



# Linear Noise Attenuation Test

## NZ 3D Processing

30 September 2020

[cgg.com](http://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)

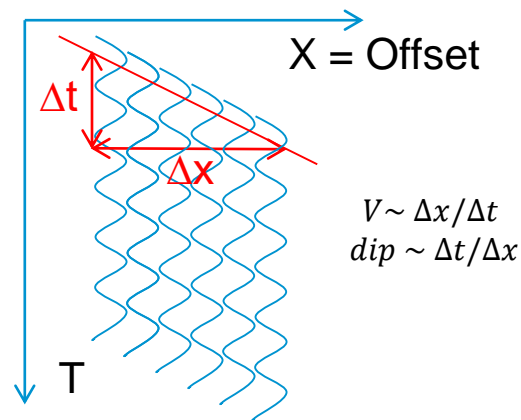
## Objective:

To attenuate linear noise.

## Procedure:

Linear noise attenuation is done on shot gathers in Tau-P domain and the parameters are designed around apparent sound velocity in water.

Start Time	Primary Protection dip (ms/tr)	Corresponding cut-off apparent velocity (m/s)
WBT+700	-8.1 ~ 8.1	1540 m/s
WBT+1300	-7.7 ~ 7.7	1620 m/s
WBT+2000	-6.9 ~ 6.9	1810 m/s
WBT+4500	-5.6 ~ 5.6	2230 m/s



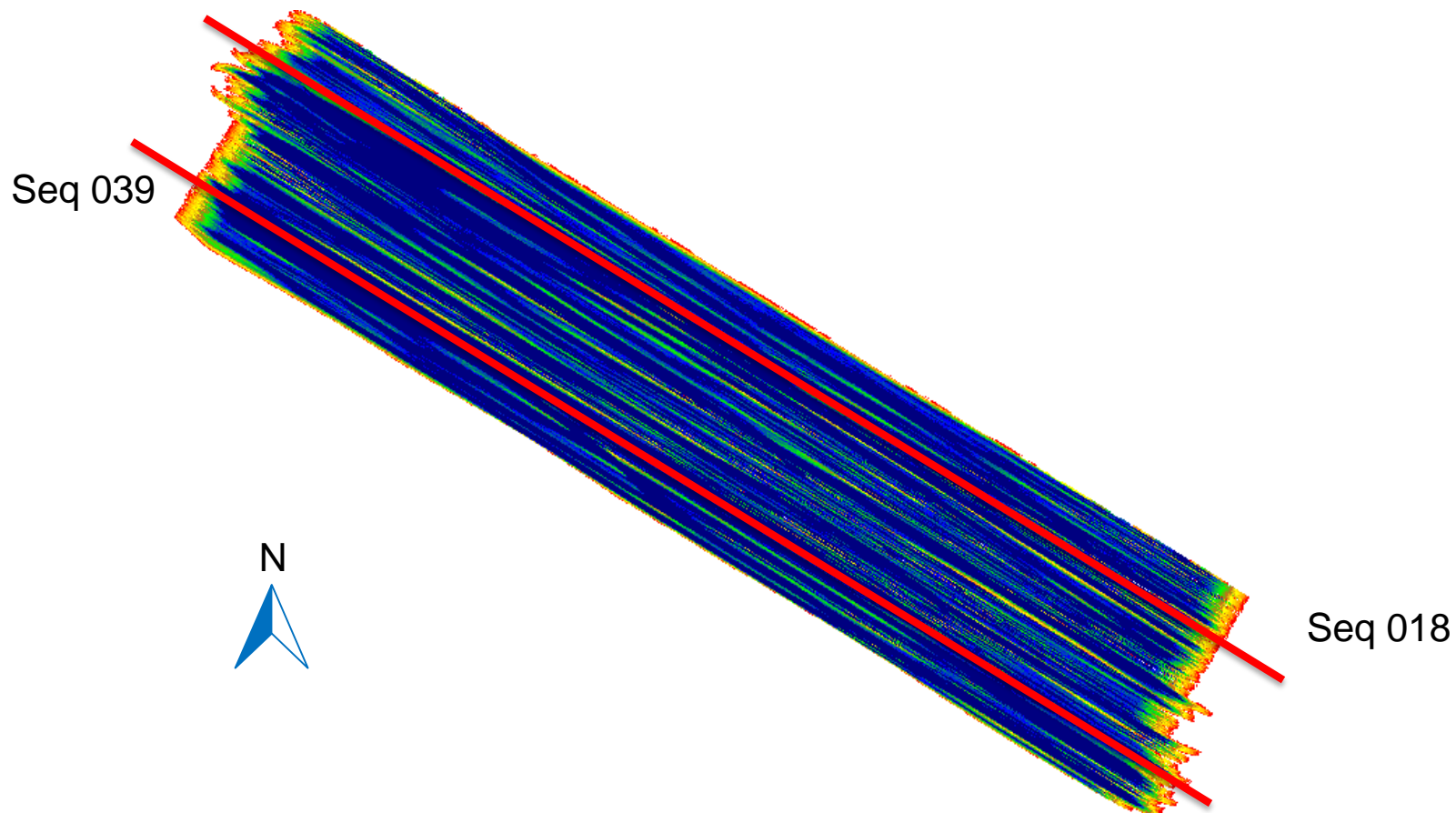
## Display:

Test line: Seq 018 (Gun 1 Cable 2); Sequence 039 (Gun 2 Cable 1).

Display: Selected shot gathers, stacks, and amplitude maps.

## Observation and Recommendation:

This test shows linear noise is attenuated in the data while keeping the primary data intact. Hence it is recommended to use in production.



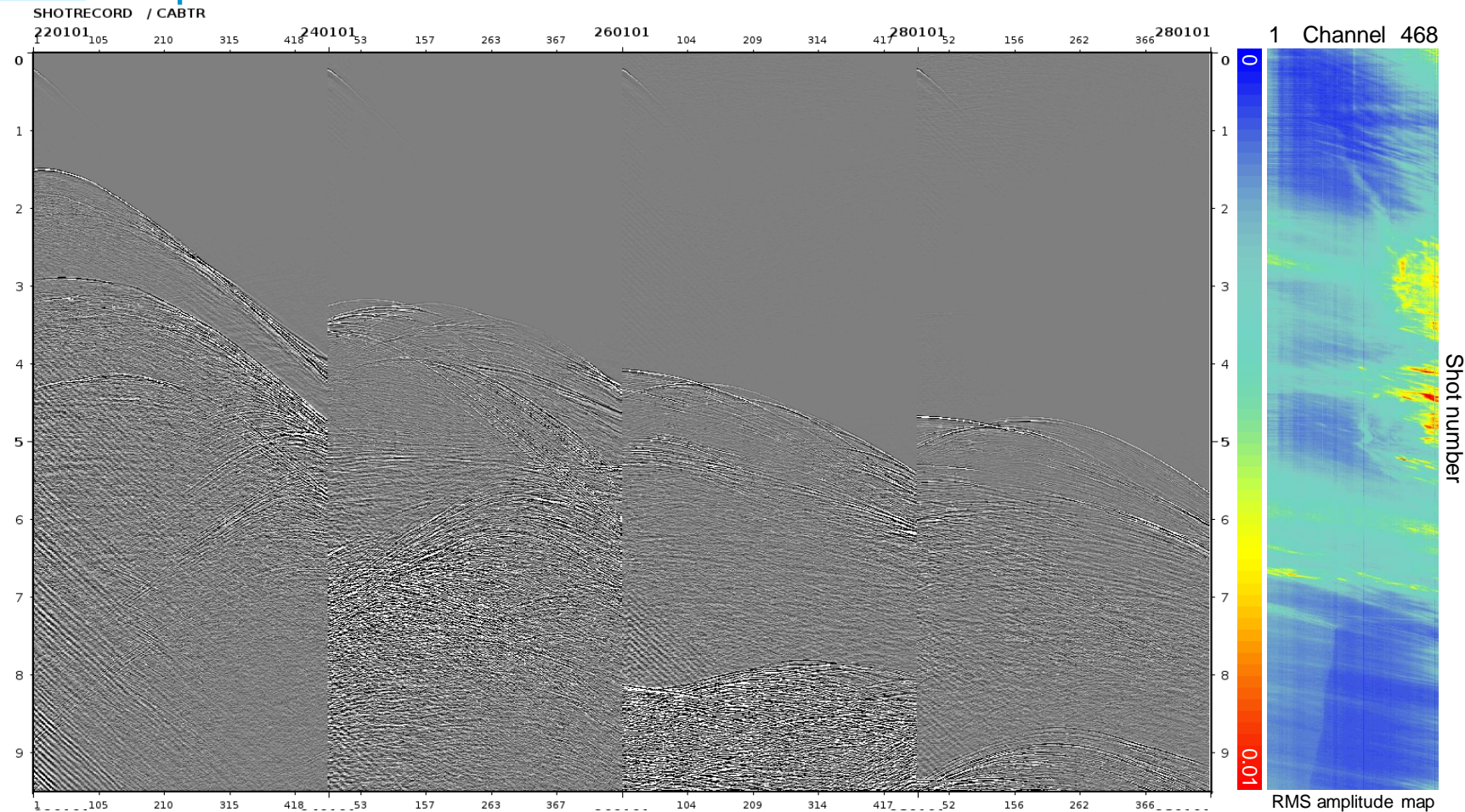


# Seq 039



# Seq 039: Selected Shot Gathers before LNA

6



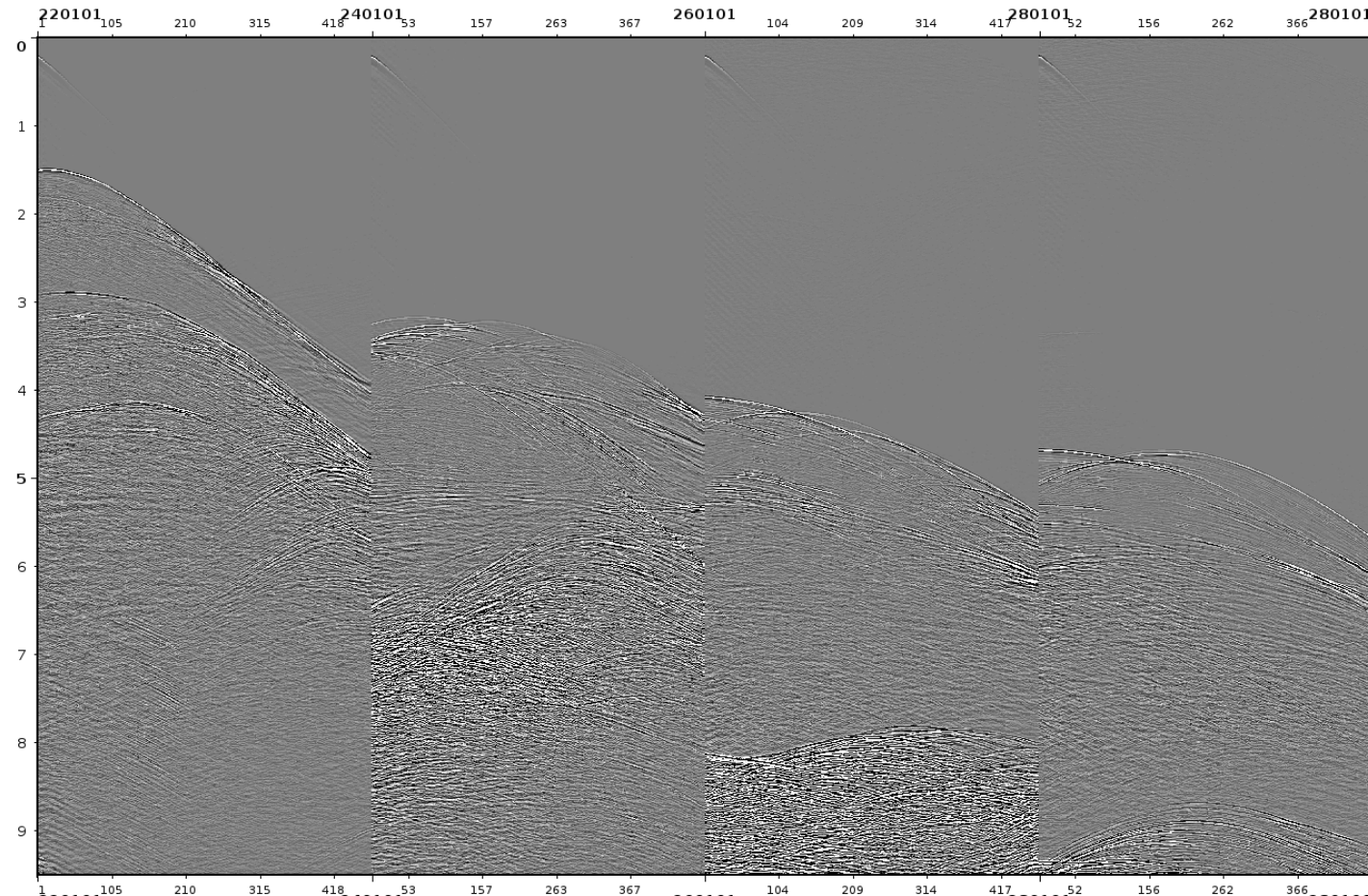




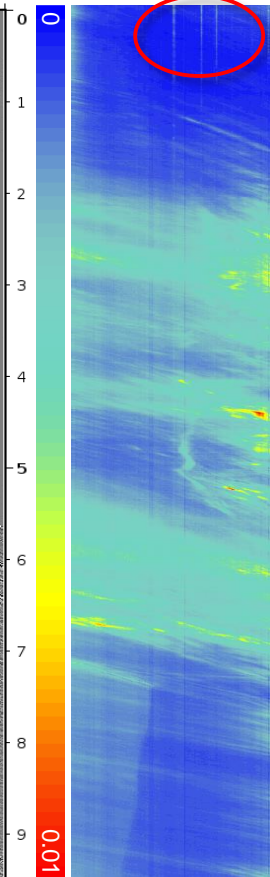
# Seq 039: Selected Shot Gathers after LNA

