



TVS and TVF

NZ 3D Processing

6 August 2021

cgg.com



INSTITUTE FOR GEOPHYSICS



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
25. Q Analysis and Compensation
26. Final TTI Kirchhoff Migration
27. Convert from Depth to Time Domain
28. High Density Automatically Velocity Analysis
29. Radon Demultiple
30. Trim Static Correction
31. Post Migration Denoise
32. Q Compensation (Amplitude)
33. Spectra Offset Balancing
34. Angle Mute & Full Stack
35. Residual Noise Attenuation
36. Frequency Dependent Amplitude Correction for Spatial Amplitude
37. Bandwidth Enhancement
38. Footprint Removal
39. TVS and TVF

■ Objective:

- Apply a time variant amplitude scaling (TVS).
- Apply a time variant filter (TVF) to attenuate high frequency noise.

■ Procedure:

- TVS parameters is WBT variant, because the geology is different in shallow and deep water area.

WBT=0ms	WBT=1000ms	WBT=4500ms
0ms → 0dB	0ms → 0dB	0ms → 0dB
500ms → 0dB	1500ms → 0dB	5500ms → 0dB
2000ms → 20dB	4000ms → 15dB	6500ms → 5dB
4000ms → 25dB	6000ms → 20dB	7500ms → 15dB
7000ms → 25dB	7000ms → 25dB	9000ms → 25dB
9500ms → 25dB	9500ms → 25dB	9500ms → 25dB

- **Procedure:**

- TVF parameters:

Time	High cut filter (Hz)	Slope (dB/Oct)
0-6000ms	-	-
6500-7000ms	50	36
7500-9500ms	18	36

- **Display:**

- Full and angle stack in depth domain.
- Selected subline and crossline.

- **Observation & Recommendation:**

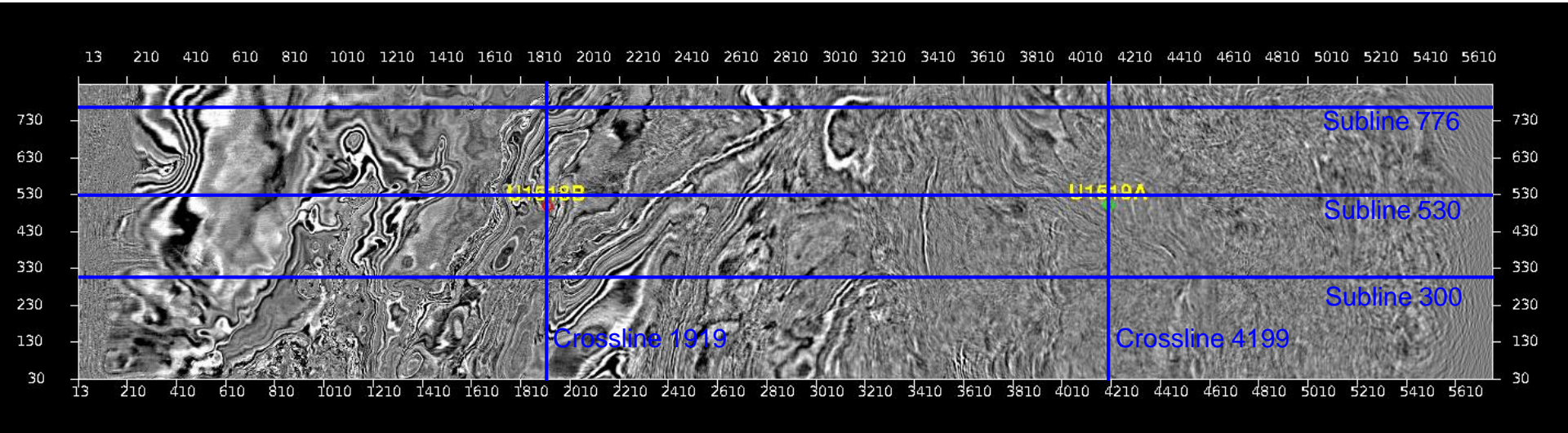
- TVS can well balance the amplitude from shallow to deep.
- TVF attenuates the high frequency noise without touching the primary.
- TVS and TVF is recommend to production.



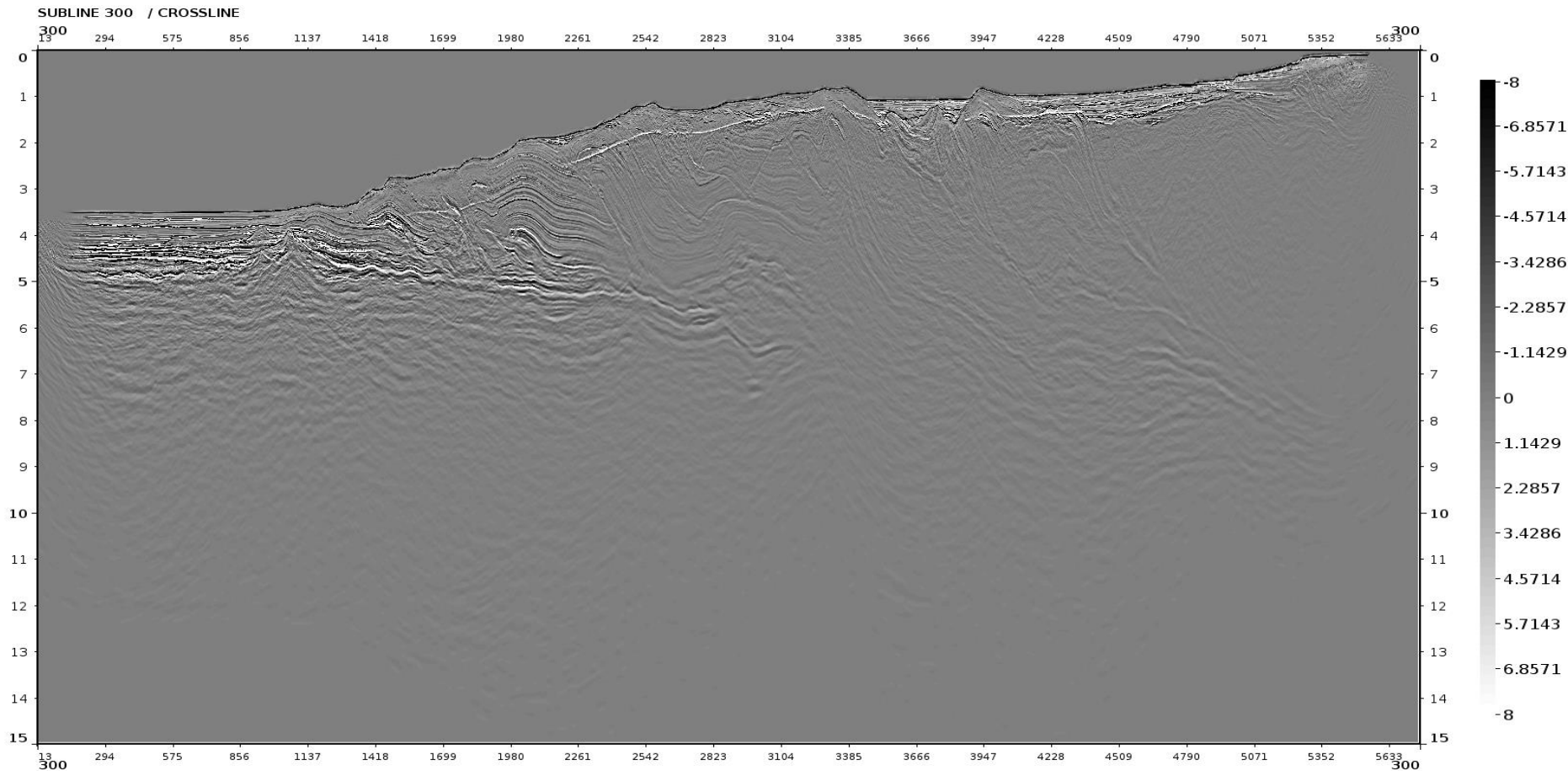
Test Lines location

5

- Subline 300, 530 and 776.
- Crossline 1919 and 4199.



