



Common Offset Denoise

NZ 3D Processing

21 April 2021

cgg.com



INSTITUTE FOR GEOPHYSICS



Passion for Geoscience

1. Convert to CGG internal format
2. Nav merge / trace edit
3. Low cut filter
4. Time Variant Scaling (TVS) & Resample to 4ms
5. Swell noise attenuation (SNA)
6. Debubble
7. Linear noise attenuation (LNA)
8. Tidal statics correction
9. Water column statics correction
10. Shot & channel scaling
11. Receiver motion correction (RMC)
12. Joint Deghost & Designature
13. Residual Bubble Removal
14. Source Sensor Datum Correction
15. Shallow Water Demultiple
16. Surface Related Multiple Elimination (3D SRME)
17. Simultaneous Subtraction of MWD & SRME
18. Residual linear noise attenuation (residual LNA)
19. Trace regularization & interpolation
20. Velocity Analysis
21. Radon Demultiple
22. Footprint Removal
23. Diffracted Multiple Removal
24. Common Offset Denoise

- **Objective:**

To attenuate noise on common offset domain.

- **Procedure:**

Attenuation is tested in Subline & Crossline direction.

Low frequency (0-6hz) random noise is attenuated on whole survey*.

High frequency (8-30hz) random noise is attenuated at deep part (below 7000ms)*.

Strong dipping noise through crossline direction is attenuated.

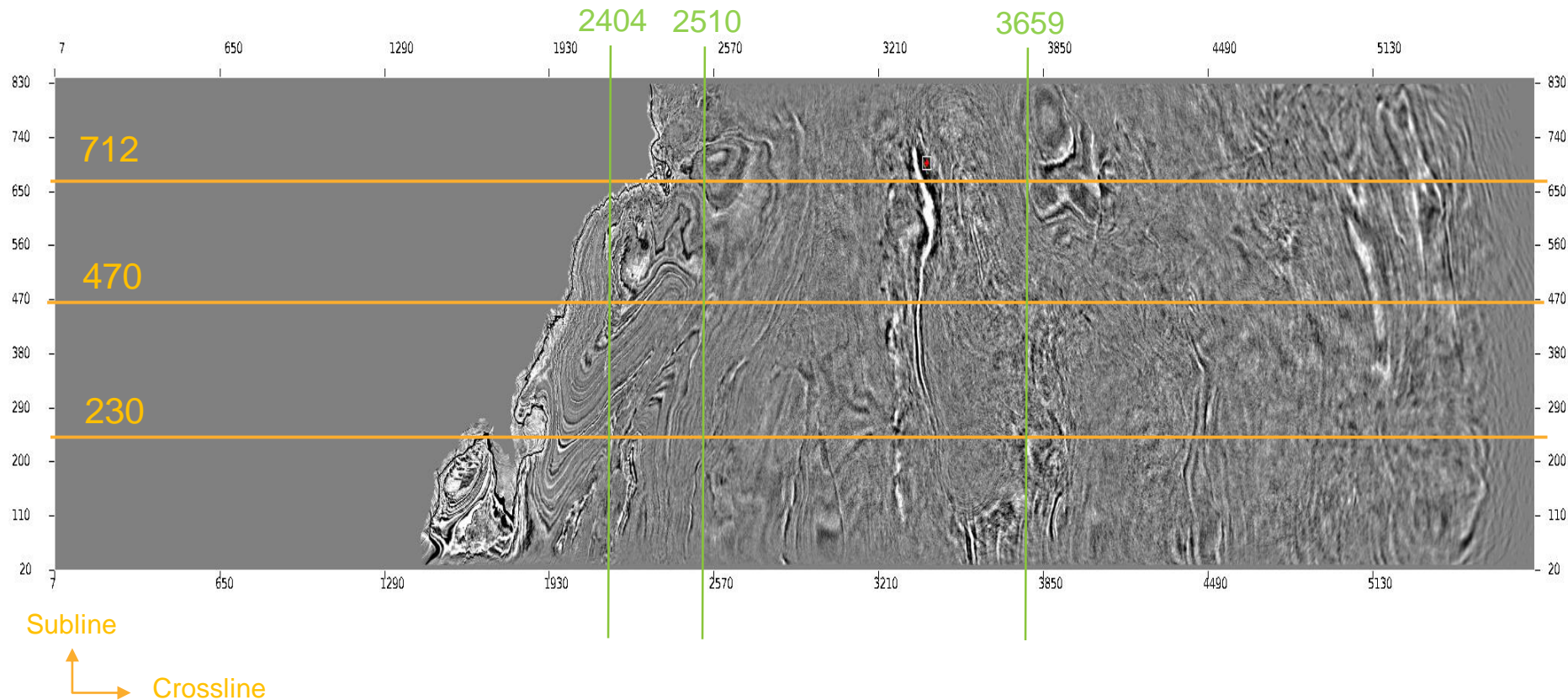
- **Display:**

Stack, common offset (subline, crossline).

- **Observation & Recommendation:**

Noise energy on common offset is attenuated and primaries are untouched. It's recommended to apply before migration.

* Sternfels, R., Viguier, G., Gondoin, R. and Le Meur, D, 2015, Multidimensional simultaneous random plus erratic noise attenuation and interpolation for seismic data by joint low-rank and sparse inversion: Geophysics, 80, No 6, WD129-WD141.

