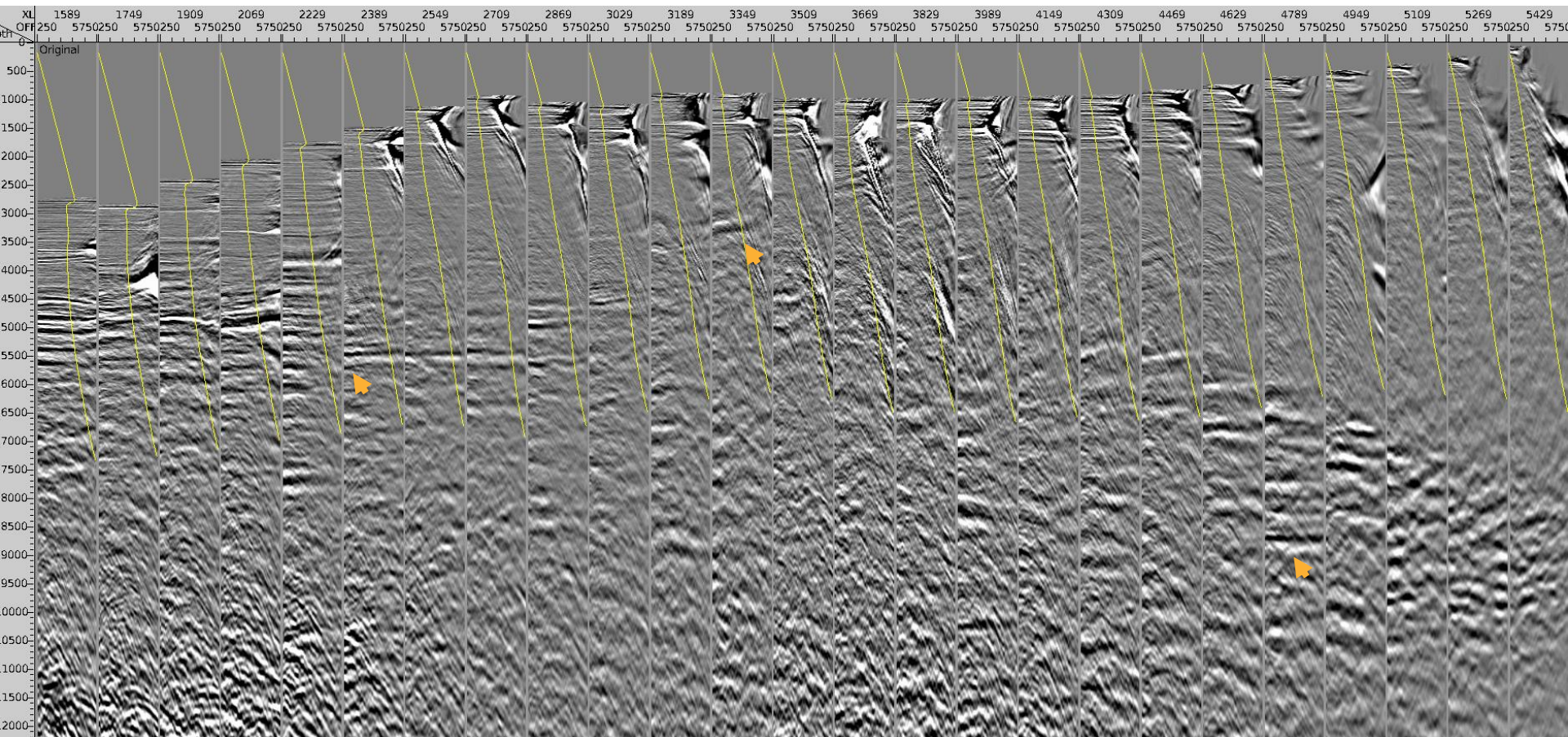




Inline 430 CDP Gathers: after TTI FWI

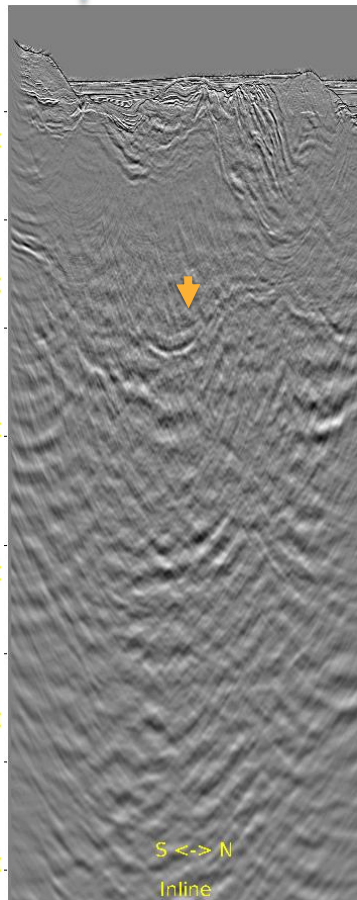