7

SHOTRECORD / CABTR



1 Channel 468



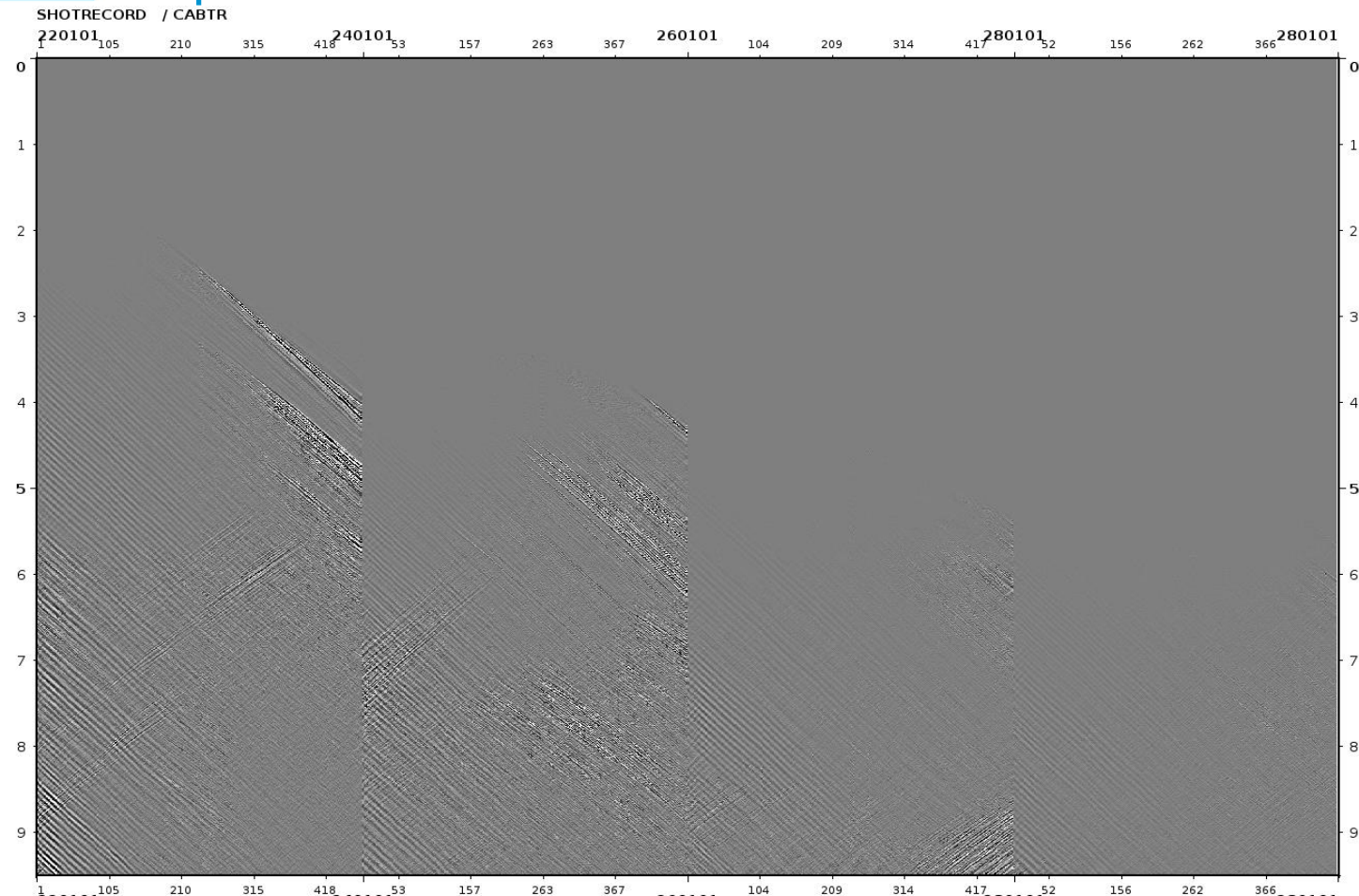
High frequency noise in shallow refraction zone.

Shot number

RMS amplitude map

# Seq 039: Difference before - after

8



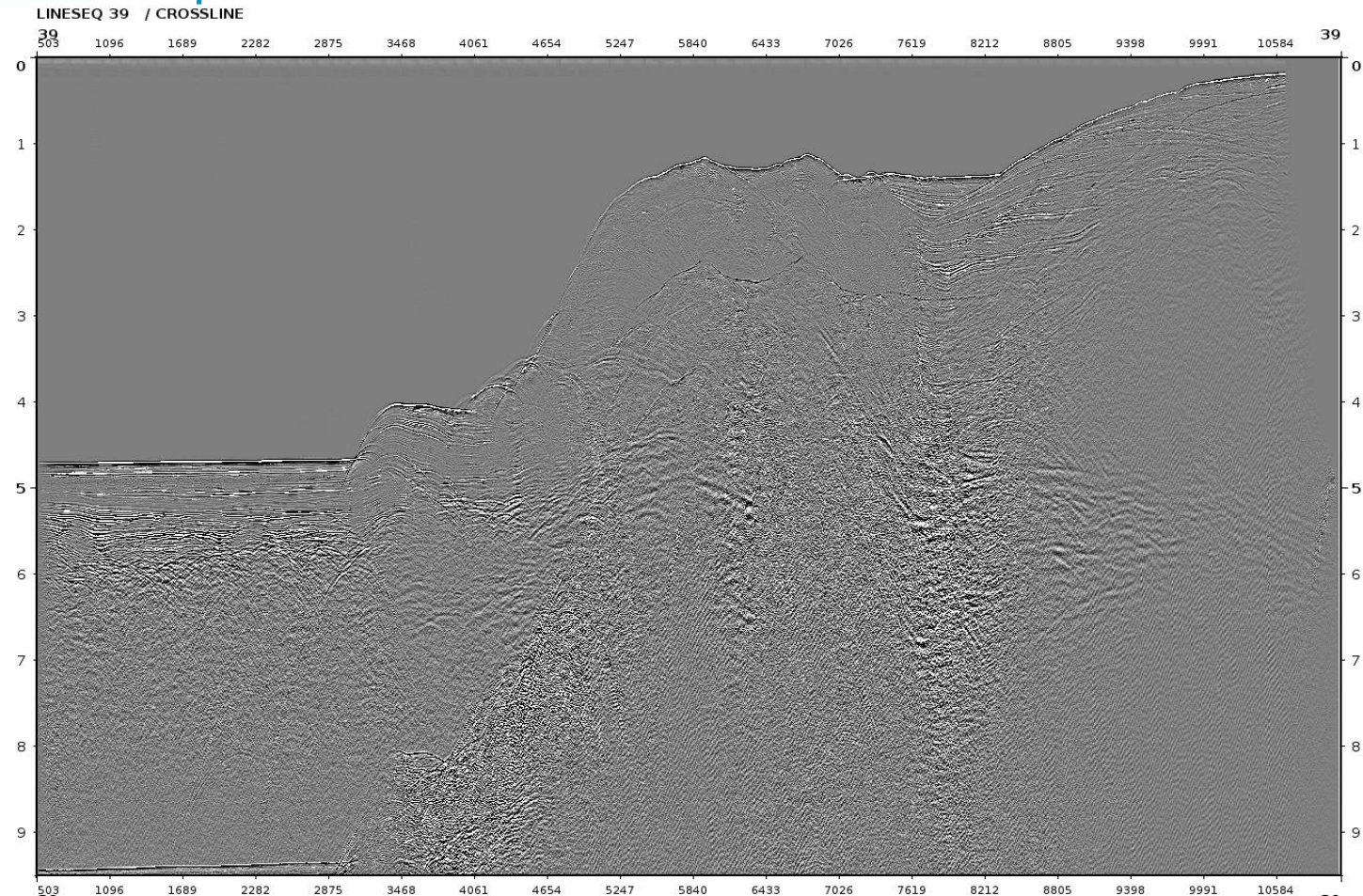
- No primary damage is observed on removed noise.





# Seq 039: 2D Stack before LNA

9



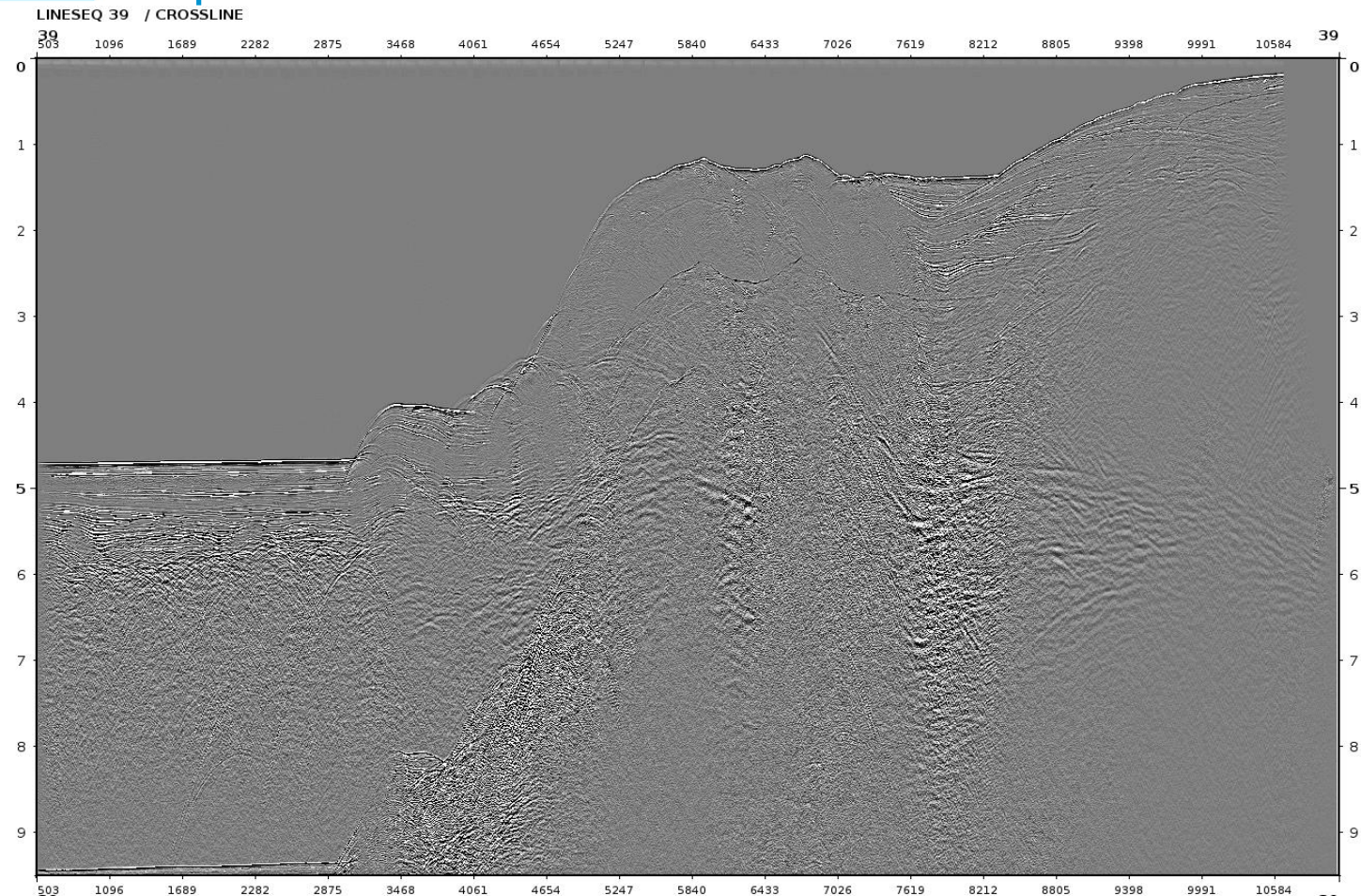
- Strong linear noise on this line.