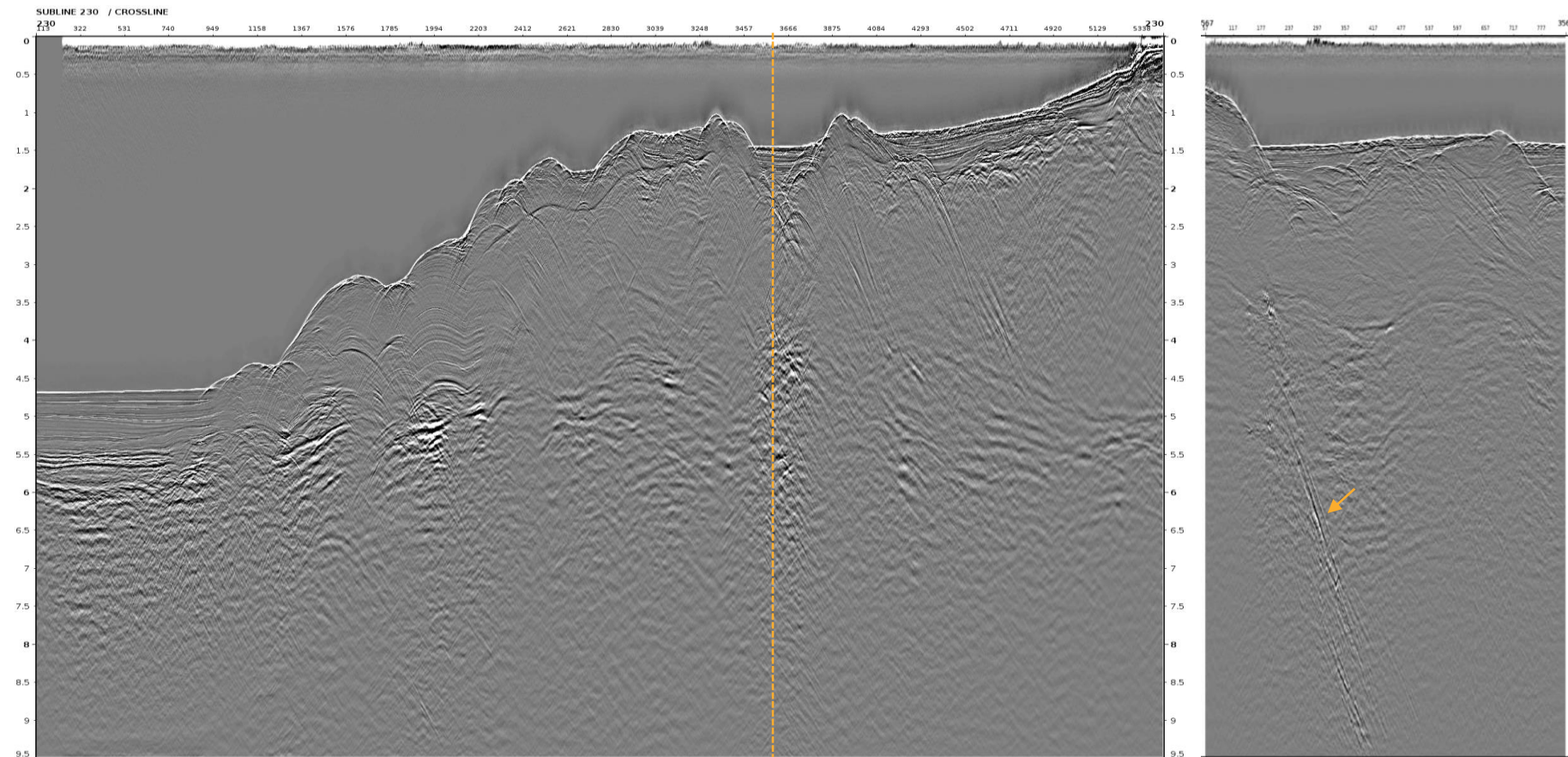


Stack

- subline 230
- subline 470
- subline 712

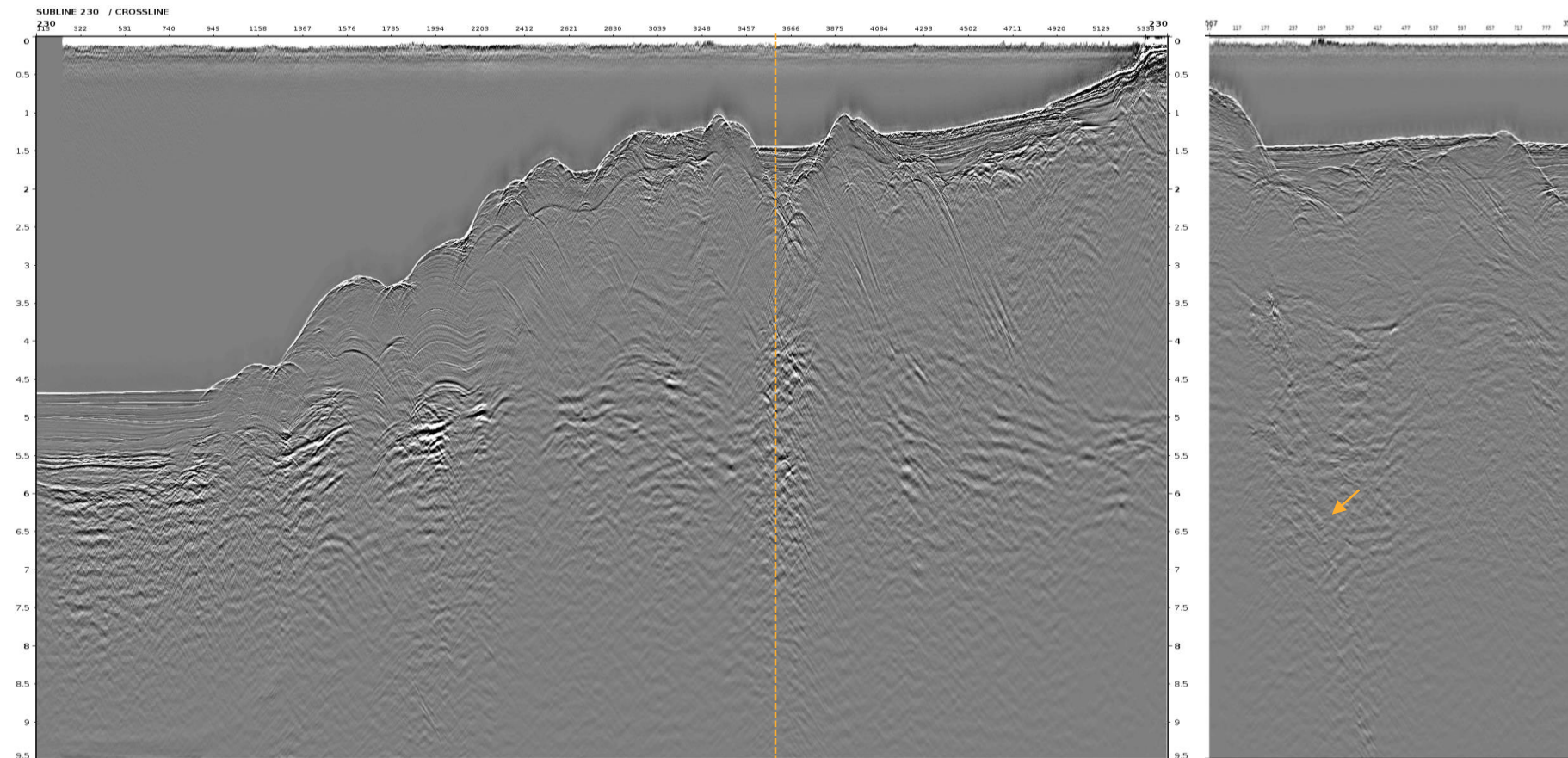
Stack before Common Offset Denoise

6



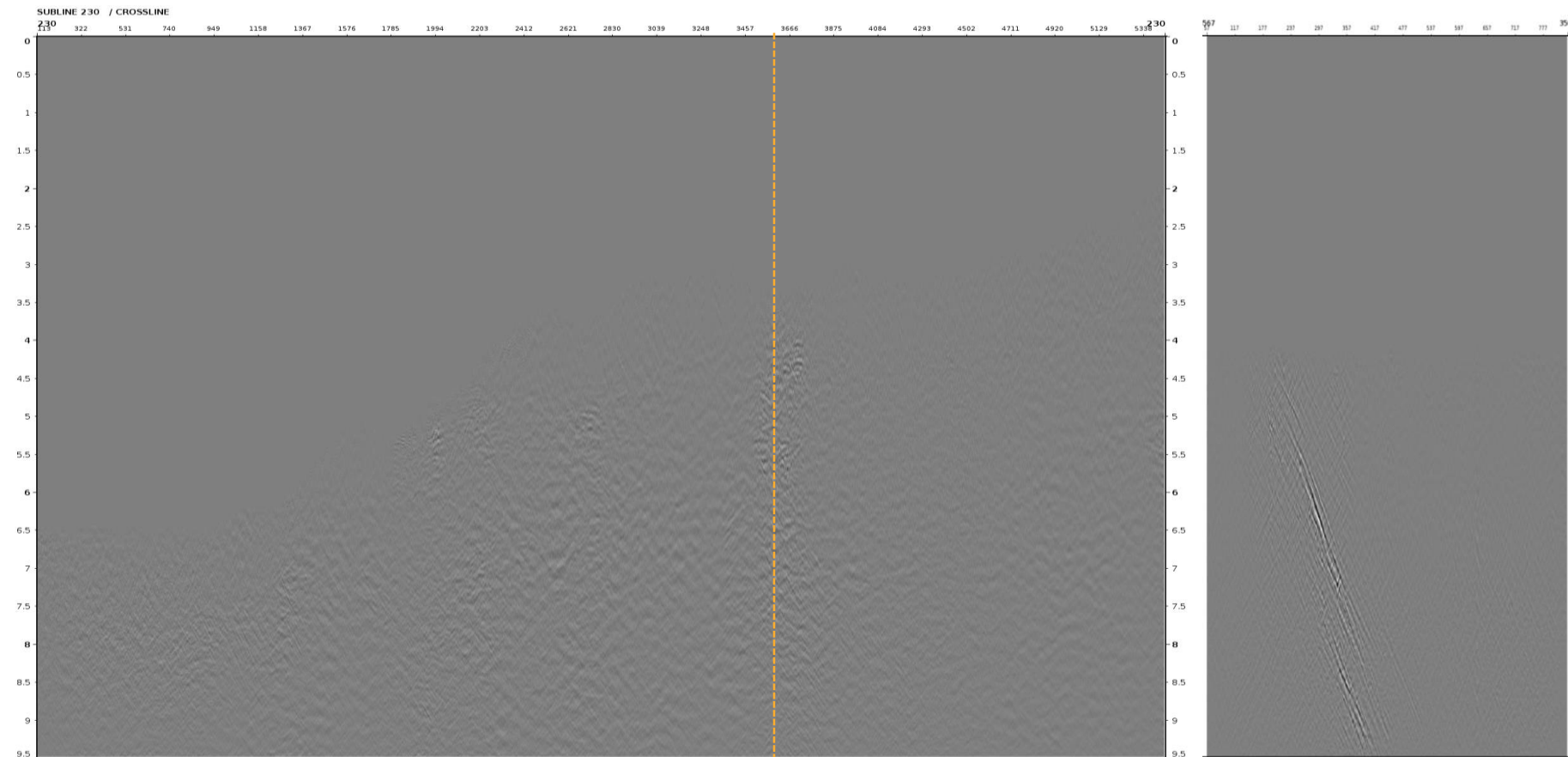
Stack after Common Offset Denoise

7





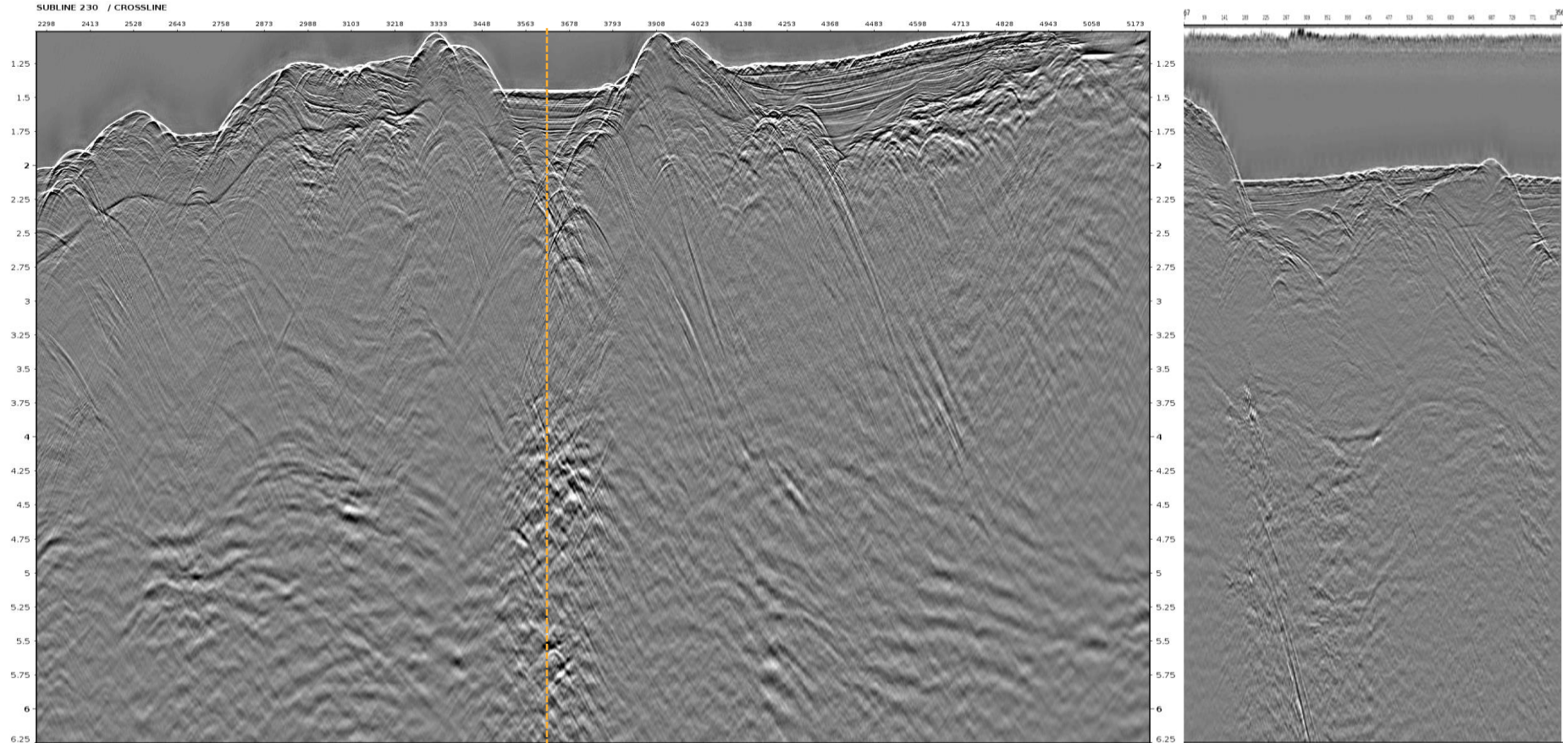
Difference before - after





Zoom in Stack before Common Offset Denoise

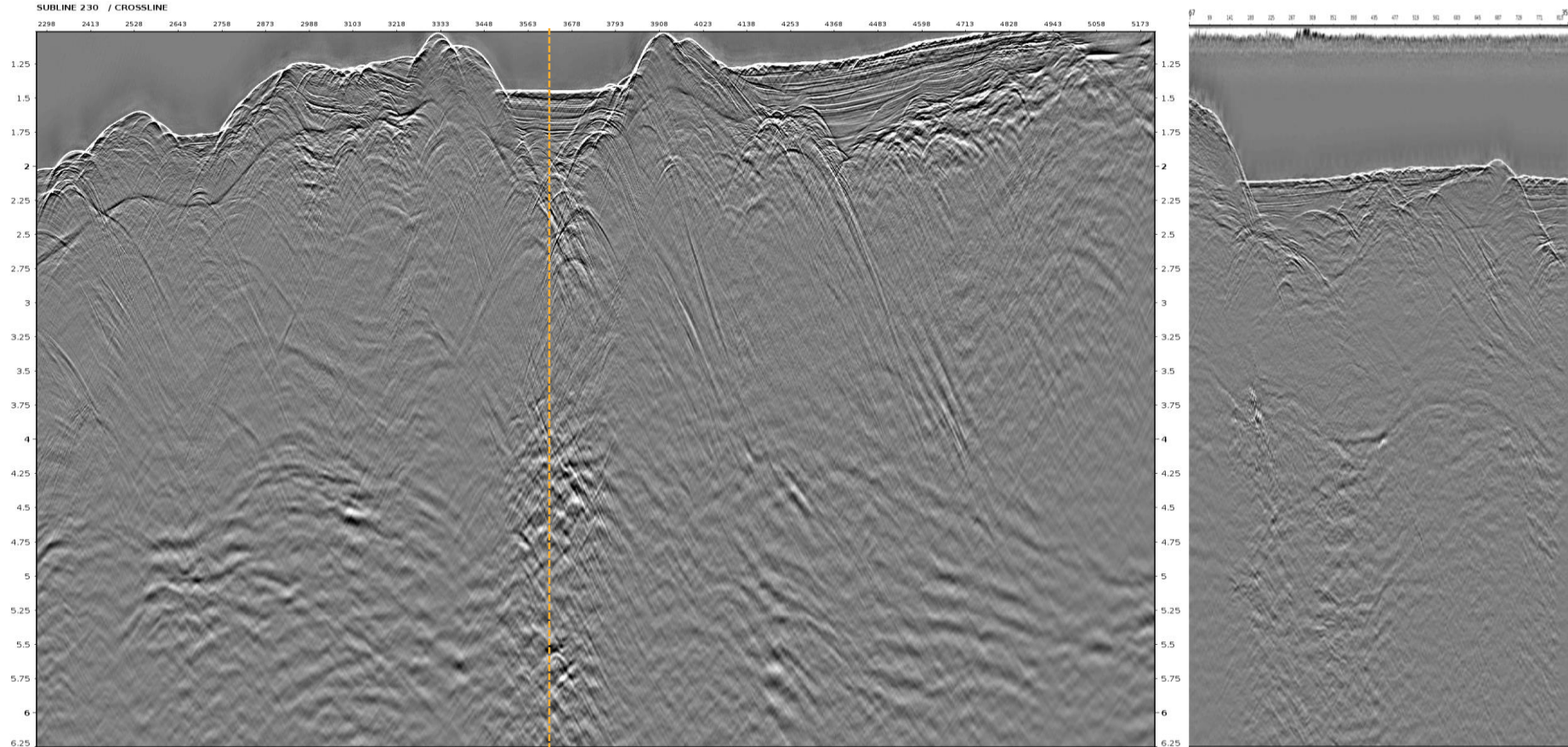
9





Zoom in Stack after Common Offset Denoise

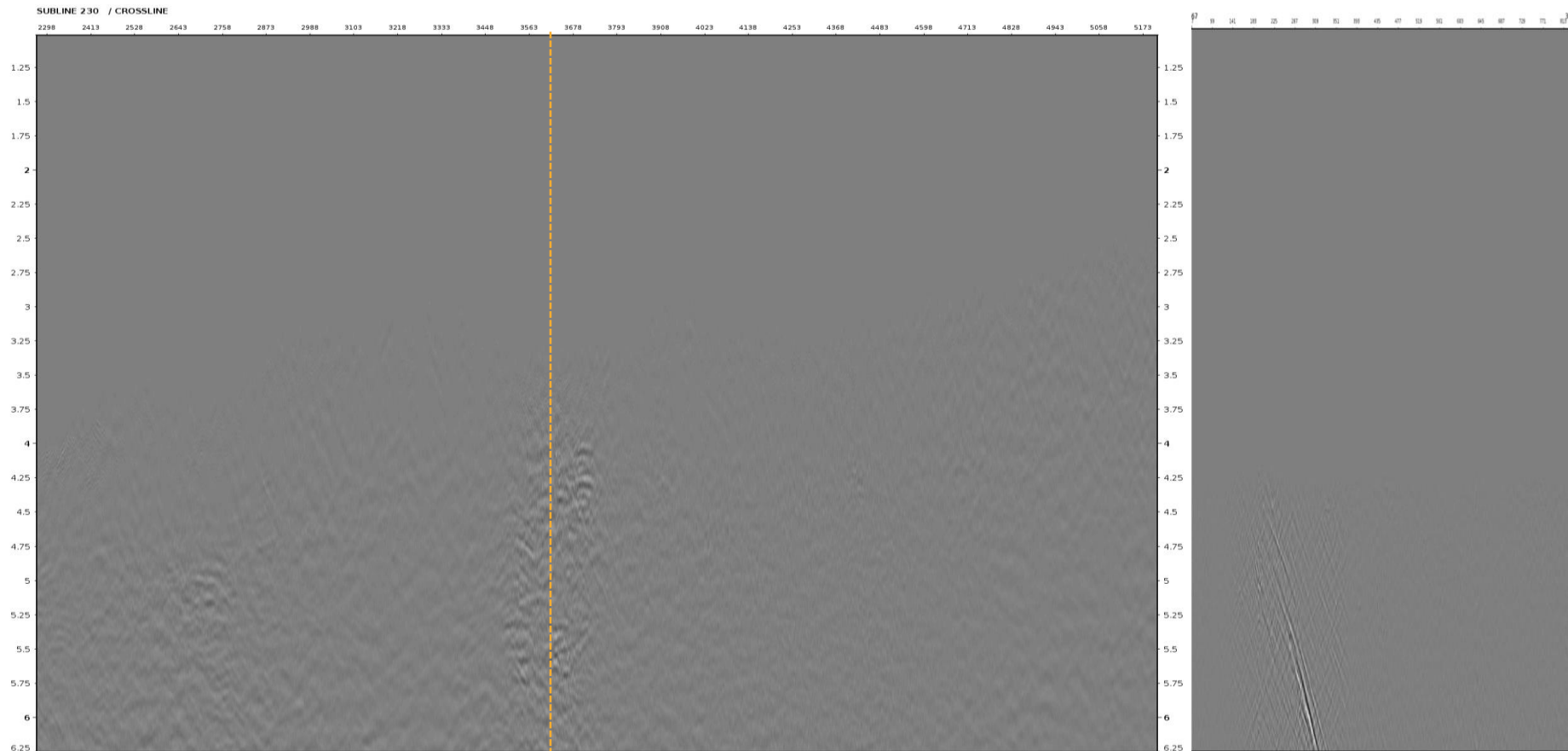
10





Difference before - after

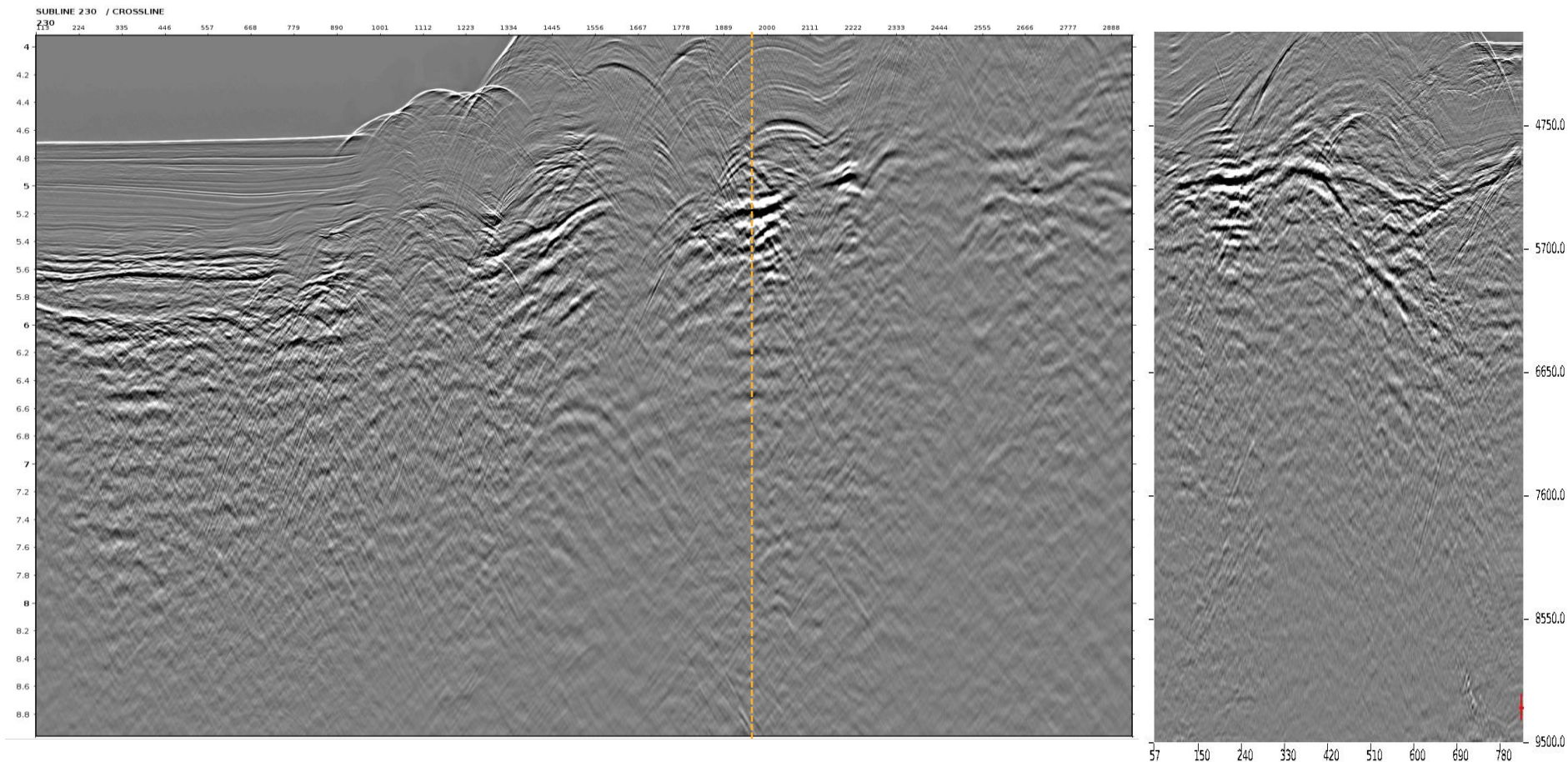
11





Zoom in Stack before Common Offset Denoise

12

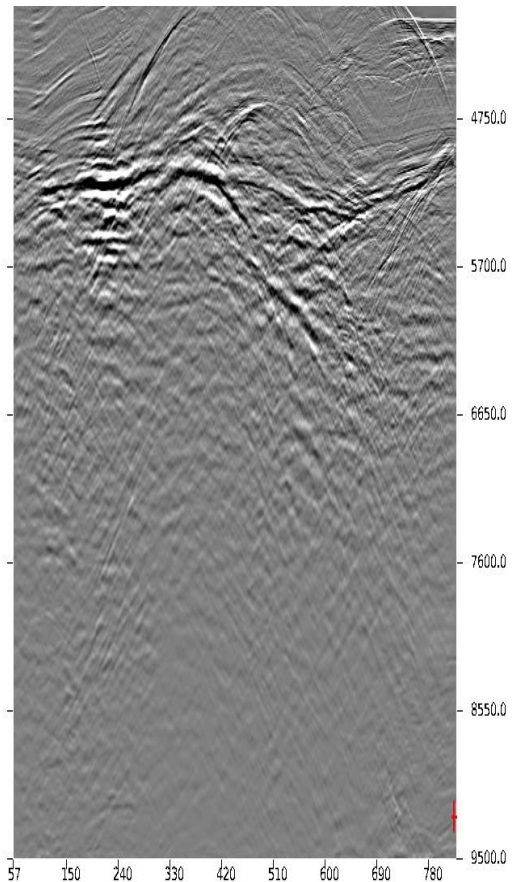
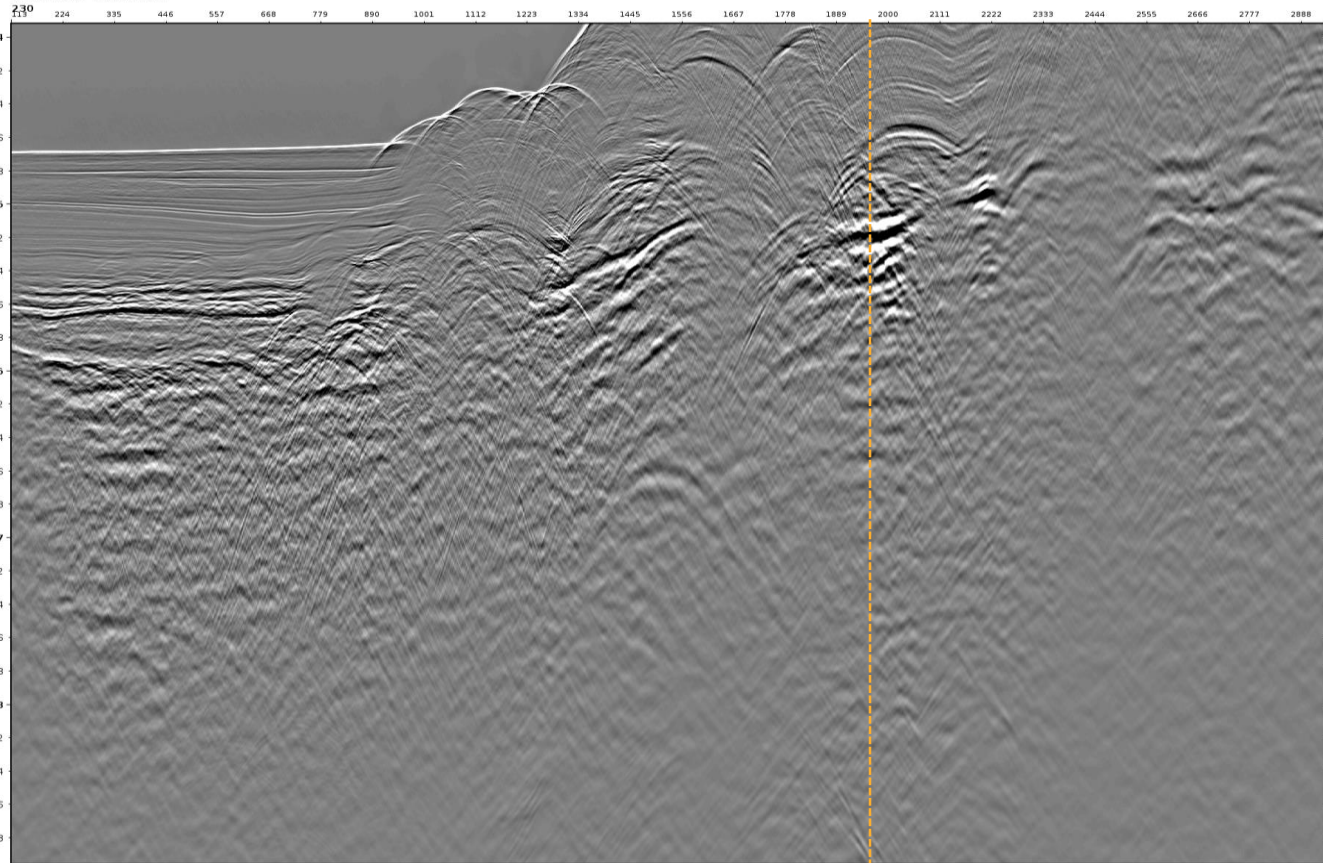




Zoom in Stack after Common Offset Denoise

13

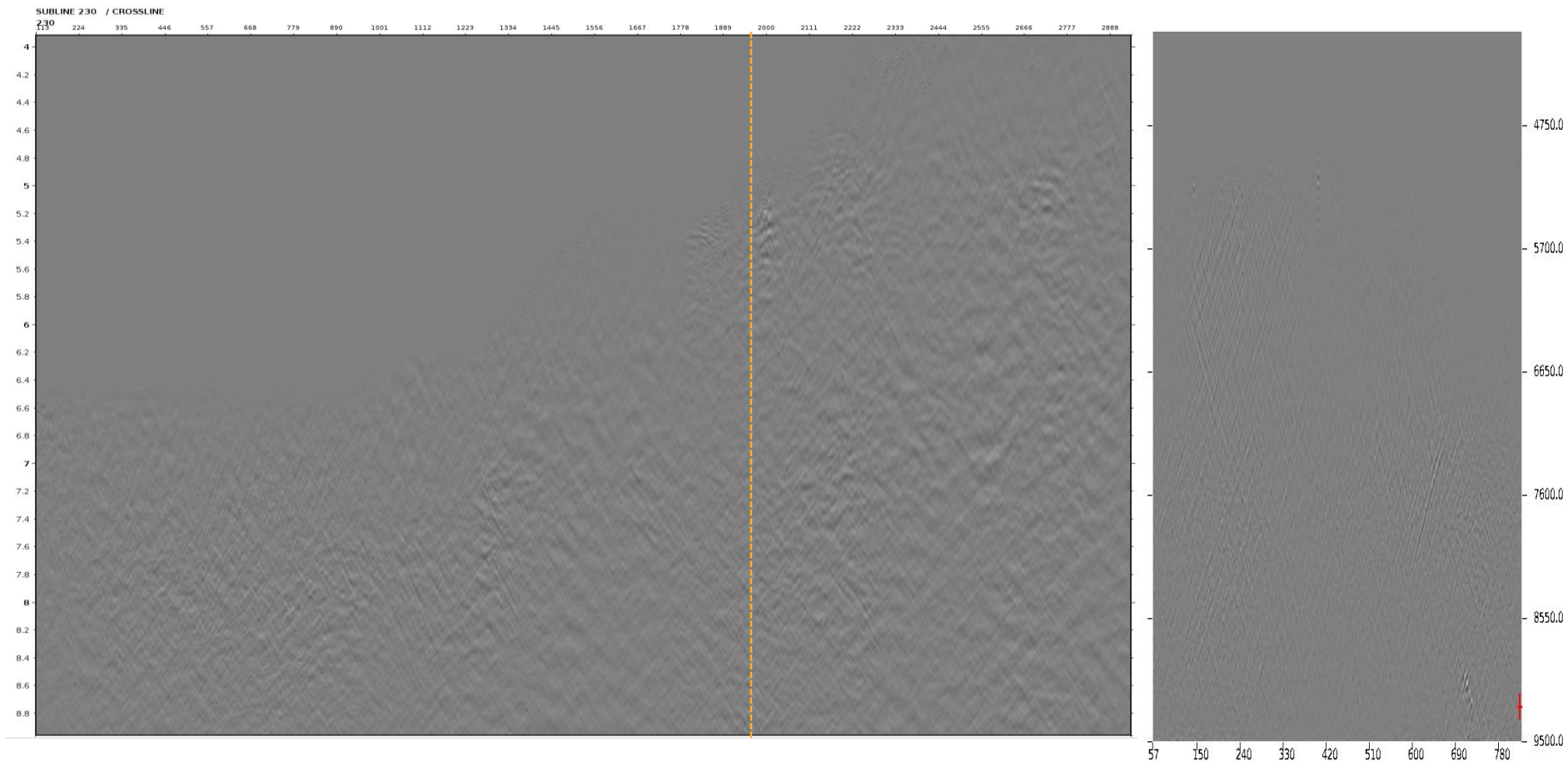
SUBLINE 230 / CROSSLINE





Difference before - after

14



Common Offset Subline 230

- offset 350m
- offset 1750m
- offset 4050m

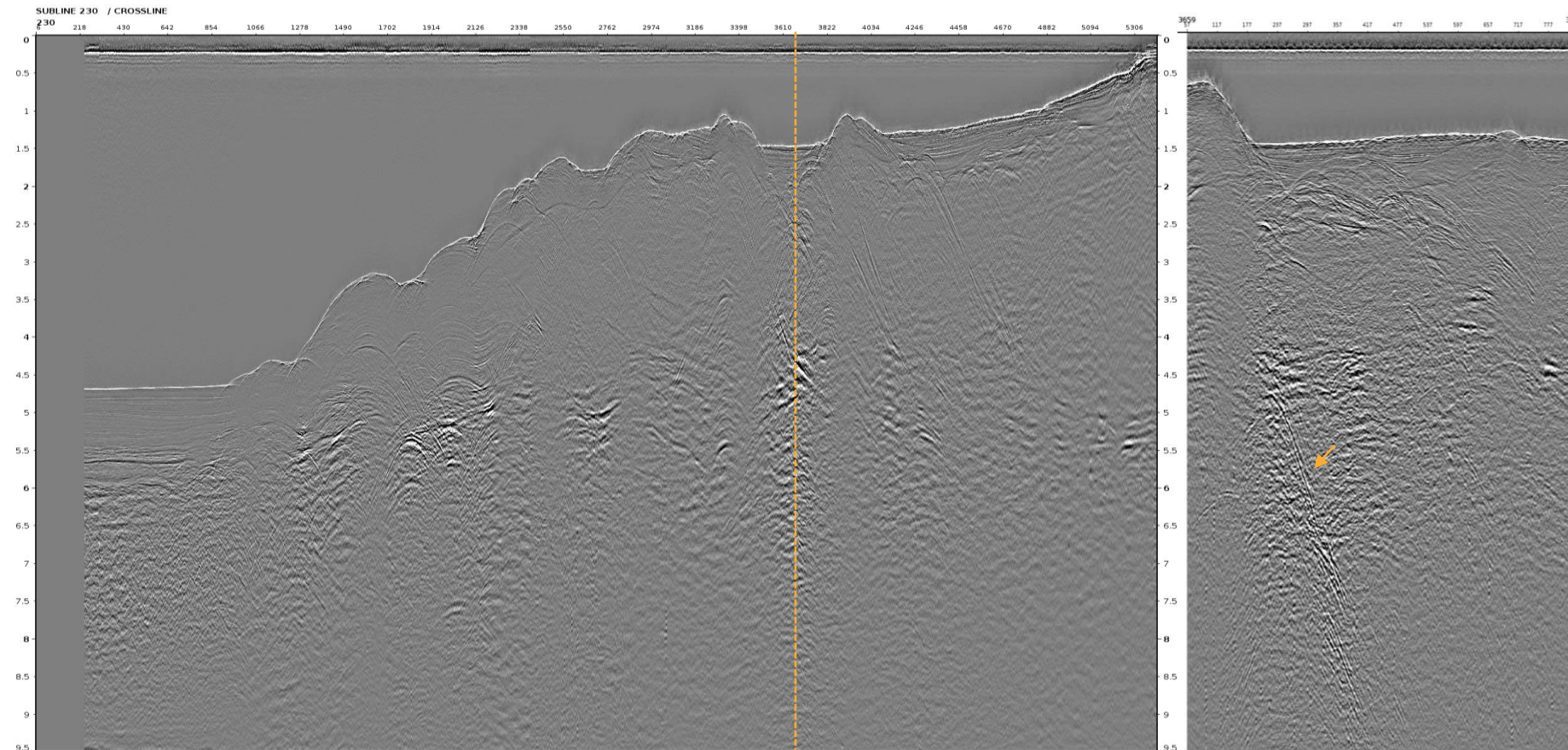


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IL 230 Common Offset 350m before Common Offset Denoise