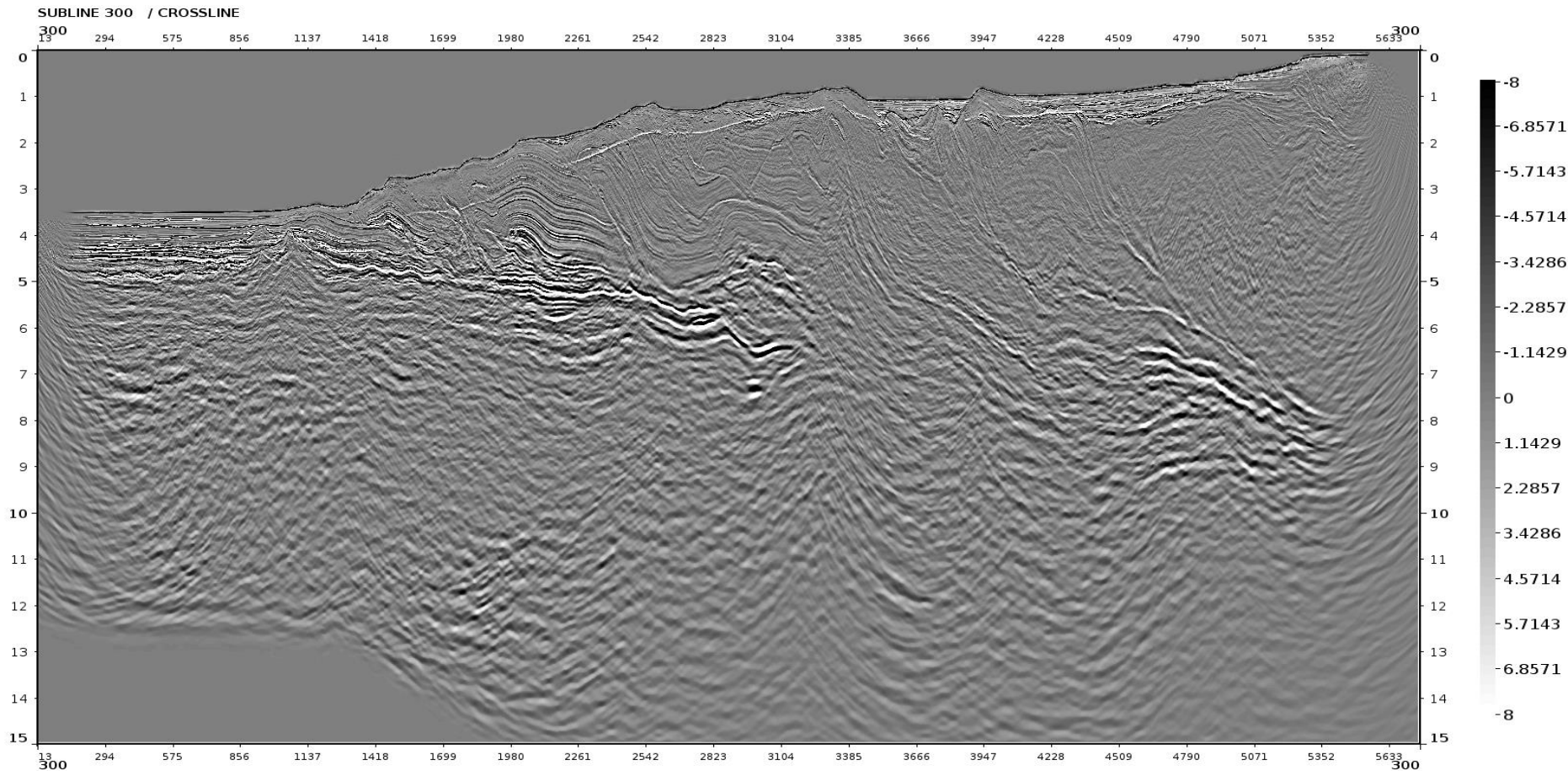
Full Stack





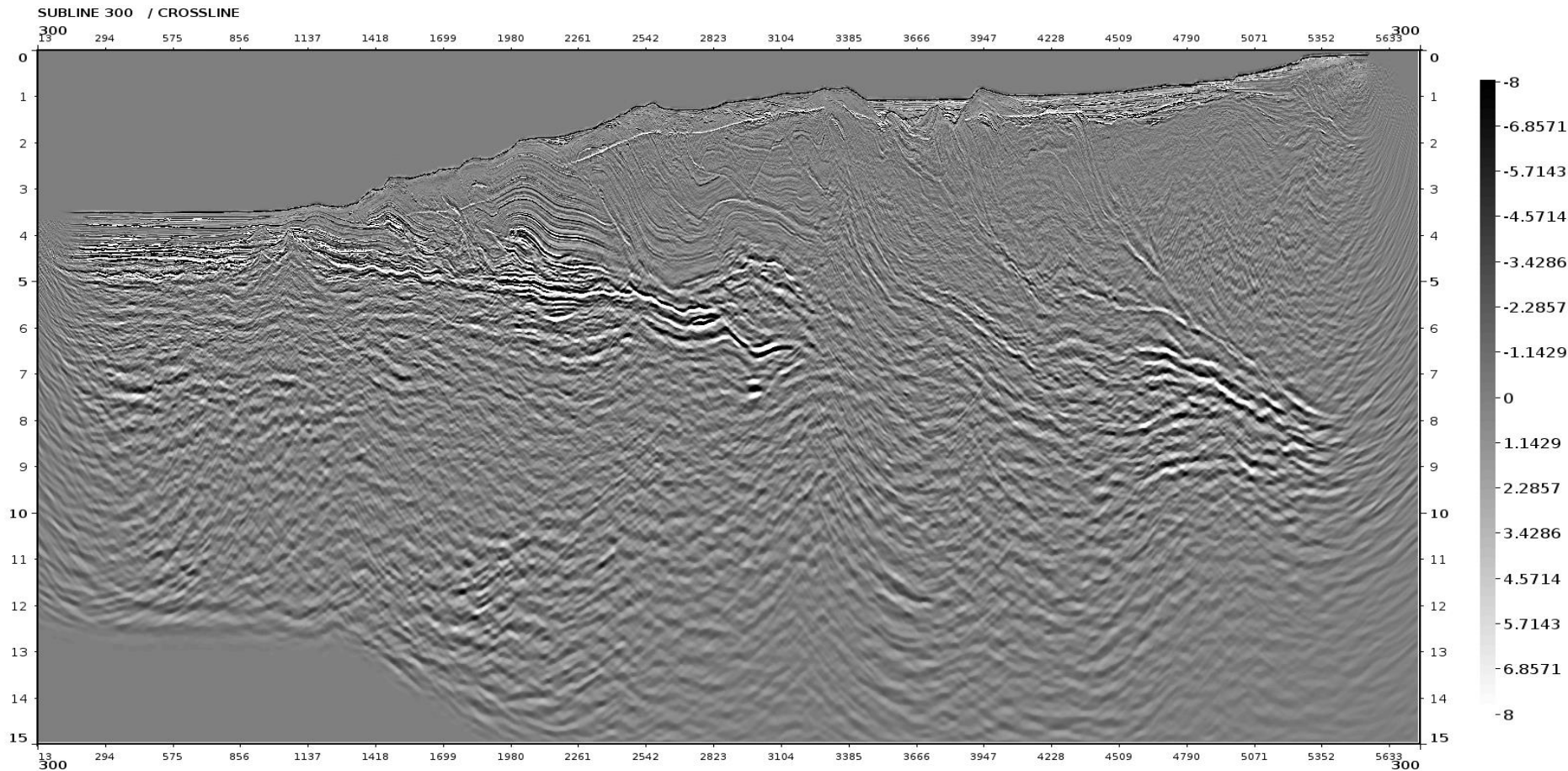
Subline 300: after TVS

8





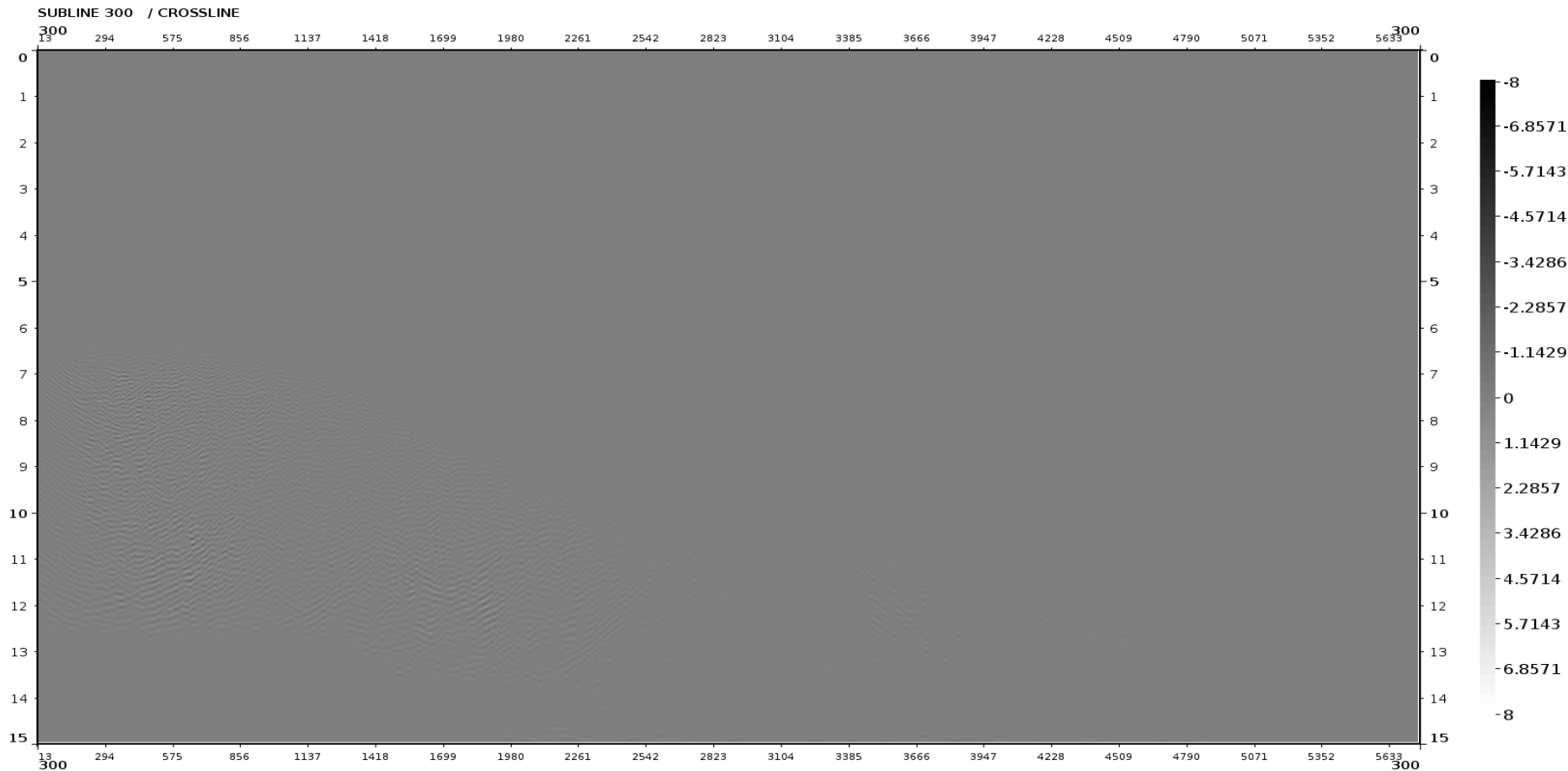
Subline 300: after TVF

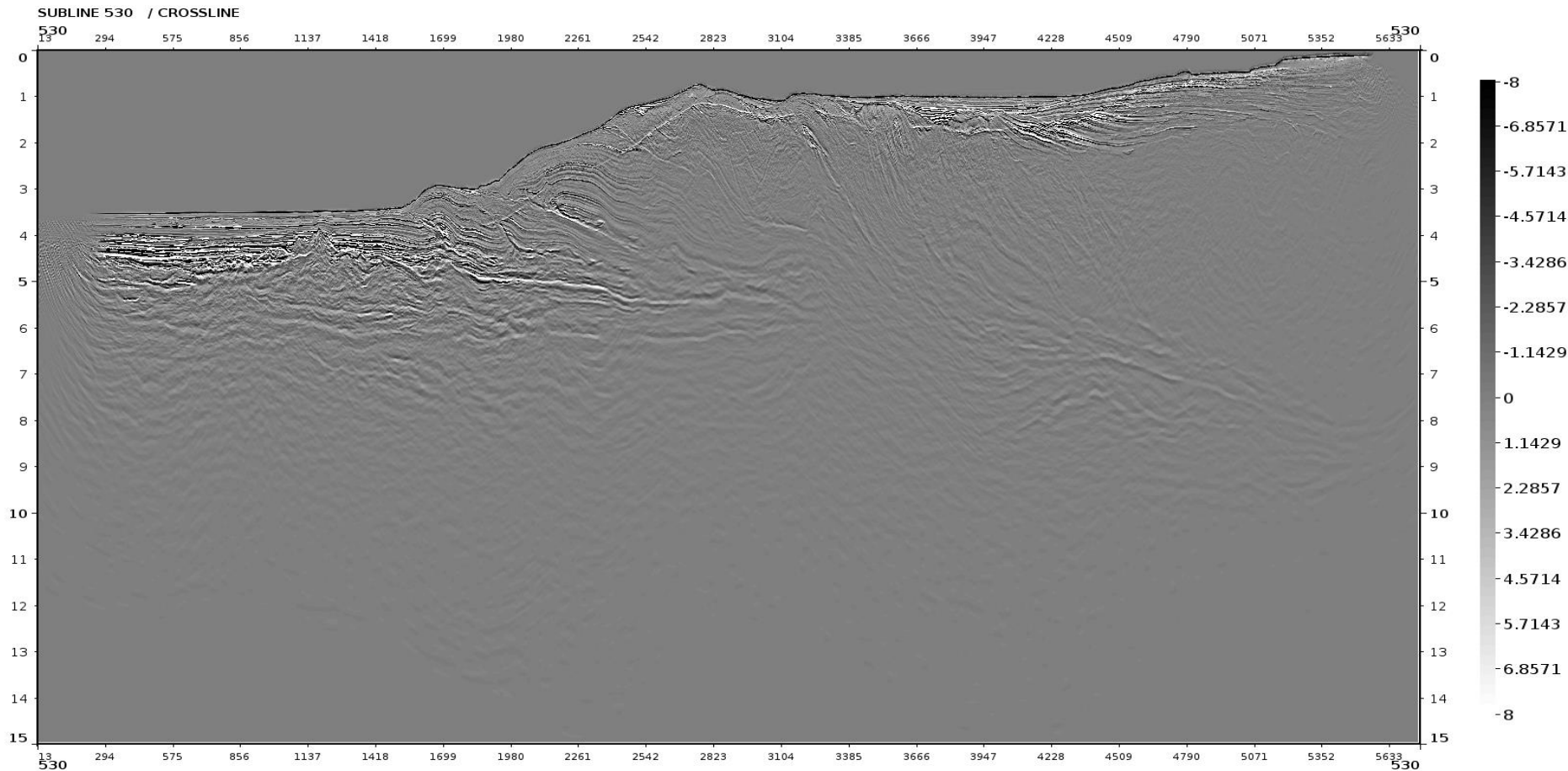




Subline 300: difference by TVF

10