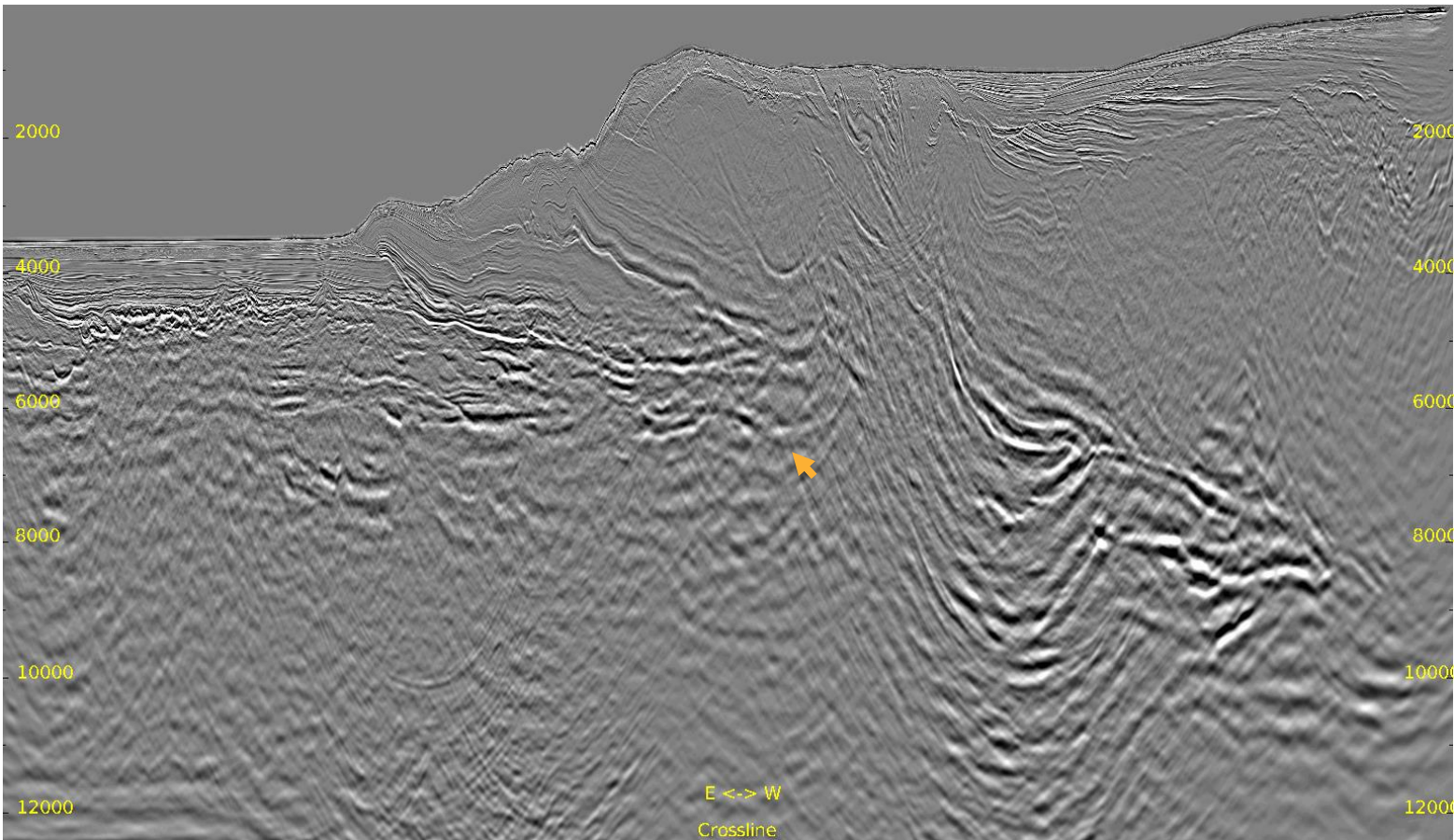
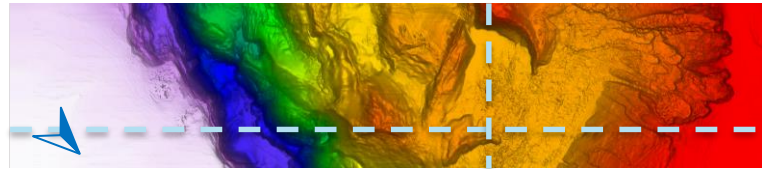
— 35° Mute