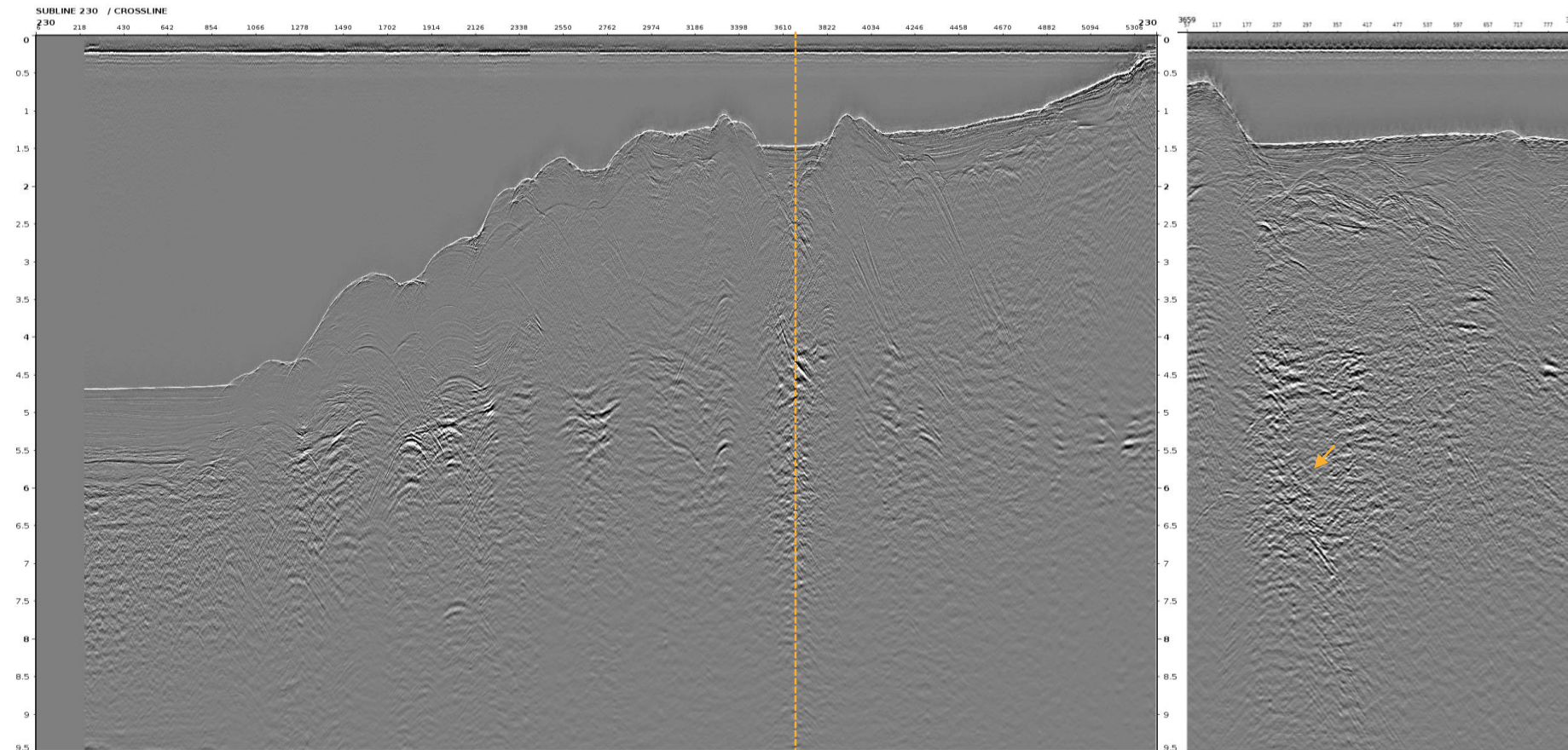
16





IL 230 Common Offset 350m **after** Common Offset Denoise

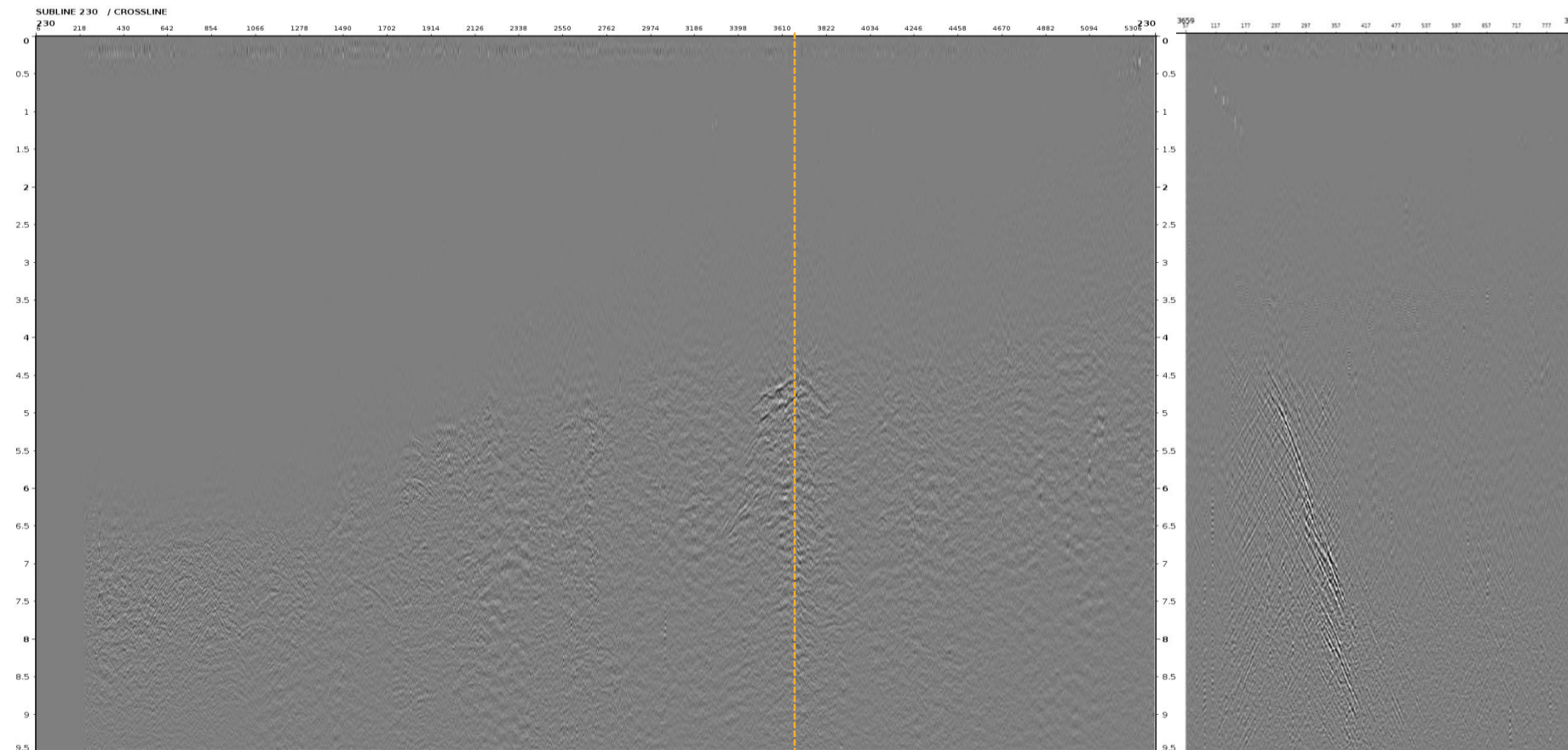
17

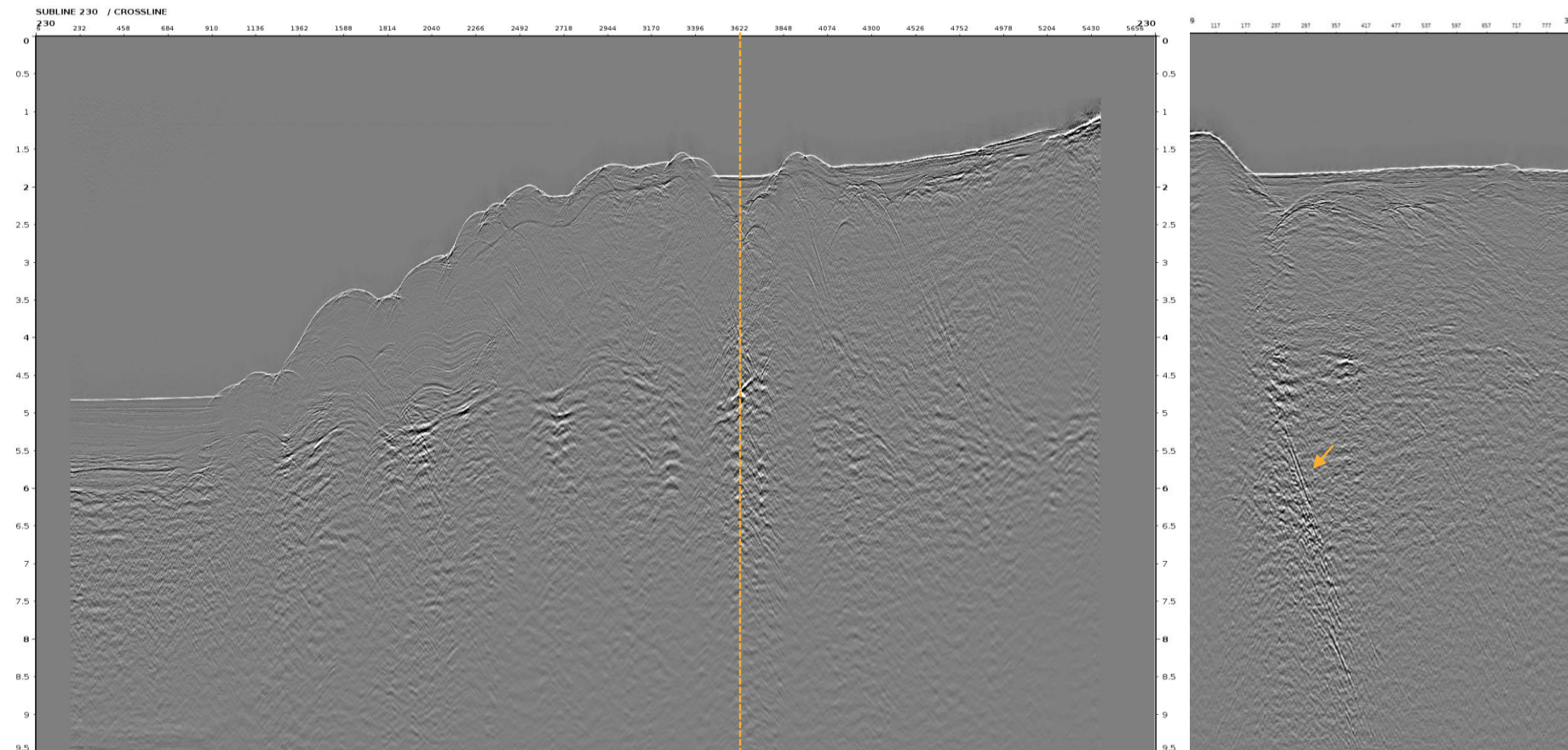




Difference before - after

18

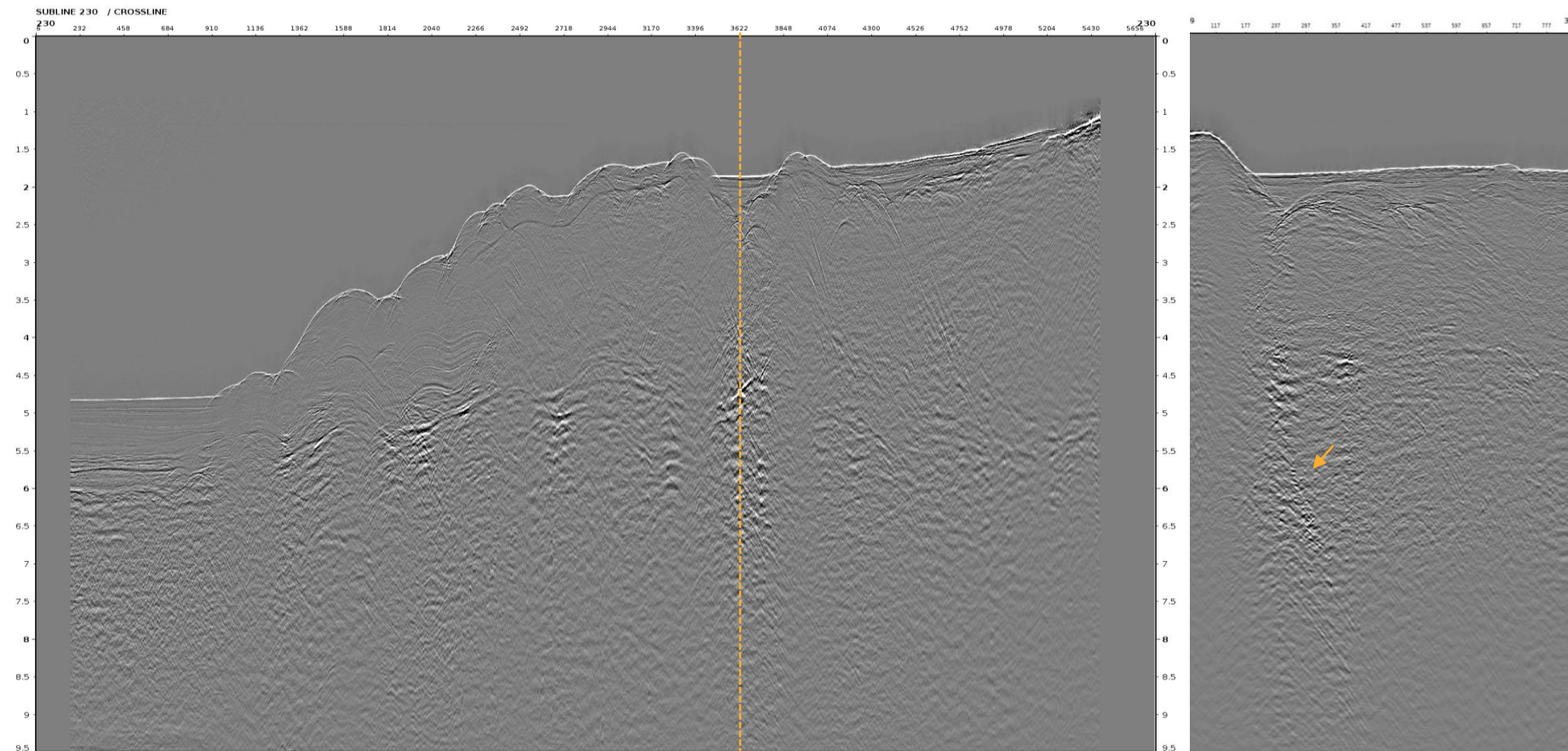






IL 230 Common Offset 1750m after Common Offset Denoise

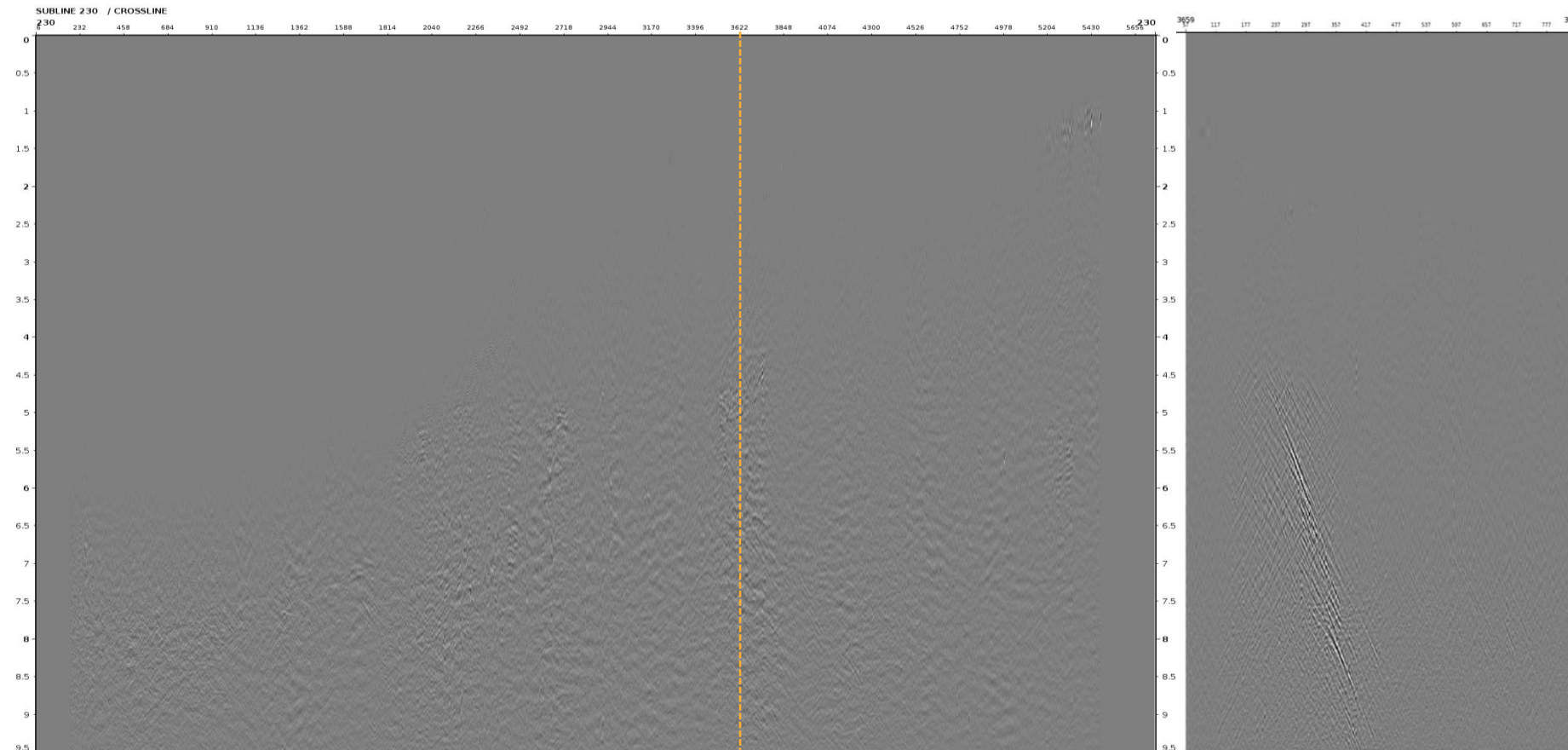
20

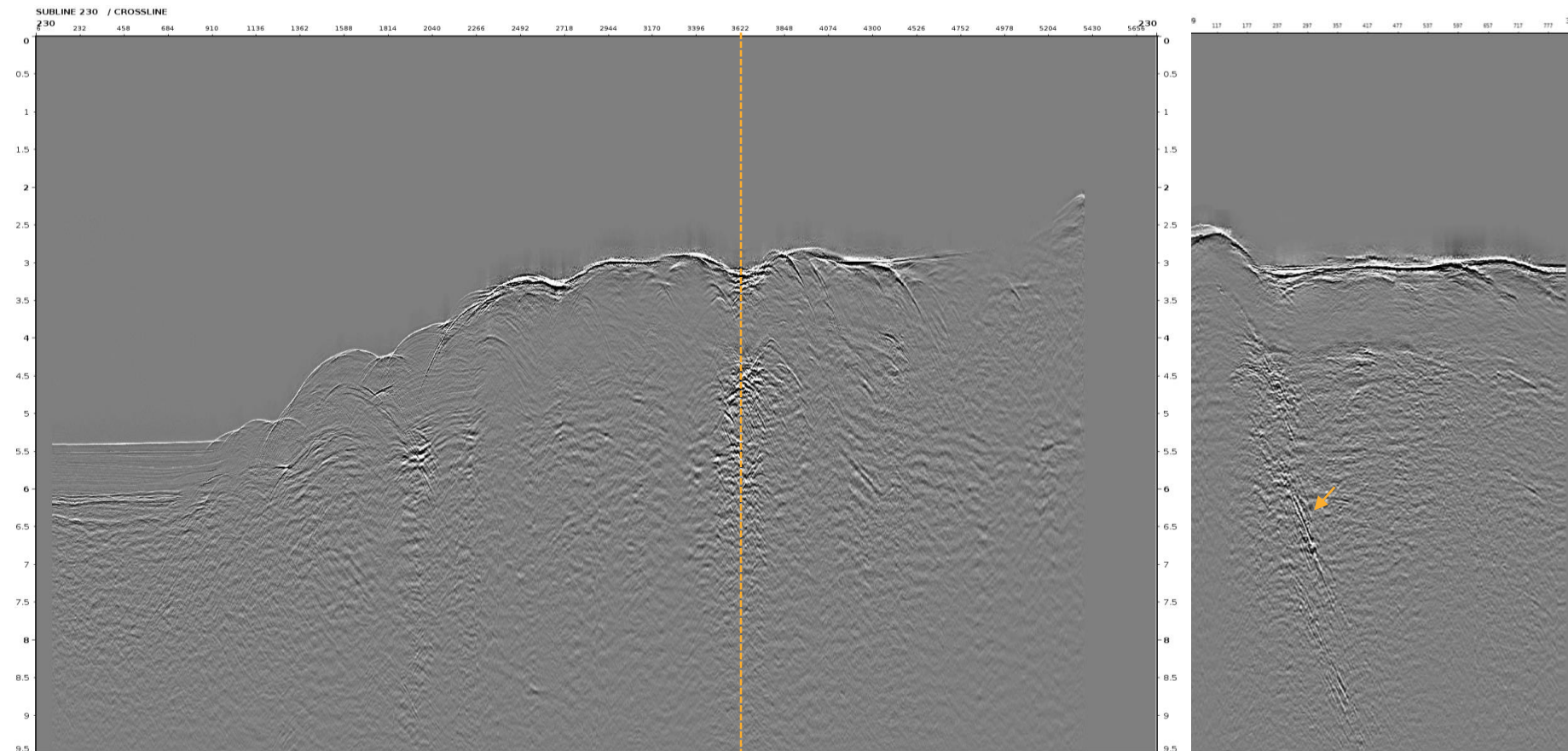




Difference before - after

21

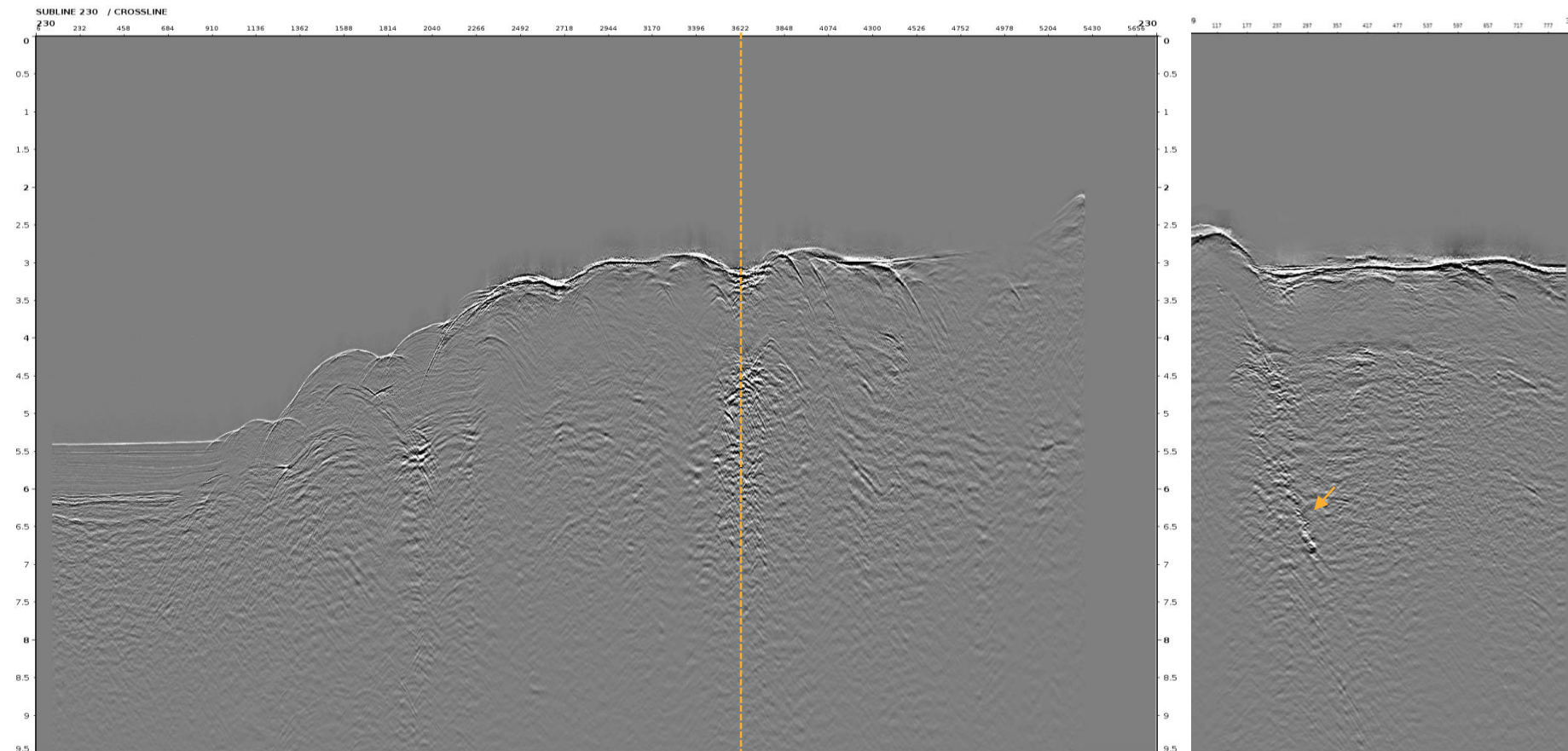






IL 230 Common Offset 4050m after Common Offset Denoise

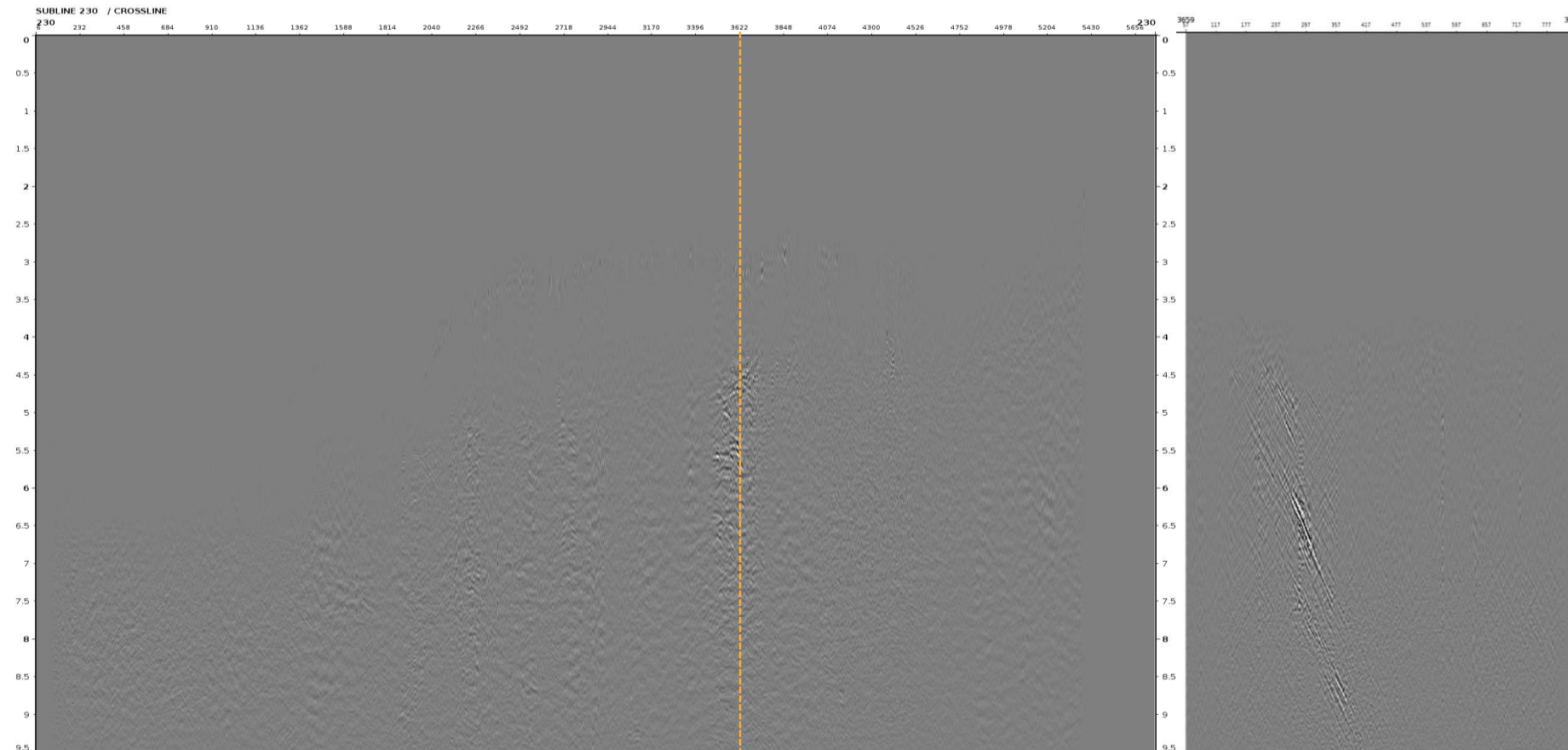
23





Difference before - after

24

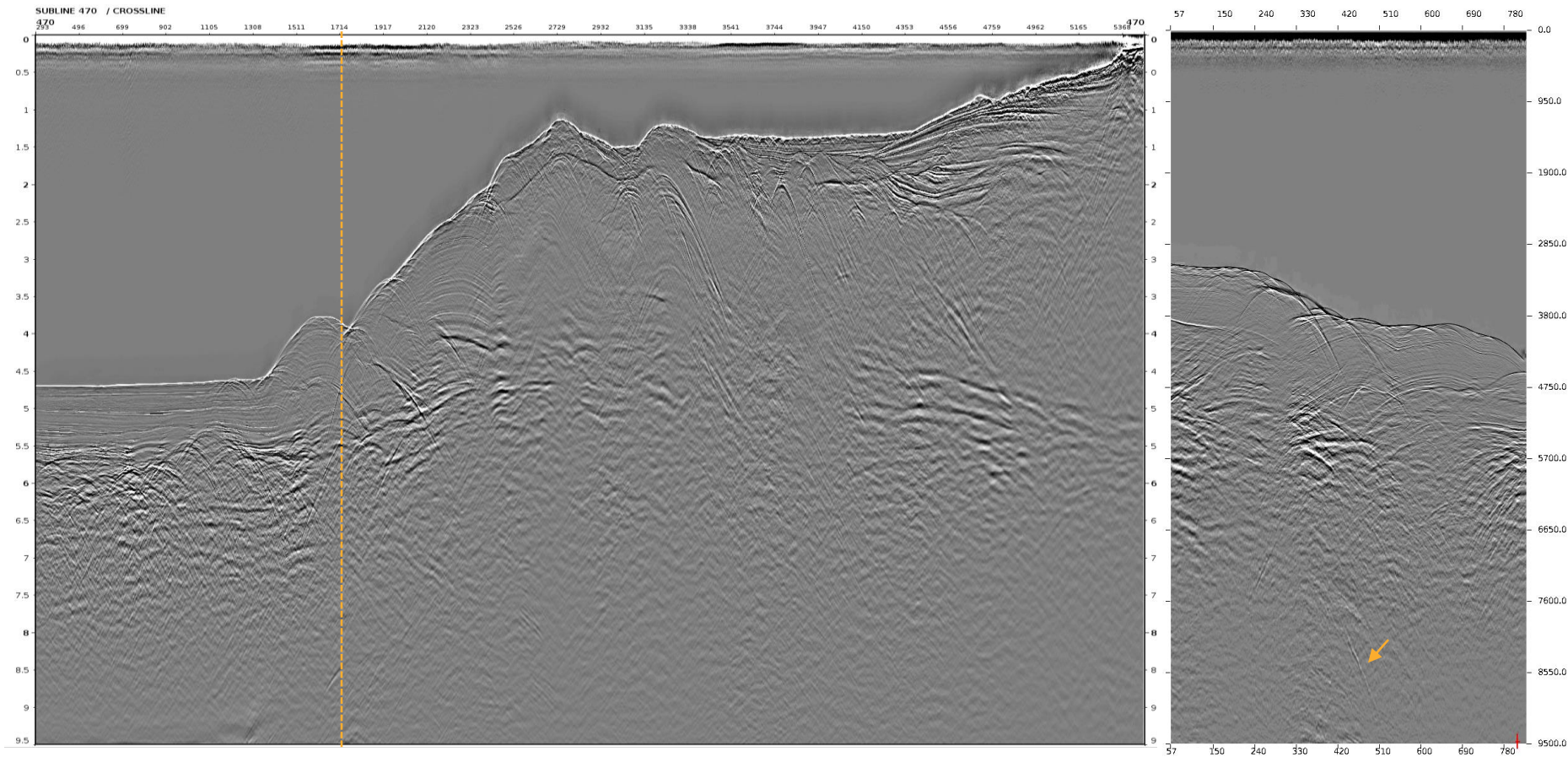