# Seq 039: 2D Stack after LNA

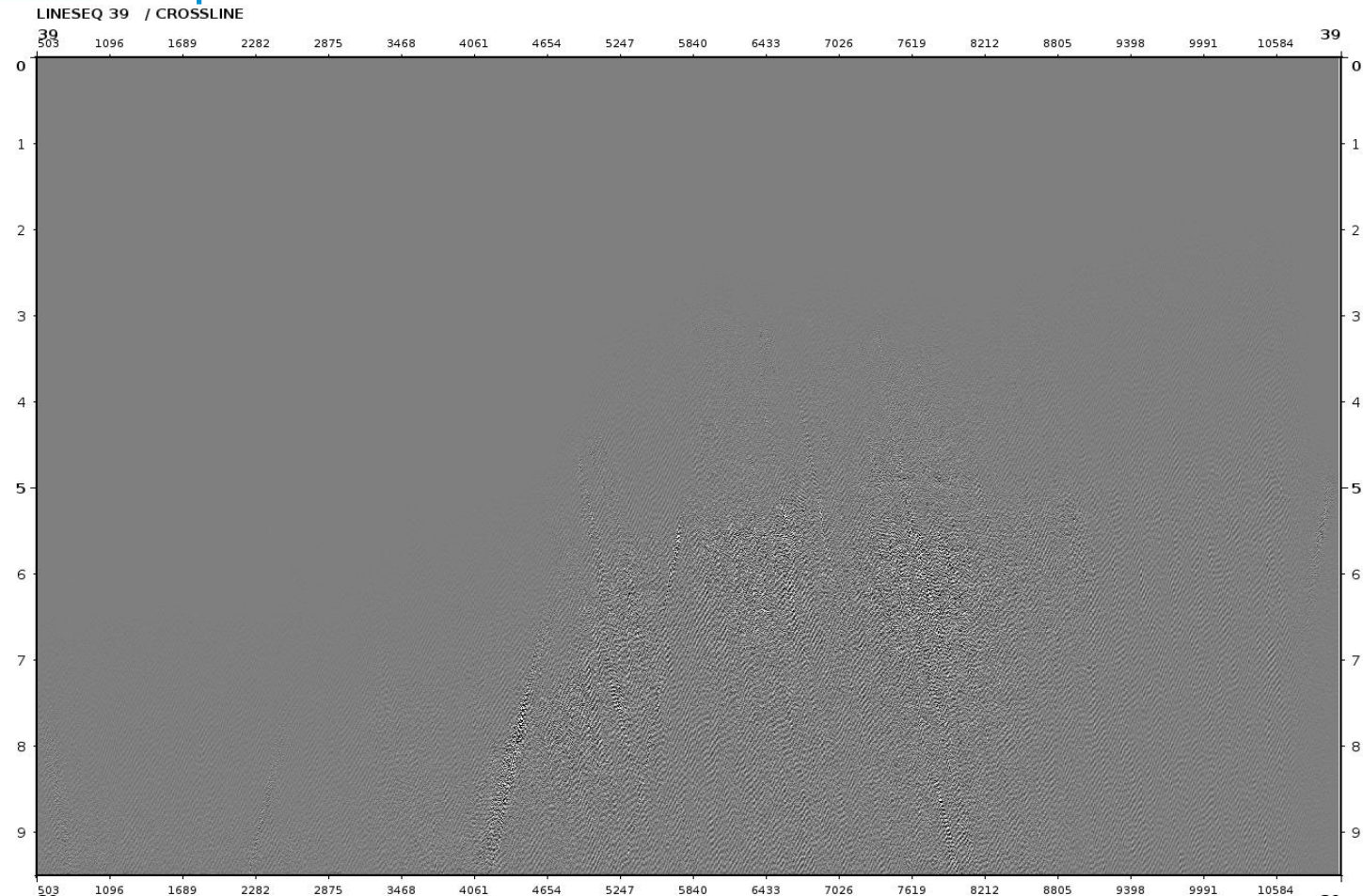
10



- Strong linear noise on this line.

# Seq 039: Difference before - after

11

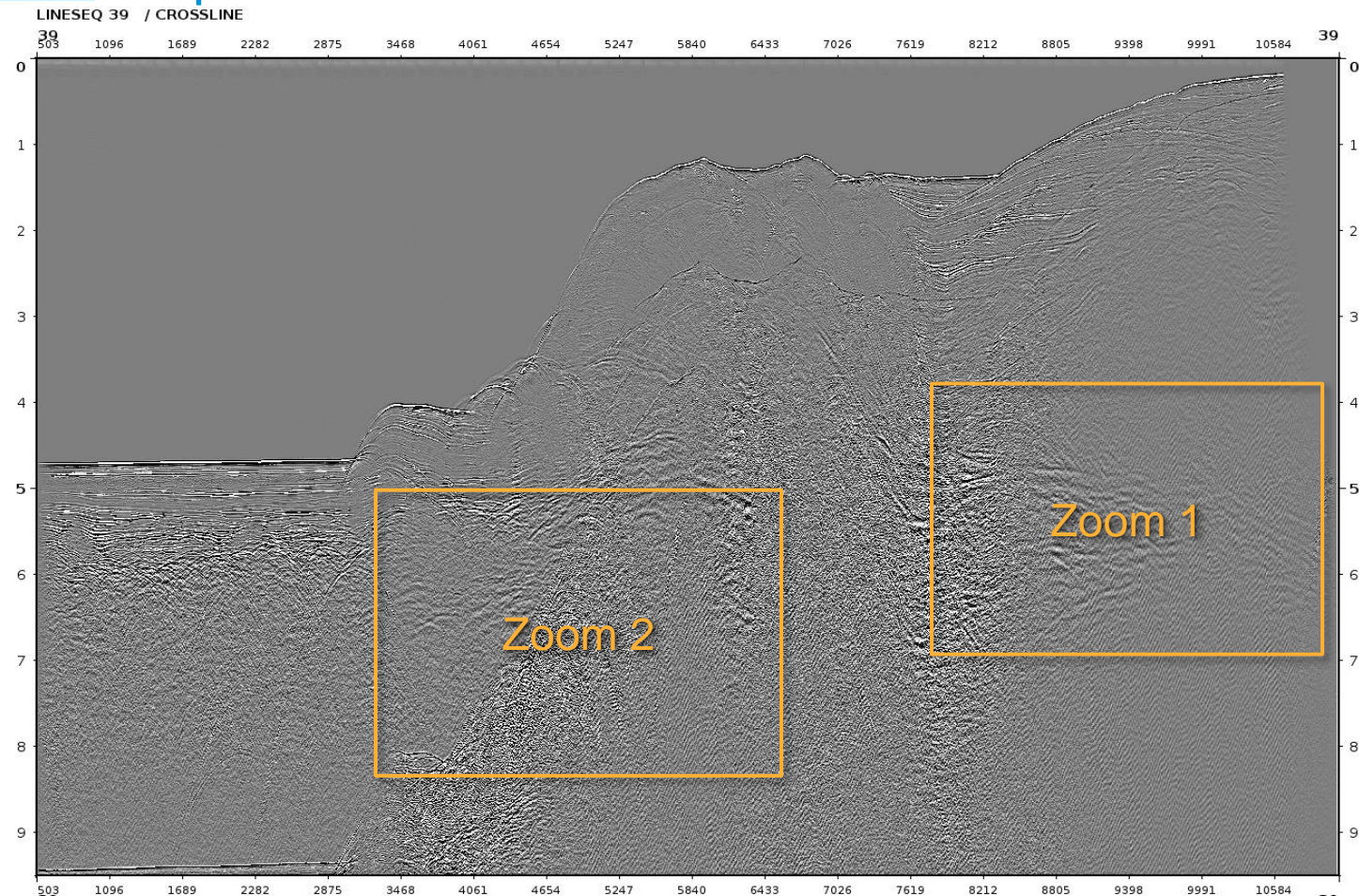


- No primary damage is observed on removed noise.



# Seq 039: 2D Stack Zoomed In Location

12



- Strong linear noise on this line.

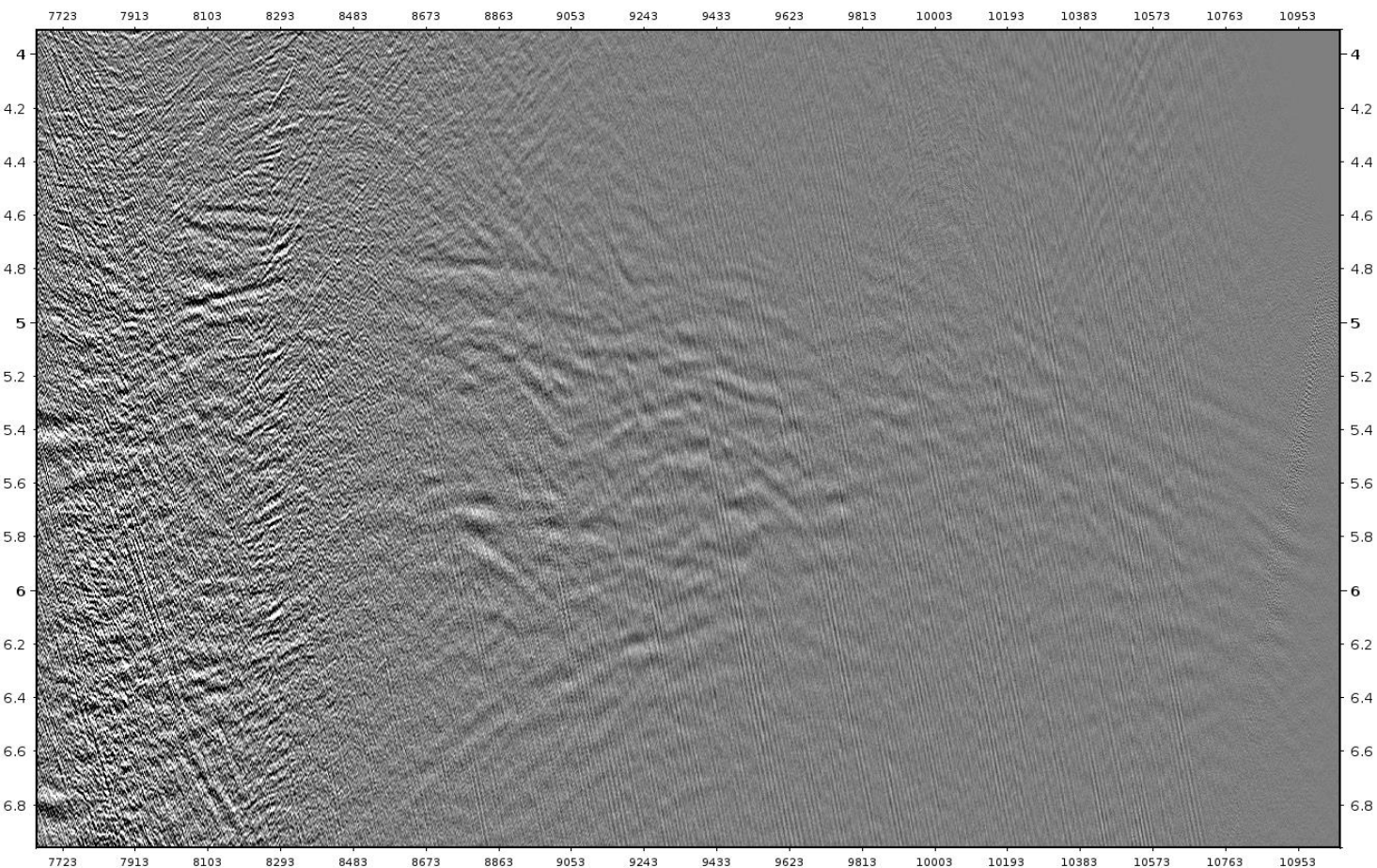




# Seq 039: Zoomed 2D Stack before LNA

13

LINESEQ 39 / CROSSLINE



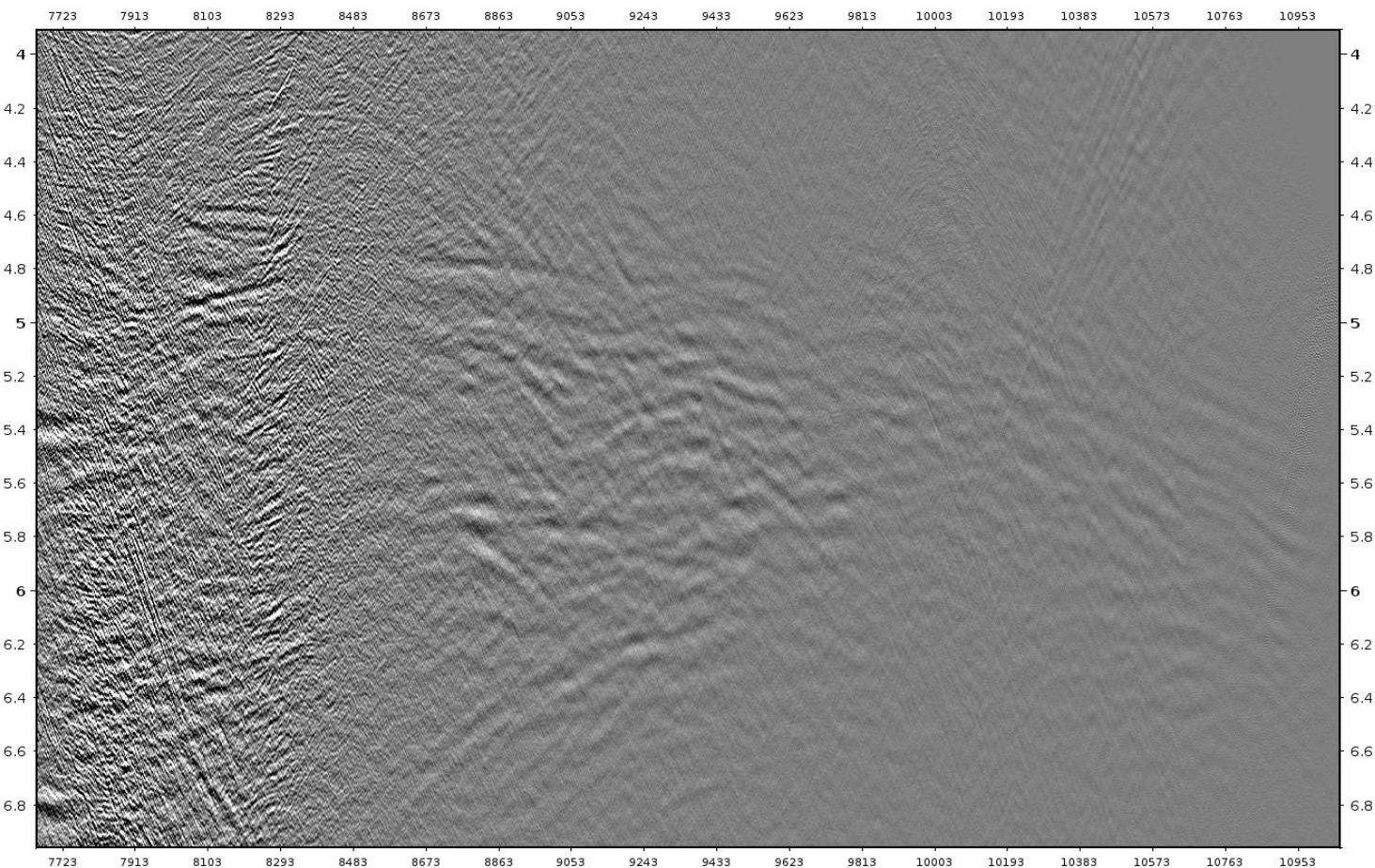
- Strong linear noise on this line.