25



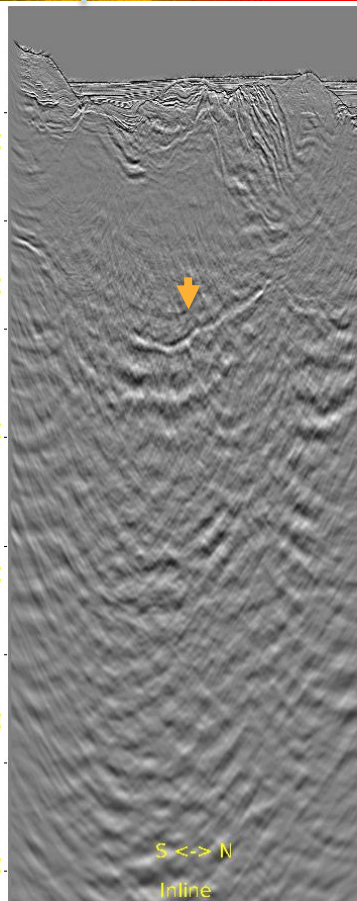
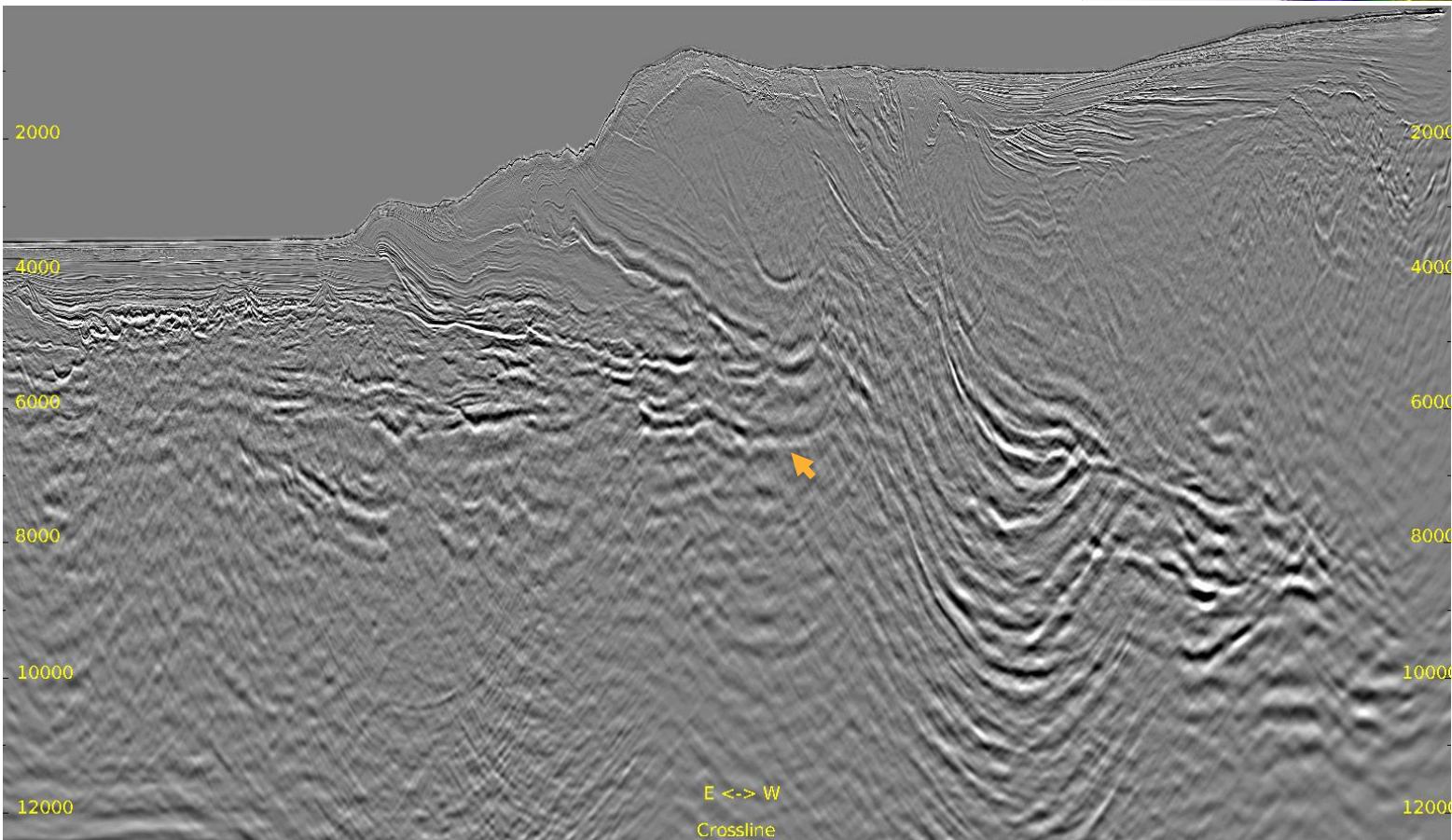
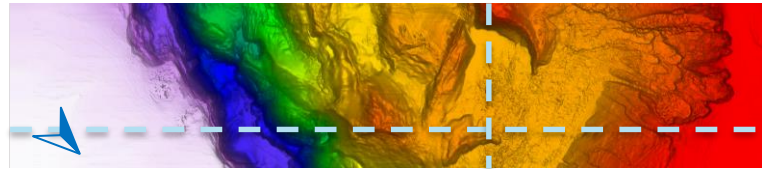
Full Stack: before TTI FWI