Stack

- subline 230
- **subline 470**
- subline 712

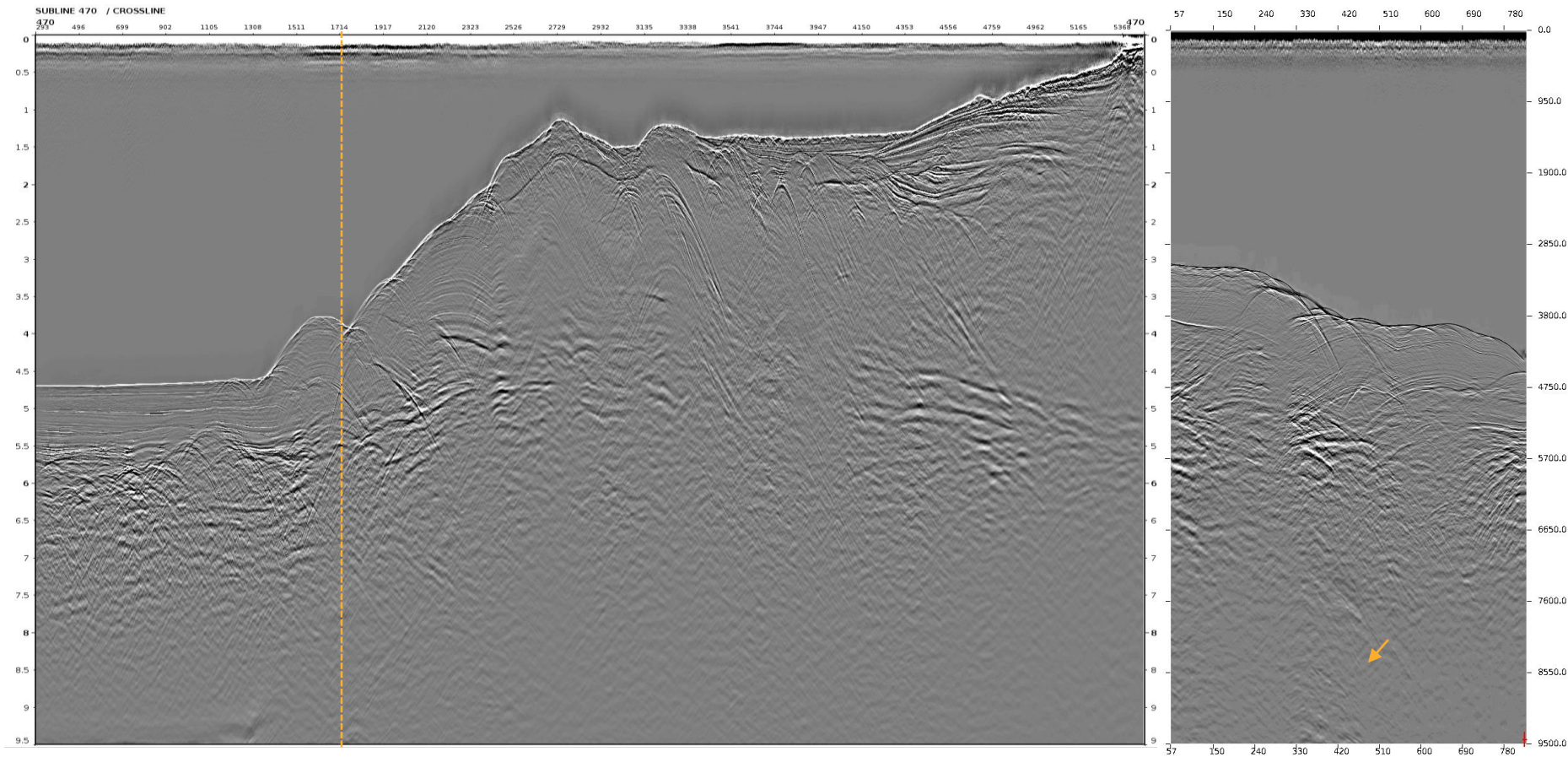
Stack before Common Offset Denoise

26



Stack after Common Offset Denoise

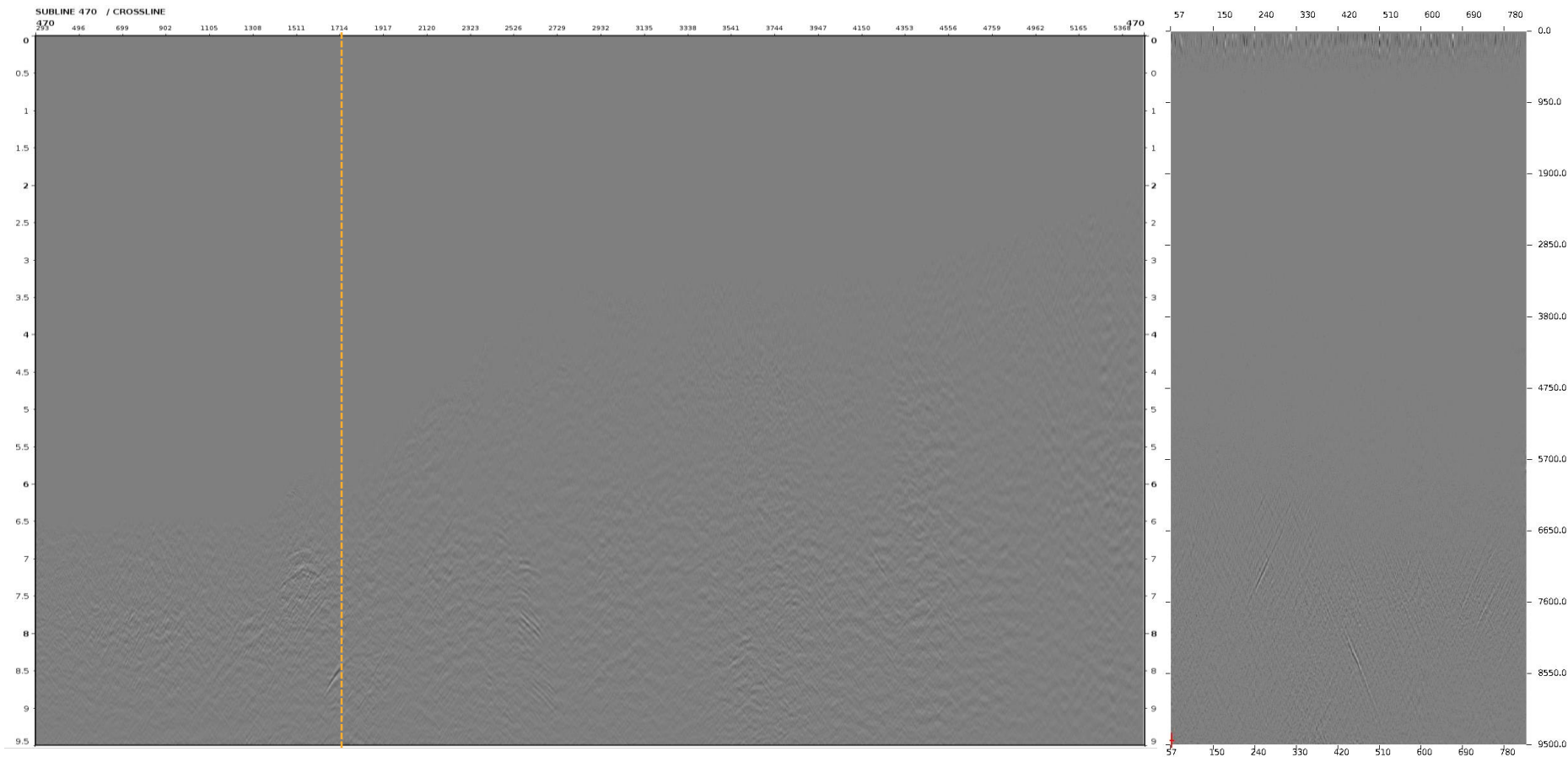
27





Difference before - after

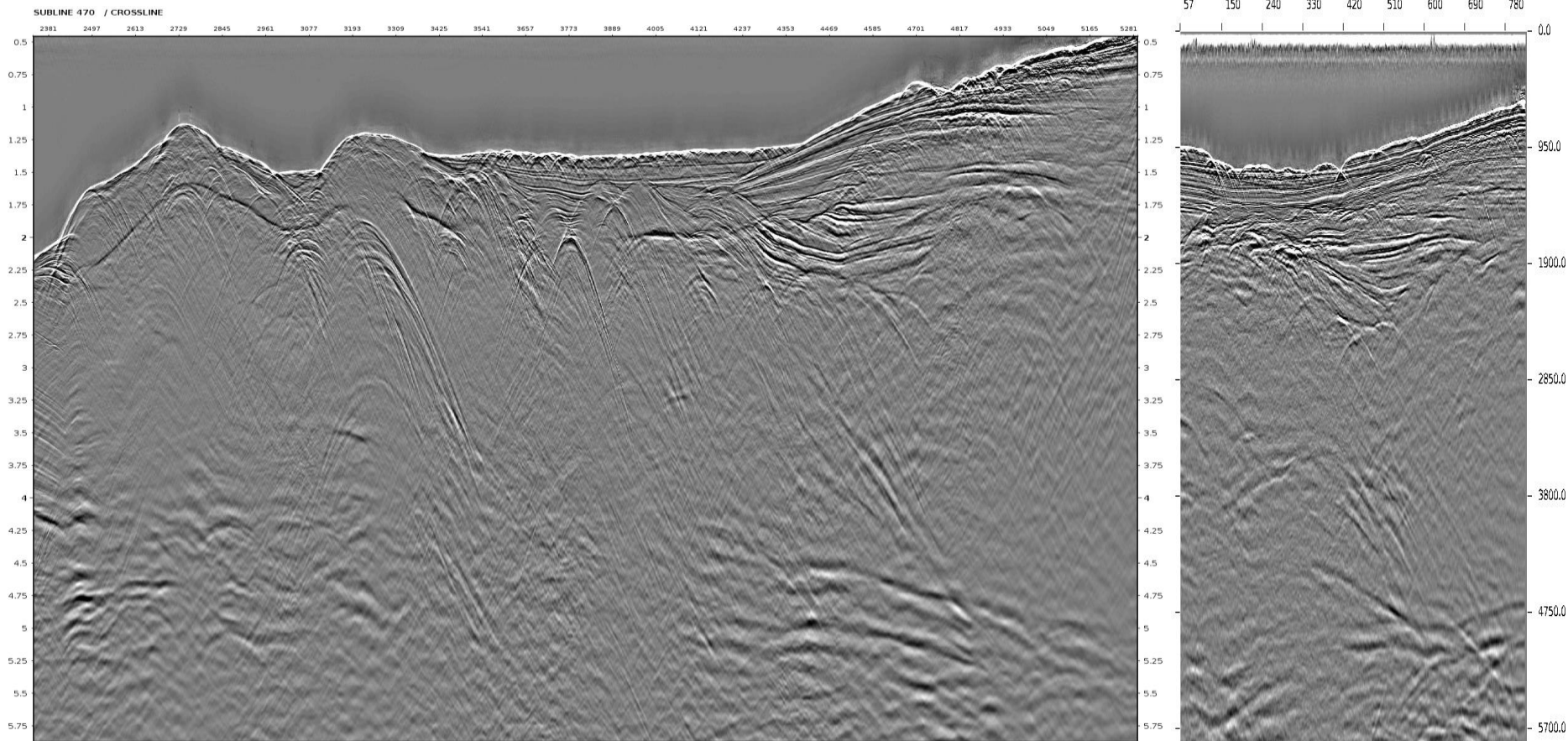
28





Zoom in Stack before Common Offset Denoise

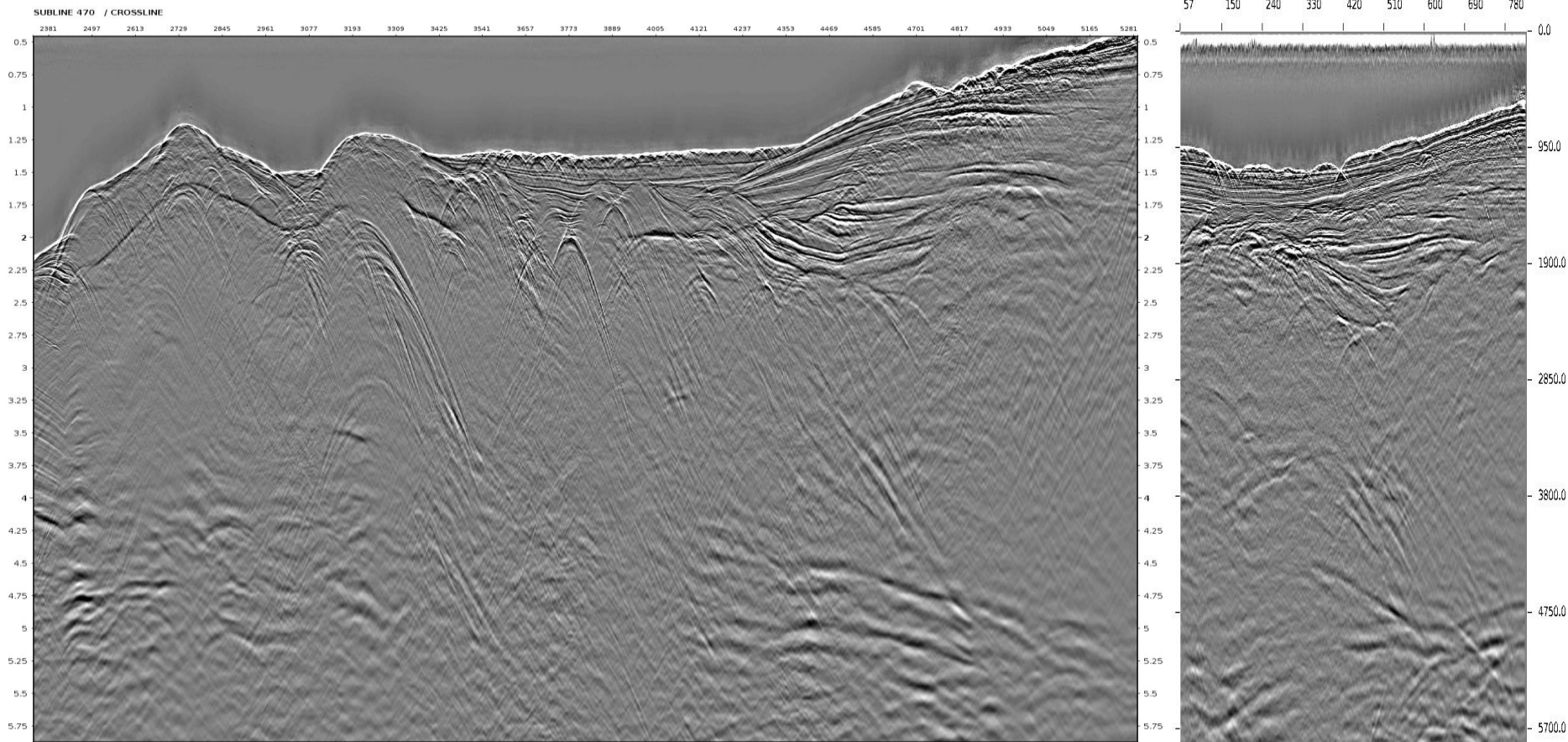
29





Zoom in Stack after Common Offset Denoise

30





Difference before - after

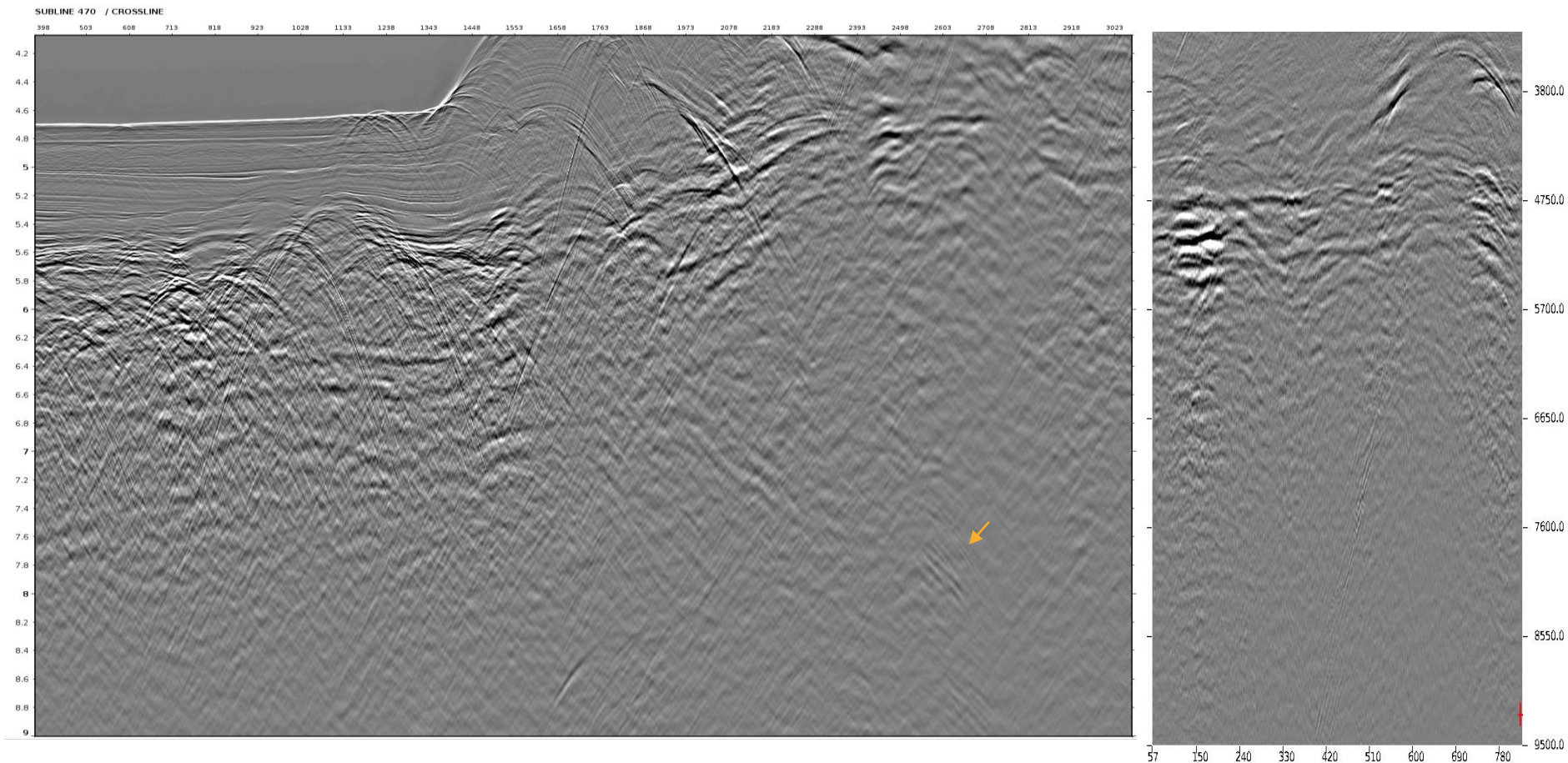
31





Zoom in Stack before Common Offset Denoise

32

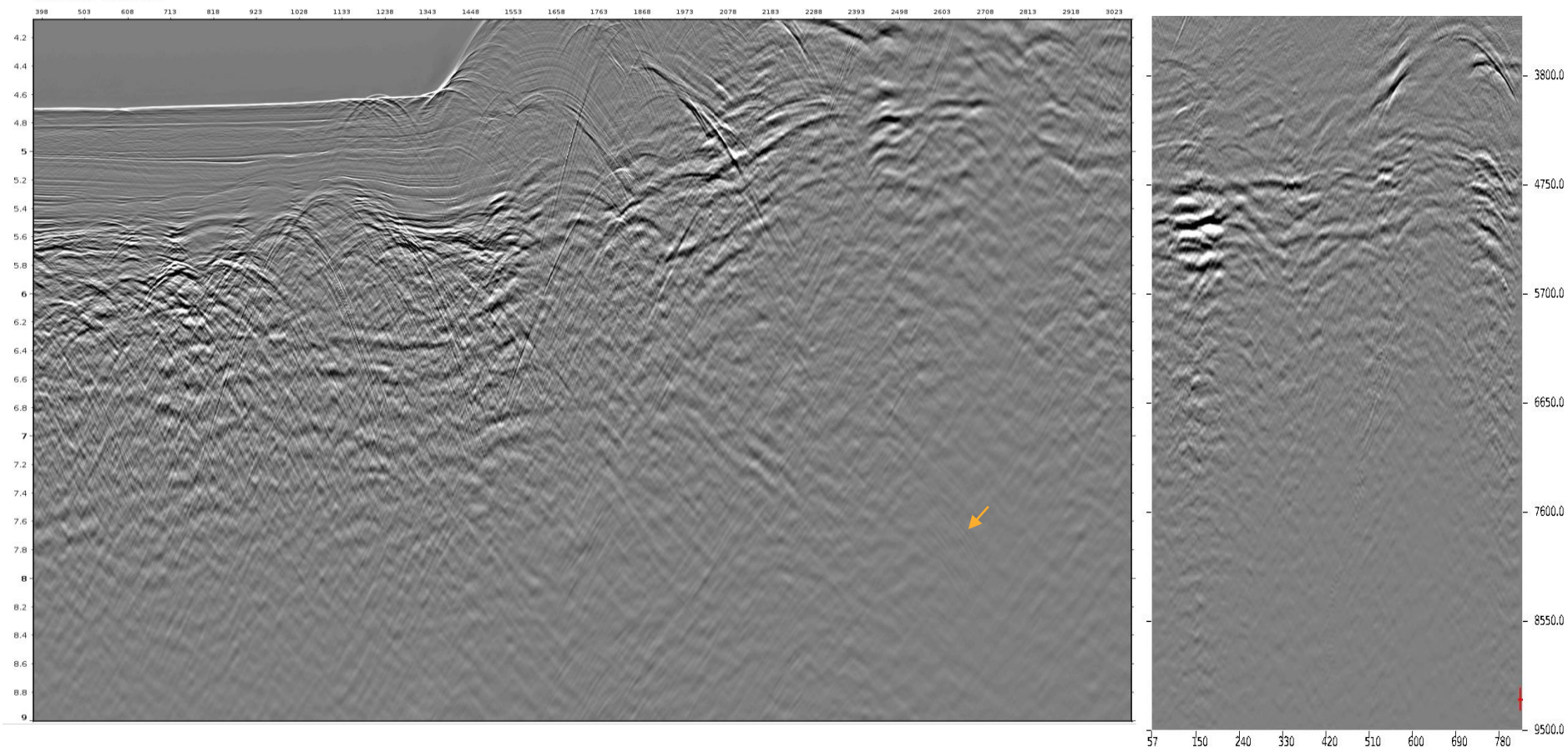


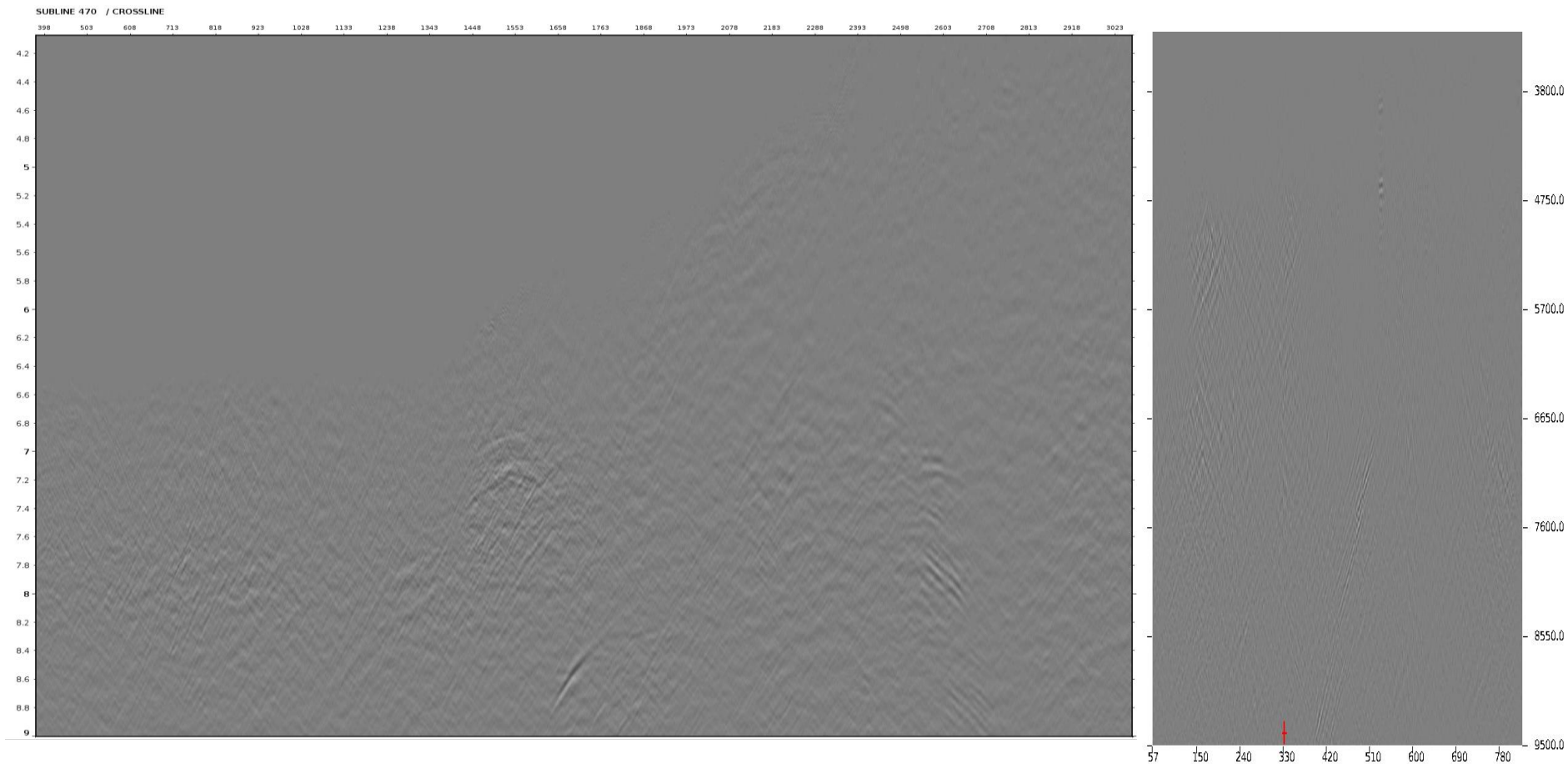