# Seq 039: Zoomed 2D Stack after LNA

14

LINESEQ 39 / CROSSLINE

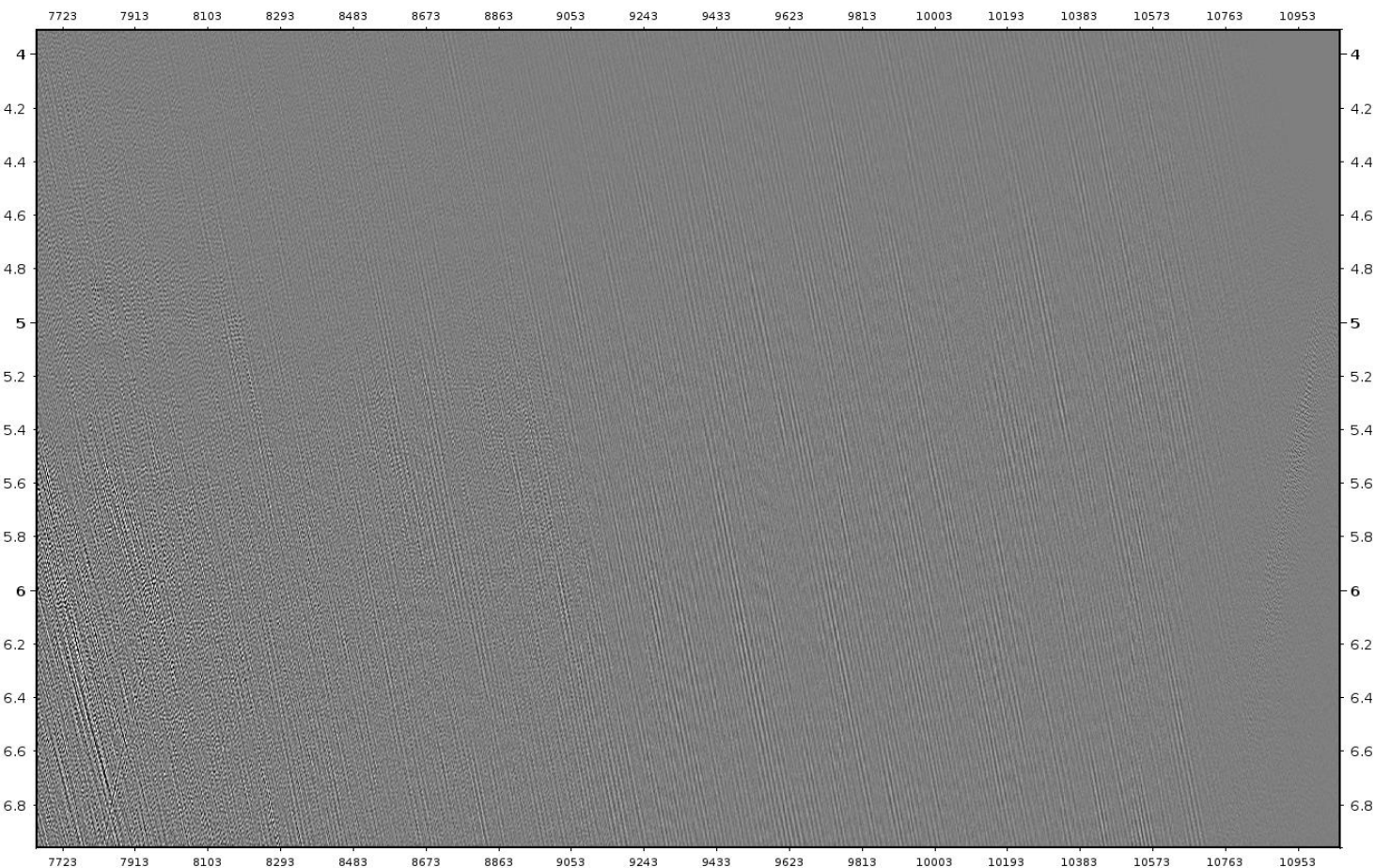


- Strong linear noise is attenuated

# Seq 039: Difference before -after

15

LINESEQ 39 / CROSSLINE



- No primary damage is observed on removed noise.

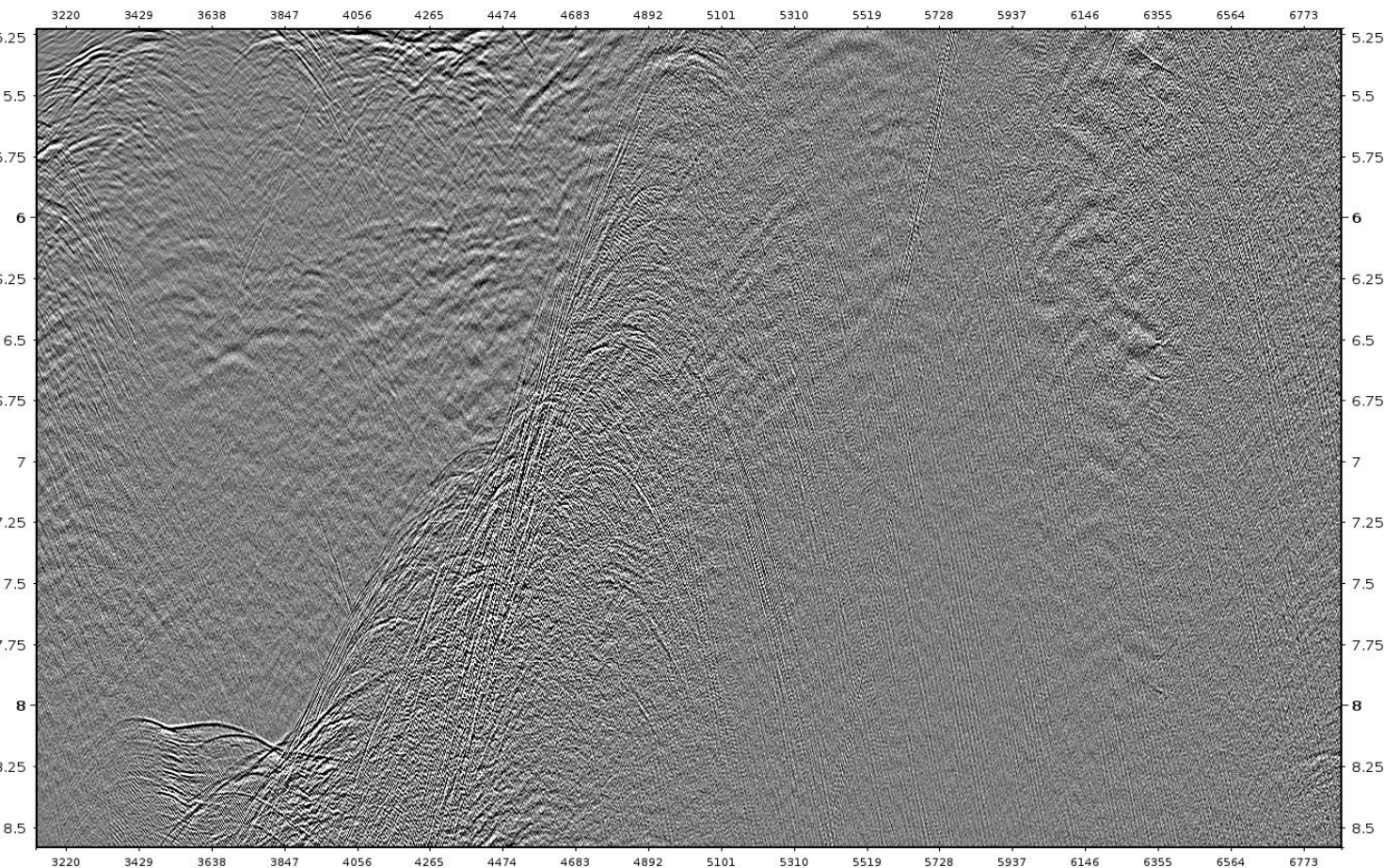




# Seq 039: Zoomed 2D Stack before LNA

16

LINESEQ 39 / CROSSLINE



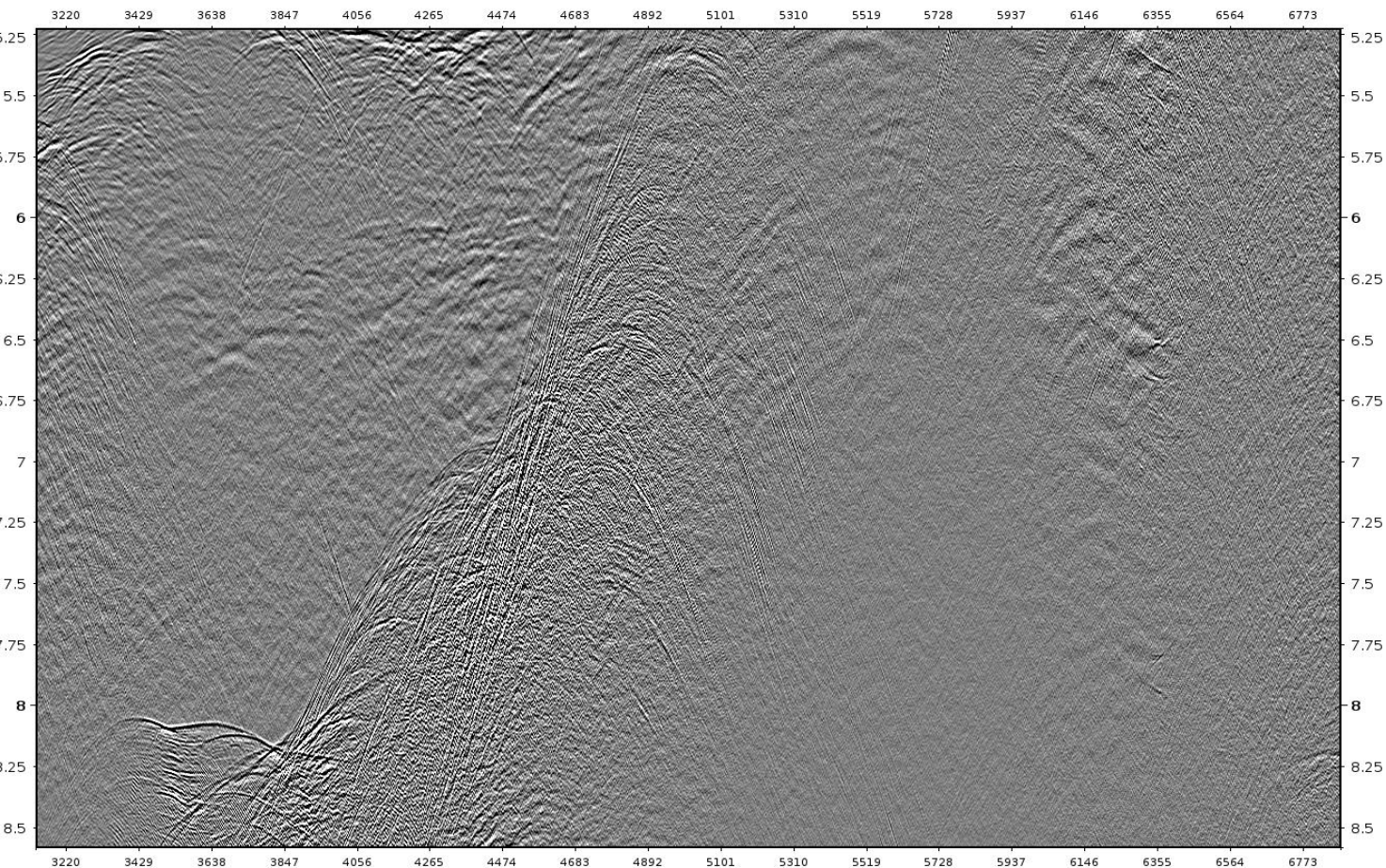
■ Strong linear noise on this line.