Inline 628 & Crossline 3524



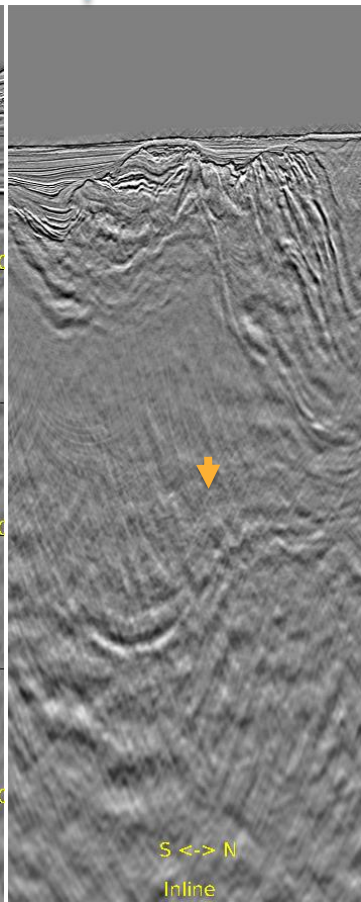
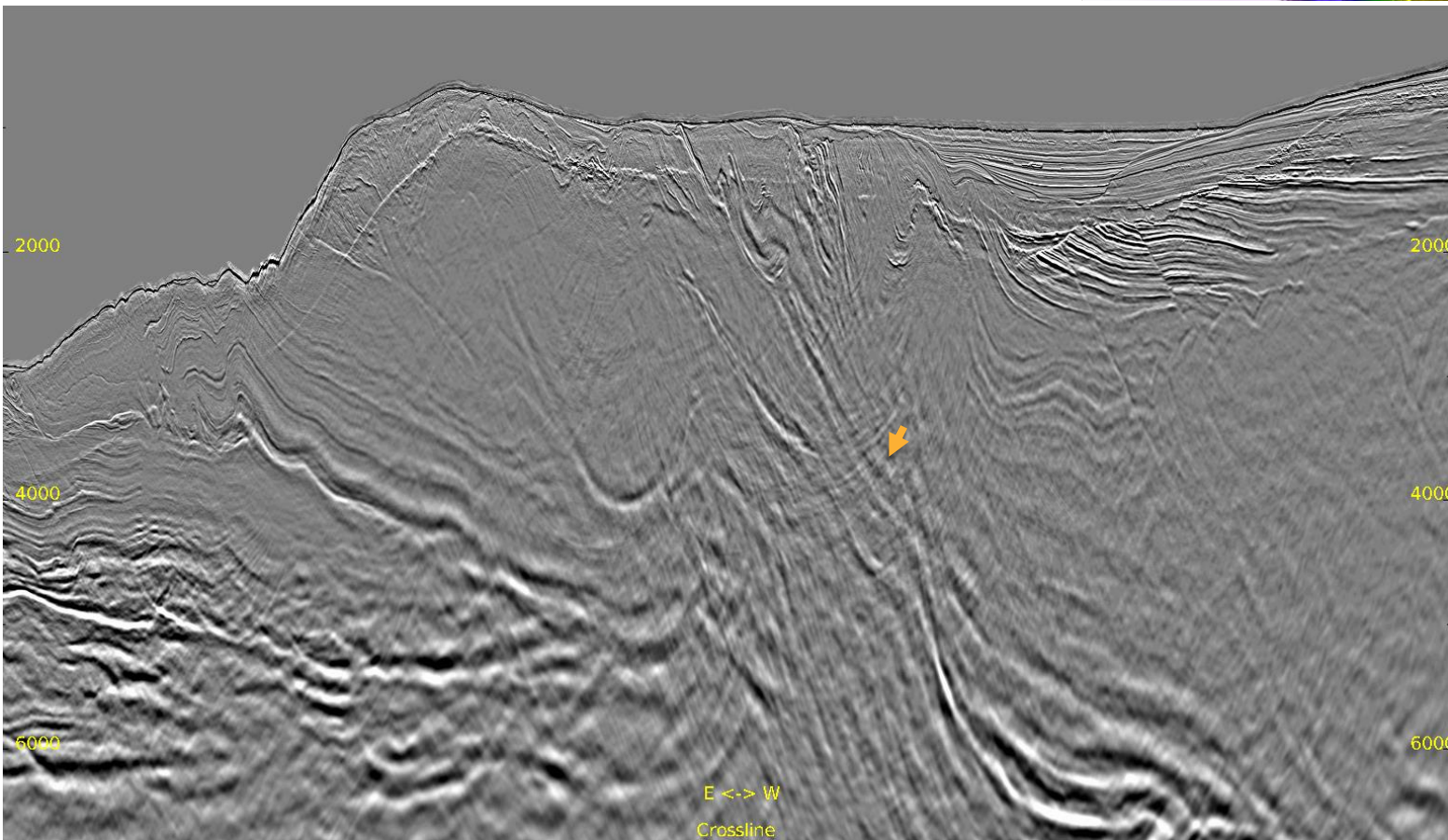
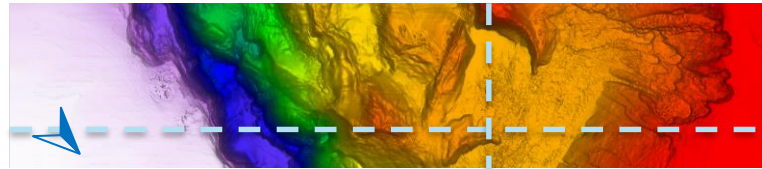
Full Stack: after TTI FWI