Zoom in Stack after Common Offset Denoise

33

SUBLINE 470 / CROSSLINE





Common Offset Subline 470

- offset 350m
- offset 1750m
- offset 4050m

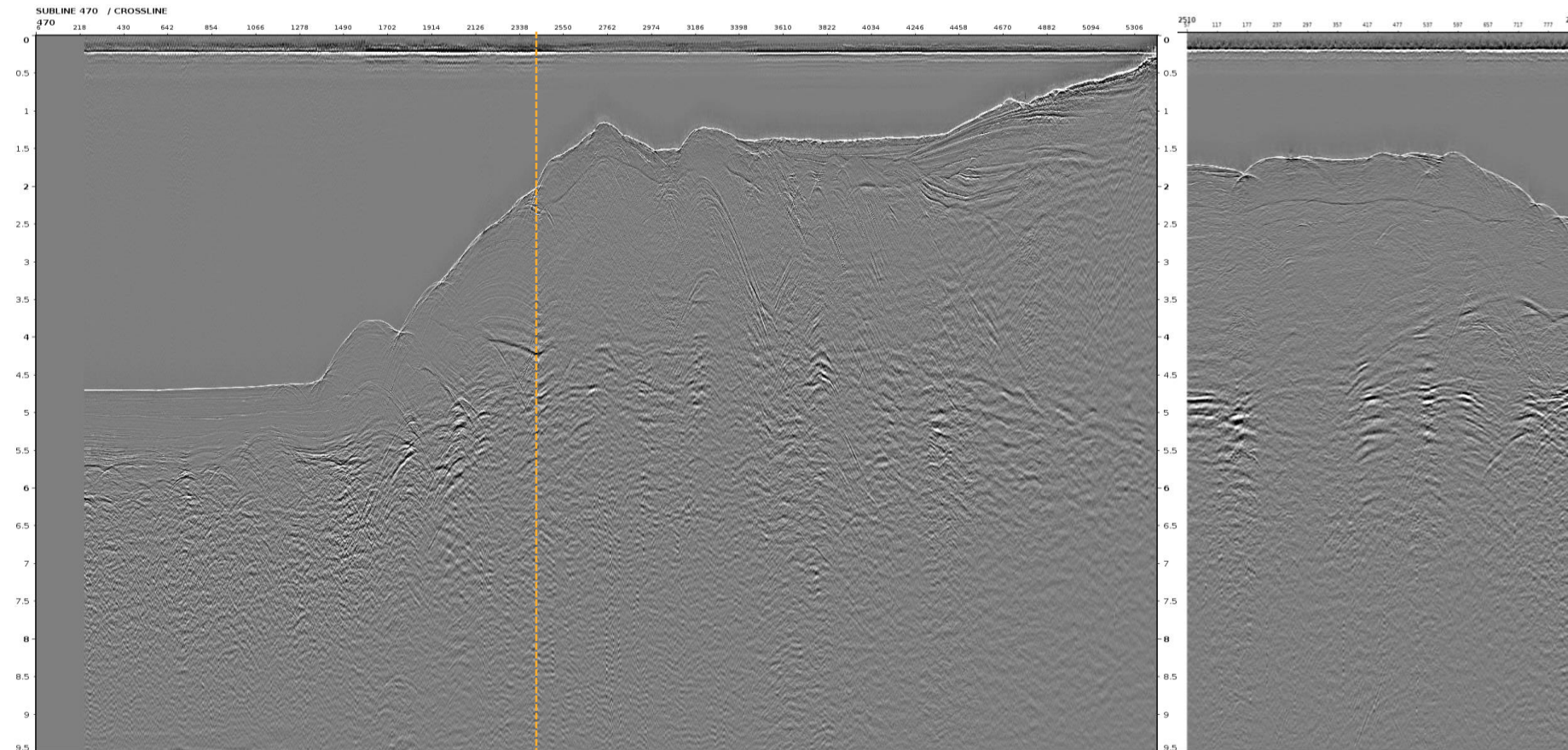


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IL 470 Common Offset 350m before Common Offset Denoise

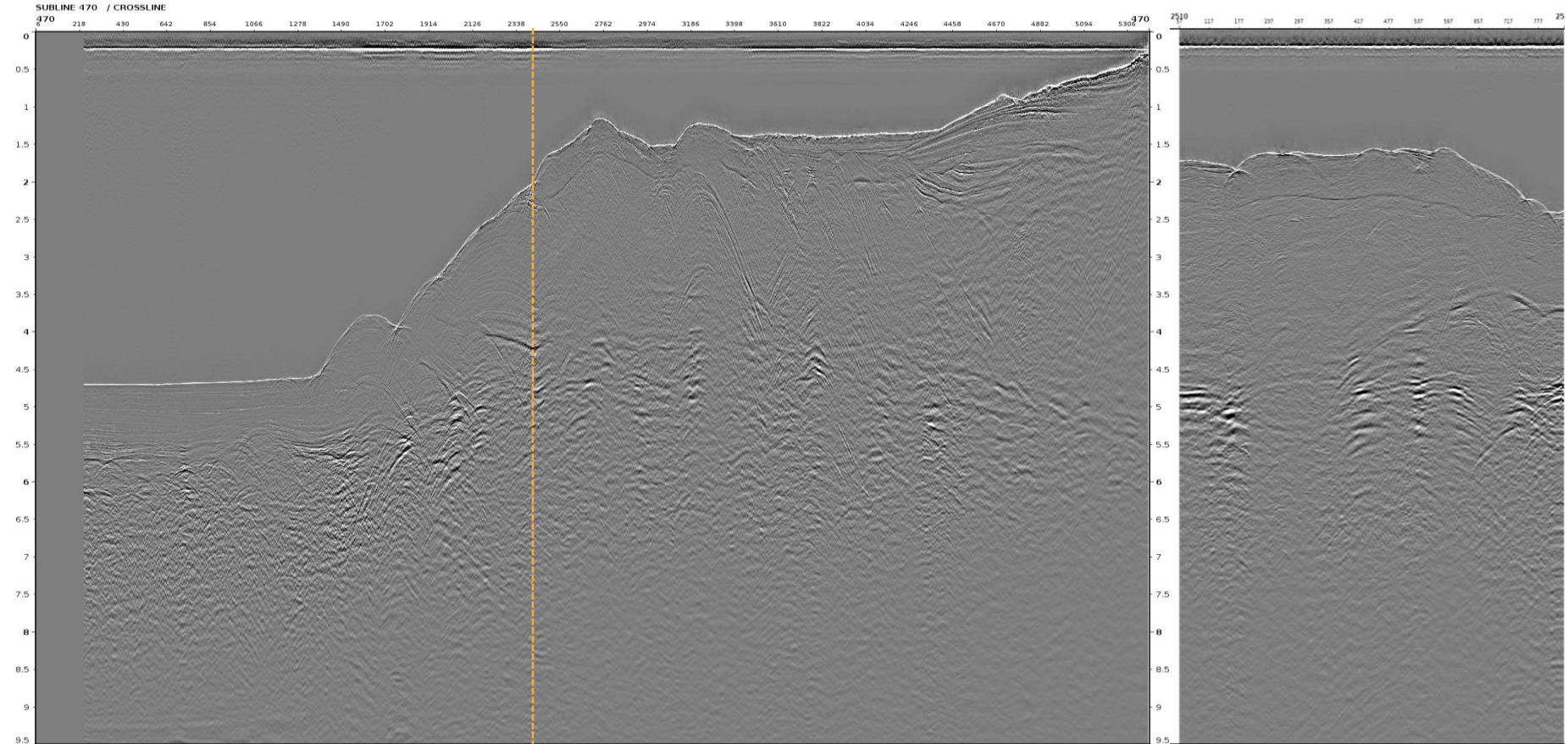
36





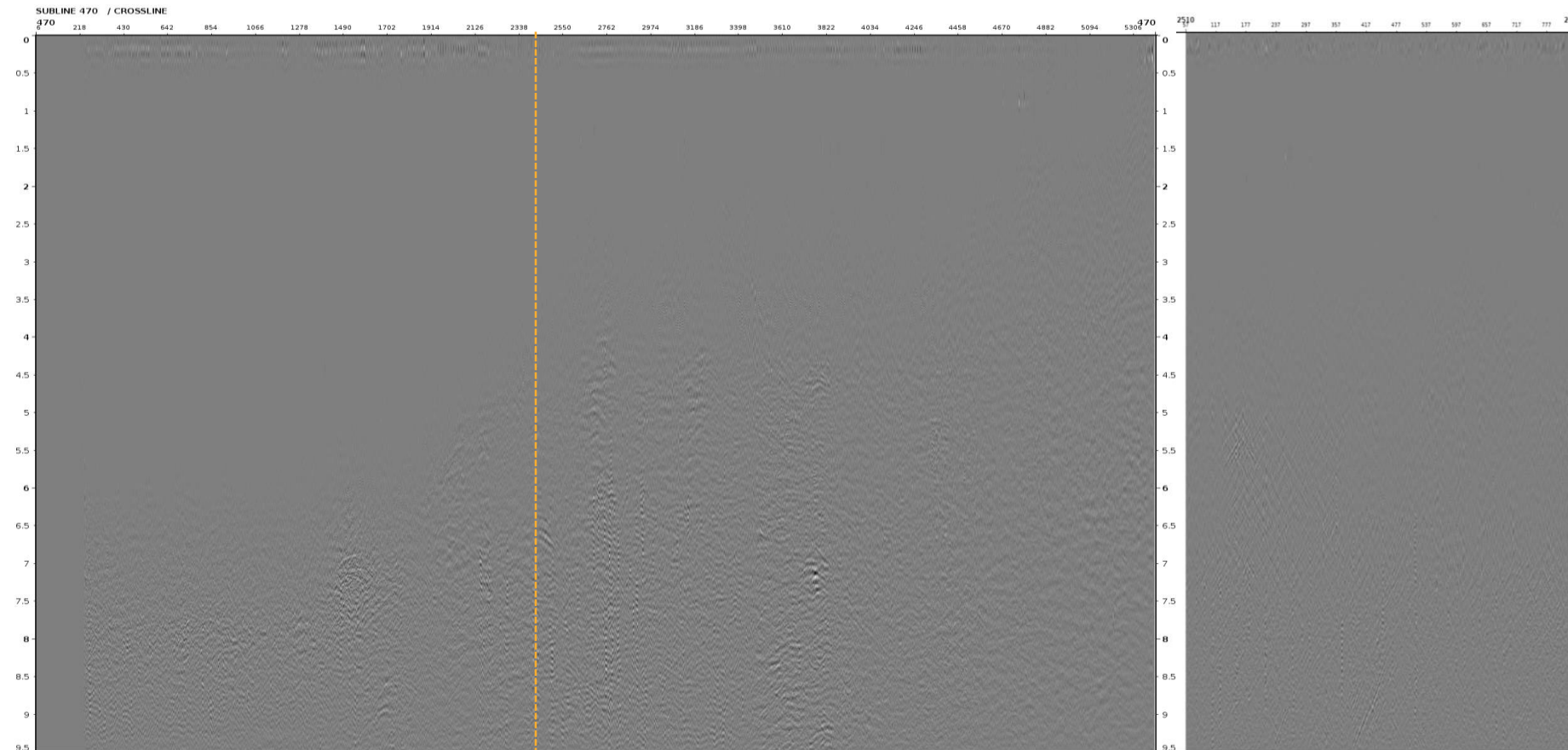
IL 470 Common Offset 350m **after** Common Offset Denoise

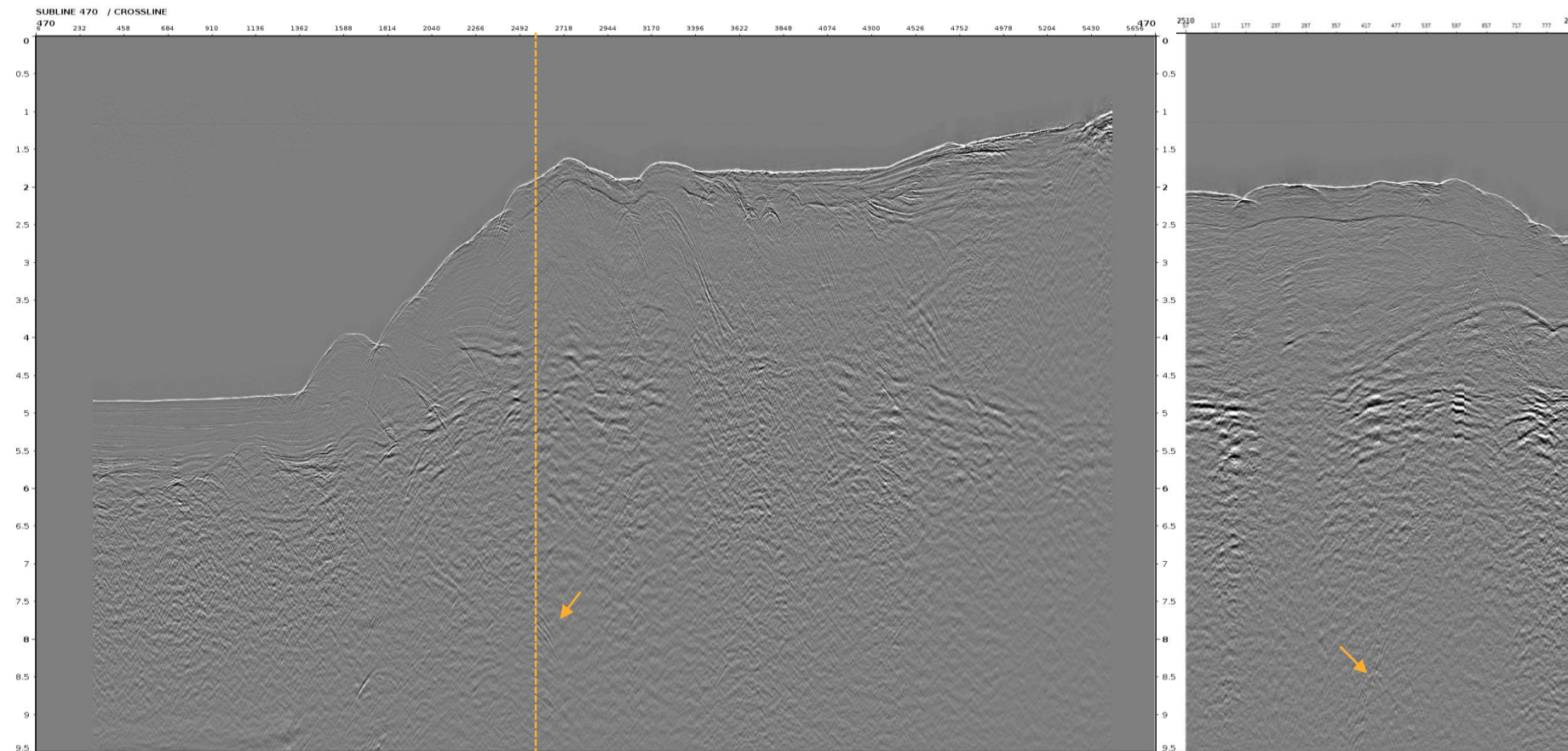
37





Difference before - after

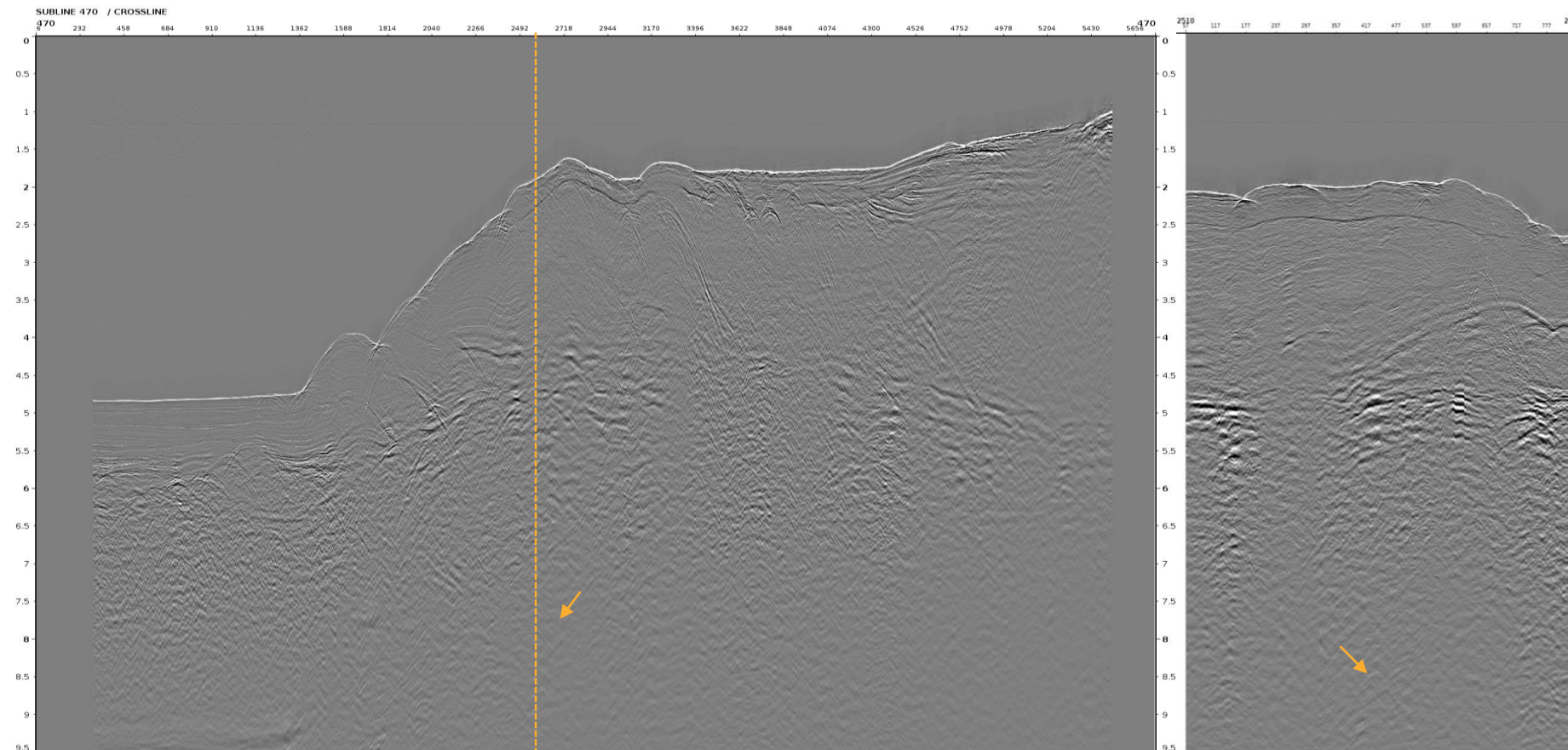






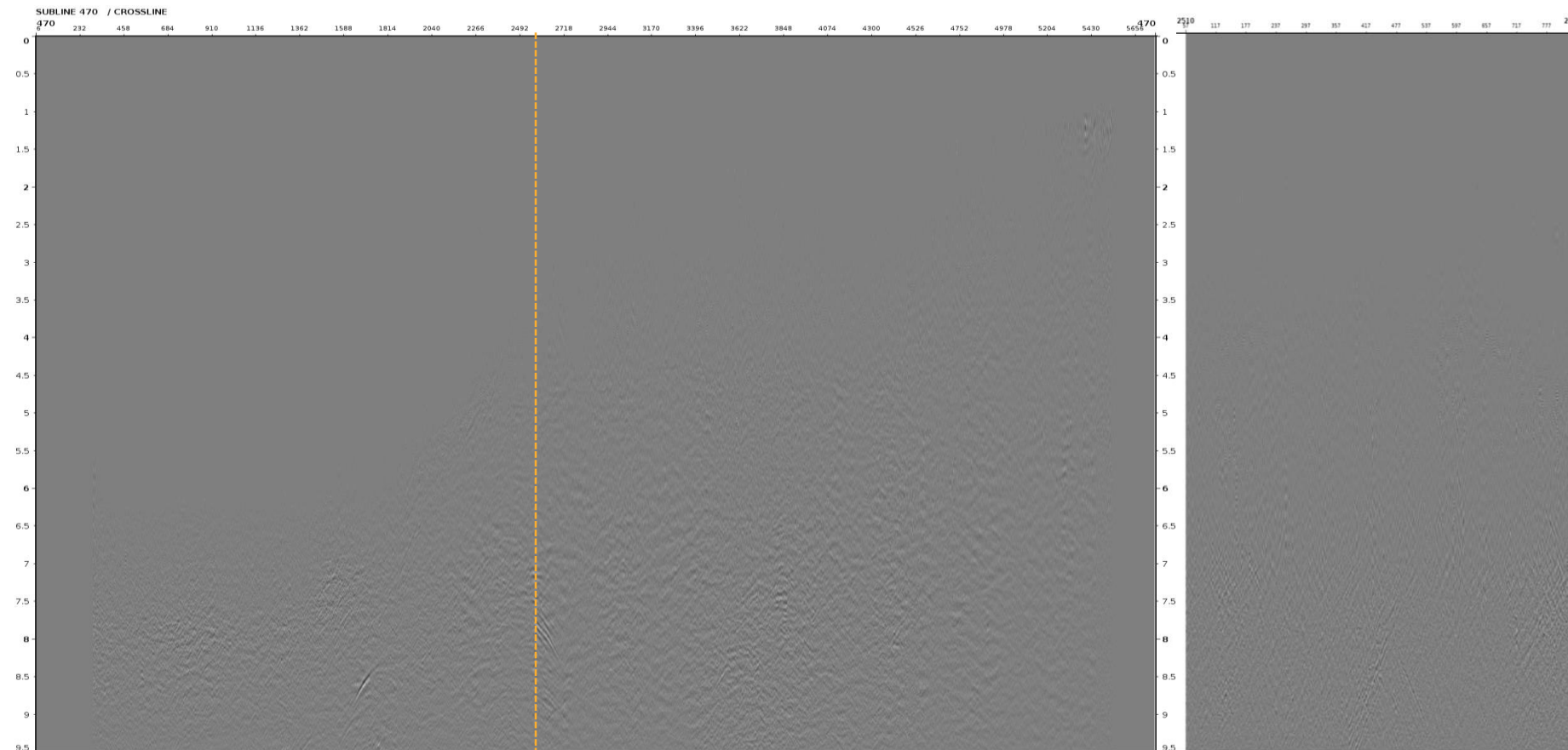
IL 470 Common Offset 1750m **after** Common Offset Denoise