# Seq 039: Zoomed 2D Stack after LNA

17

LINESEQ 39 / CROSSLINE

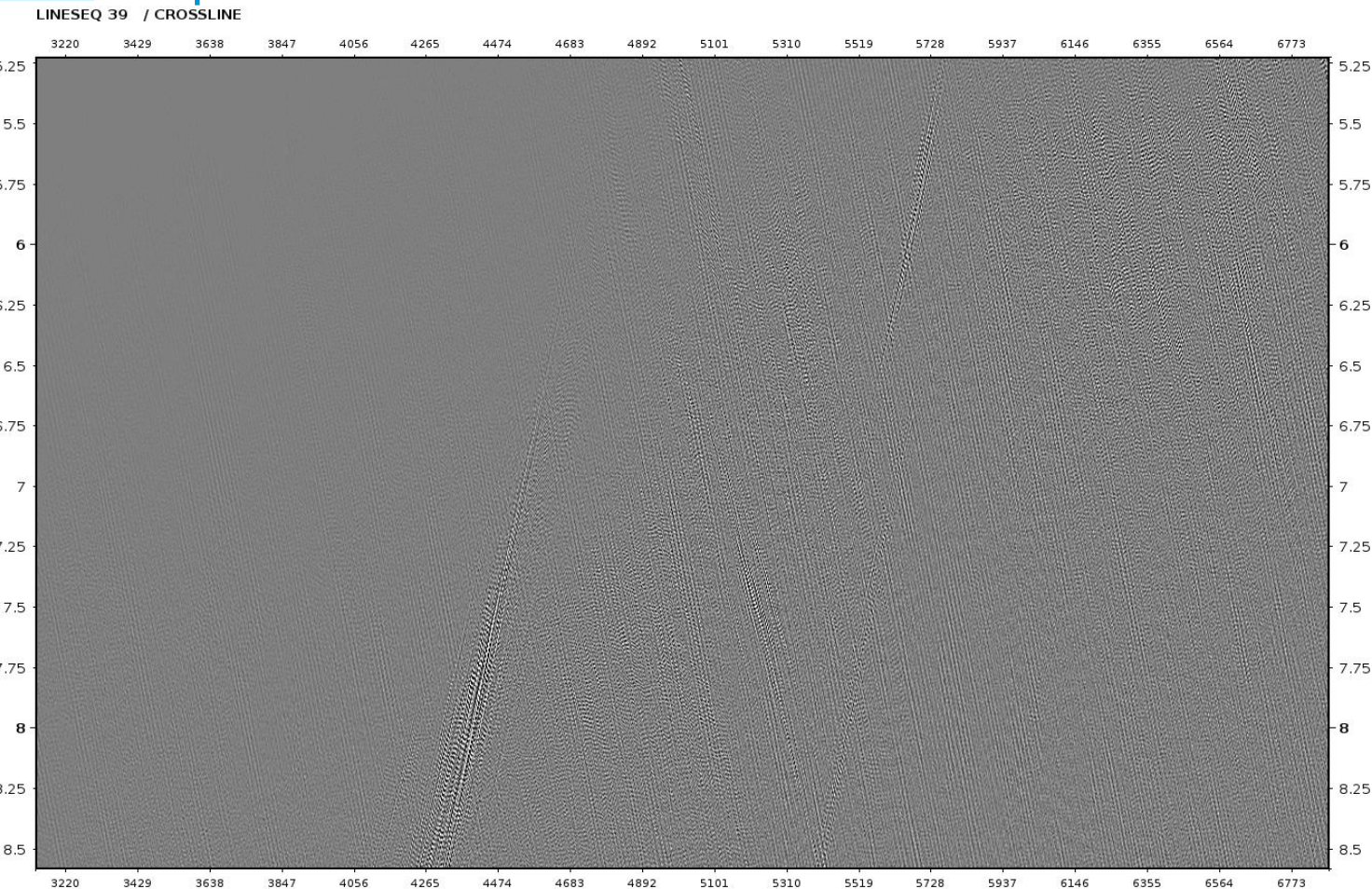


■ Strong linear noise on this line.



# Seq 039: Difference before -after

18



- No primary damage is observed on removed noise.

- Multiple diffractions travelling slower than sound in water are also attenuated.

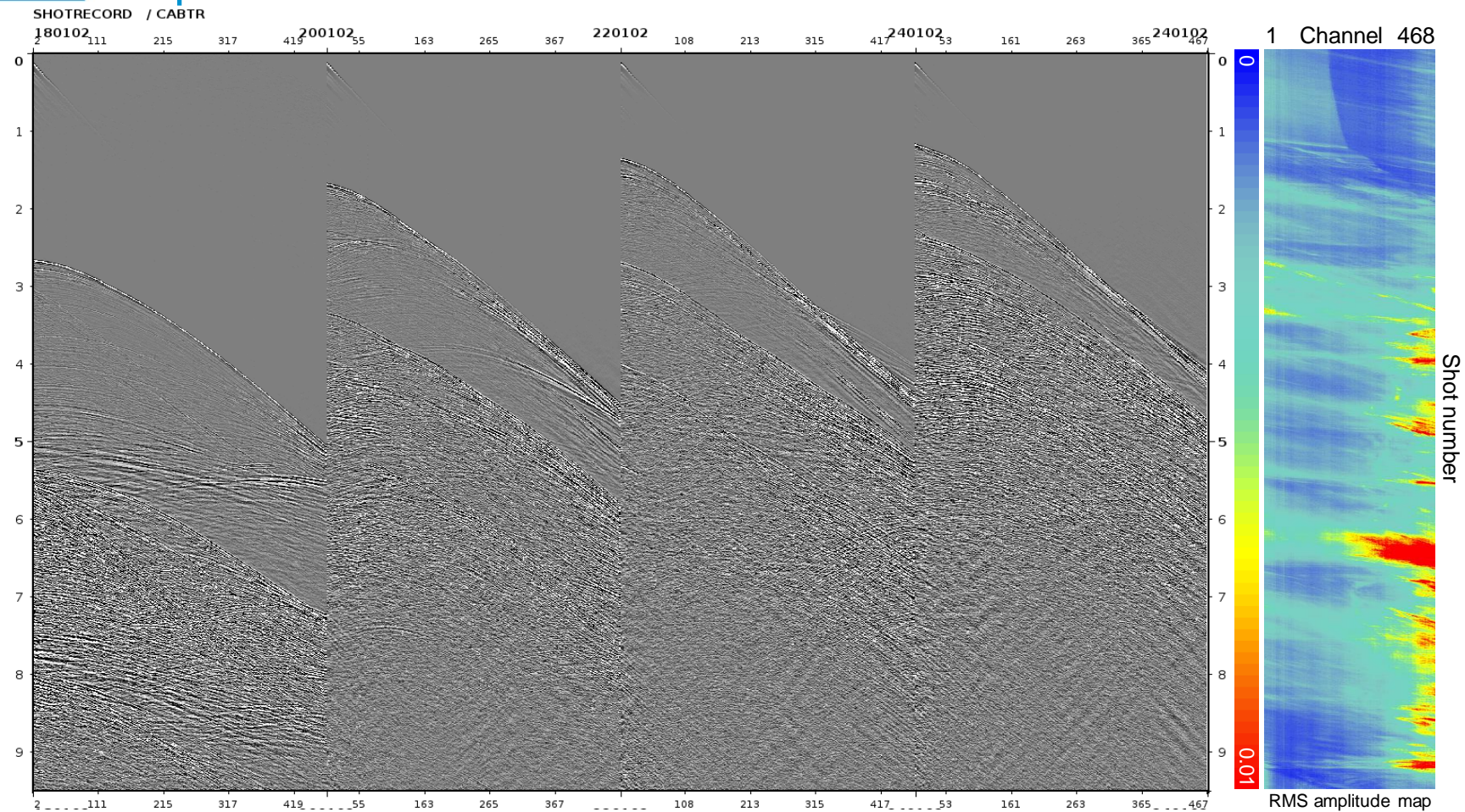


# Seq 018



# Seq 018: Selected Shot Gathers before LNA

20

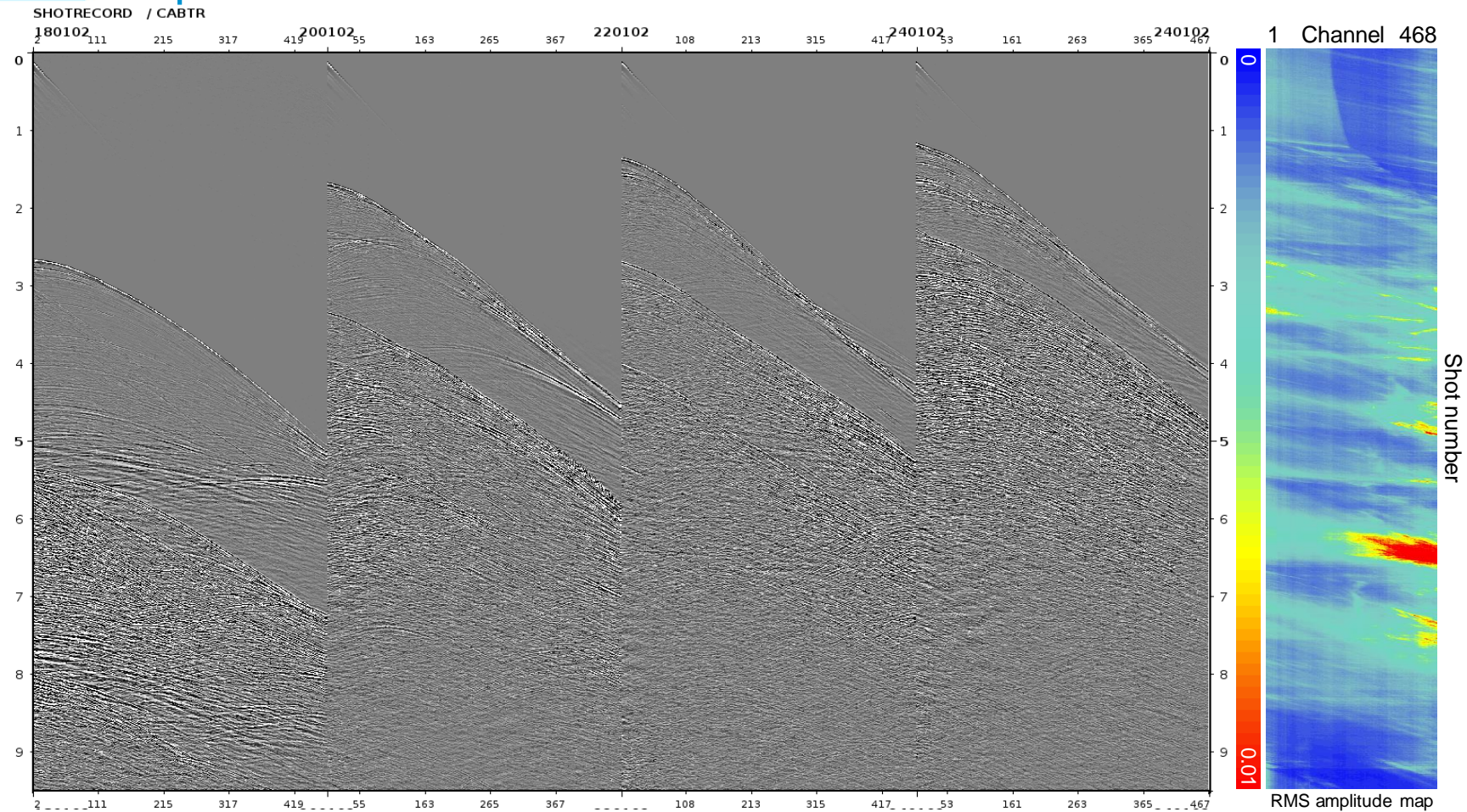






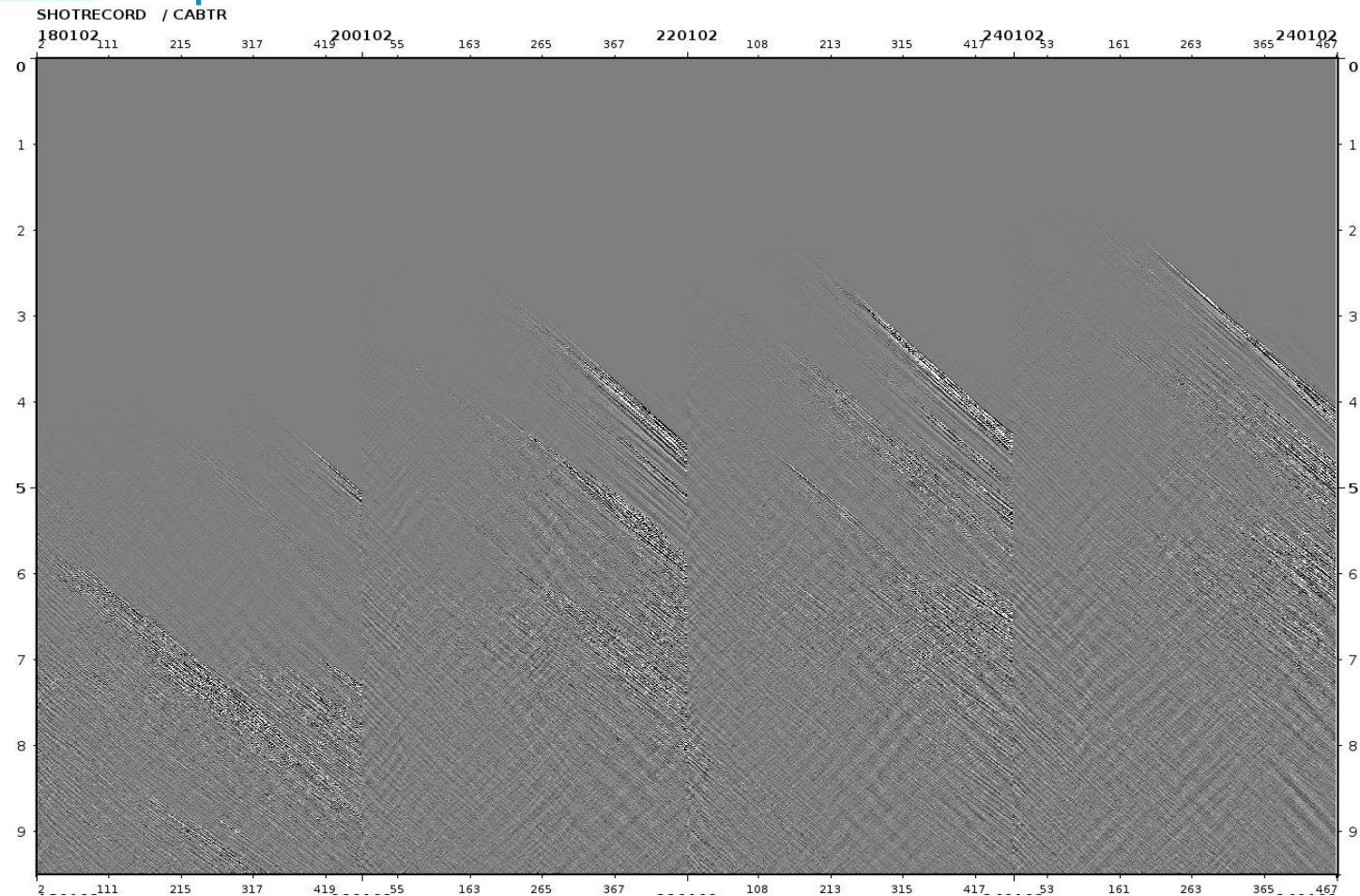
# Seq 018: Selected Shot Gathers after LNA