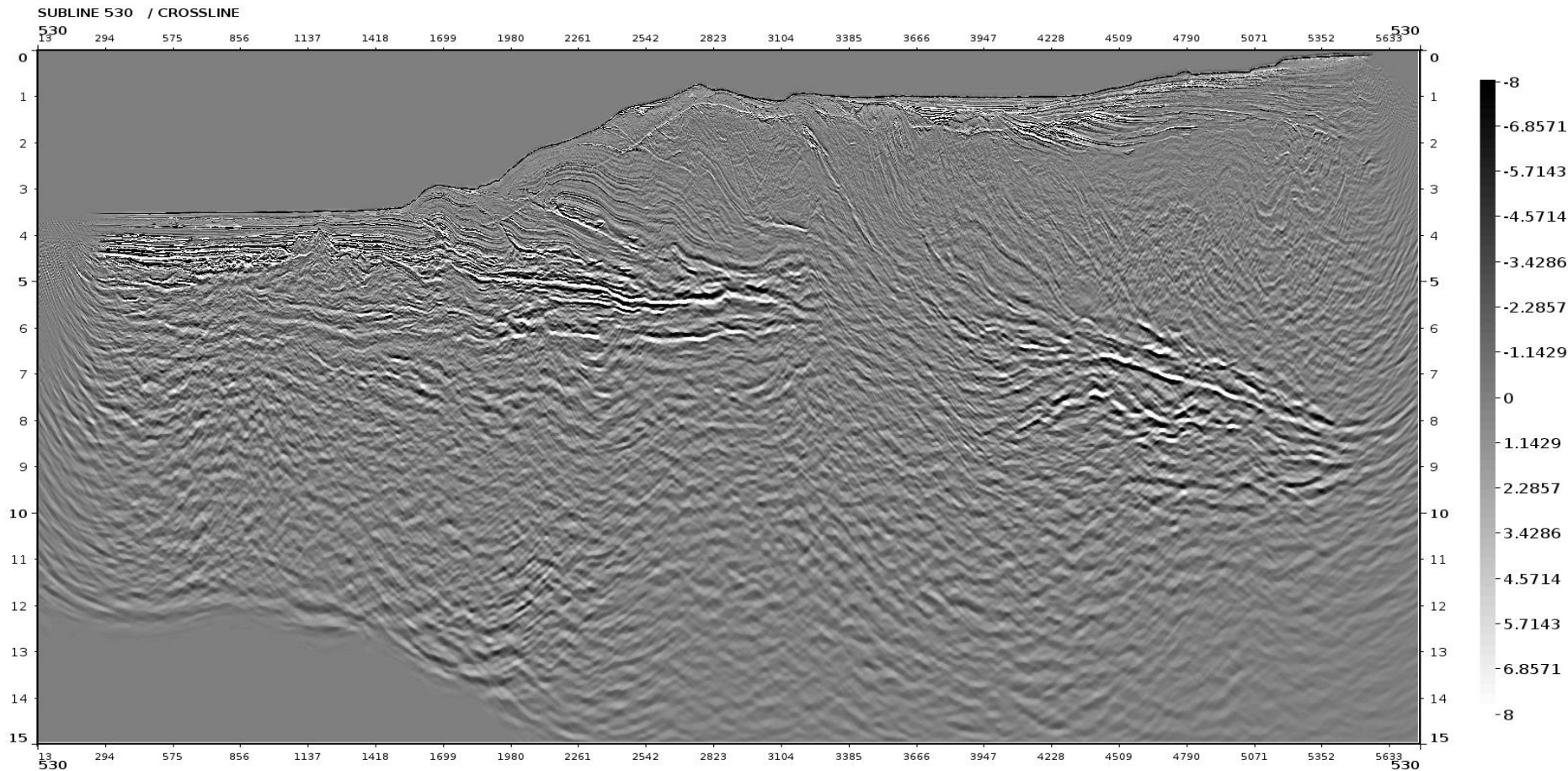






Subline 530: after TVS

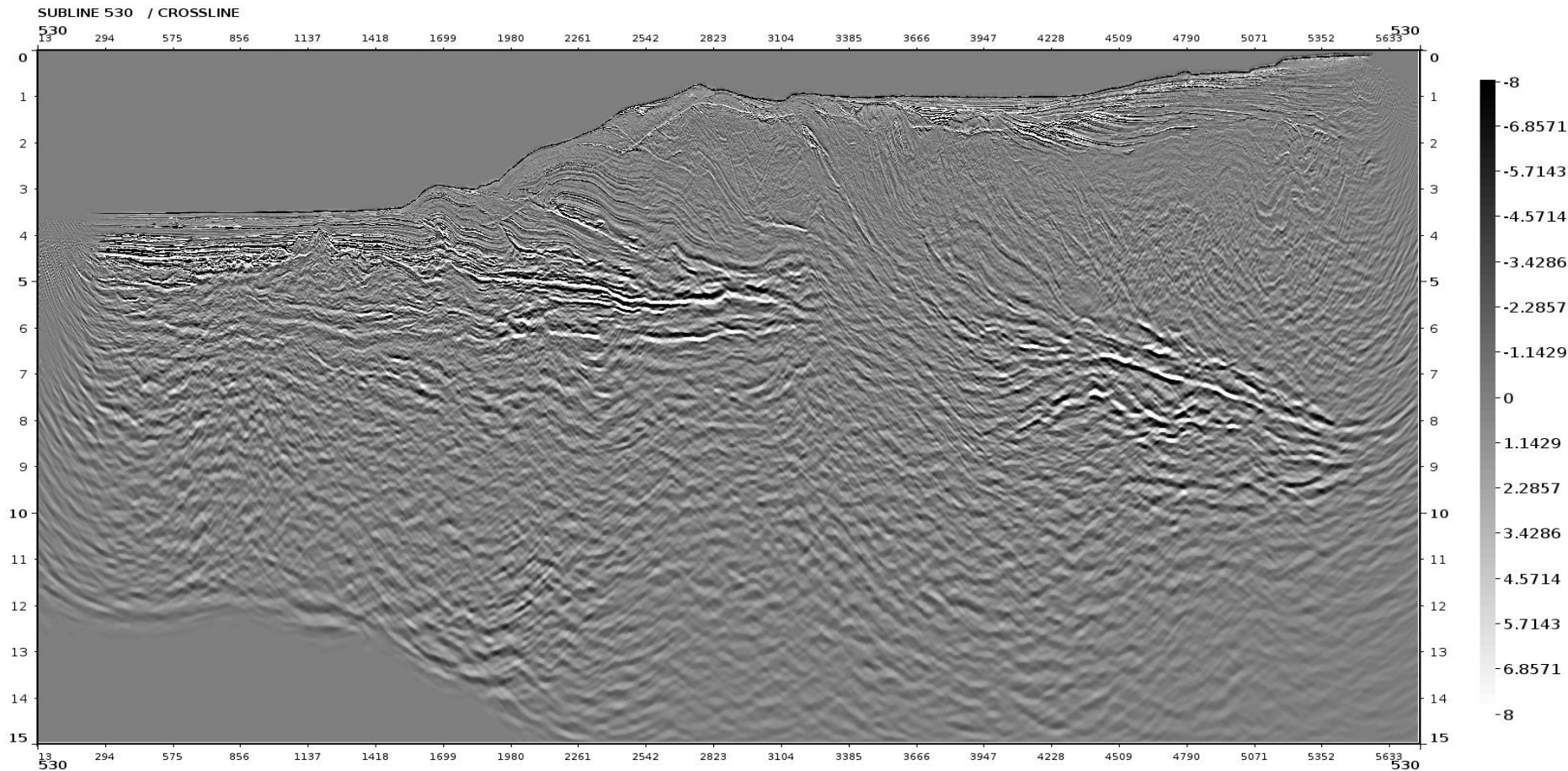
12





Subline 530: after TVF

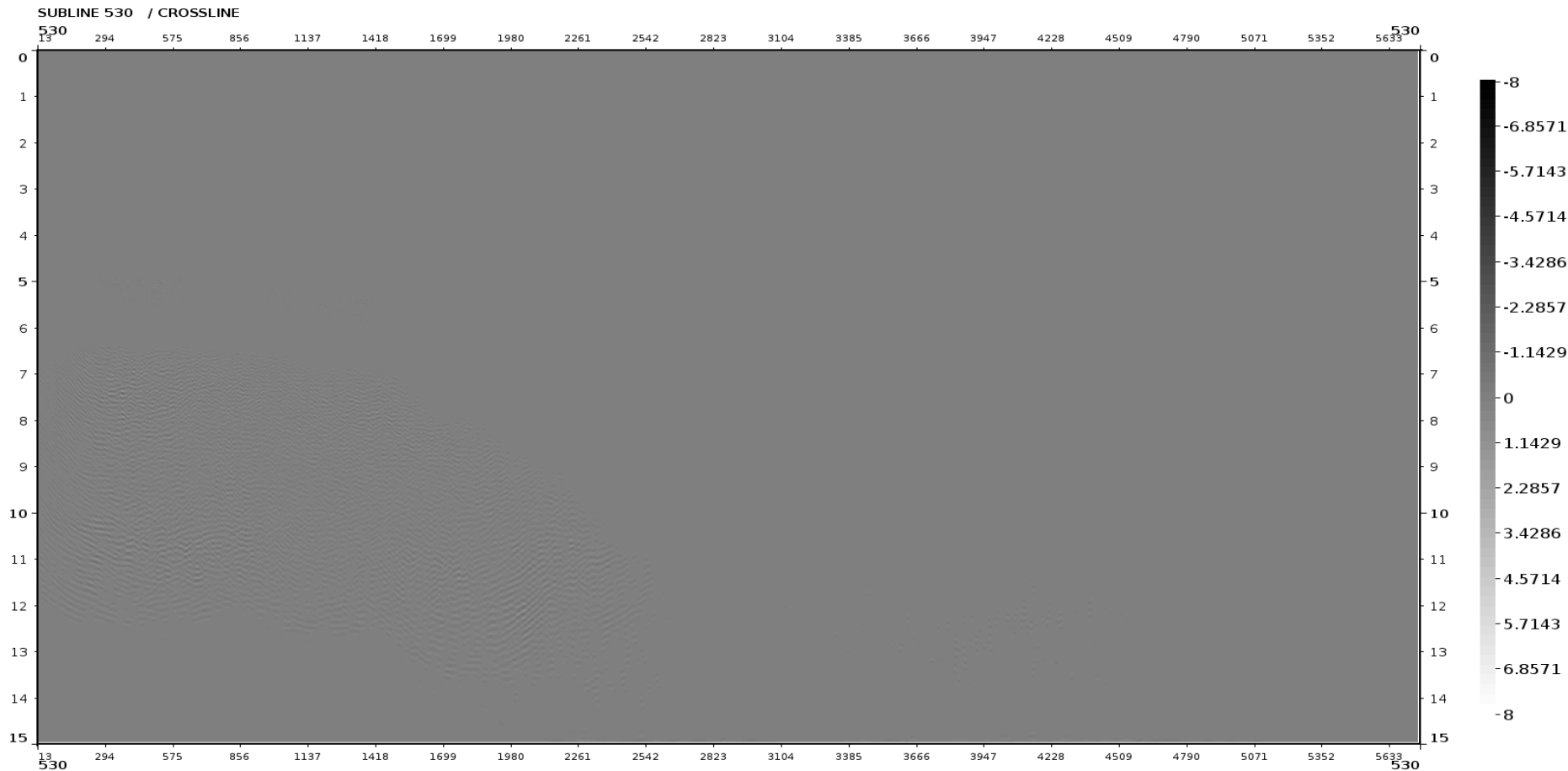
13

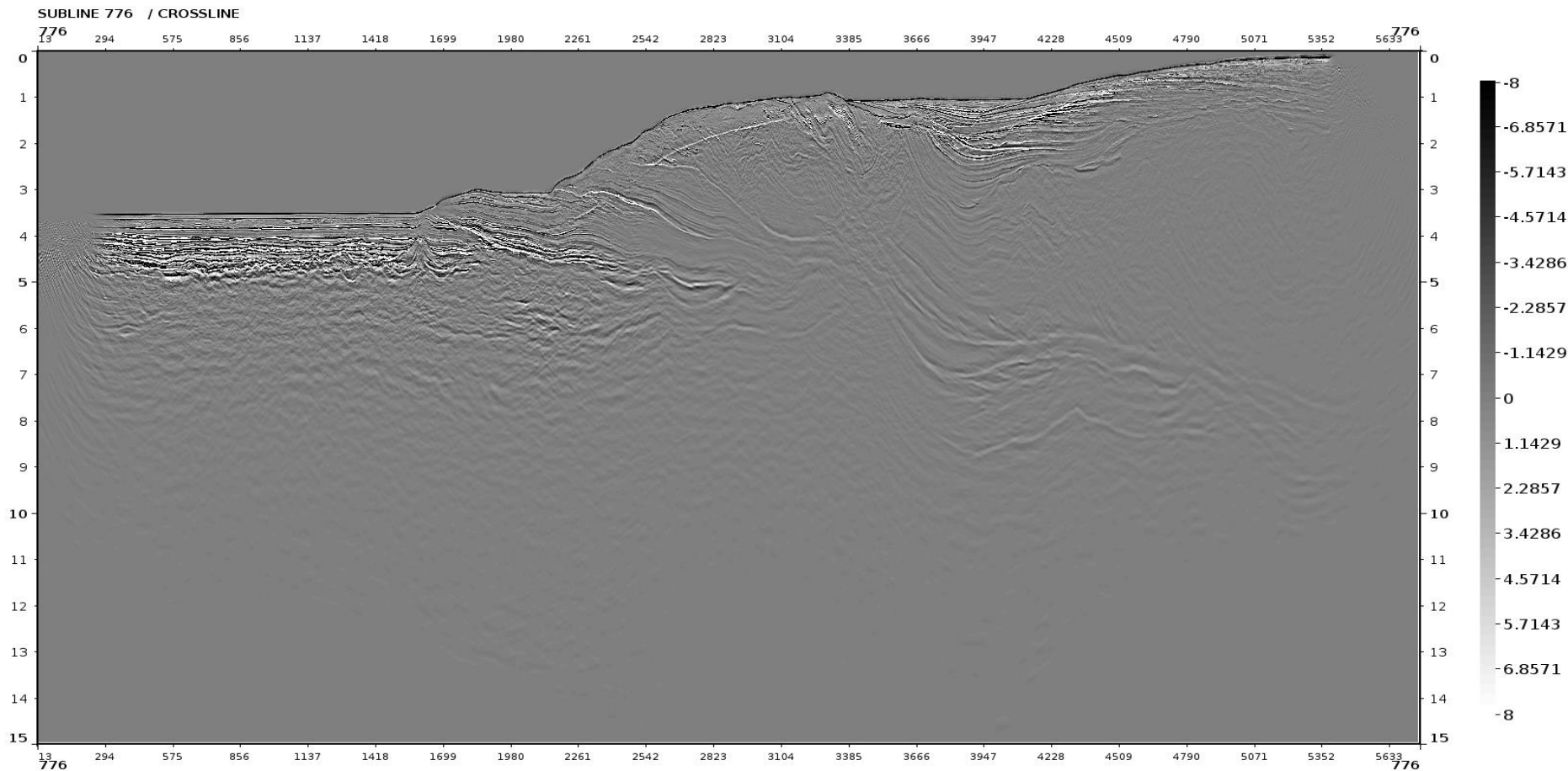




Subline 530: difference by TVF

14

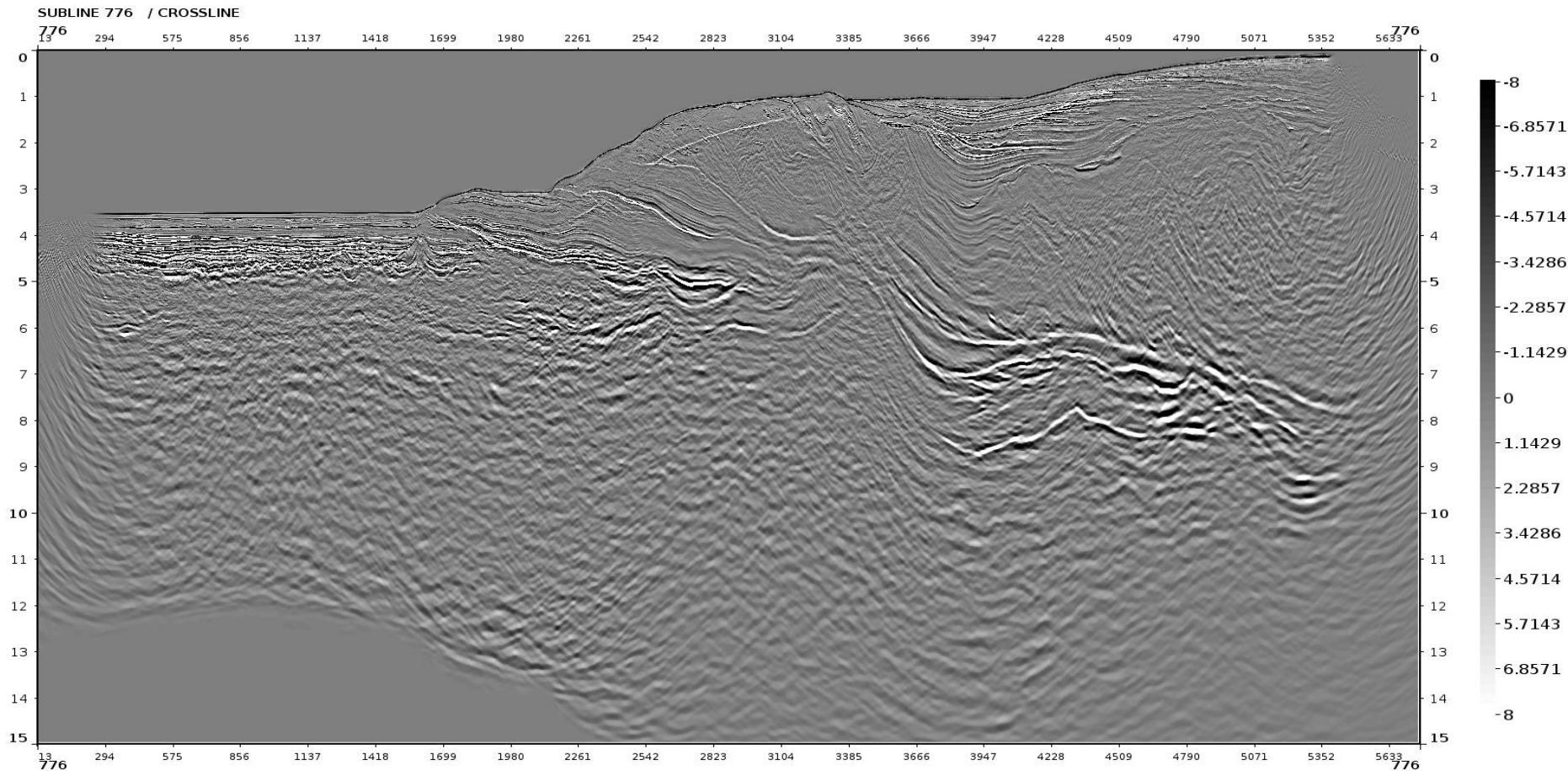