40





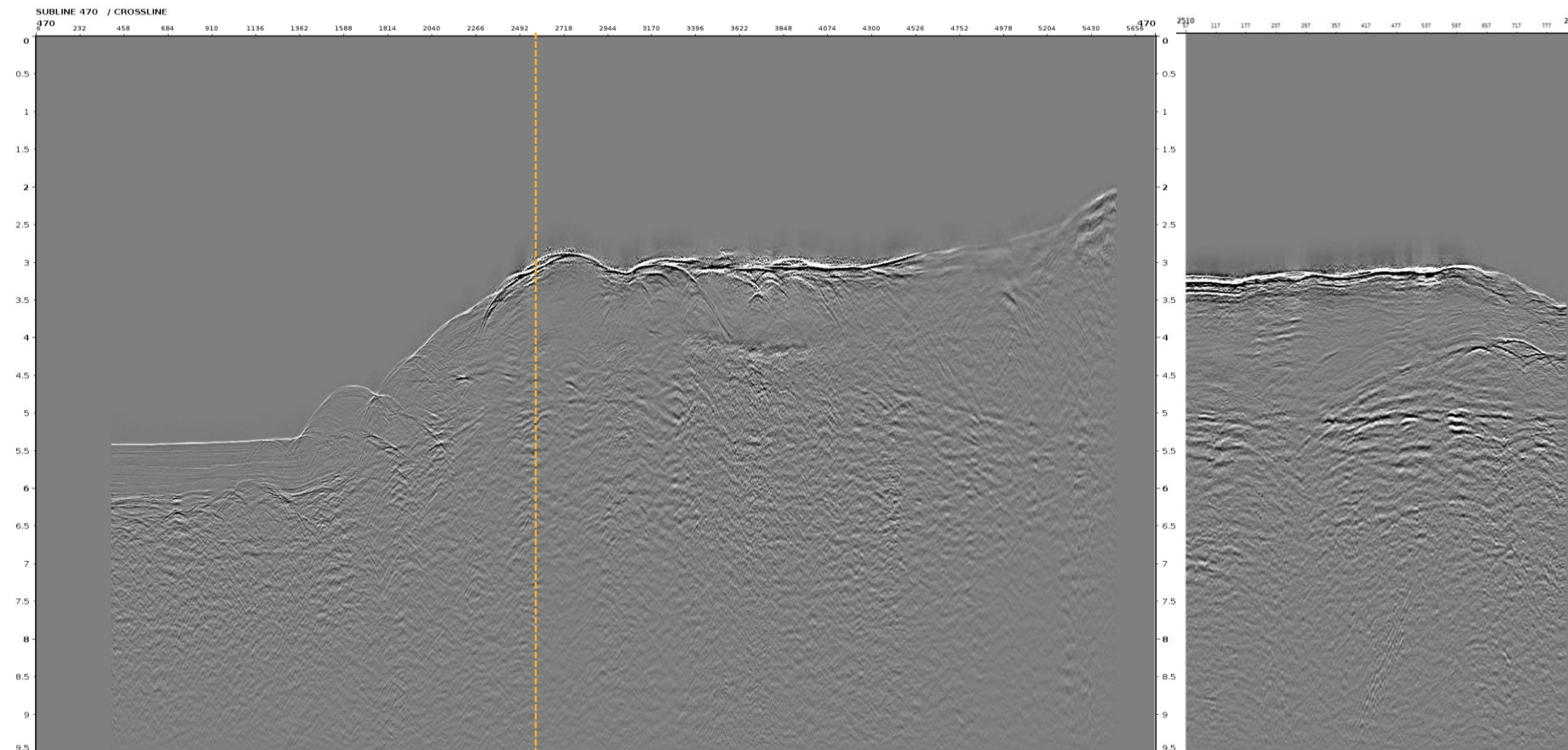
Difference before - after





IL 470 Common Offset 4050m before Common Offset Denoise

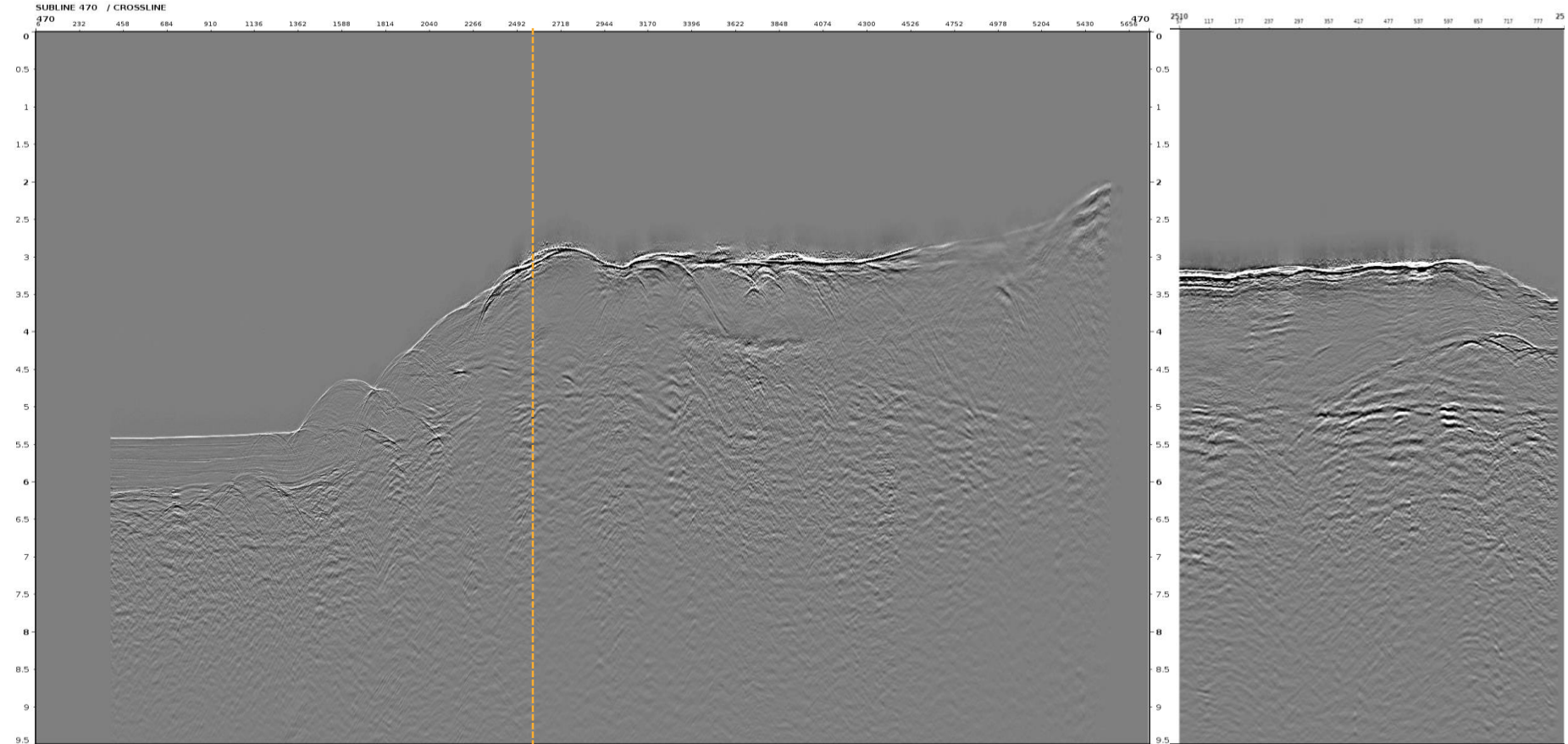
42





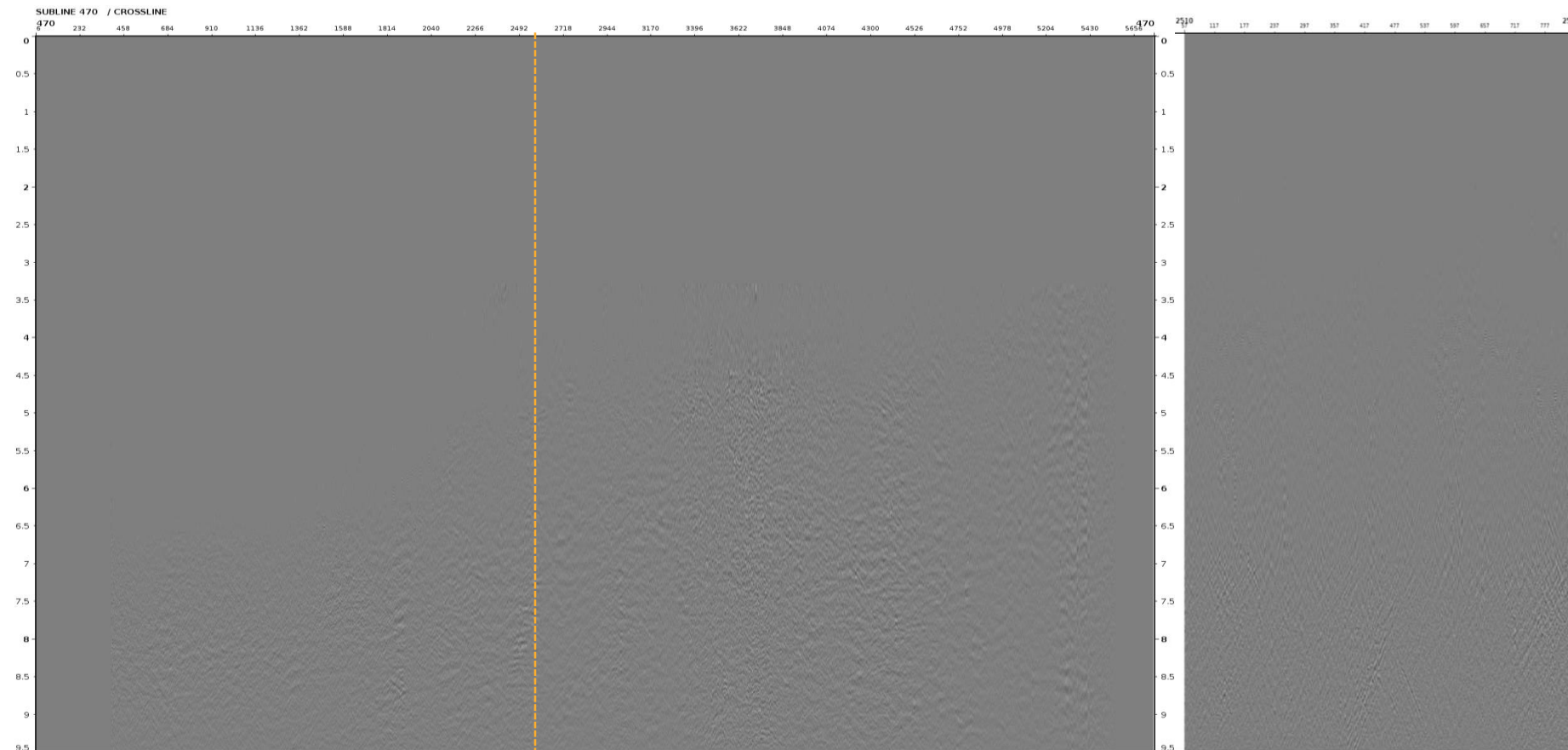
IL 470 Common Offset 4050m **after** Common Offset Denoise