Inline 628 & Crossline 3524



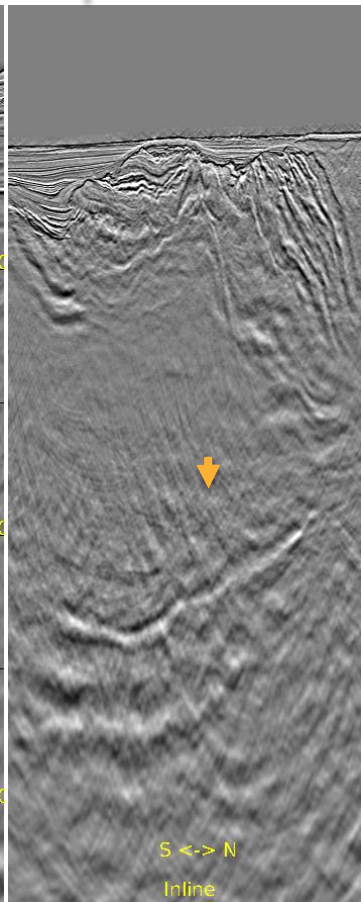
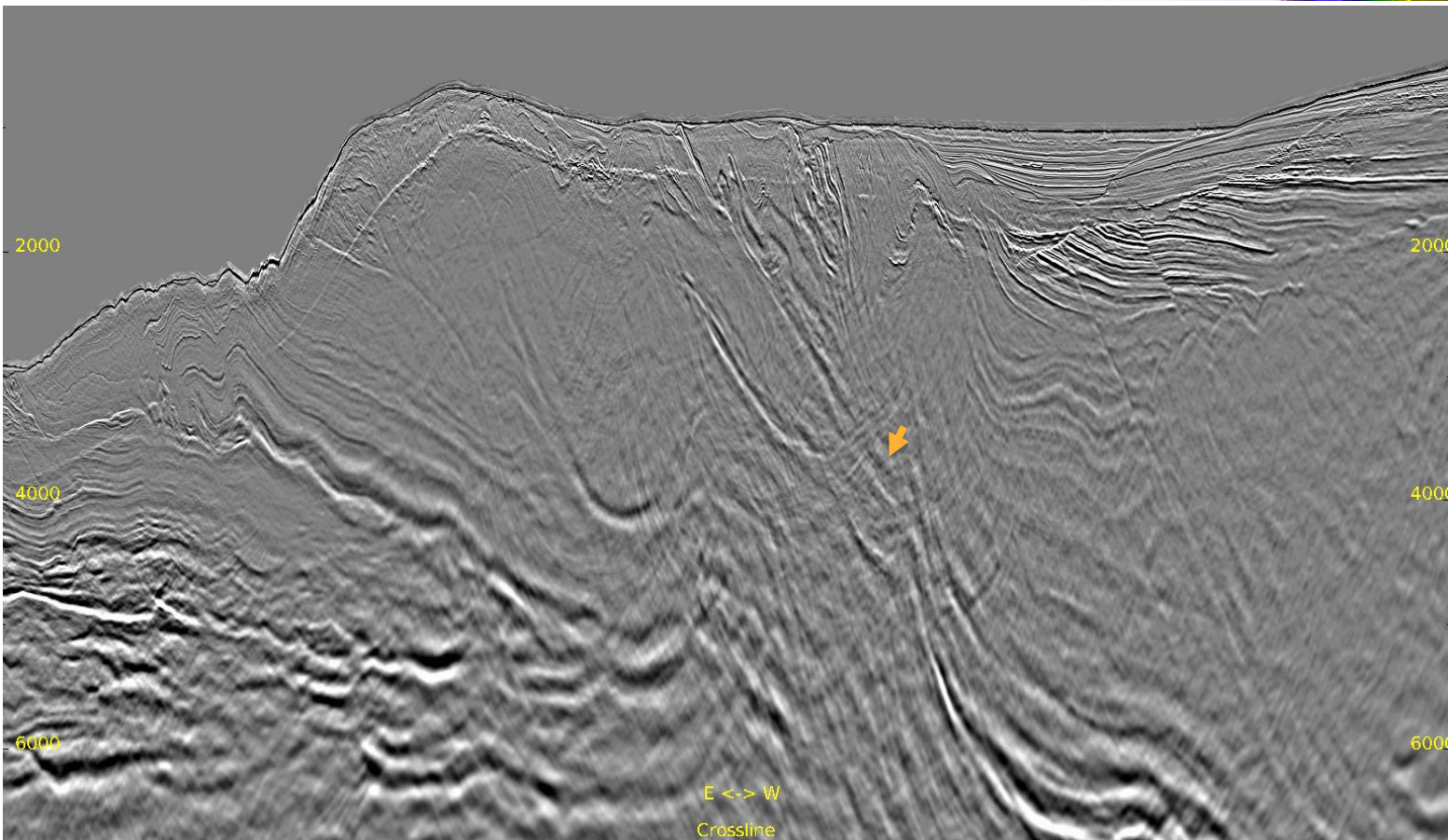
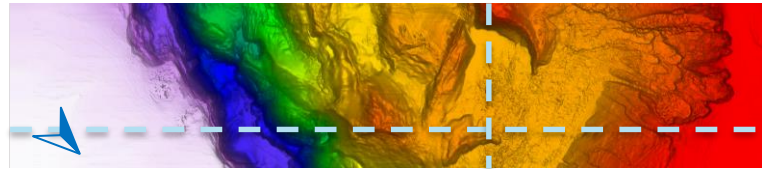
Zoomed Full Stack: before TTI FWI