Subline 776: after TVS

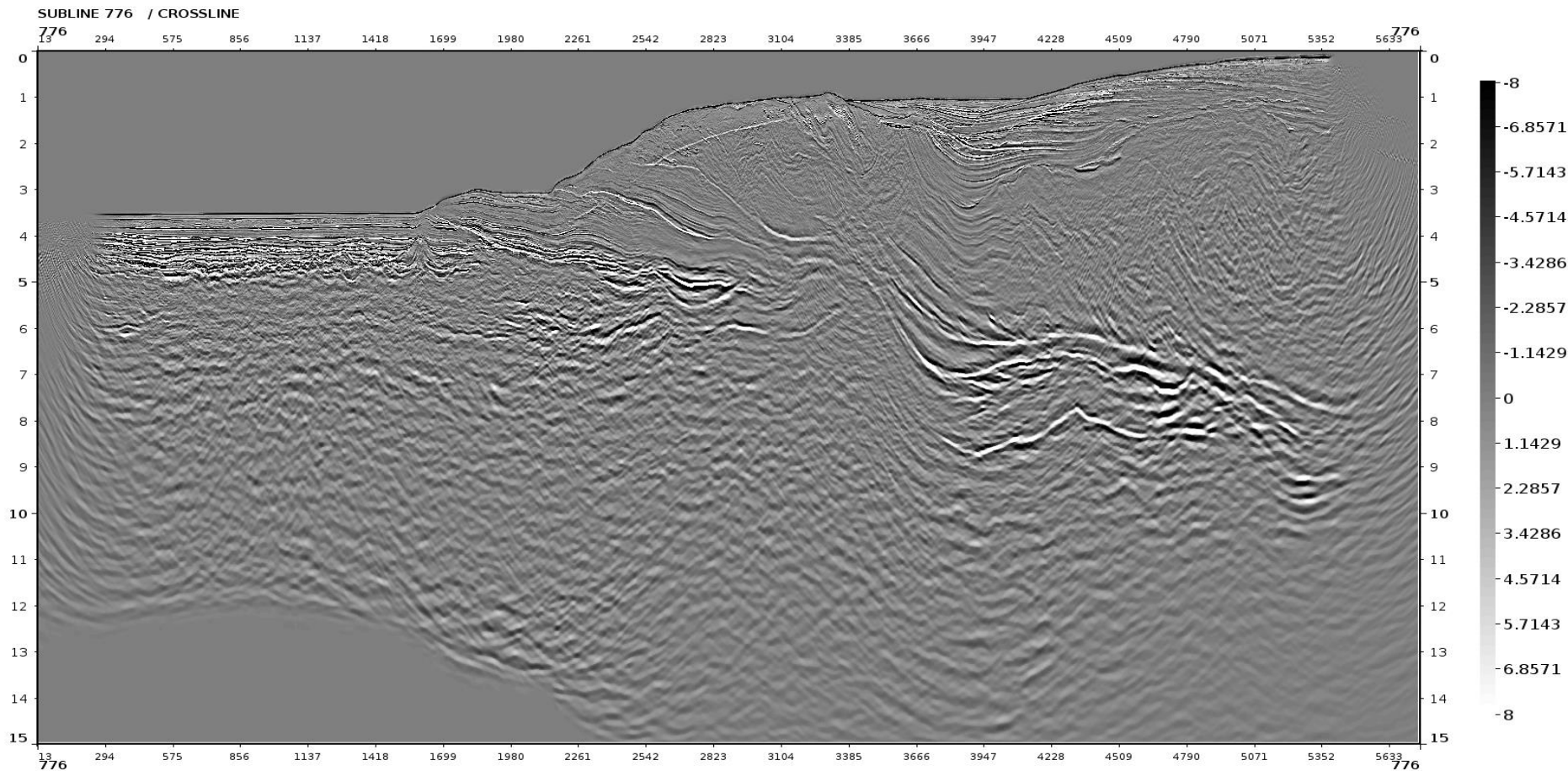
16





Subline 776: after TVF

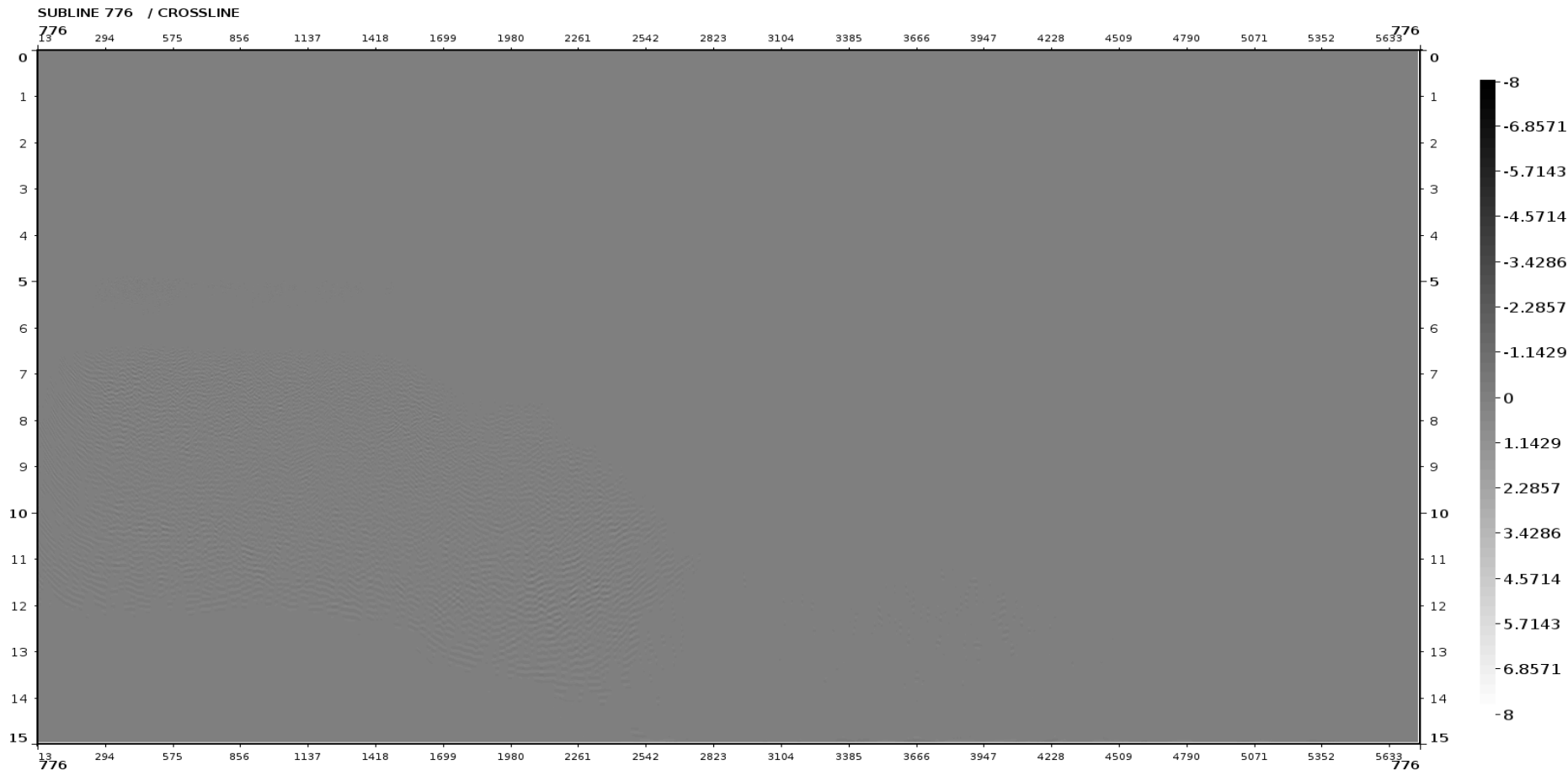
17





Subline 776: difference by TVF

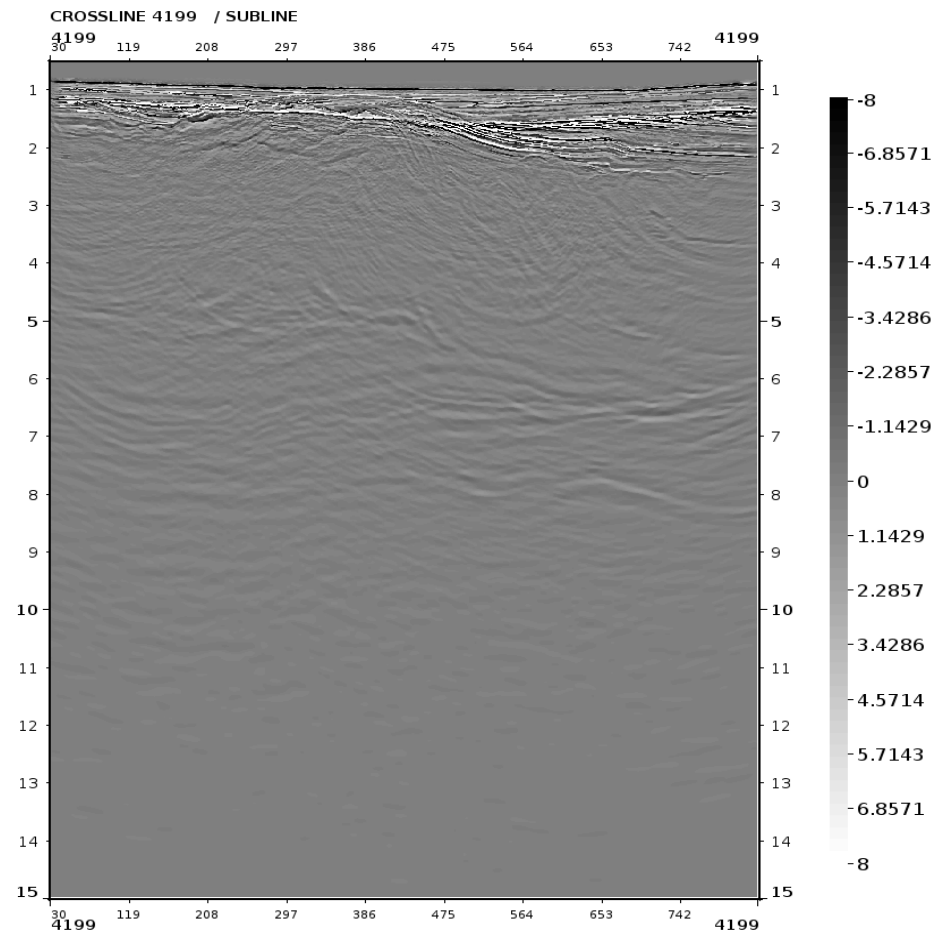
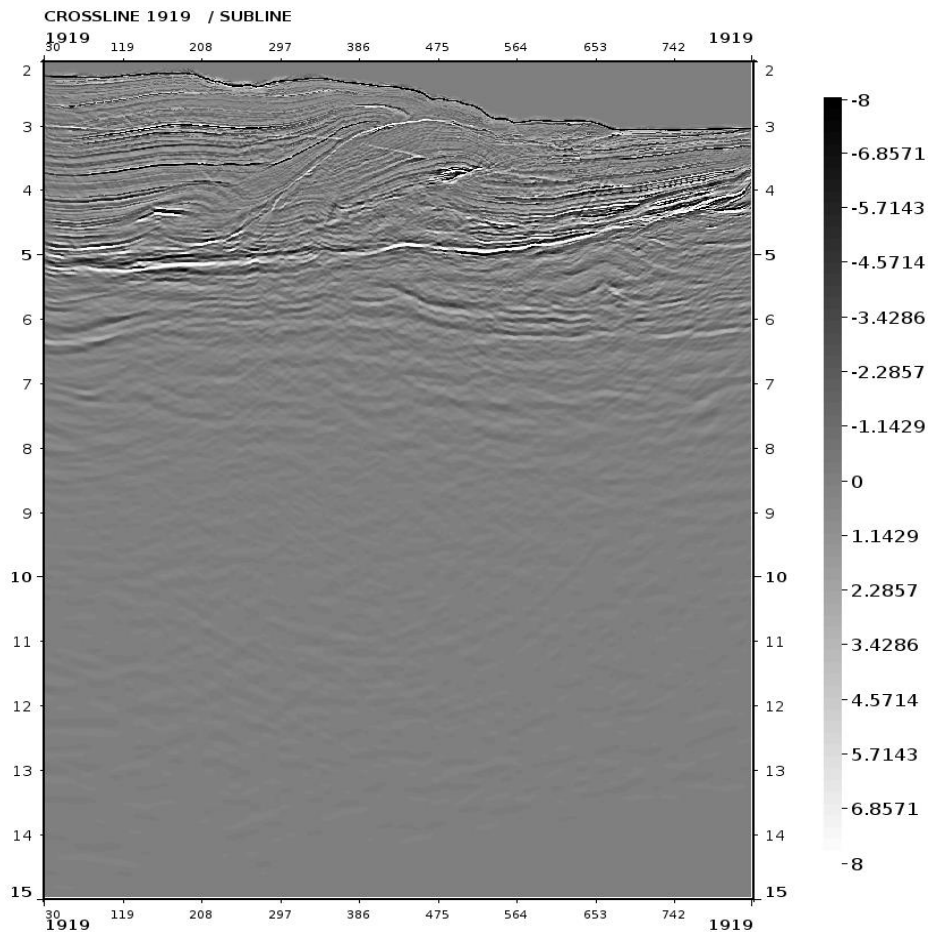
18