43





Difference before - after



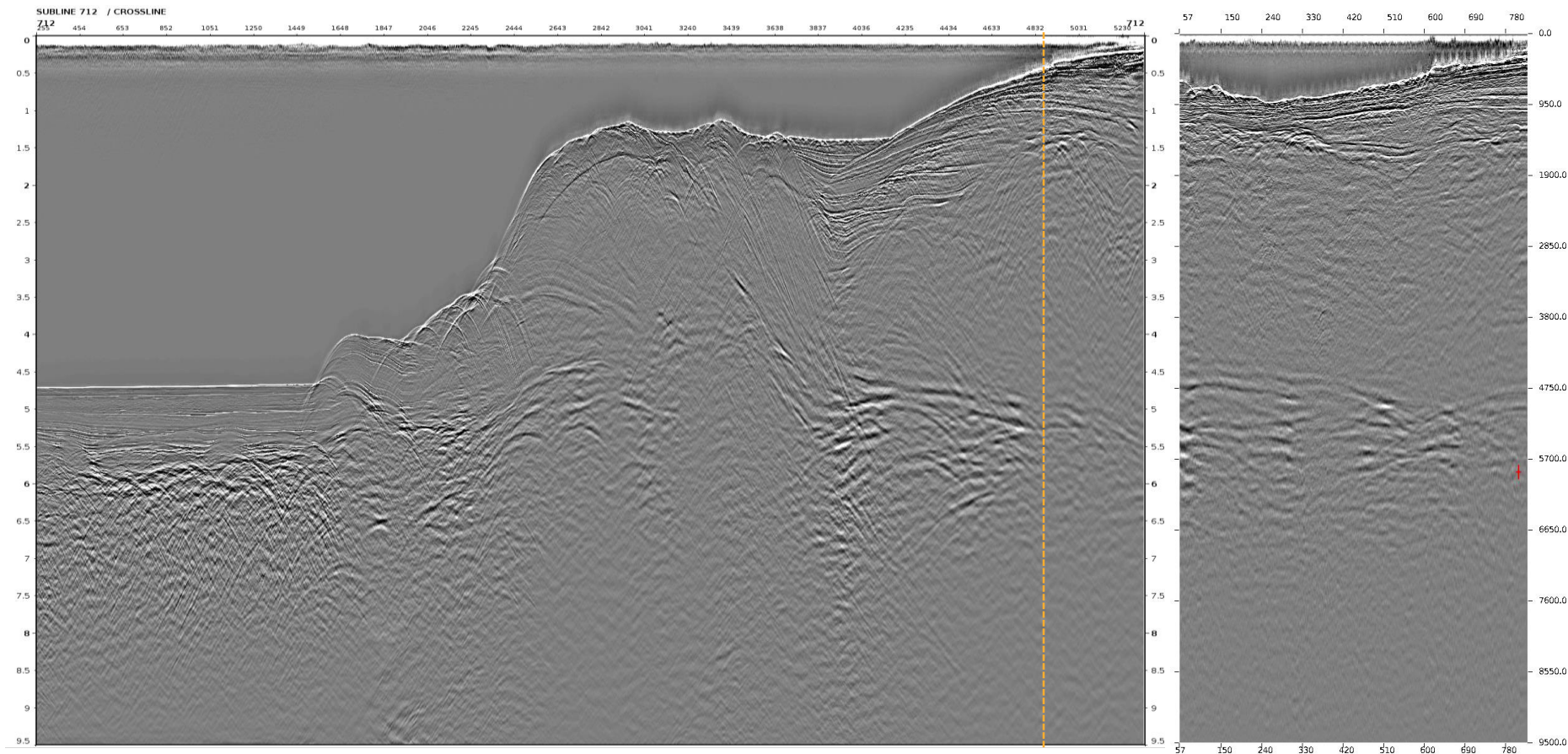
Stack

- subline 230
- subline 470
- subline 712



Zoom in Stack before Common Offset Denoise

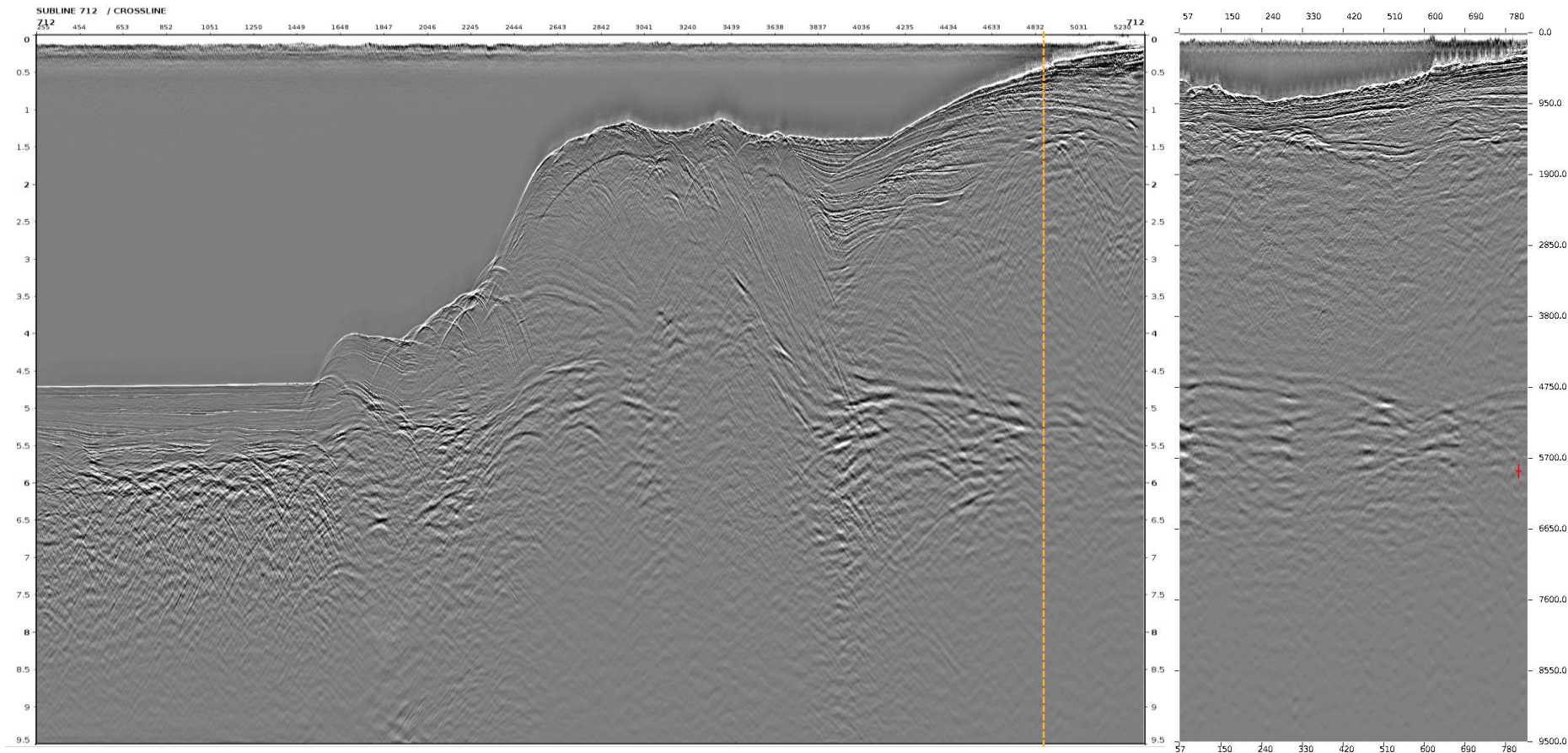
46





Zoom in Stack after Common Offset Denoise

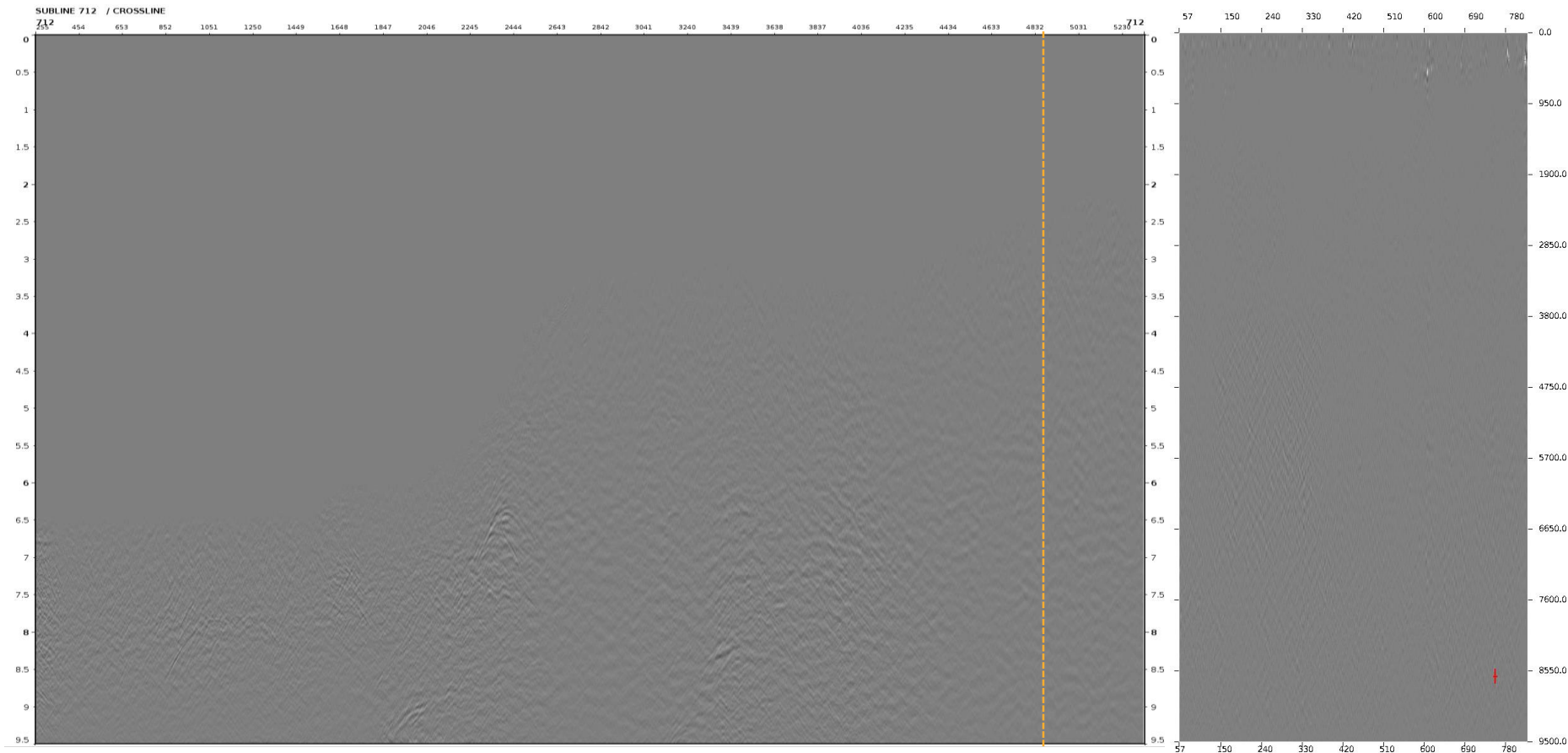
47





Difference before - after

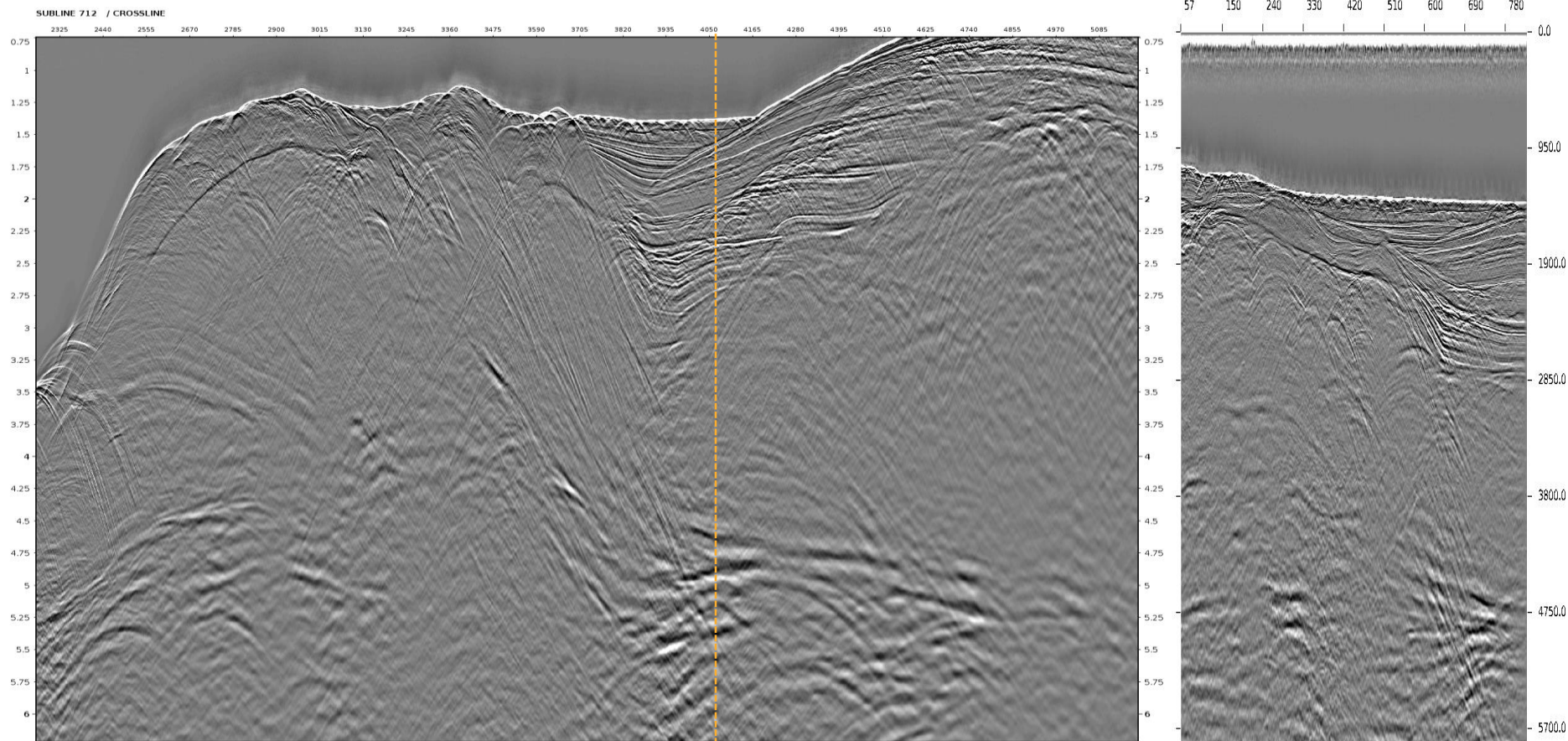
48





Zoom in Stack before Common Offset Denoise

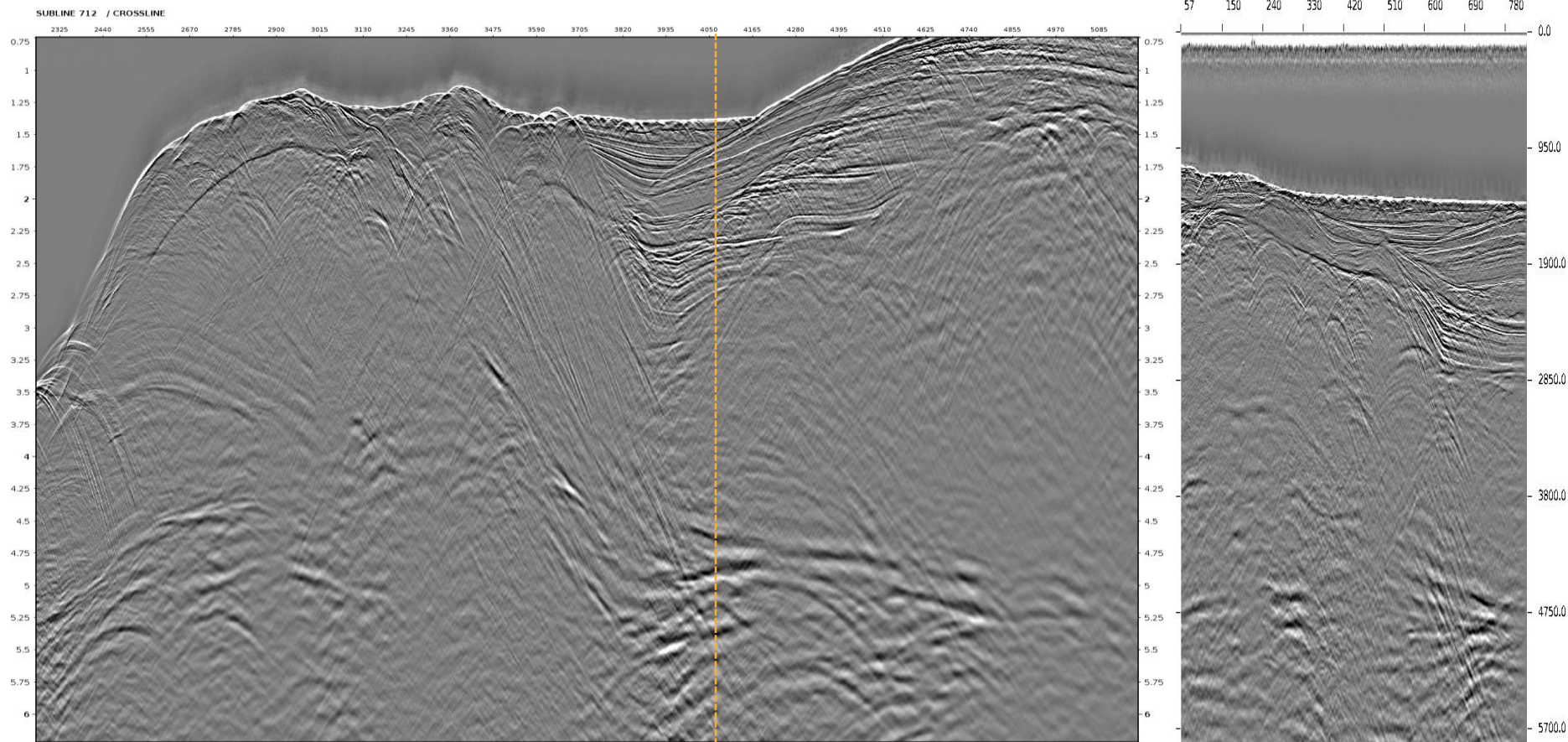
49





Zoom in Stack after Common Offset Denoise

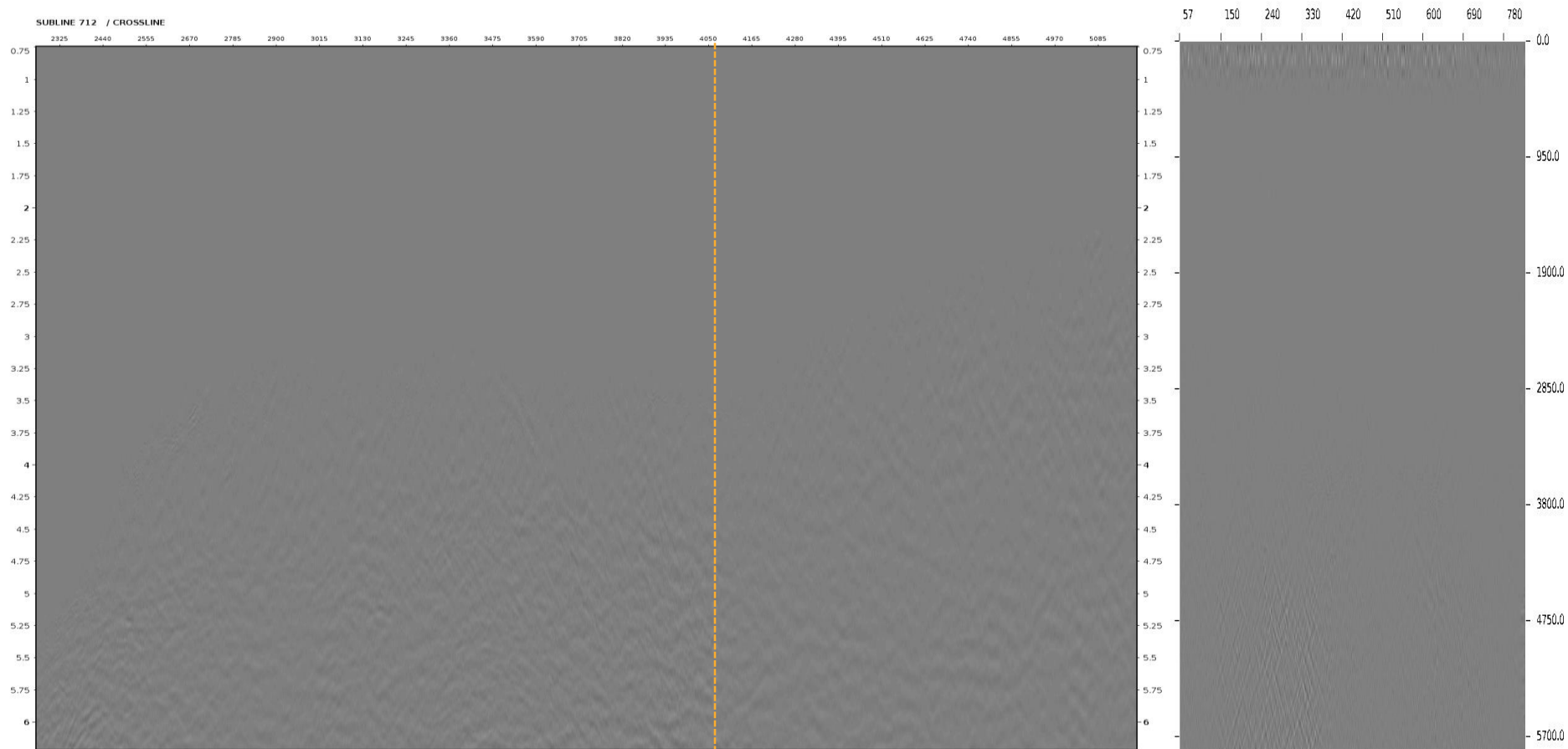
50





Difference before - after

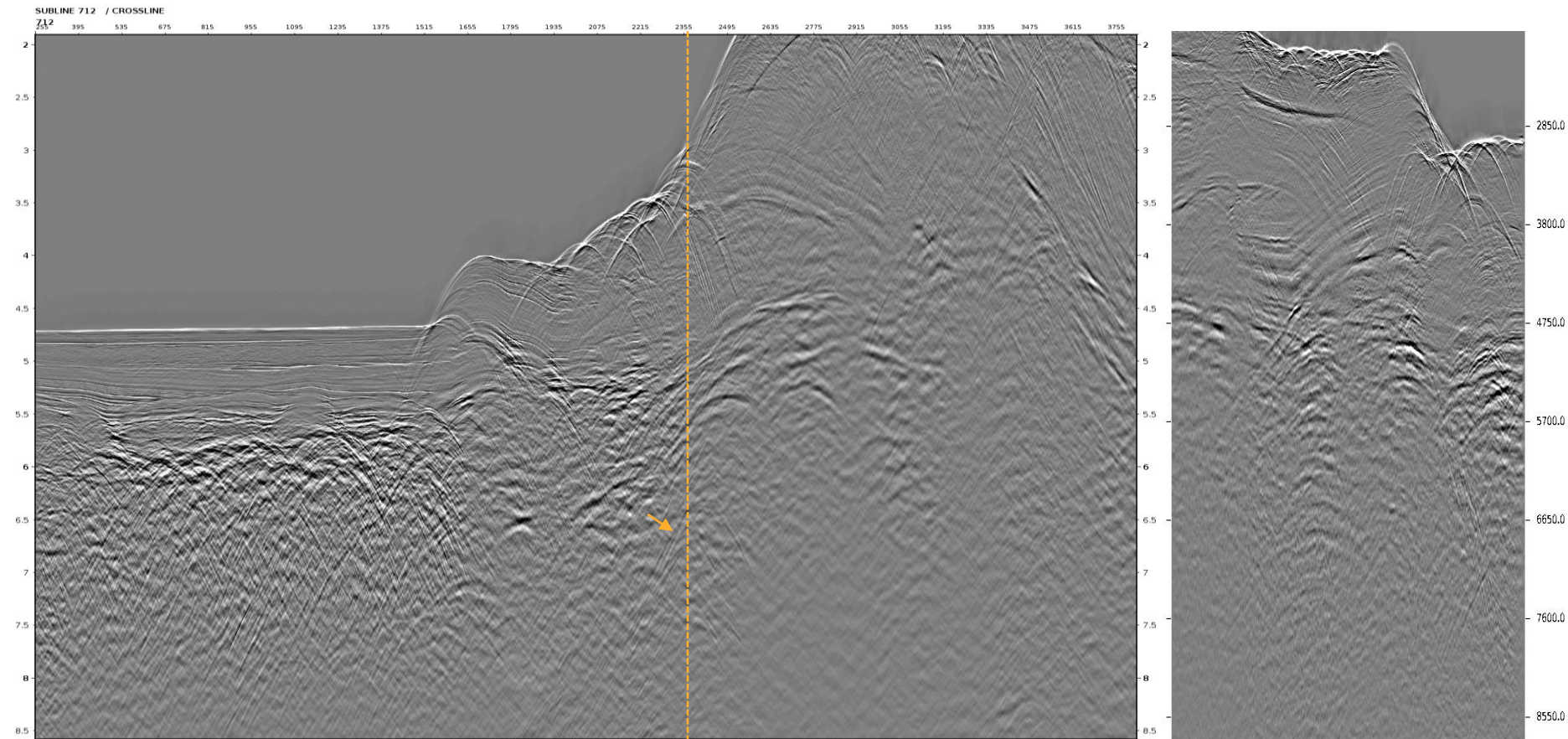
51





Zoom in Stack before Common Offset Denoise

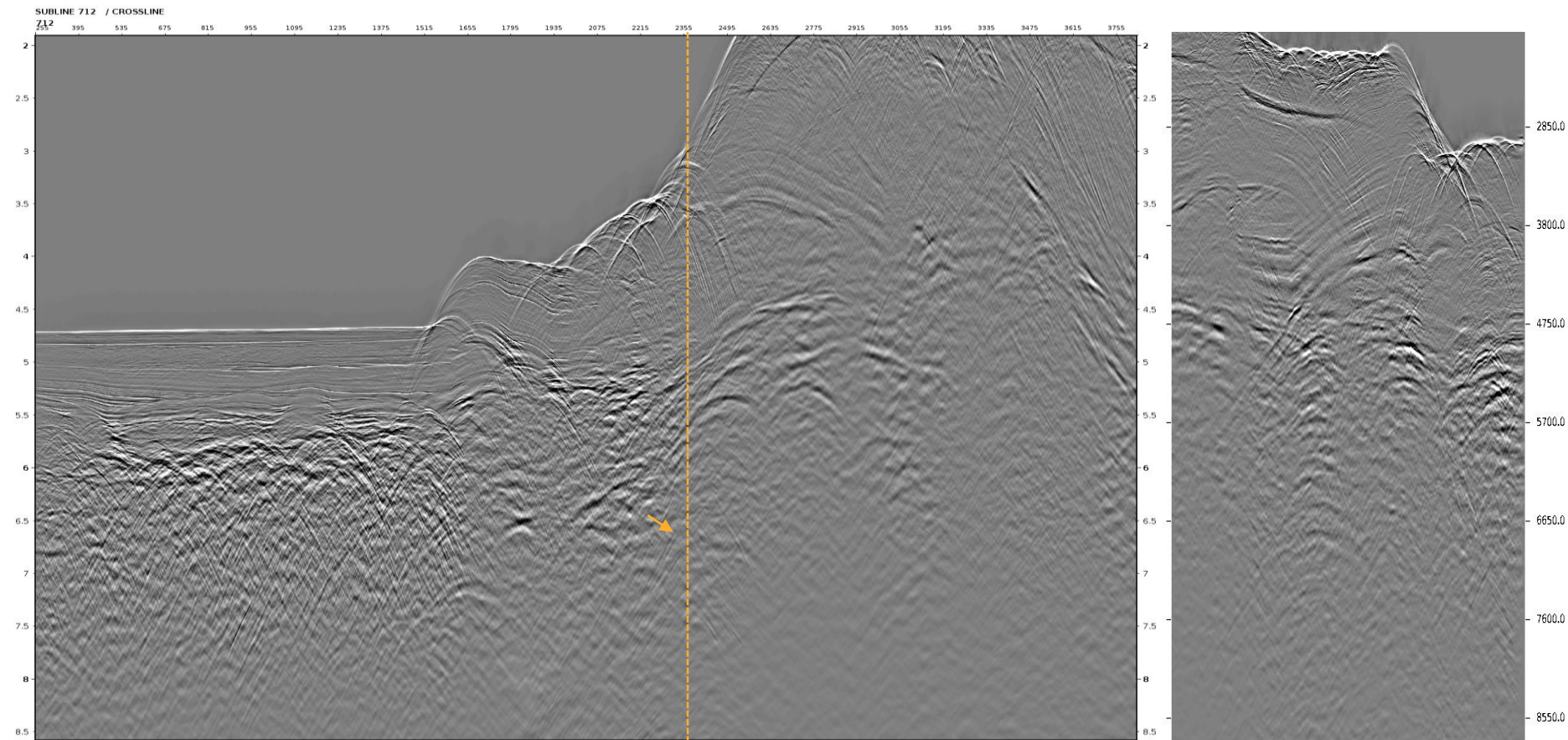
52





Zoom in Stack **after** Common Offset Denoise

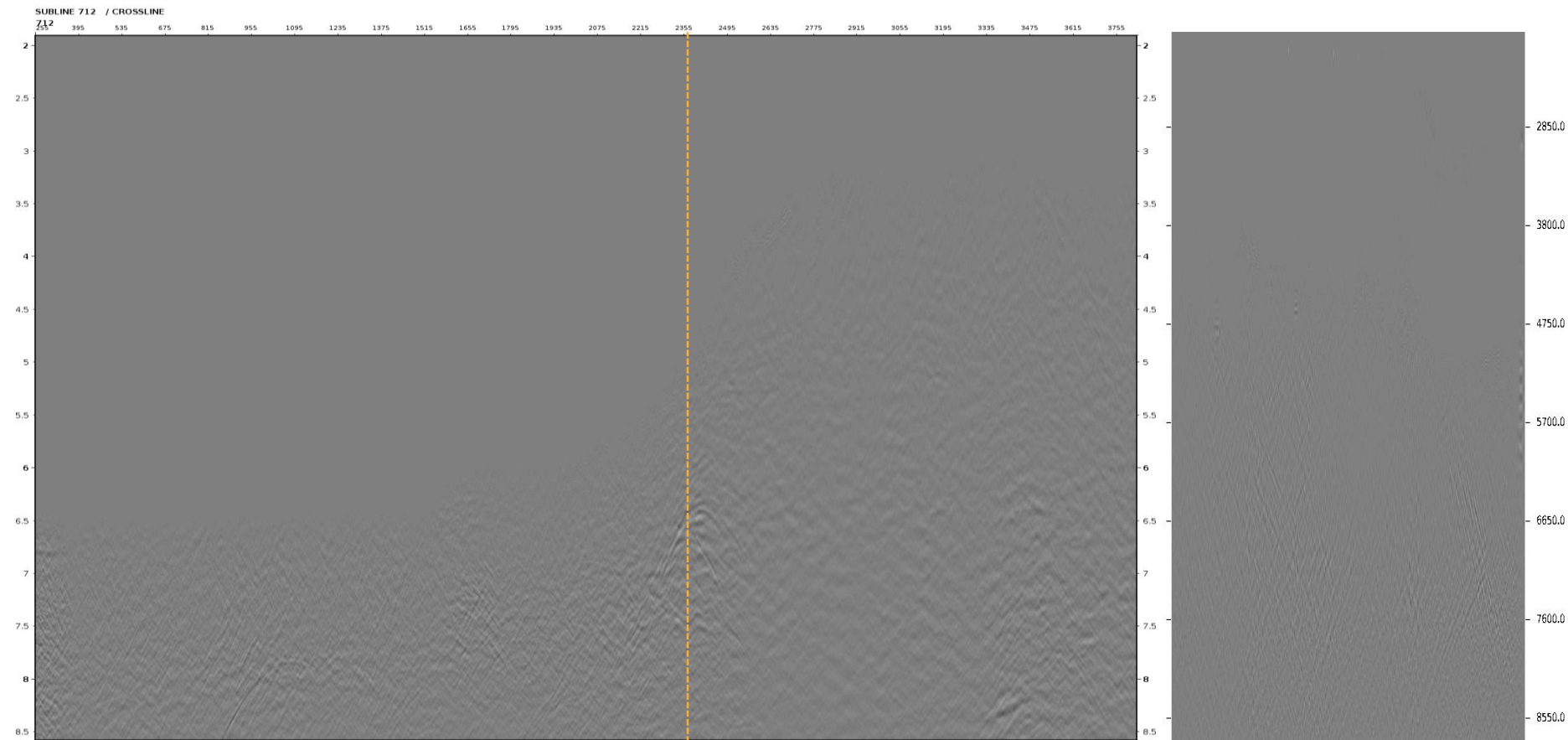
53





Difference before - after

54



Common Offset Subline 712

- offset 350m
- offset 1750m
- offset 4050m

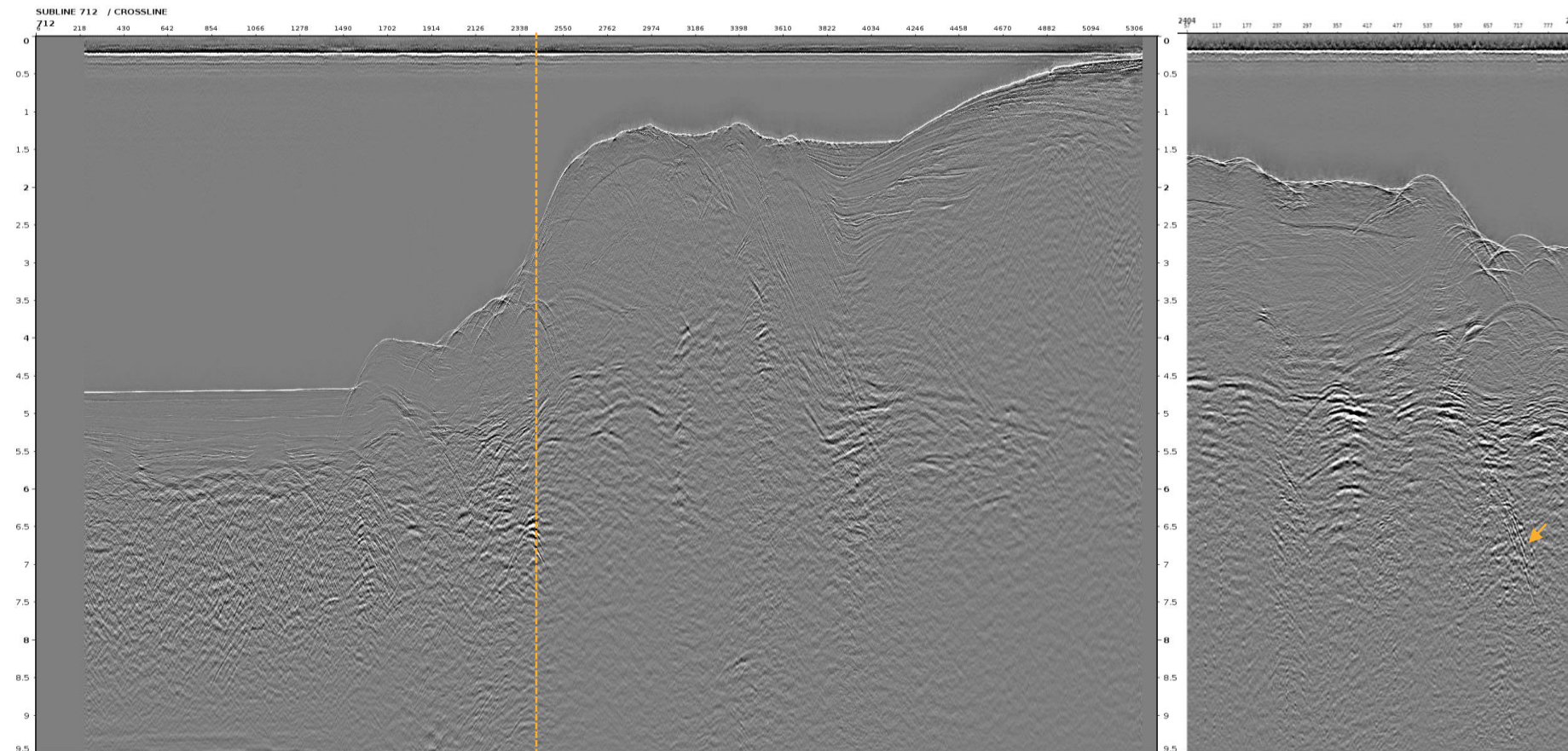


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IL 712 Common Offset 350m before Common Offset Denoise