21



# Seq 018: Difference before - after

22



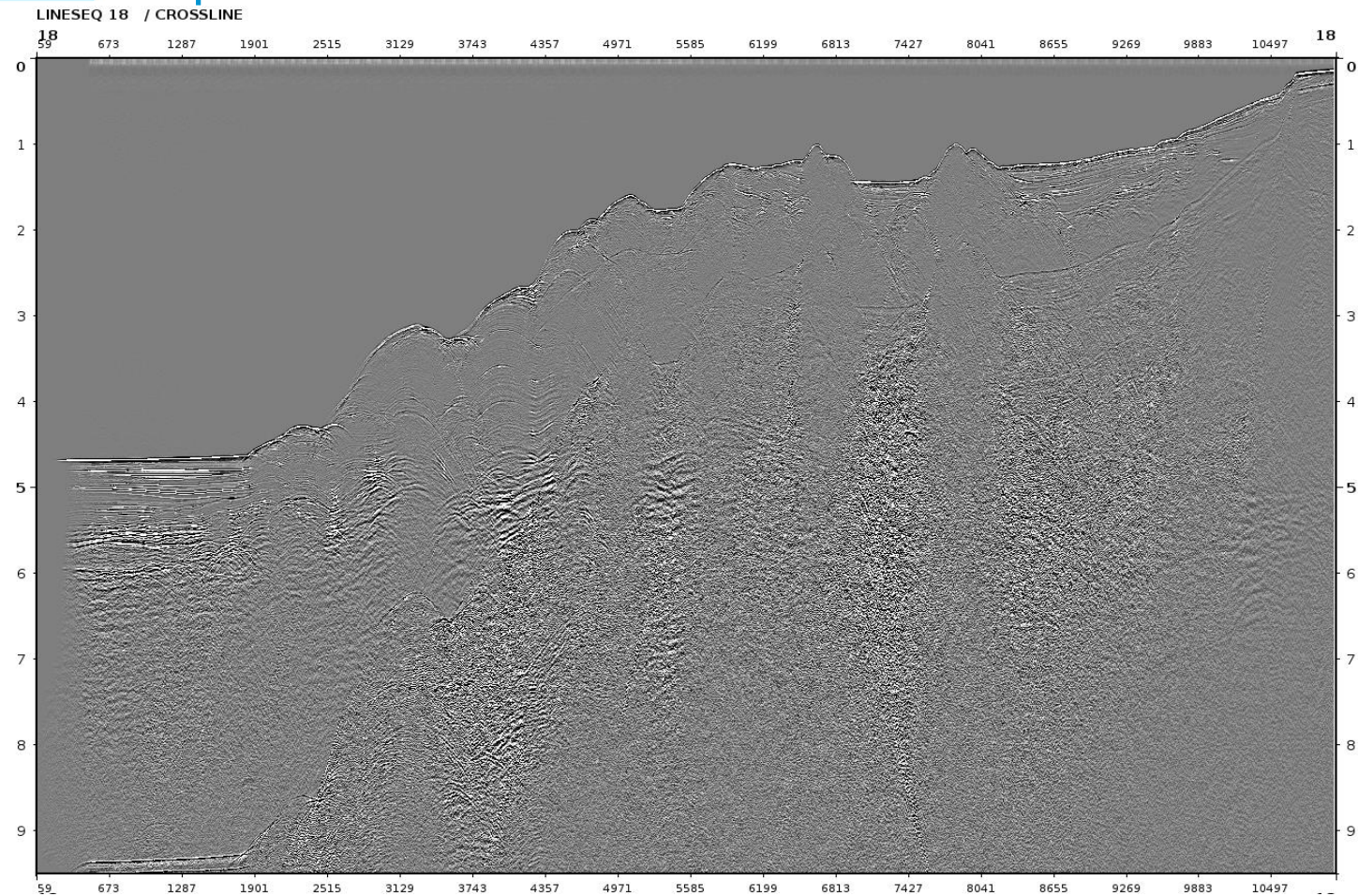
- No primary damage is observed on removed noise.





# Seq 018: 2D Stack before LNA

23



- Mild linear noise on this line.

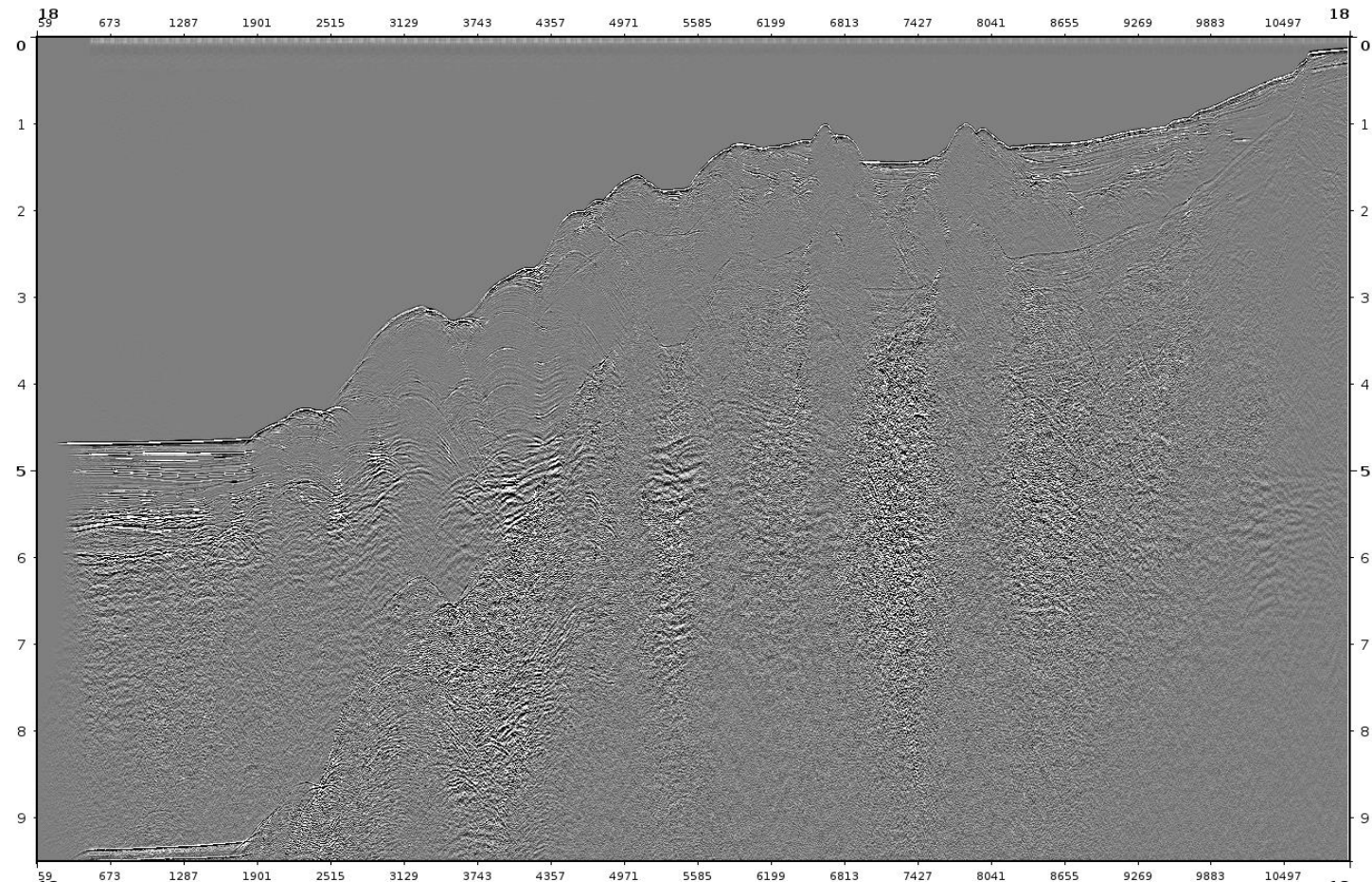




# Seq 018: 2D Stack after LNA

24

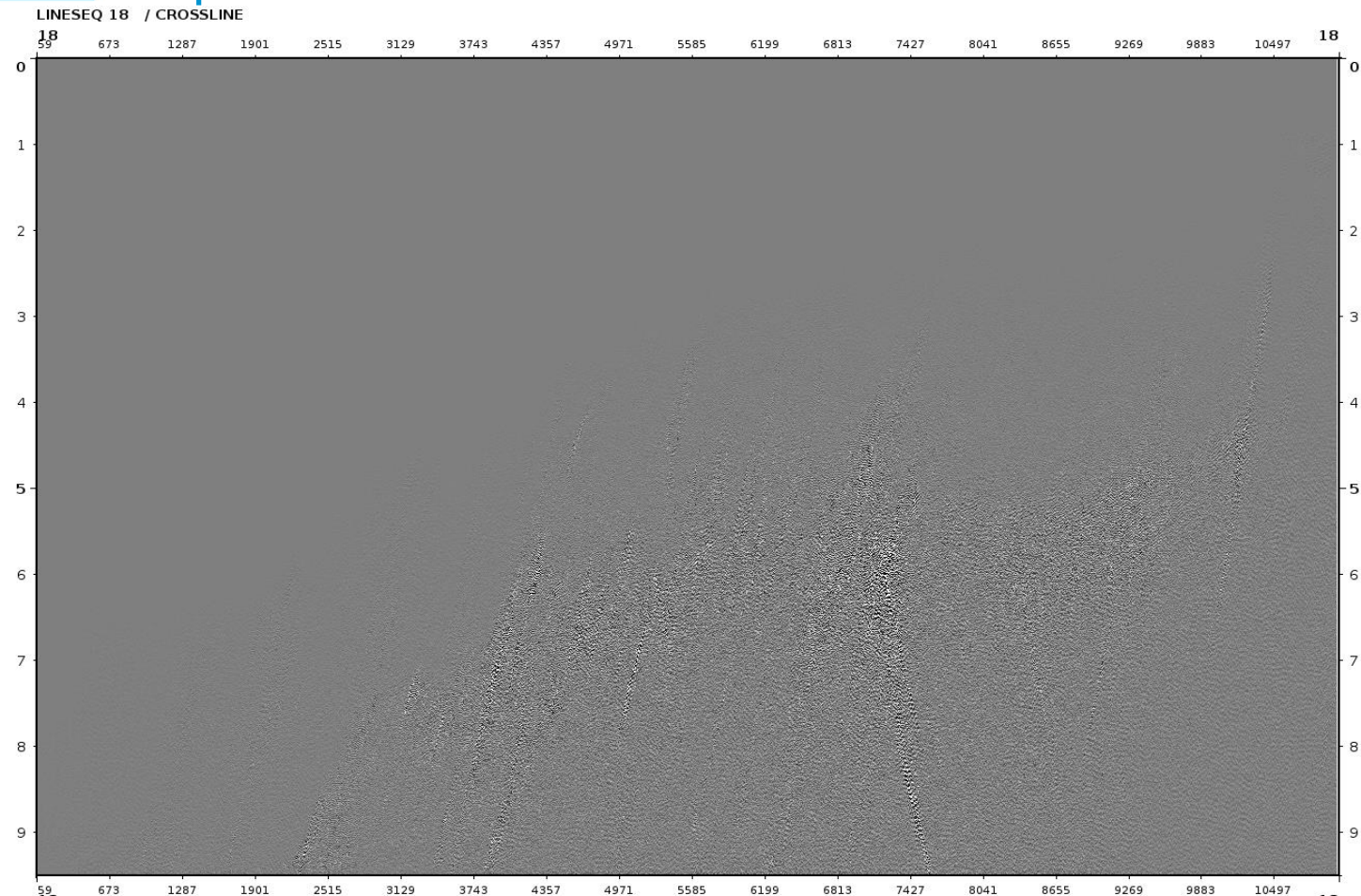
LINESEQ 18 / CROSSLINE



- Mild linear noise on this line.