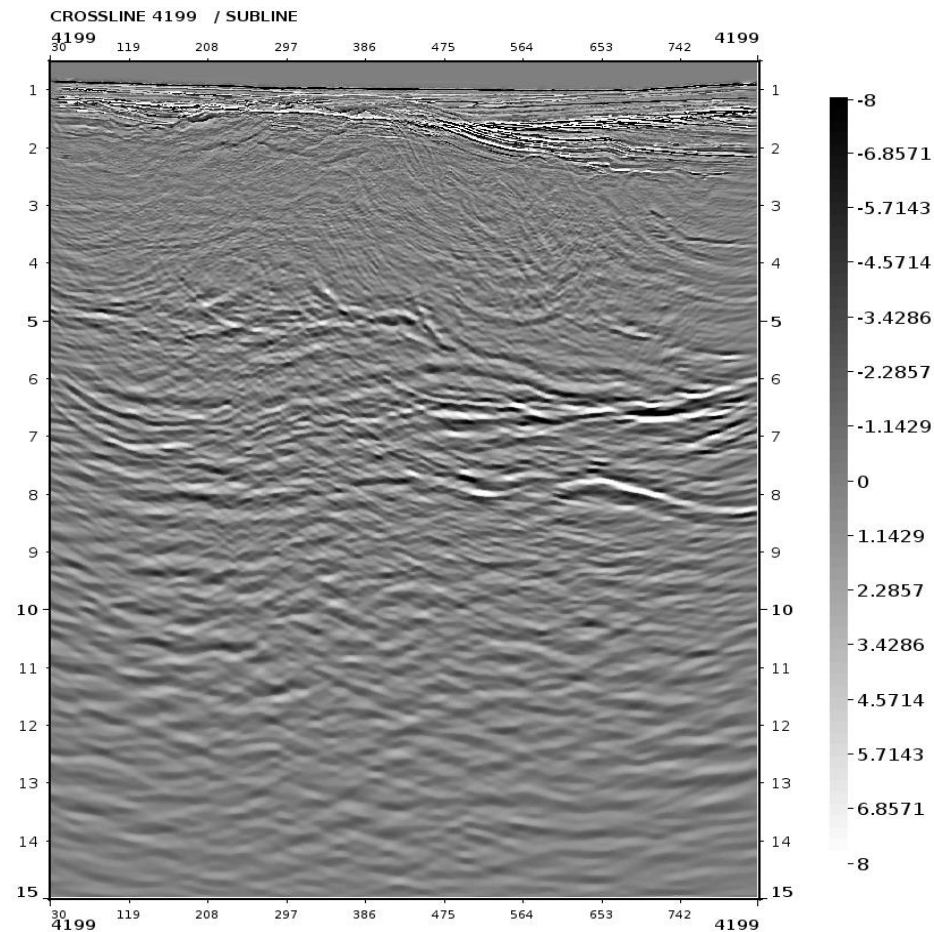
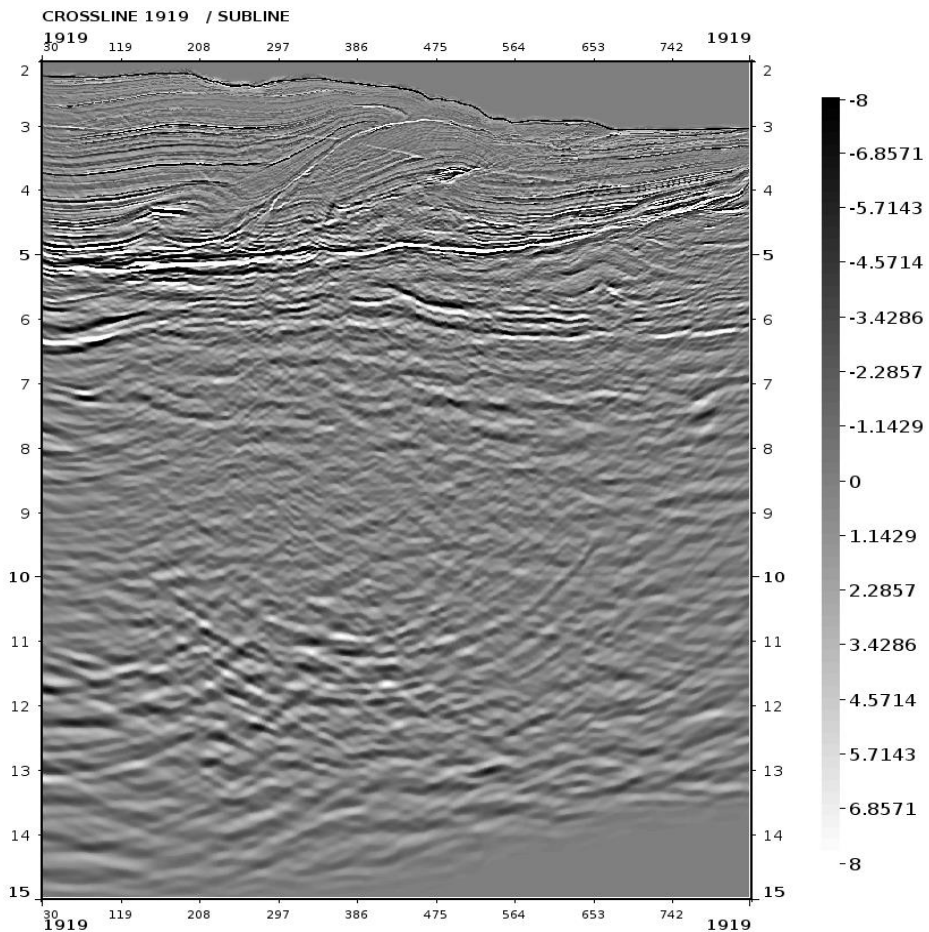
Crossline 1919 and 4199: input

19



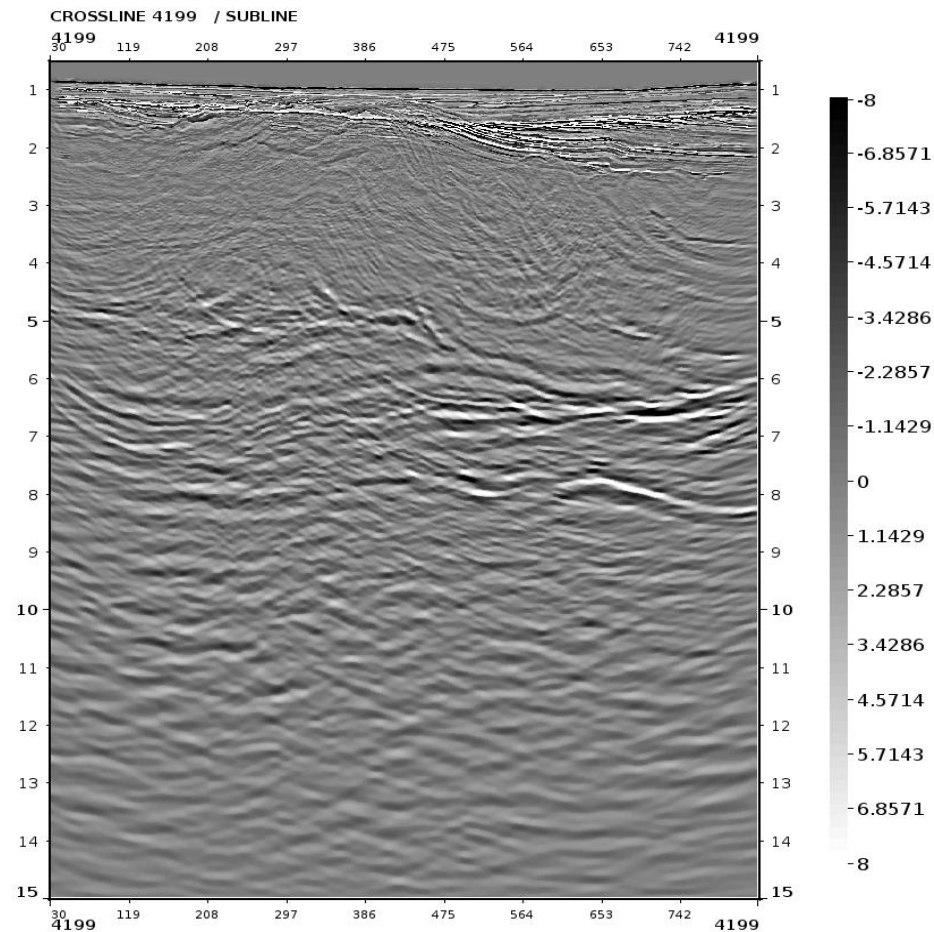
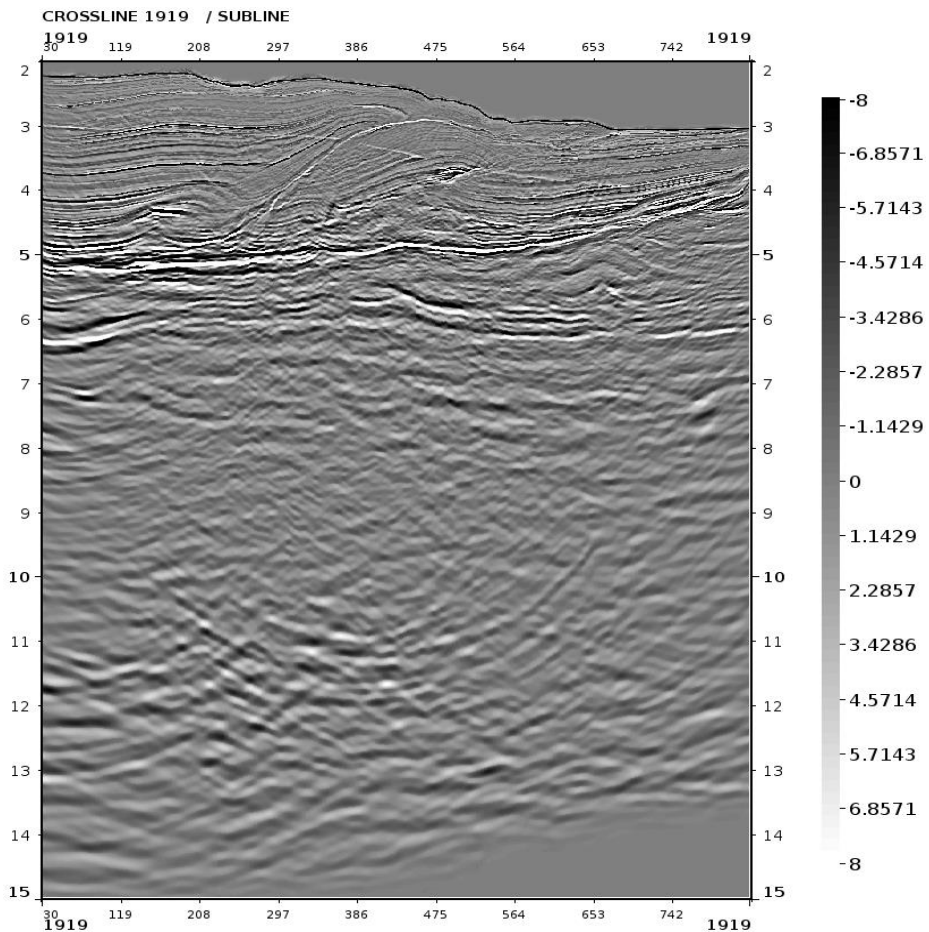
Crossline 1919 and 4199: after TVS

20



Crossline 1919 and 4199: after TVF

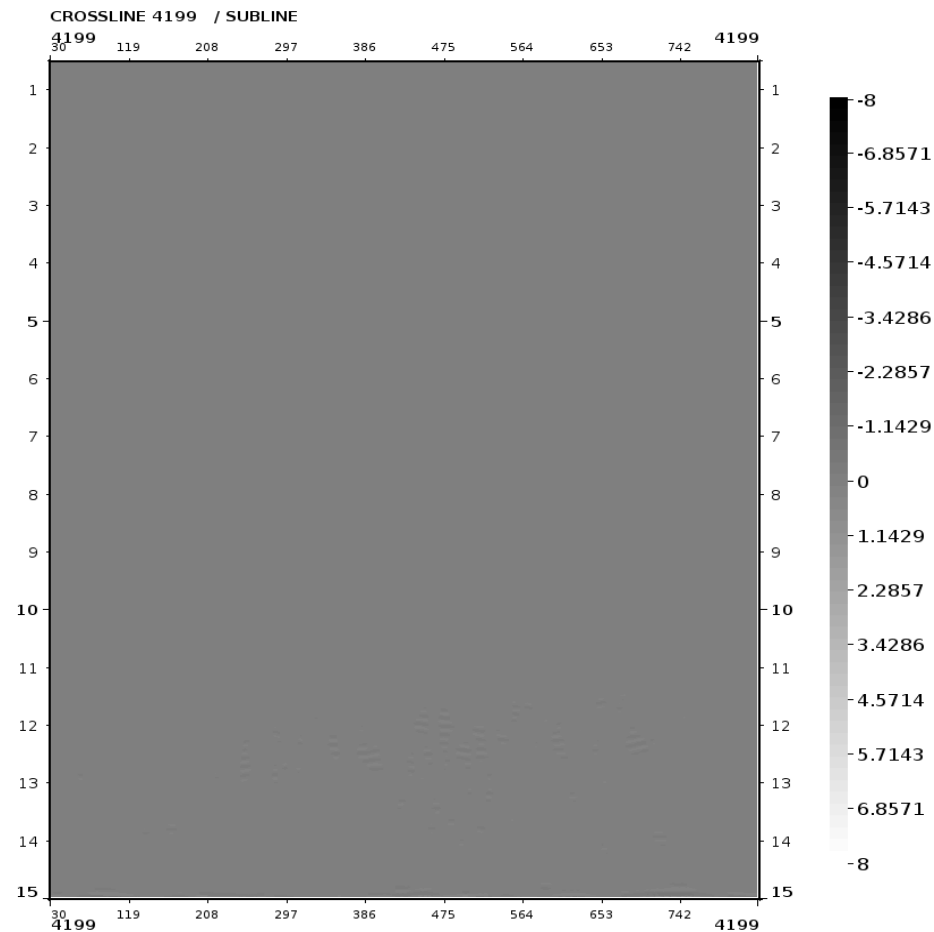
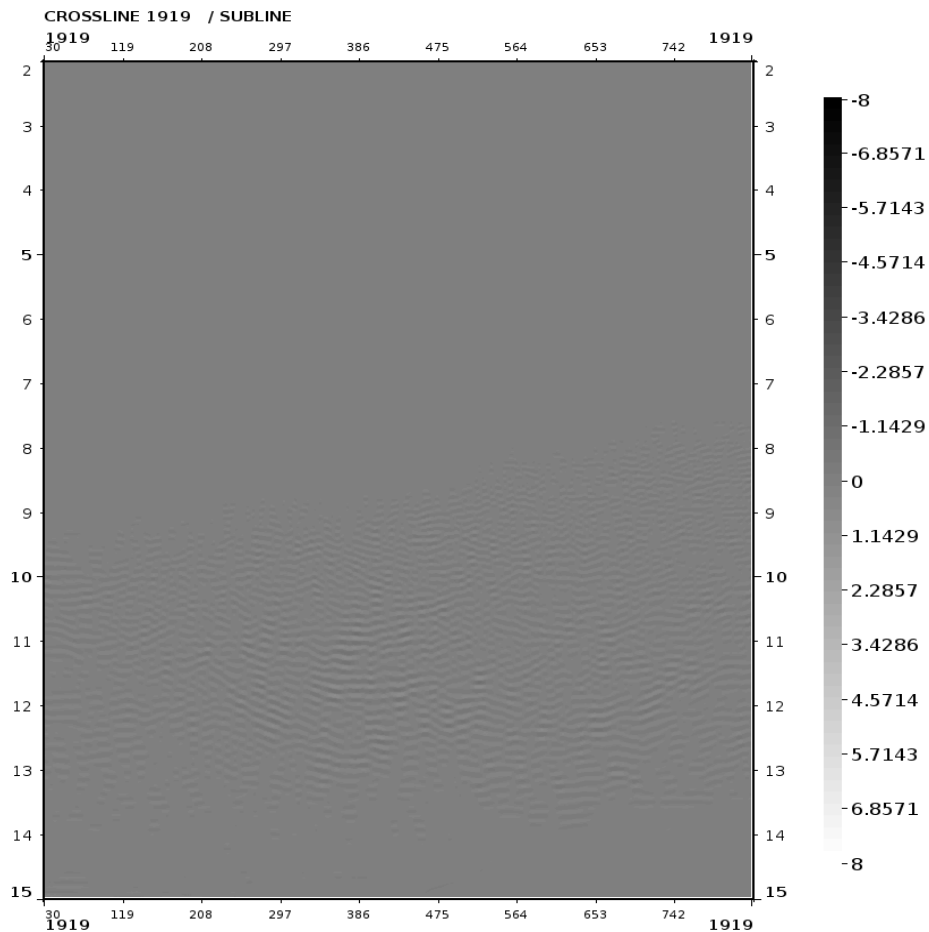
21