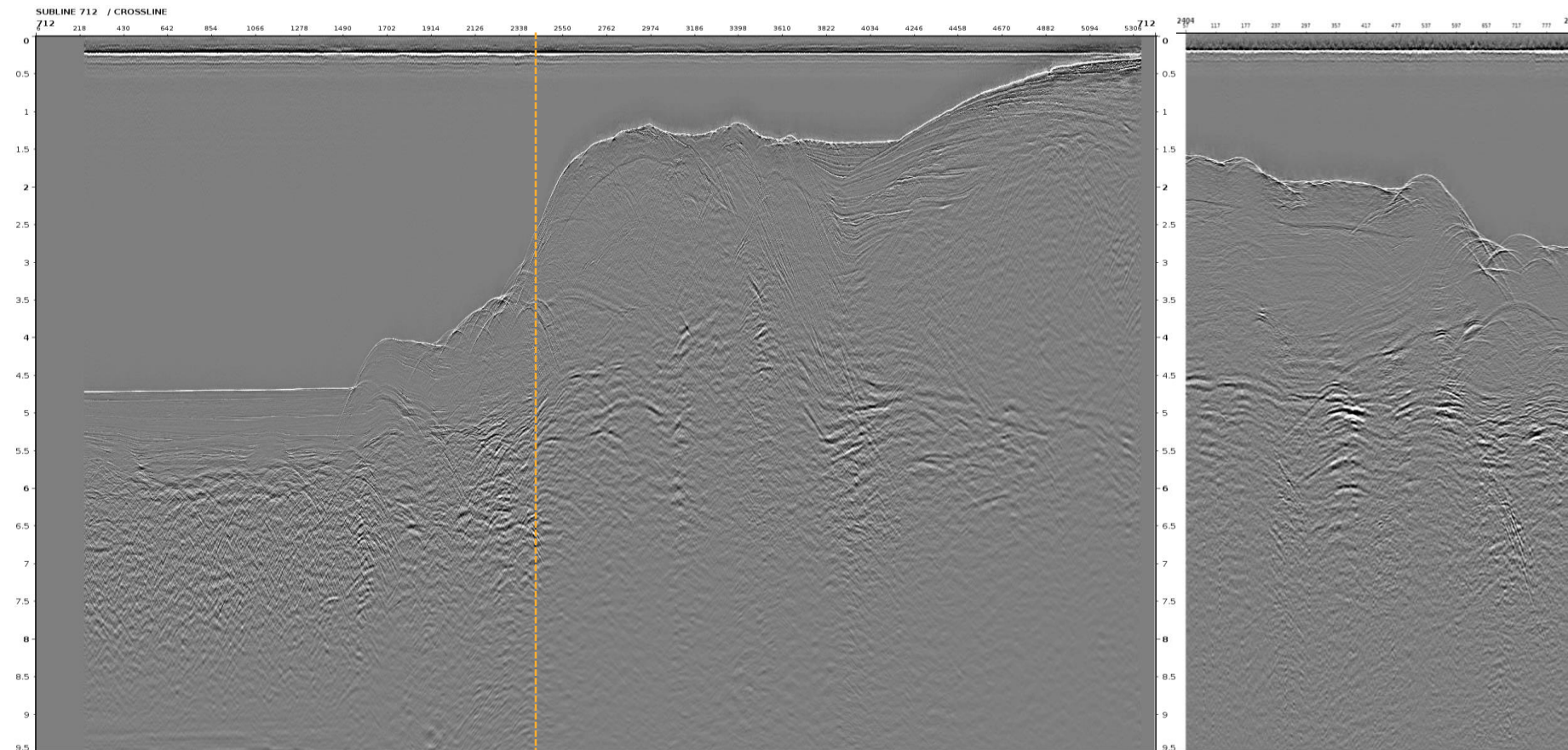
56





IL 712 Common Offset 350m **after** Common Offset Denoise

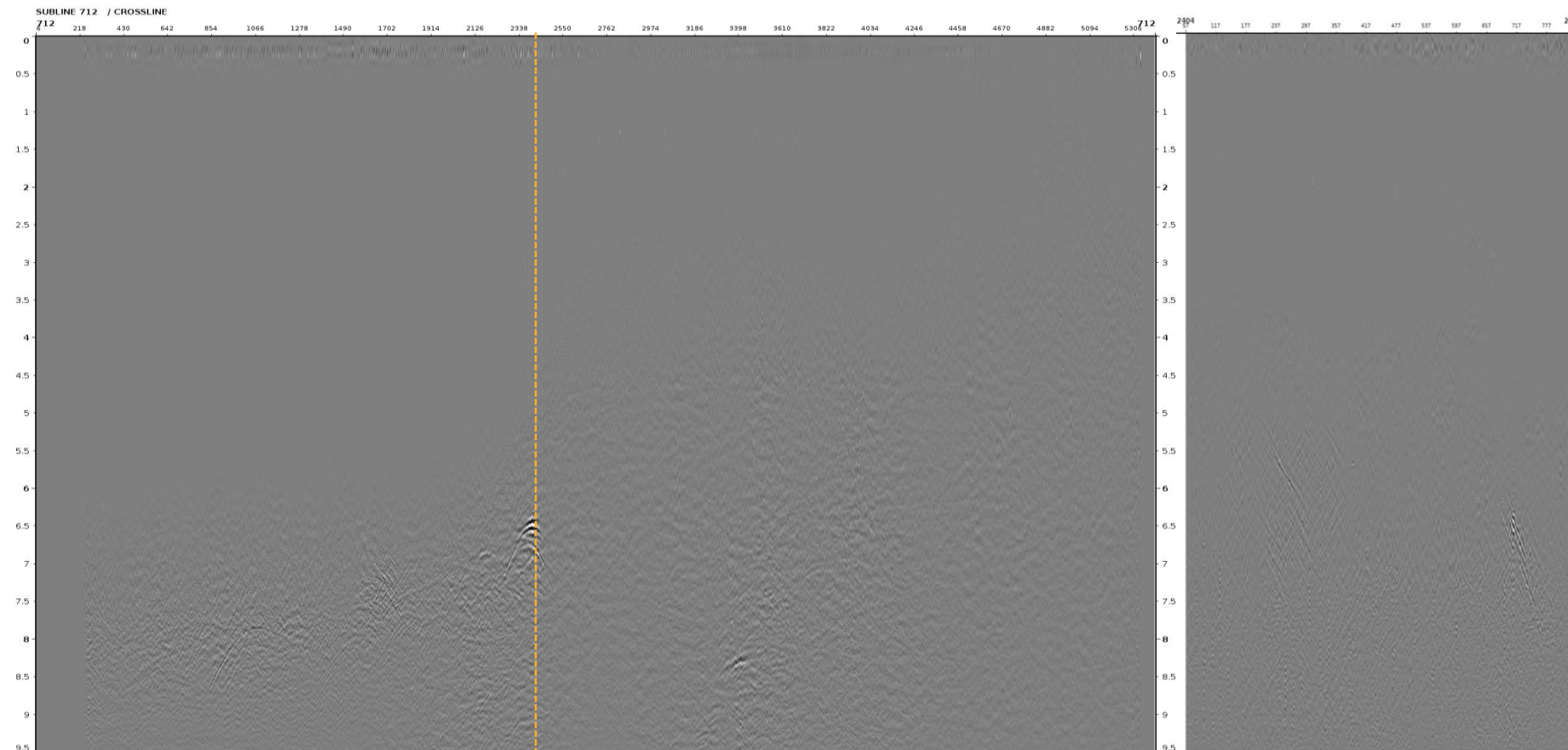
57

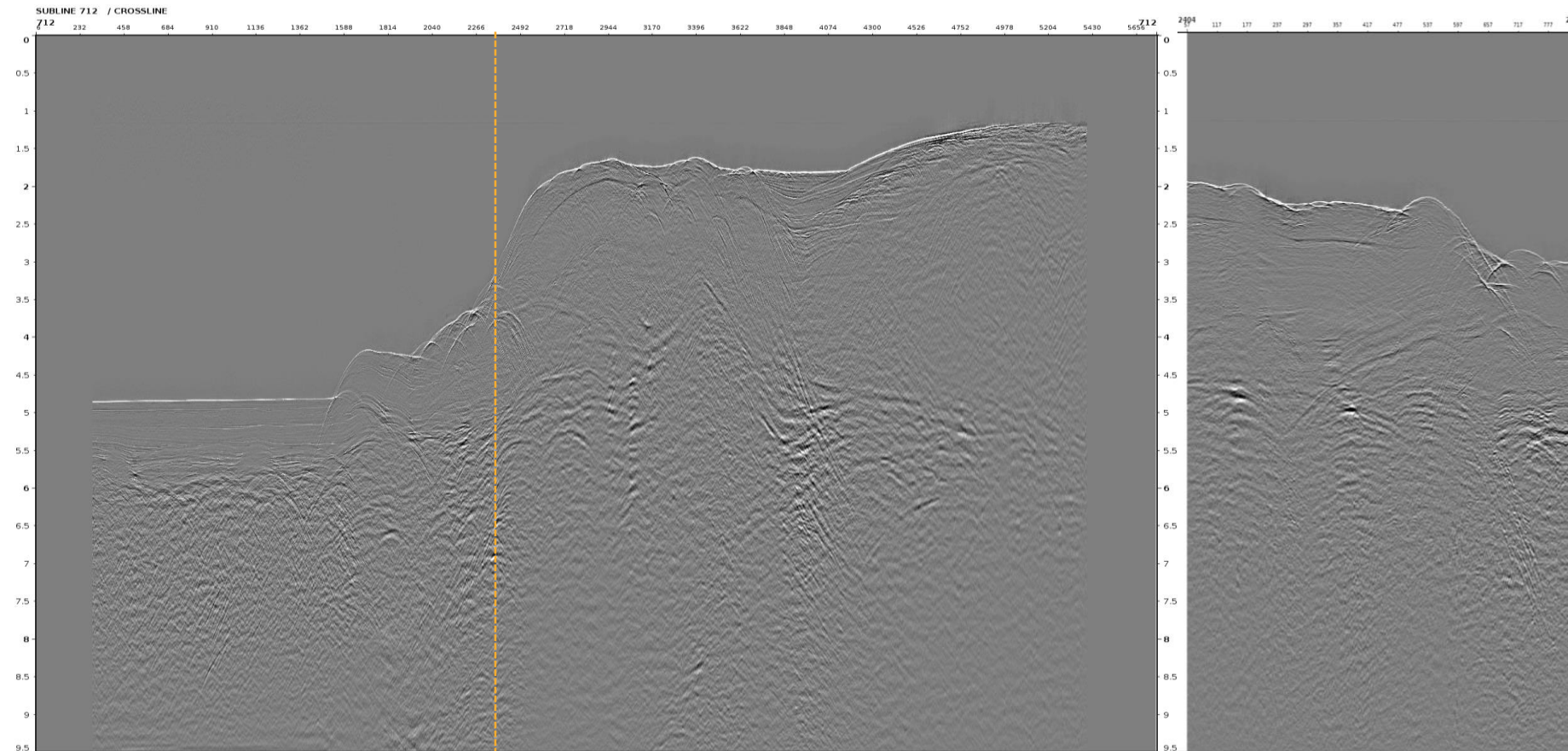




Difference before - after

58

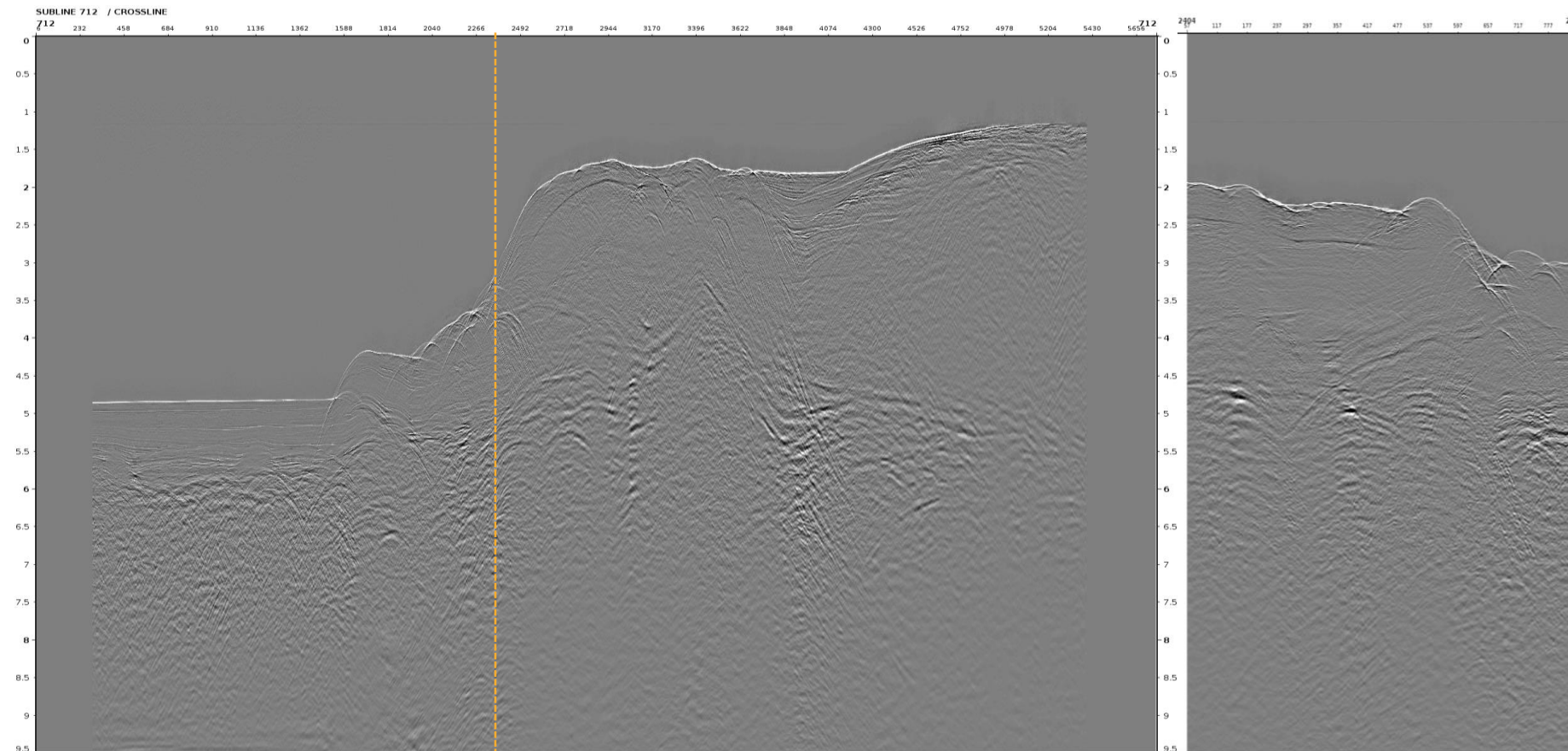






IL 712 Common Offset 1750m **after** Common Offset Denoise

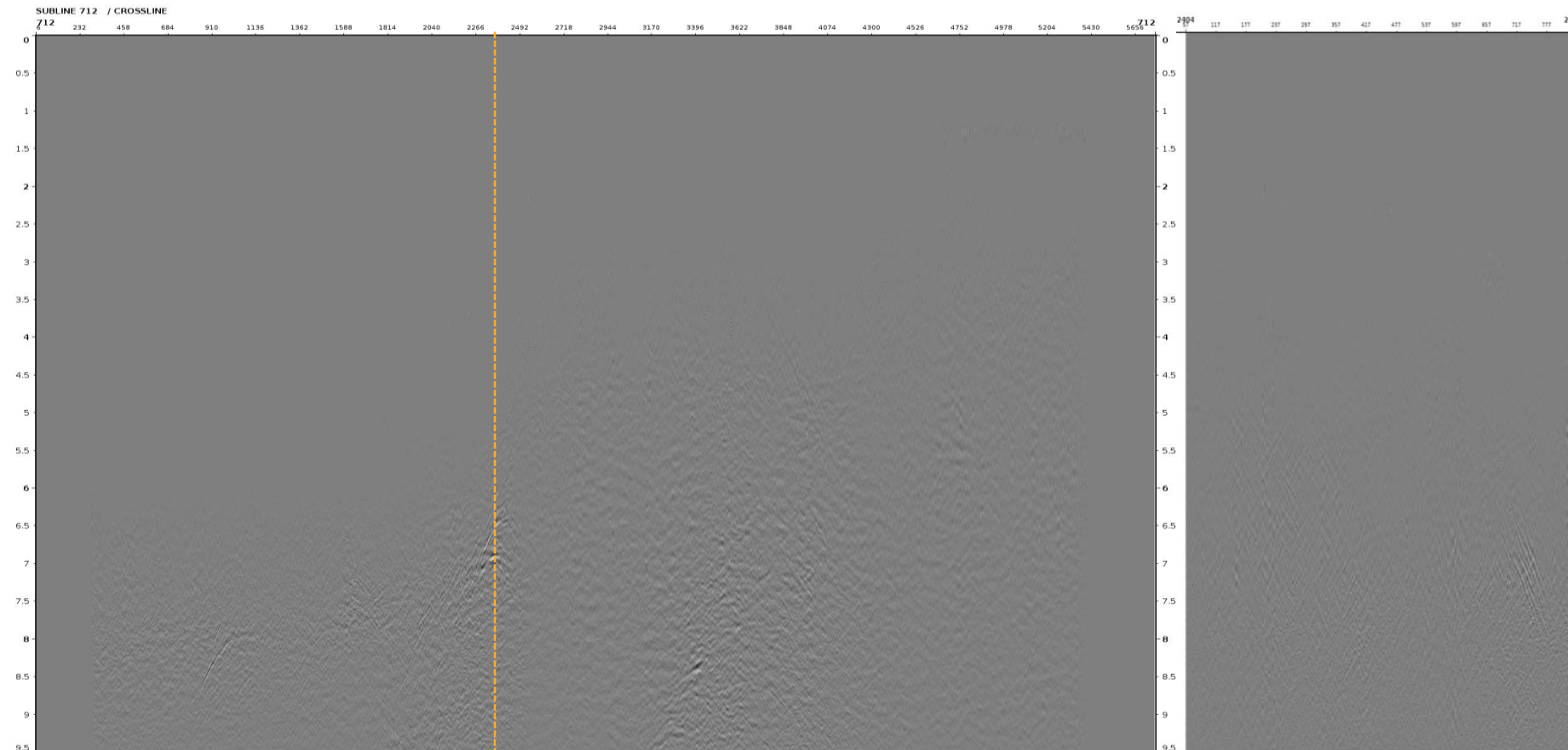
60





Difference before - after

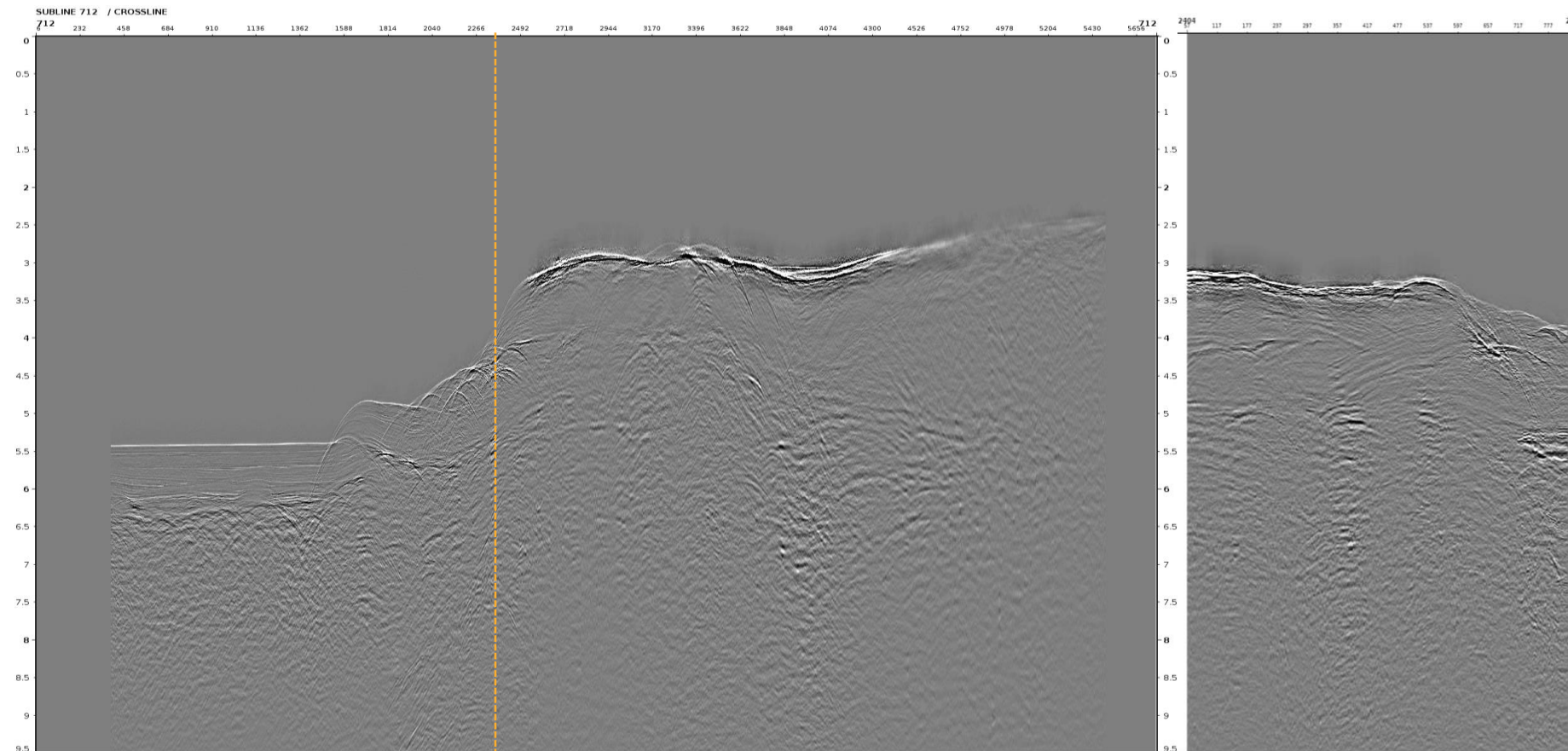
61





IL 712 Common Offset 4050m before Common Offset Denoise

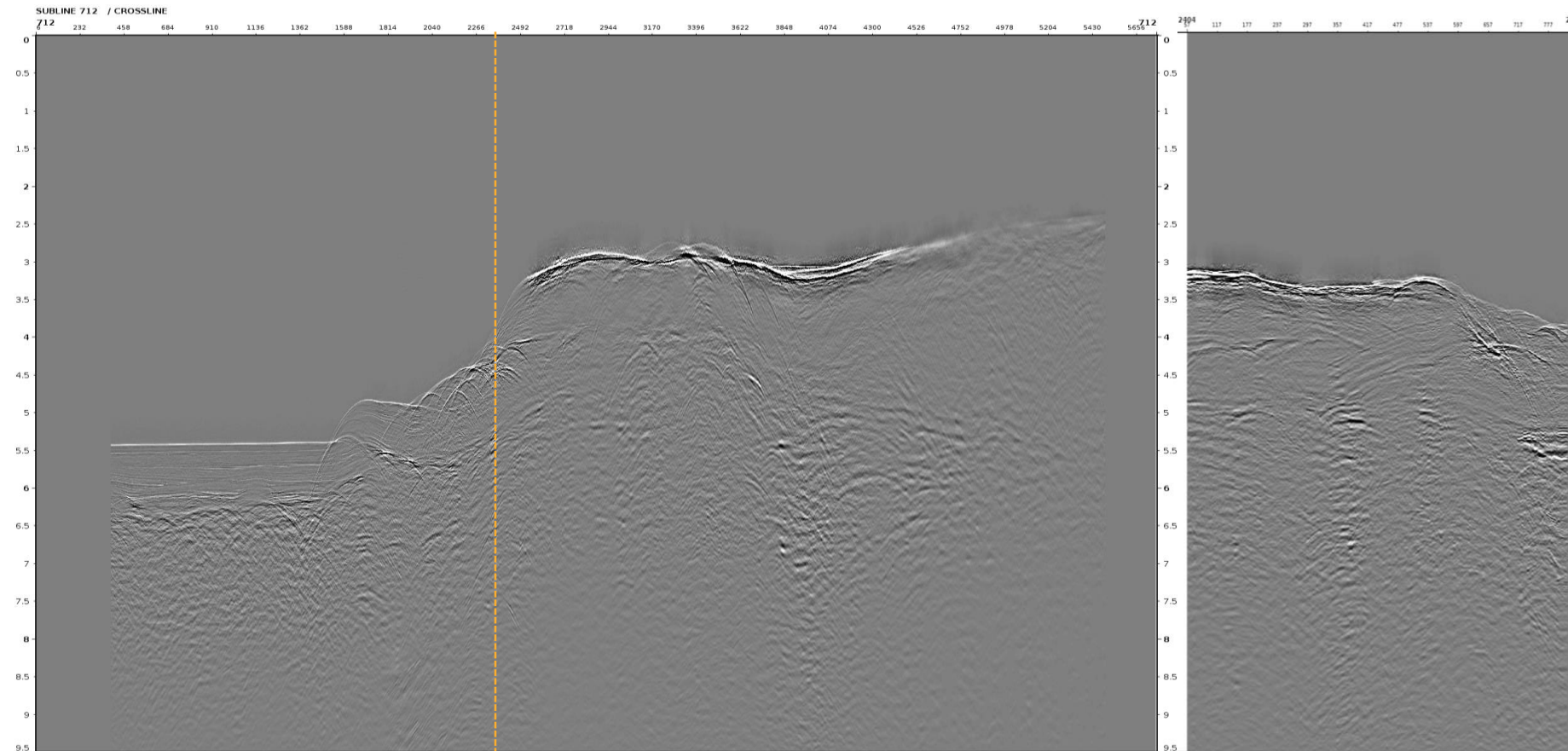
62





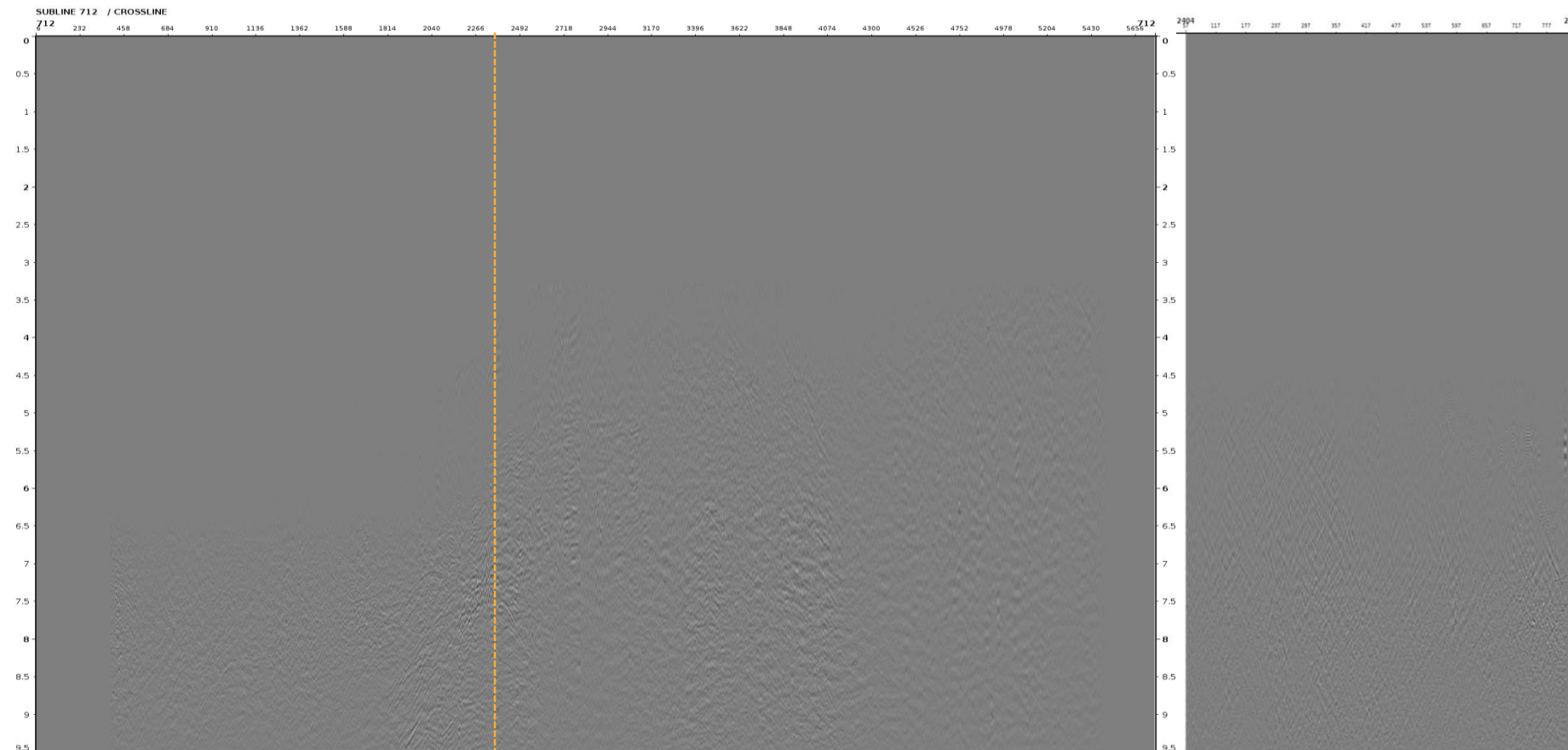
IL 712 Common Offset 4050m after Common Offset Denoise

63





Difference before - after



- Noise energy is attenuated from both crossline & subline view, which is beneficial for migration. We recommend to apply for production.