# Seq 018: Difference before - after

25

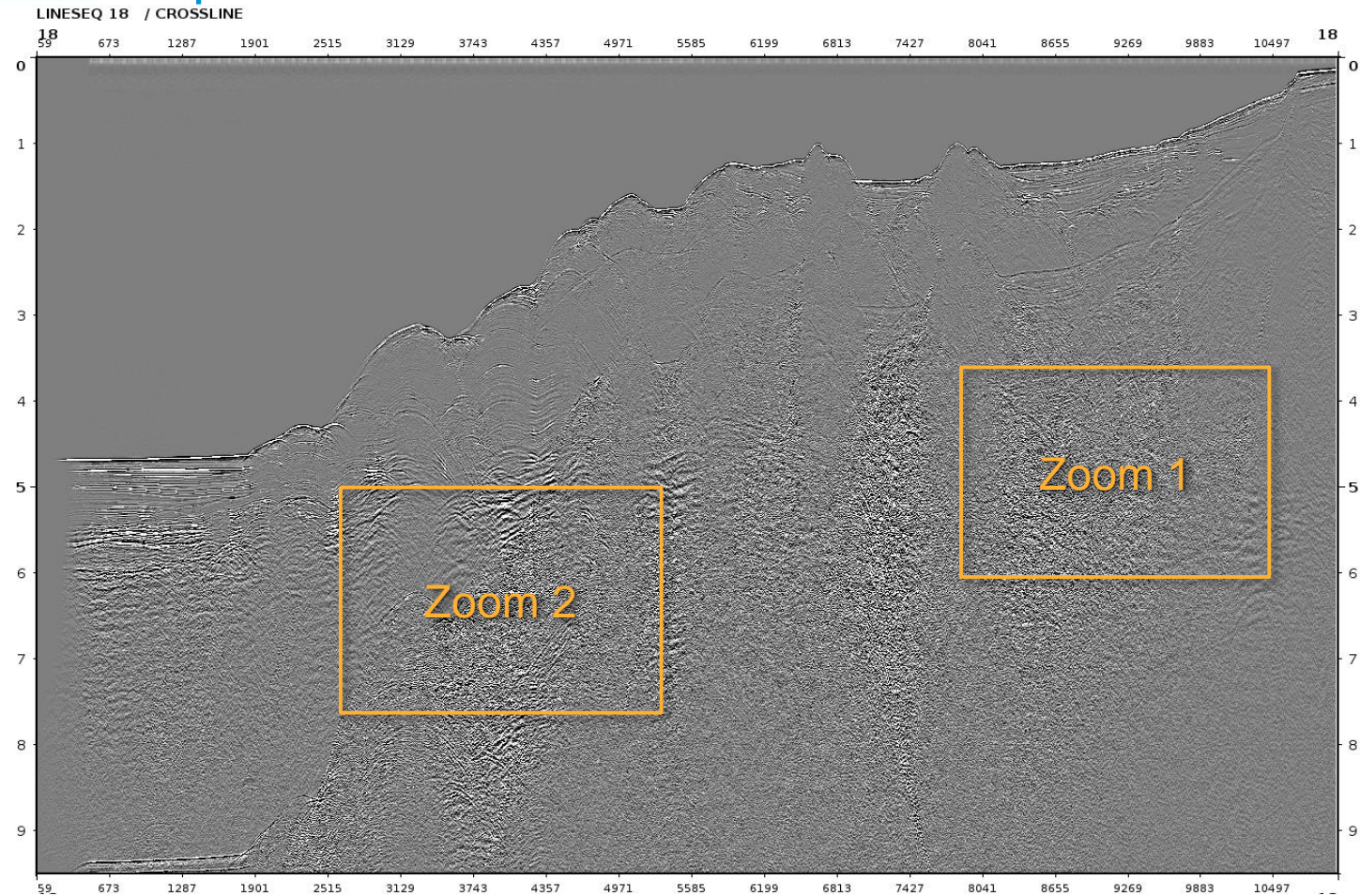


- No primary damage is observed on removed noise.



# Seq 018: 2D Stack Zoomed In Location

26



- Mild linear noise on this line.

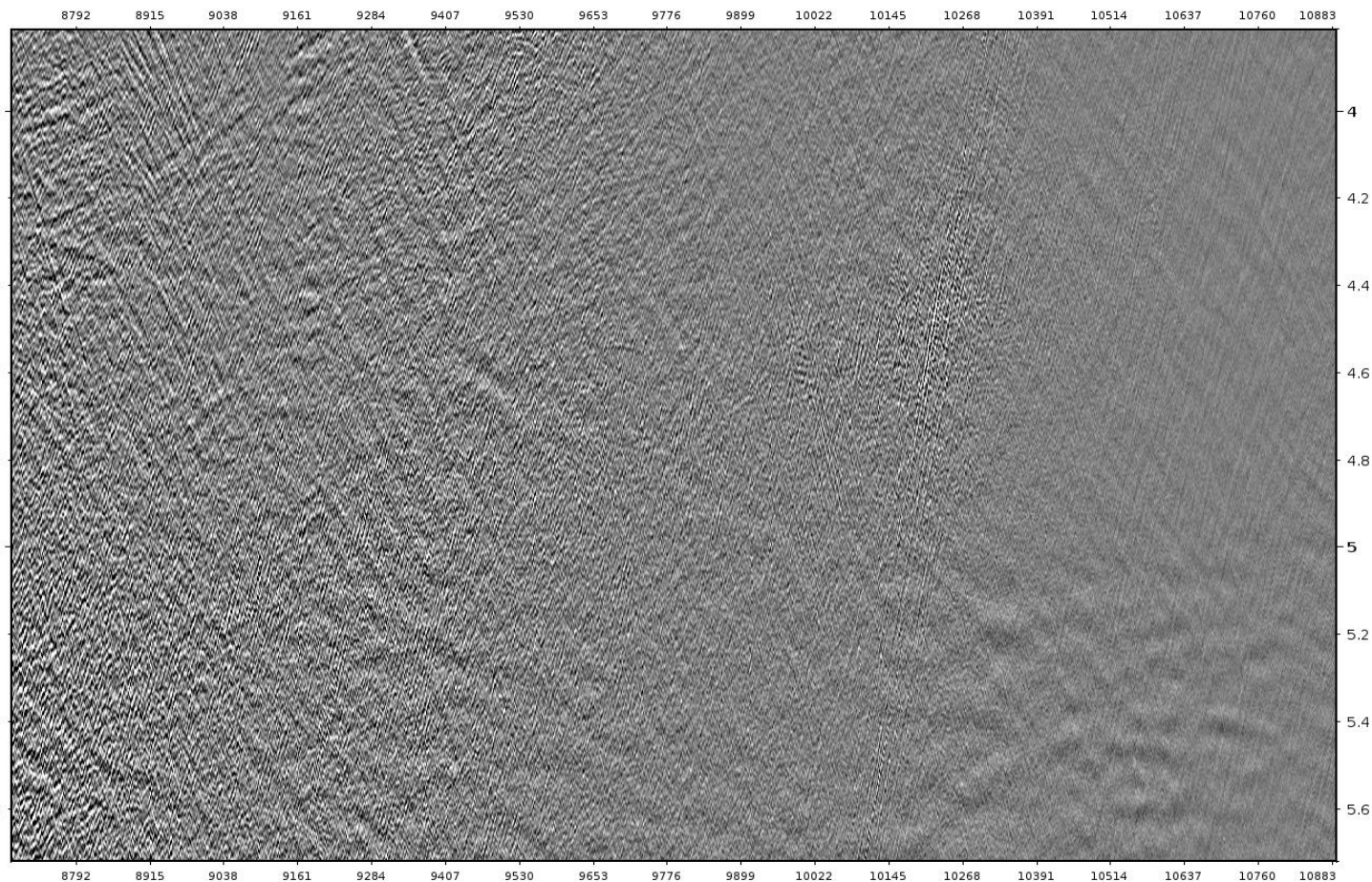




# Seq 018: Zoomed 2D Stack **before** LNA

27

LINESEQ 18 / CROSSLINE



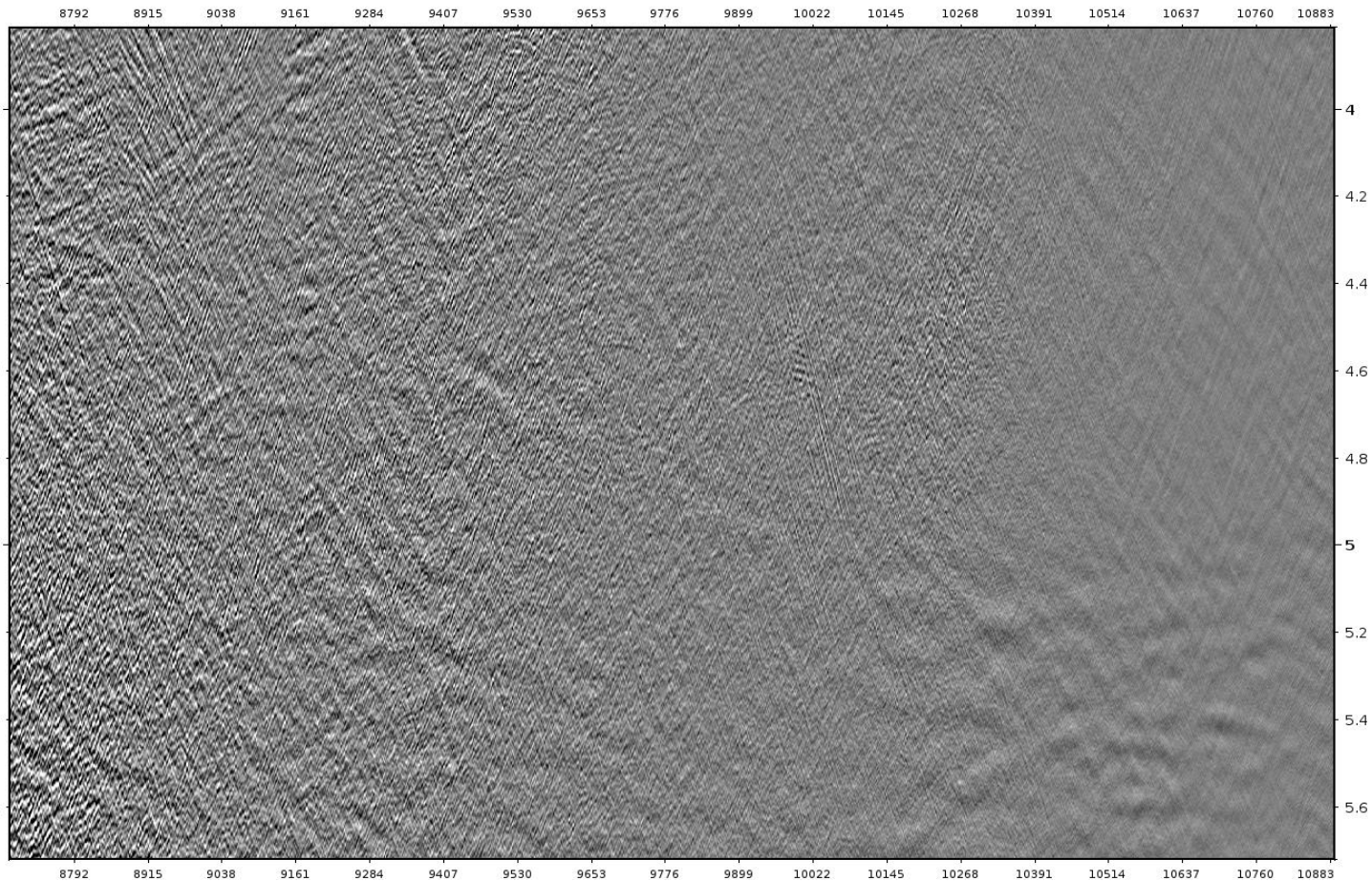
- Mild linear noise on this line.



# Seq 018: Zoomed 2D Stack after LNA

28

LINESEQ 18 / CROSSLINE

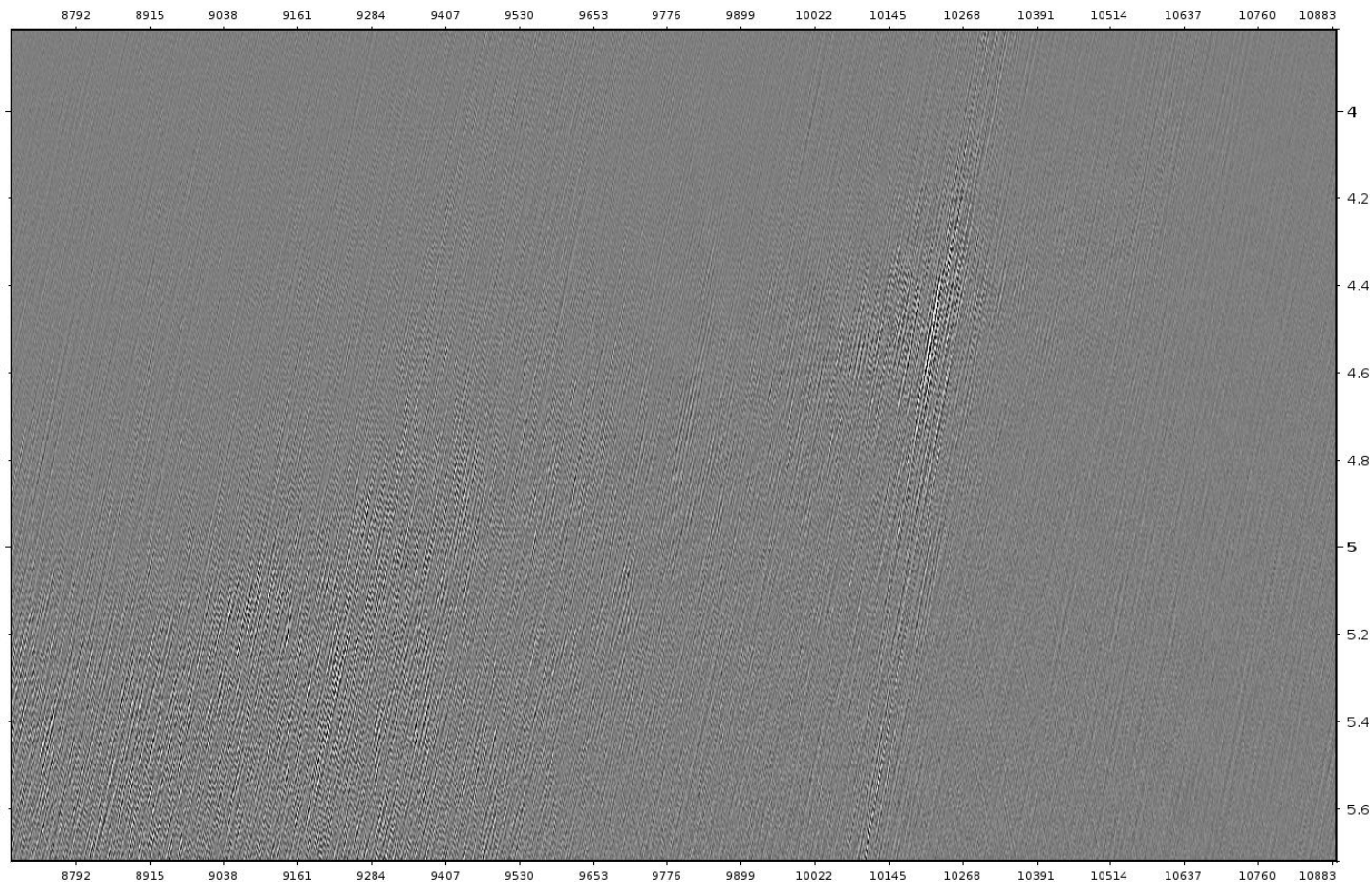


- Mild linear noise on this line.