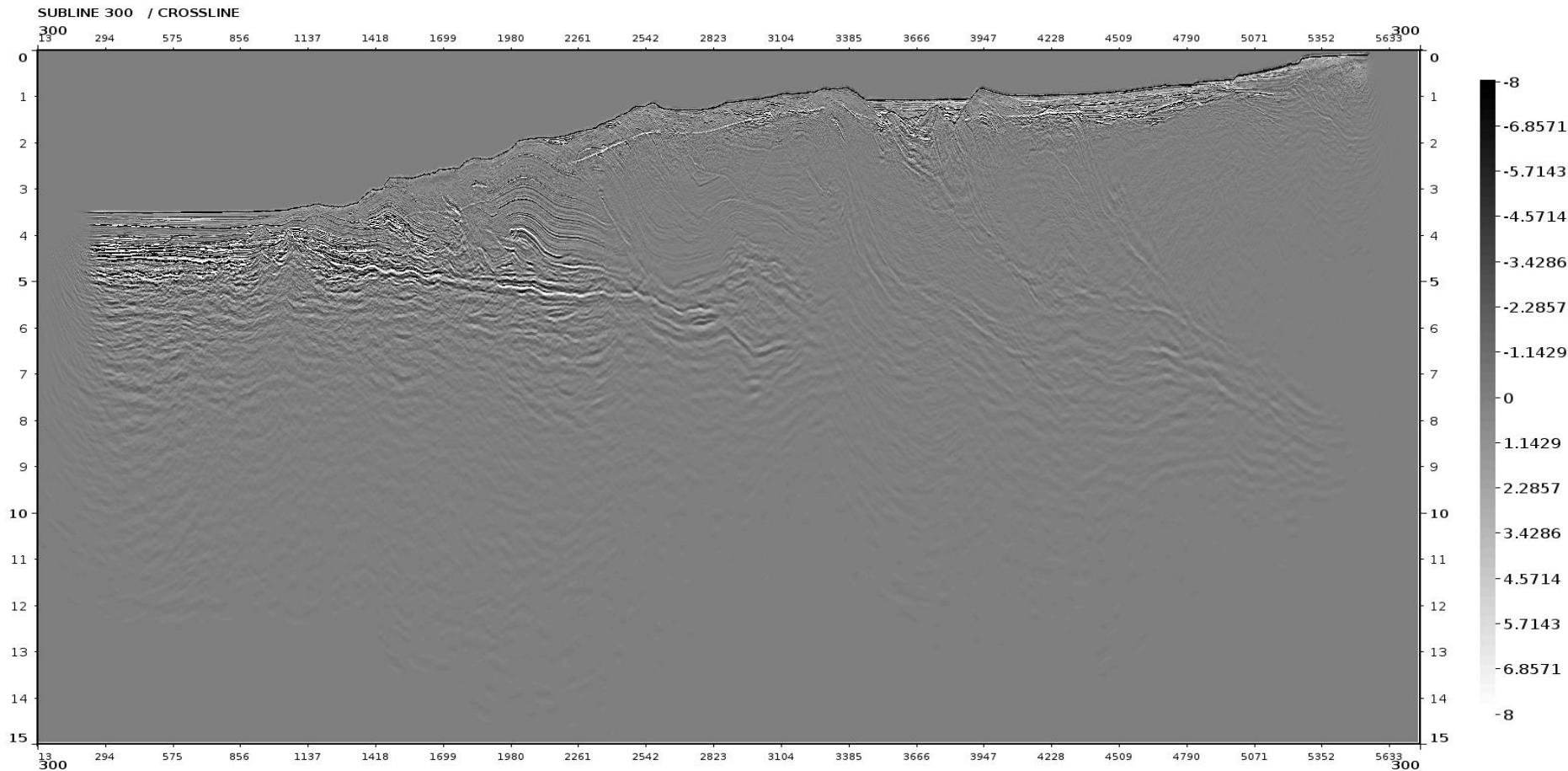


Crossline 1919 and 4199: difference by TVF

22



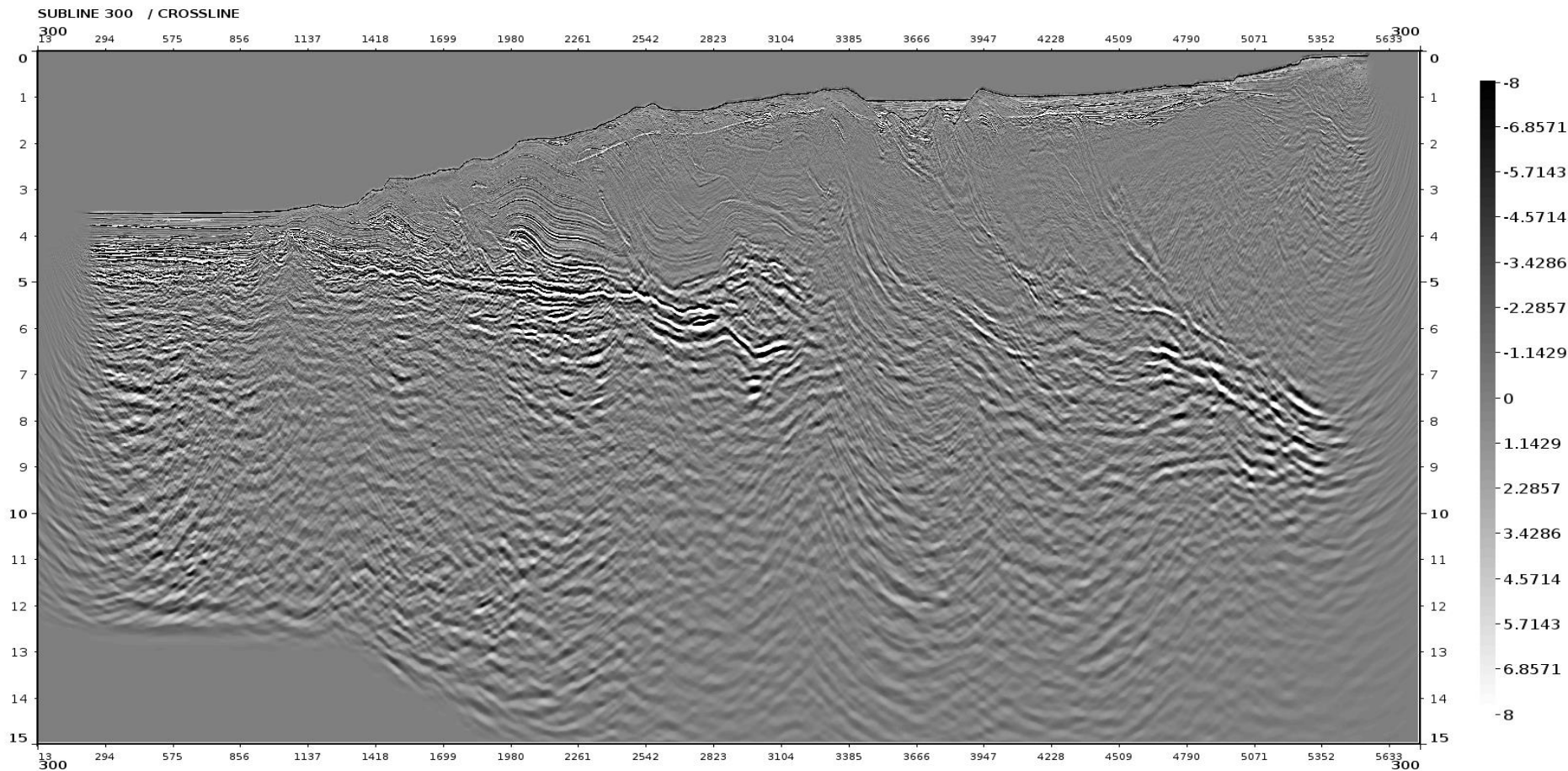
Near Stack

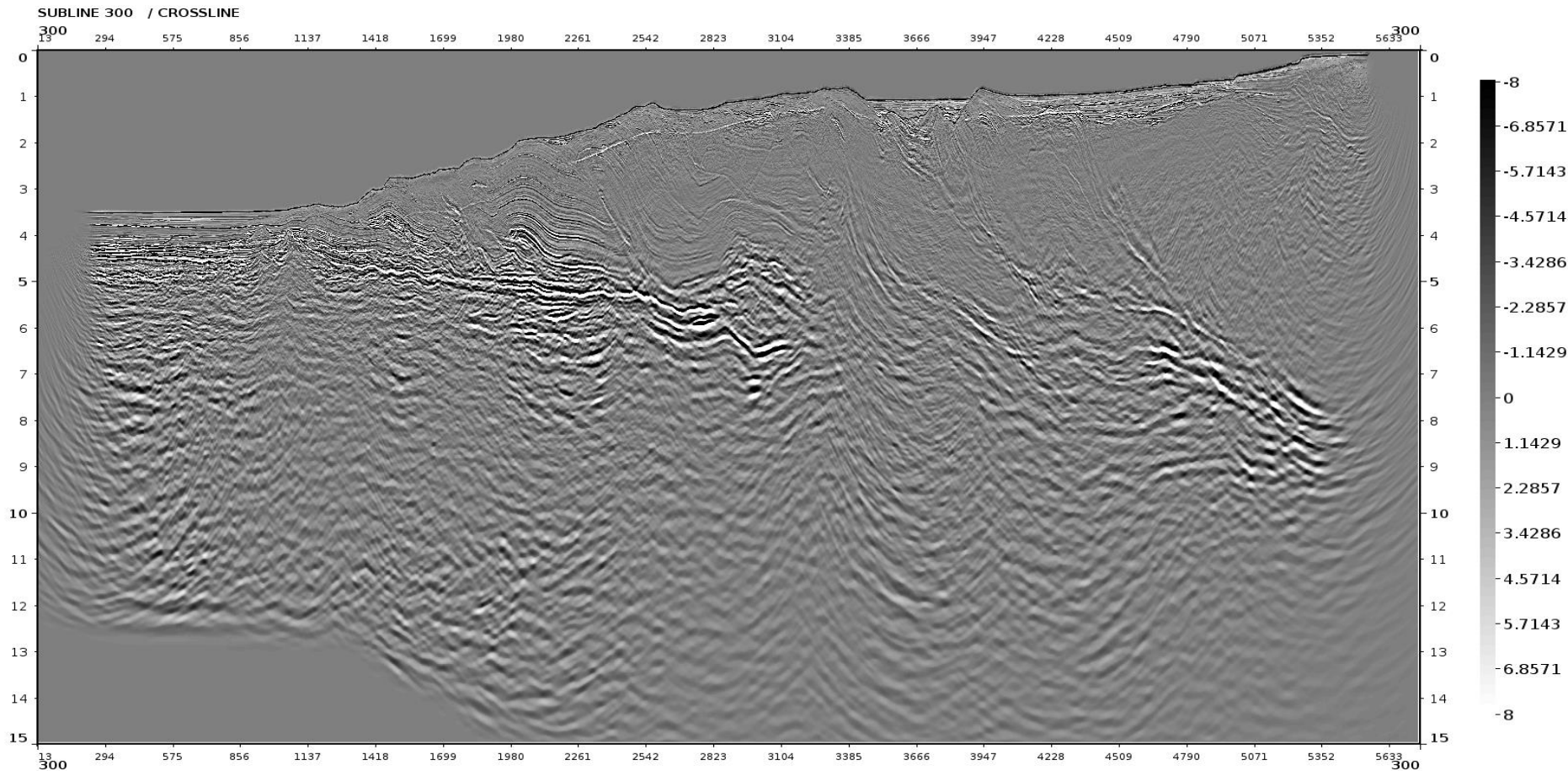




Subline 300: after TVS

25

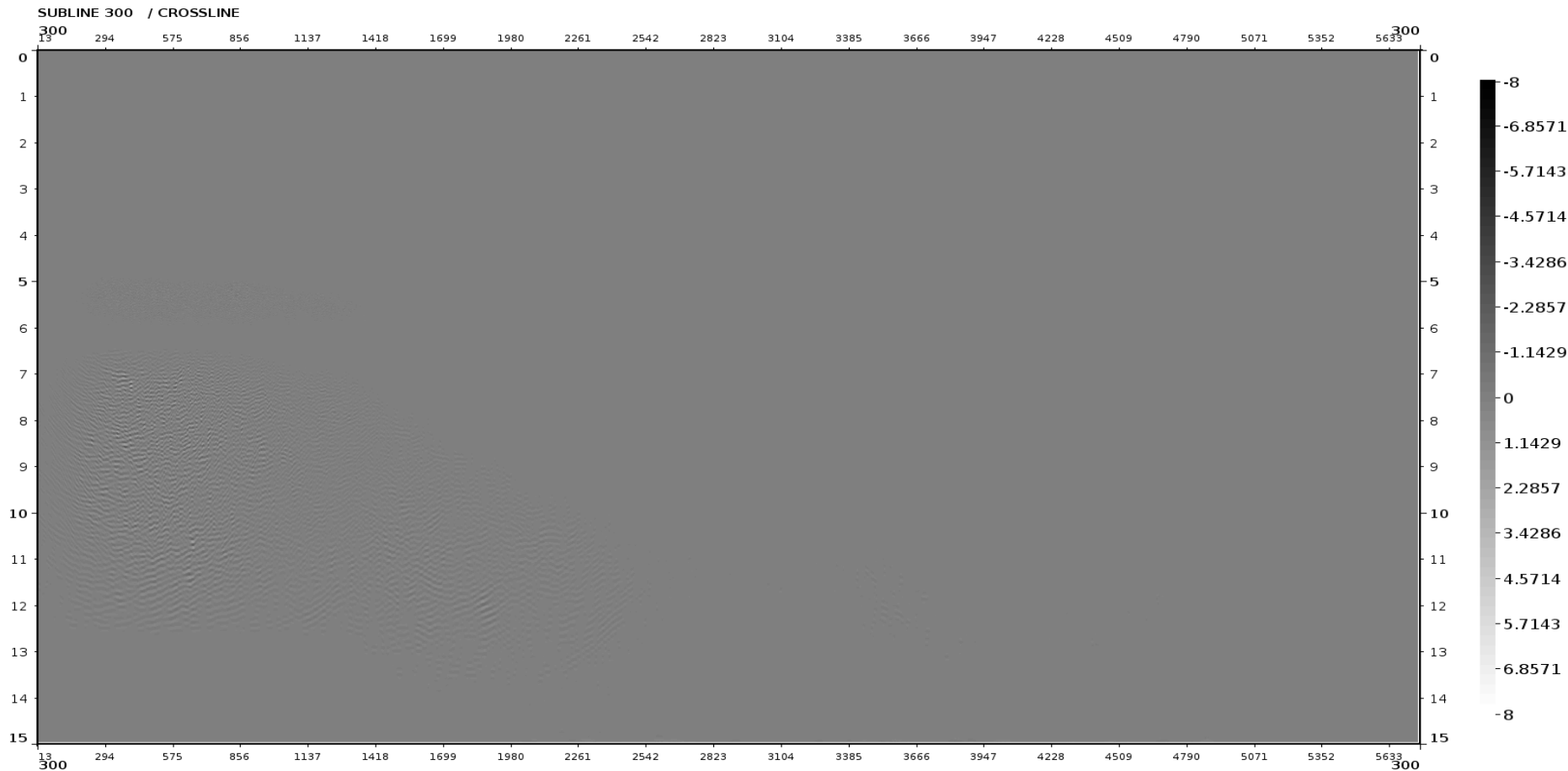