Inline 628 & Crossline 3524



Zoomed Full Stack: after TTI FWI

Inline 628 & Crossline 3524

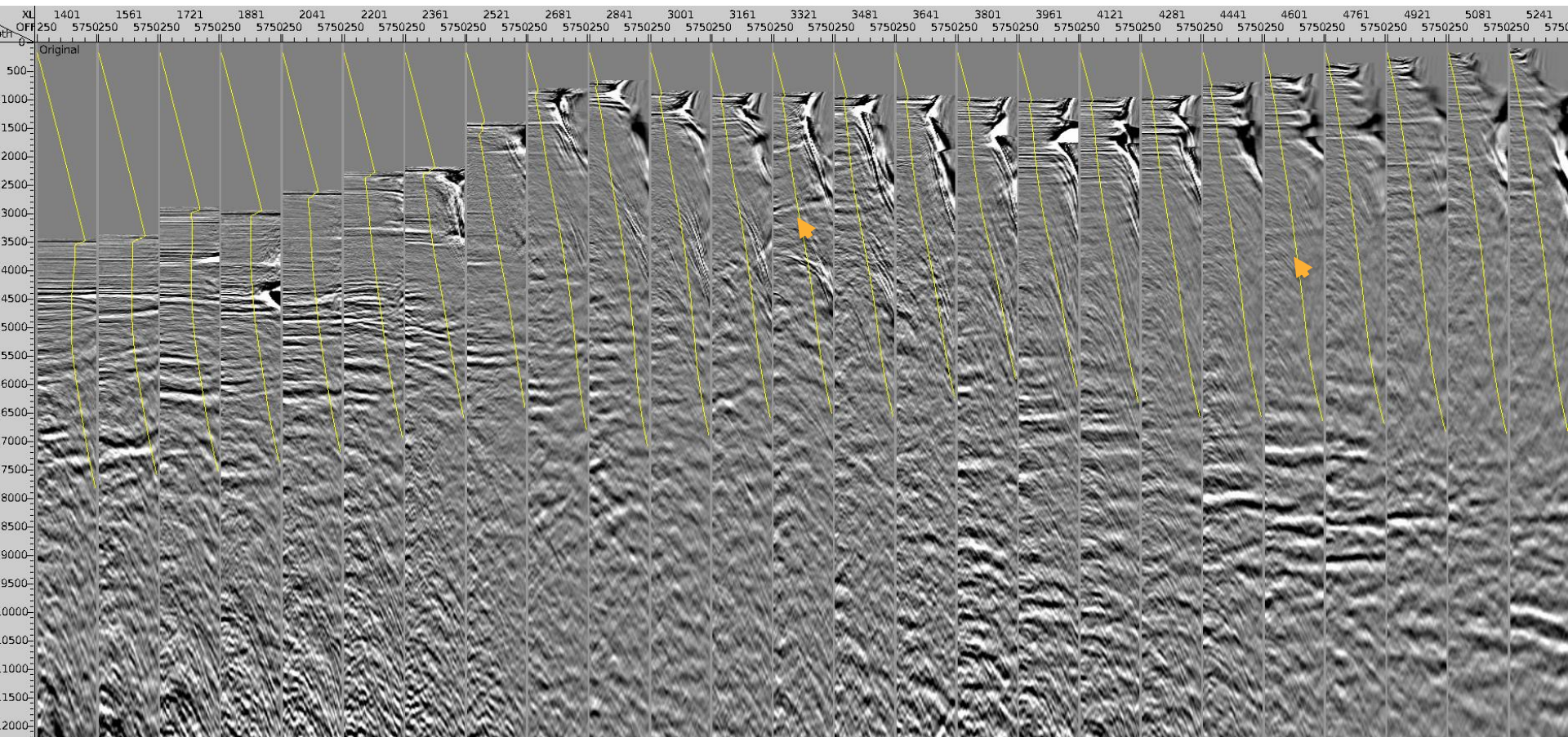




Inline 628 CDP Gathers: before TTI FWI

— 35° Mute

30





Inline 628 CDP Gathers: **after** TTI FWI

— 35° Mute

31