# Seq 018: Difference before -after

29

LINESEQ 18 / CROSSLINE



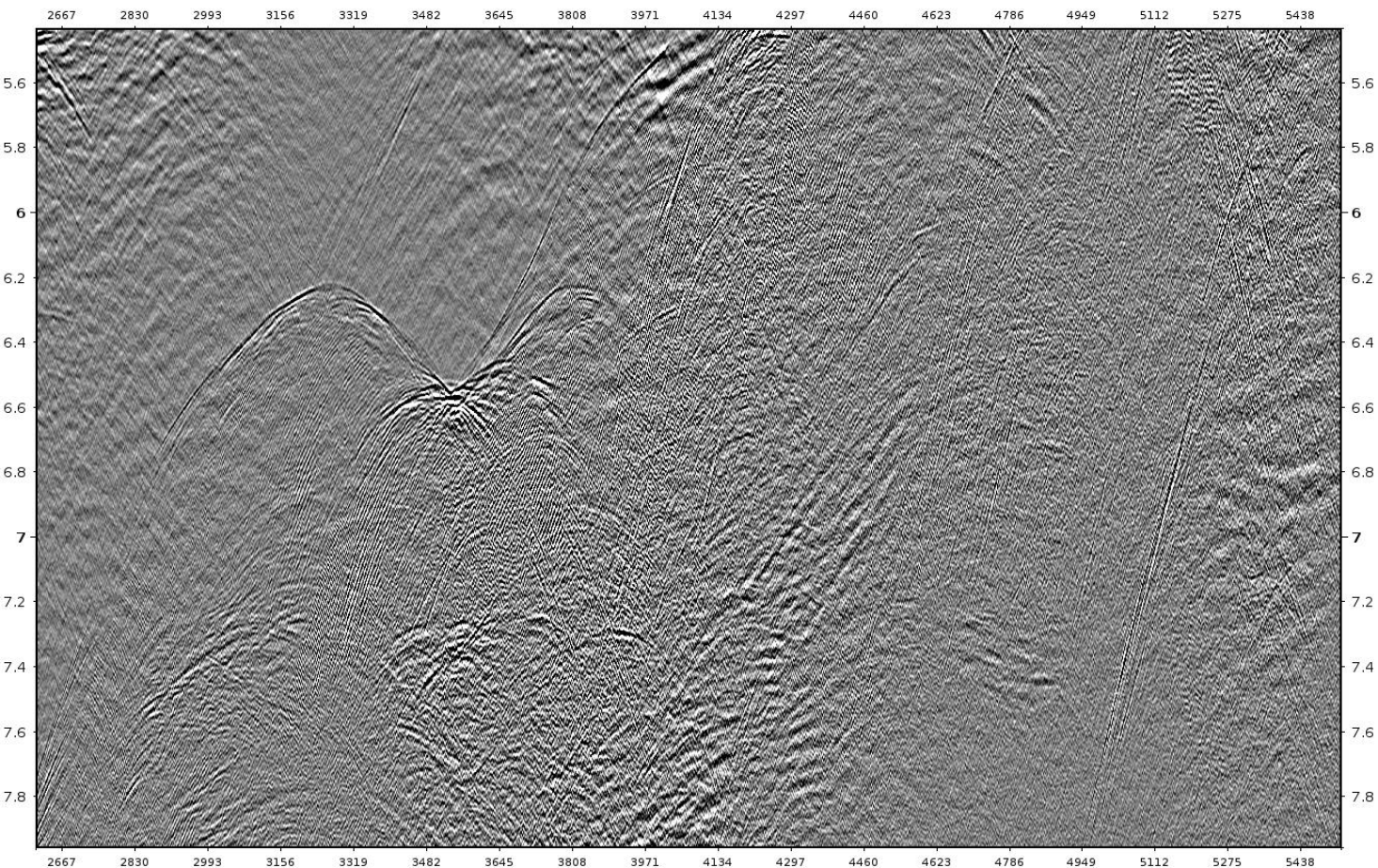
- No primary damage is observed on removed noise.
- Multiple diffractions travelling slower than sound in water are also attenuated.



# Seq 018: Zoomed 2D Stack before LNA

30

LINESEQ 18 / CROSSLINE



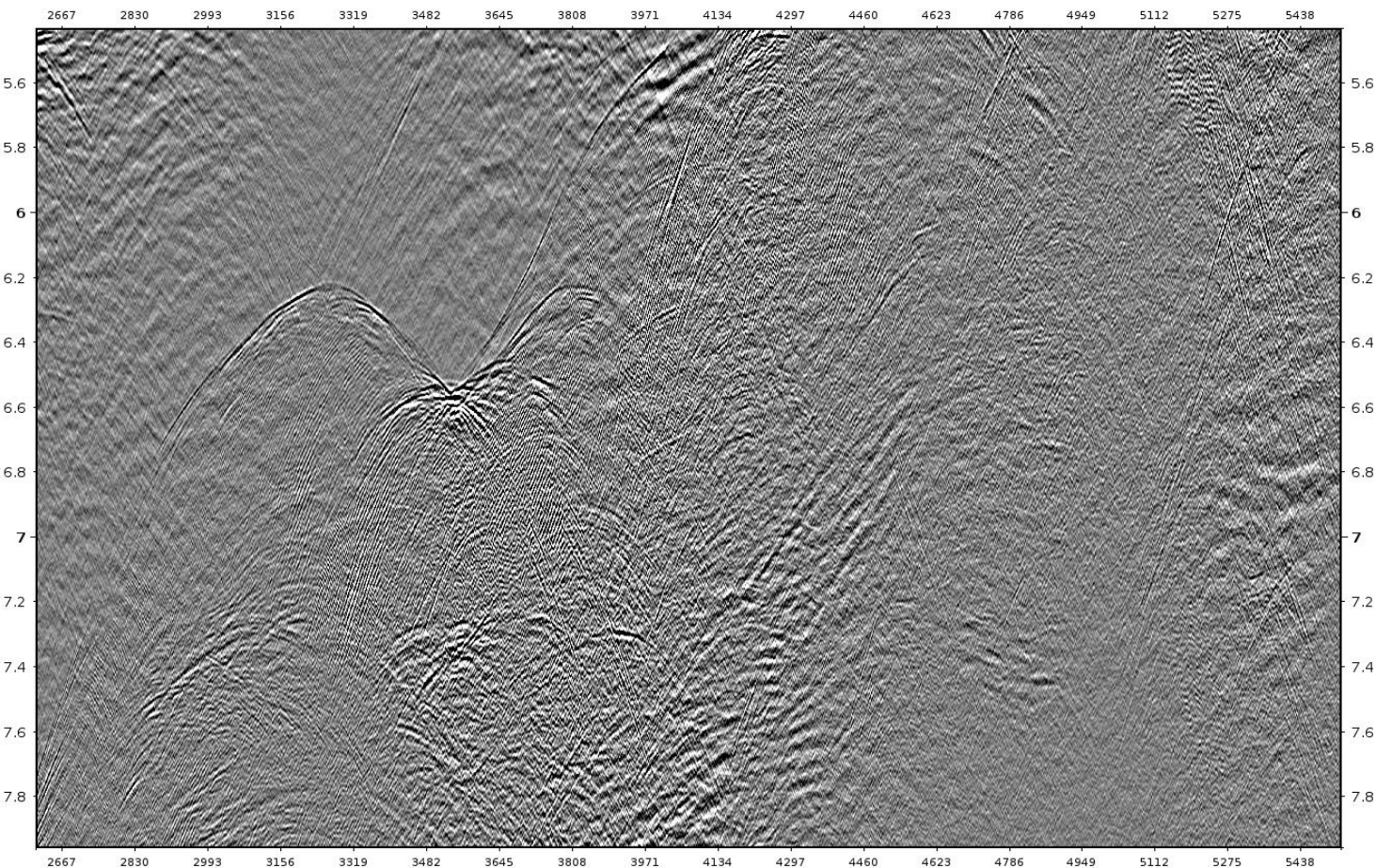
- Mild swell noise and high amplitude spikes on this line.



# Seq 018: Zoomed 2D Stack after LNA

31

LINESEQ 18 / CROSSLINE



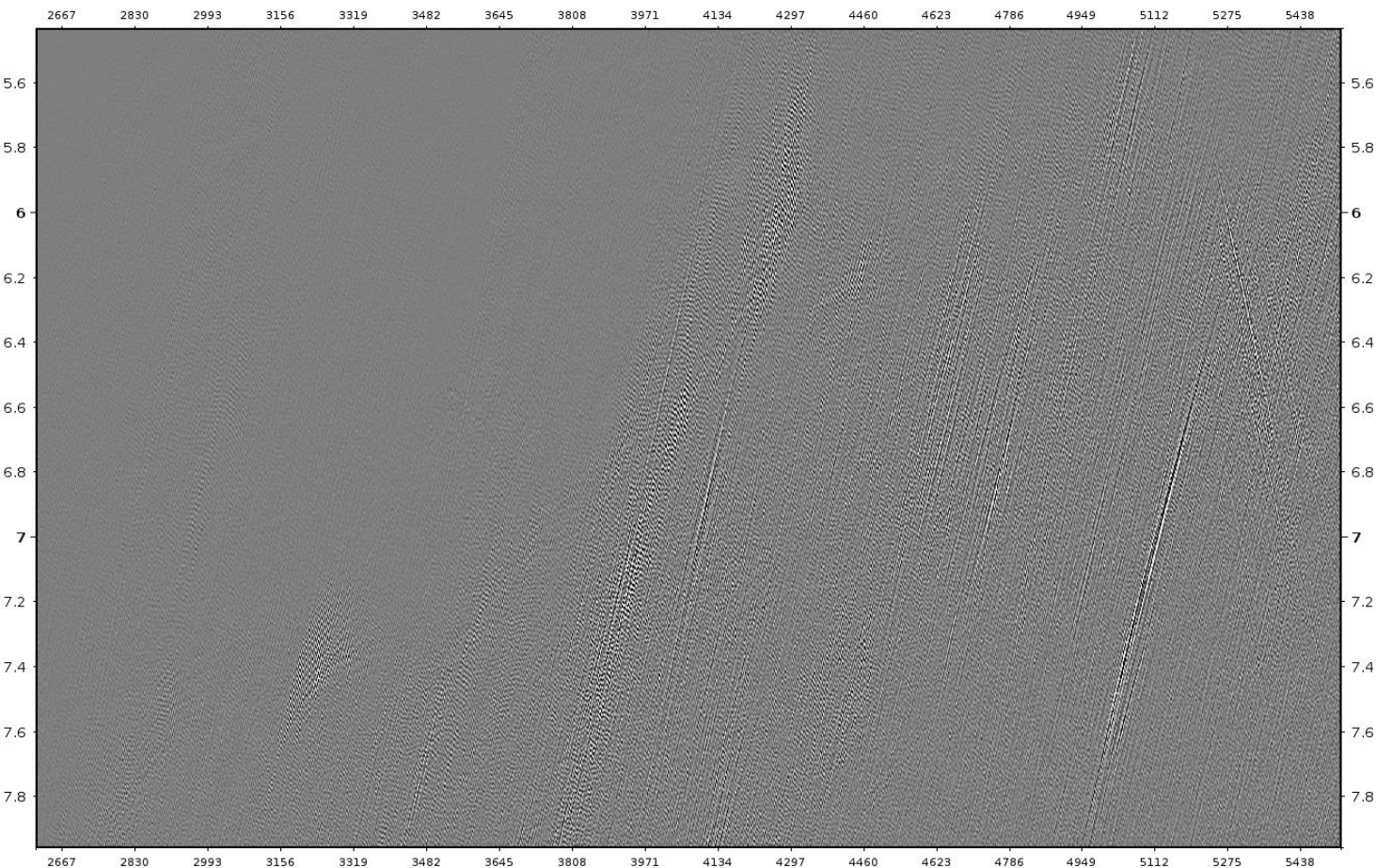
- Mild swell noise and high amplitude spikes on this line.



# Seq 018: Difference before -after

32

LINESEQ 18 / CROSSLINE



- No primary damage is observed on removed noise.
- Multiple diffractions travelling slower than sound in water are also attenuated.