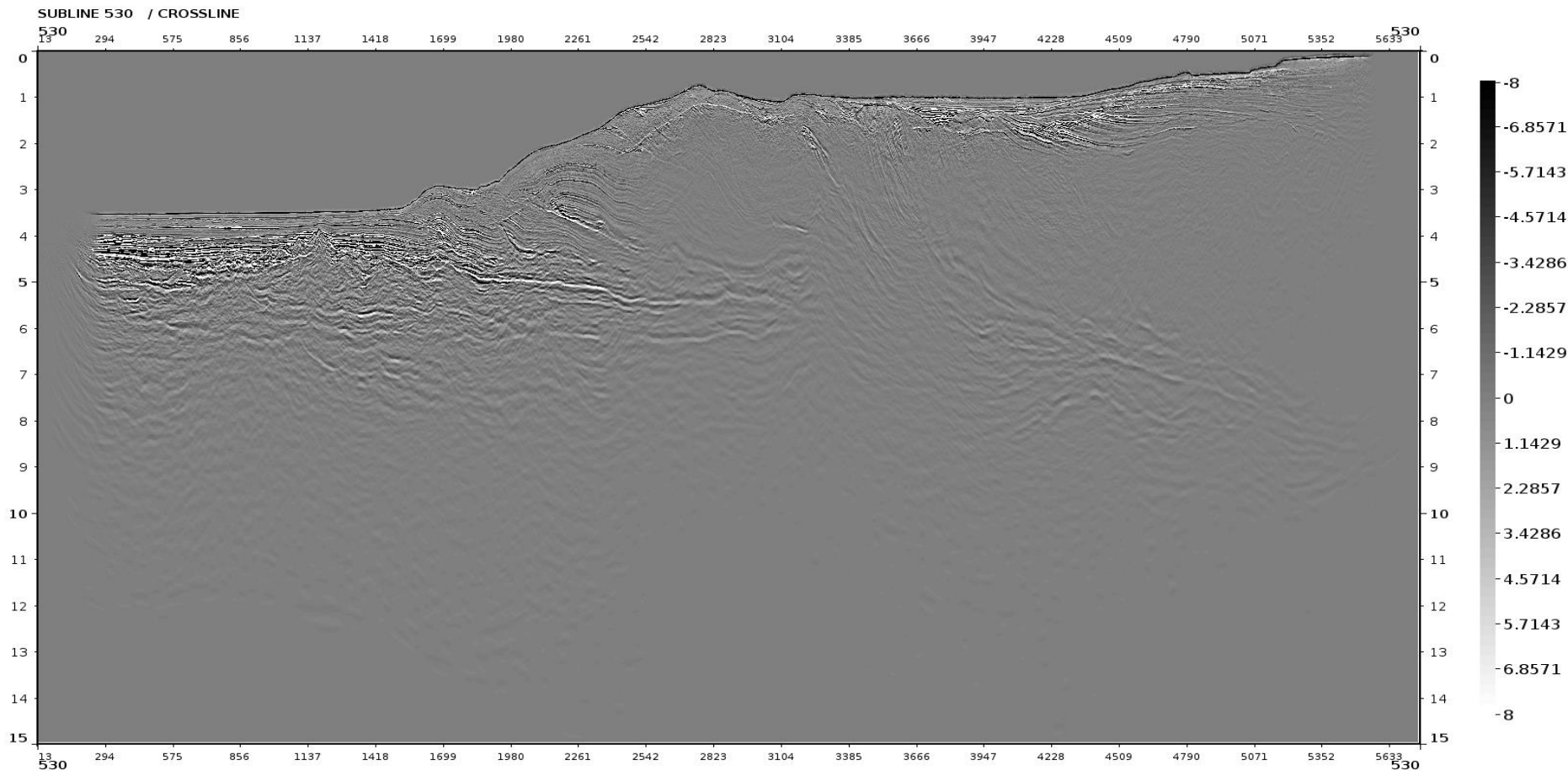




Subline 300: difference by TVF

27

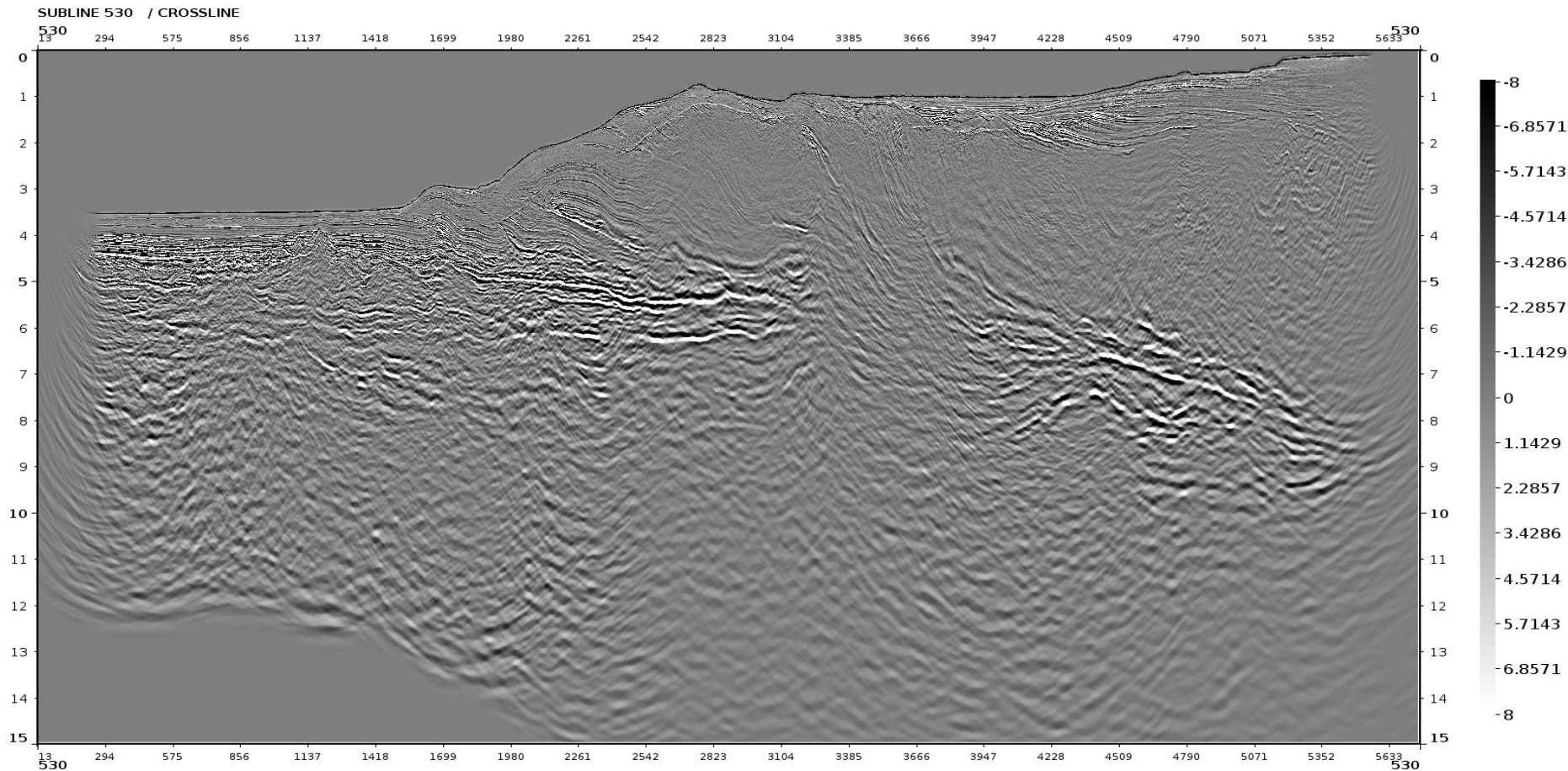






Subline 530: after TVS

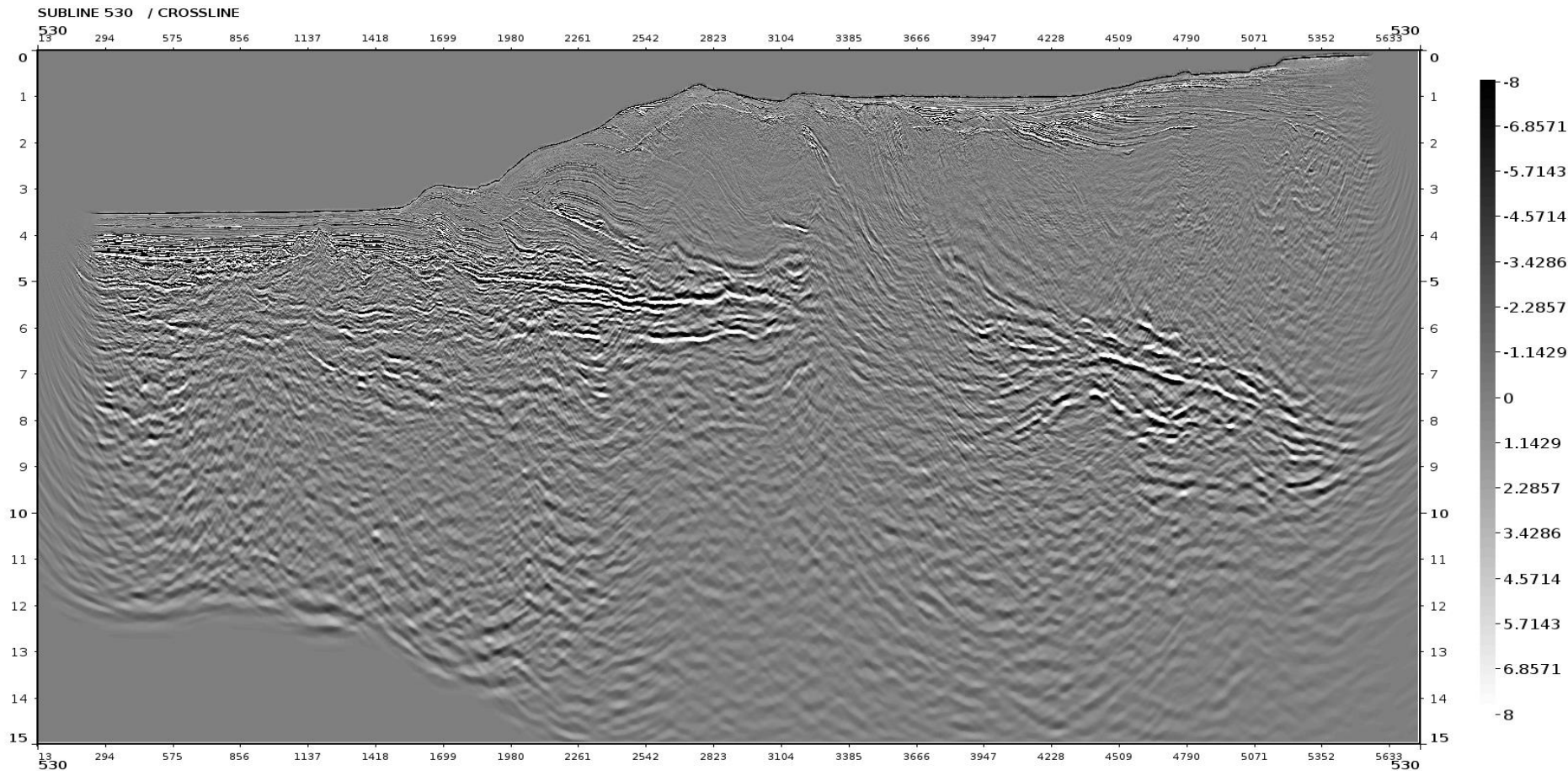
29





Subline 530: after TVF

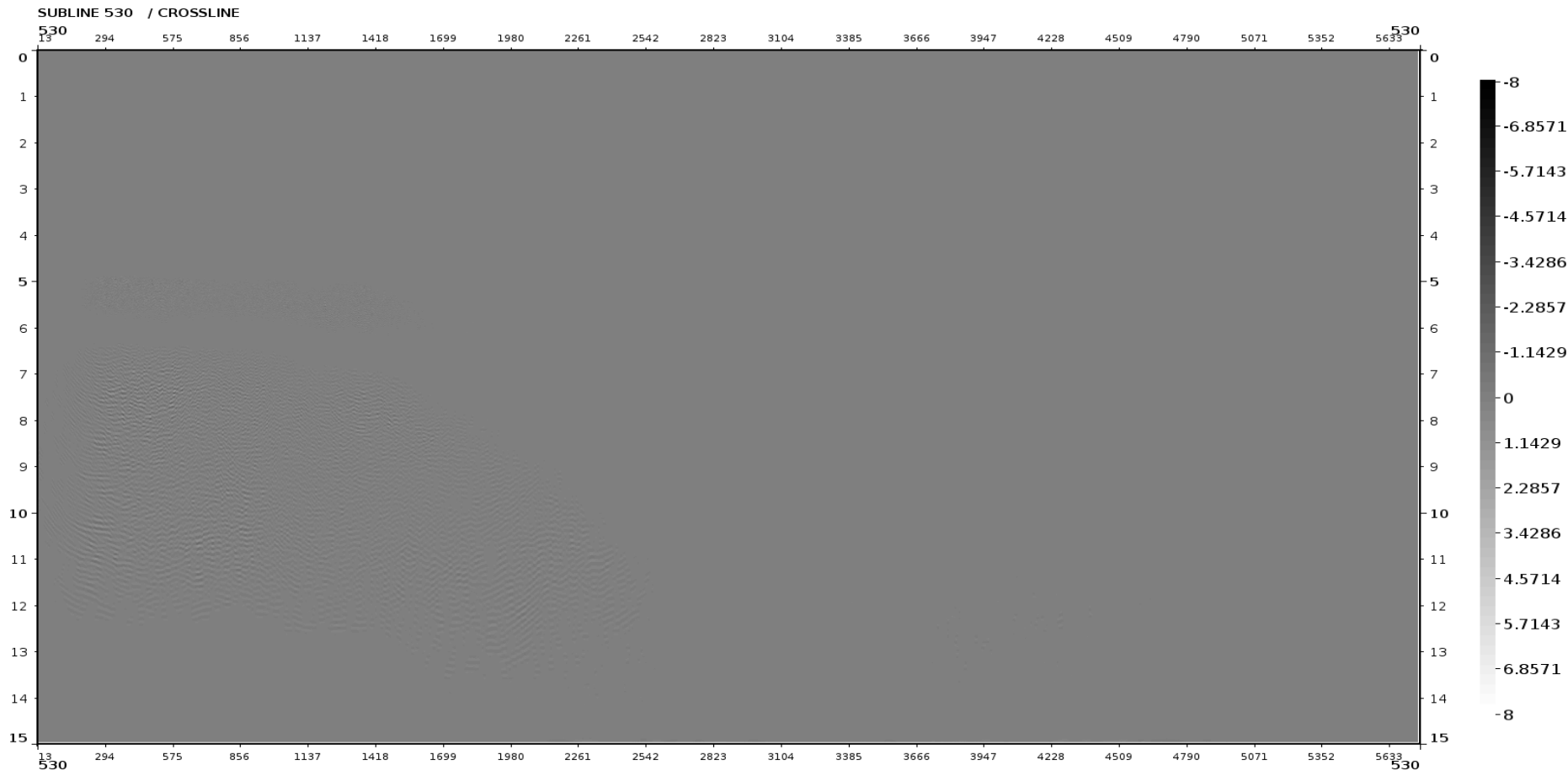
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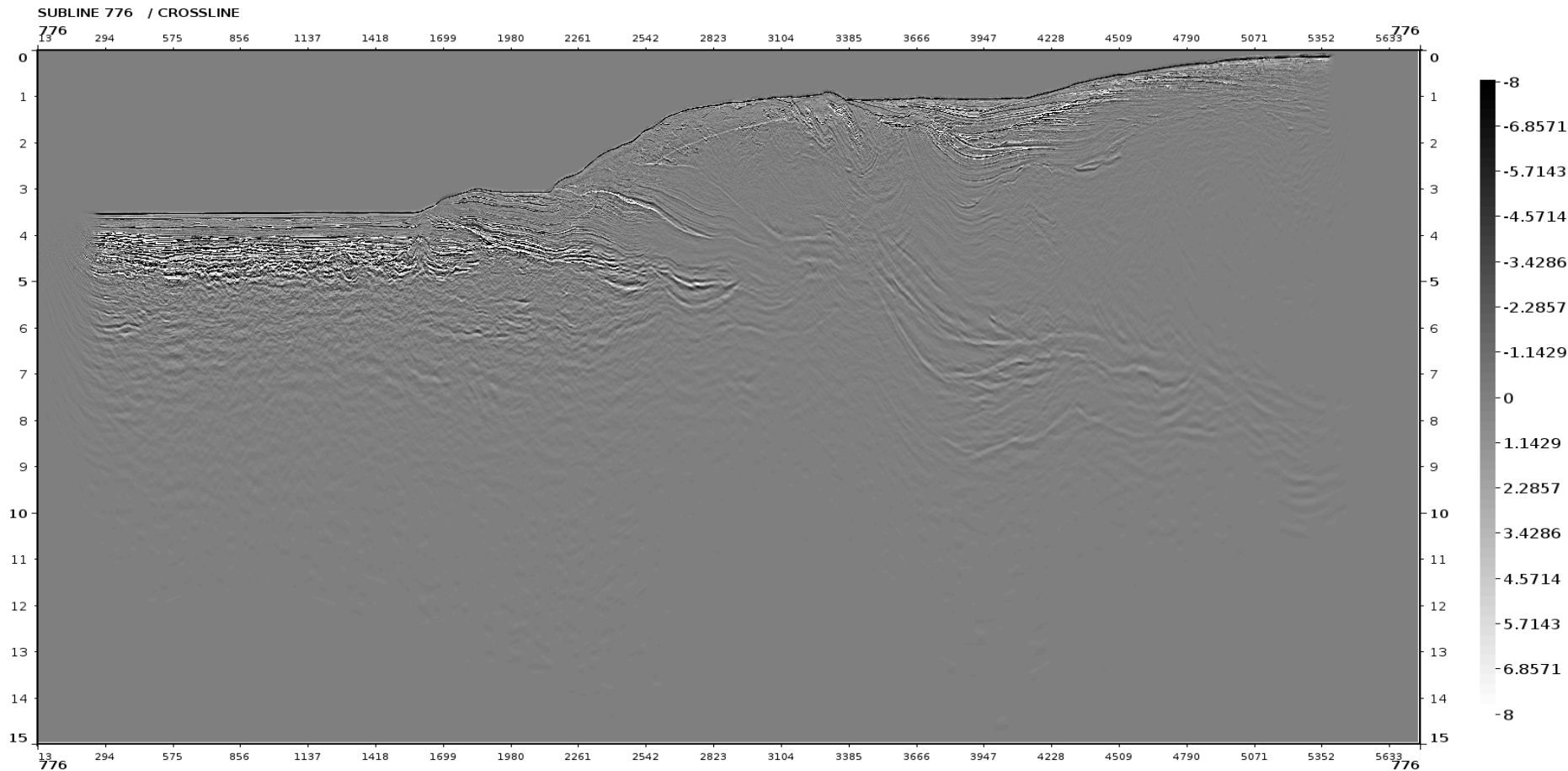




Subline 530: difference by TVF

31

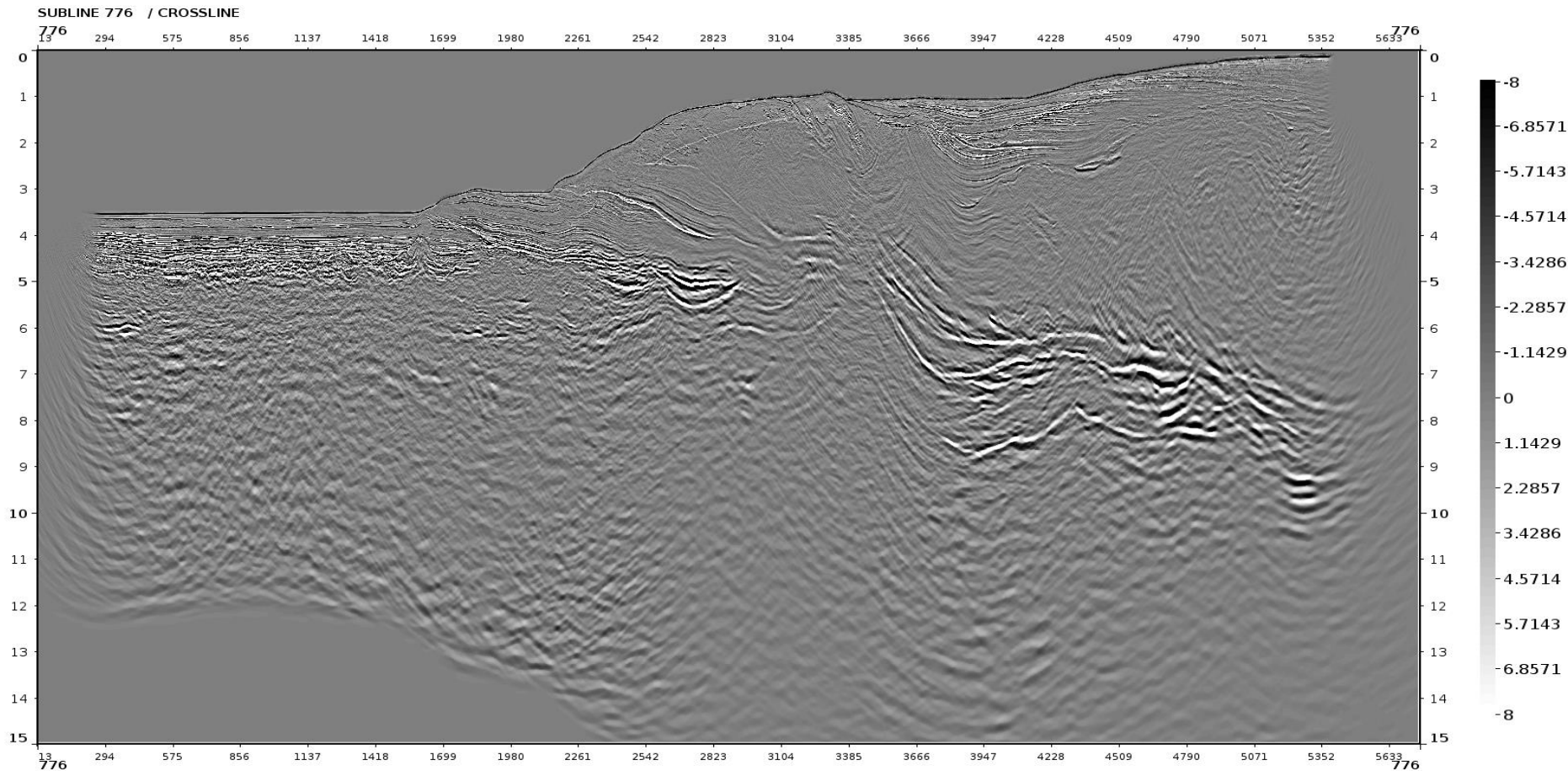


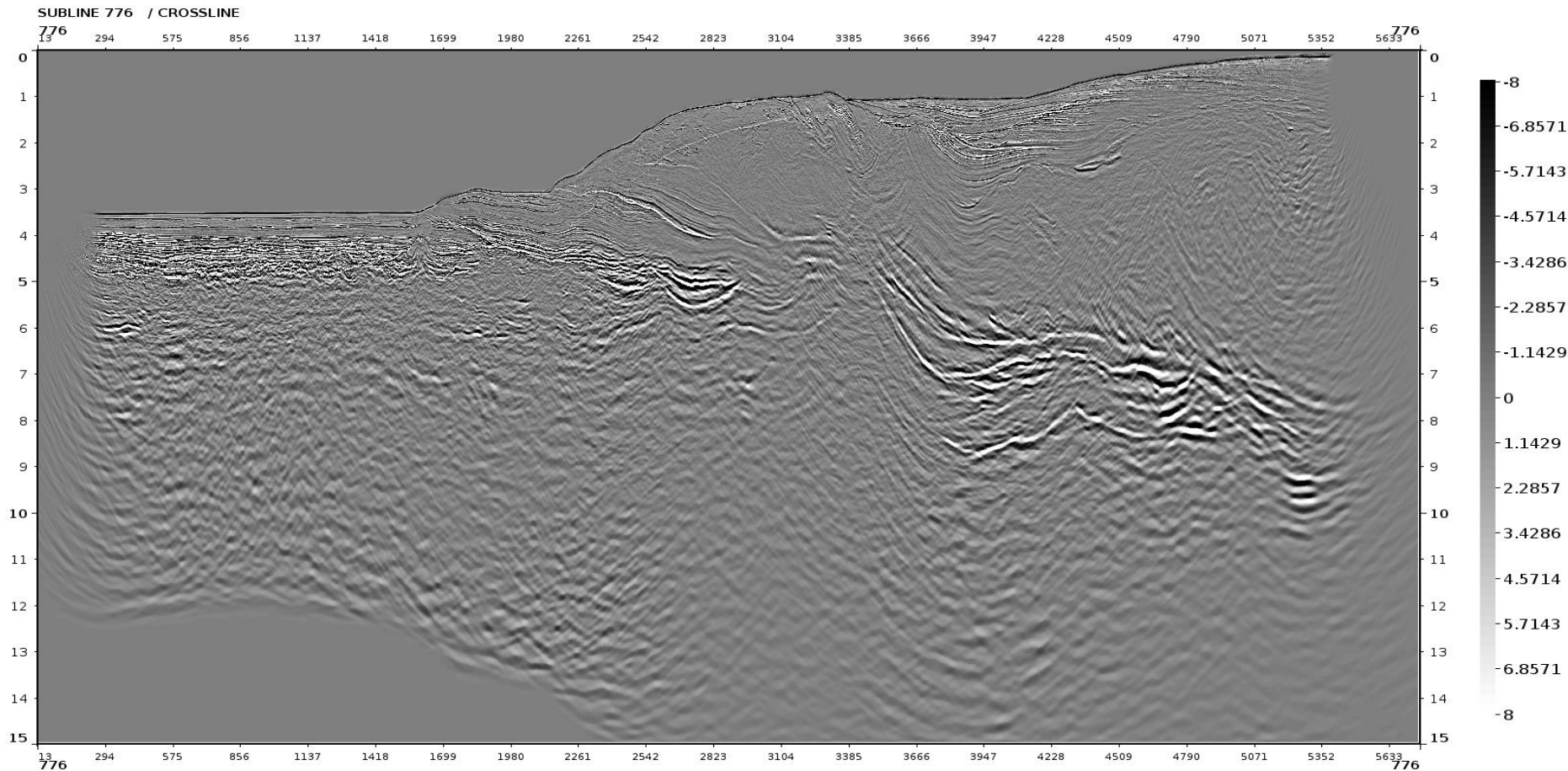




Subline 776: after TVS

33

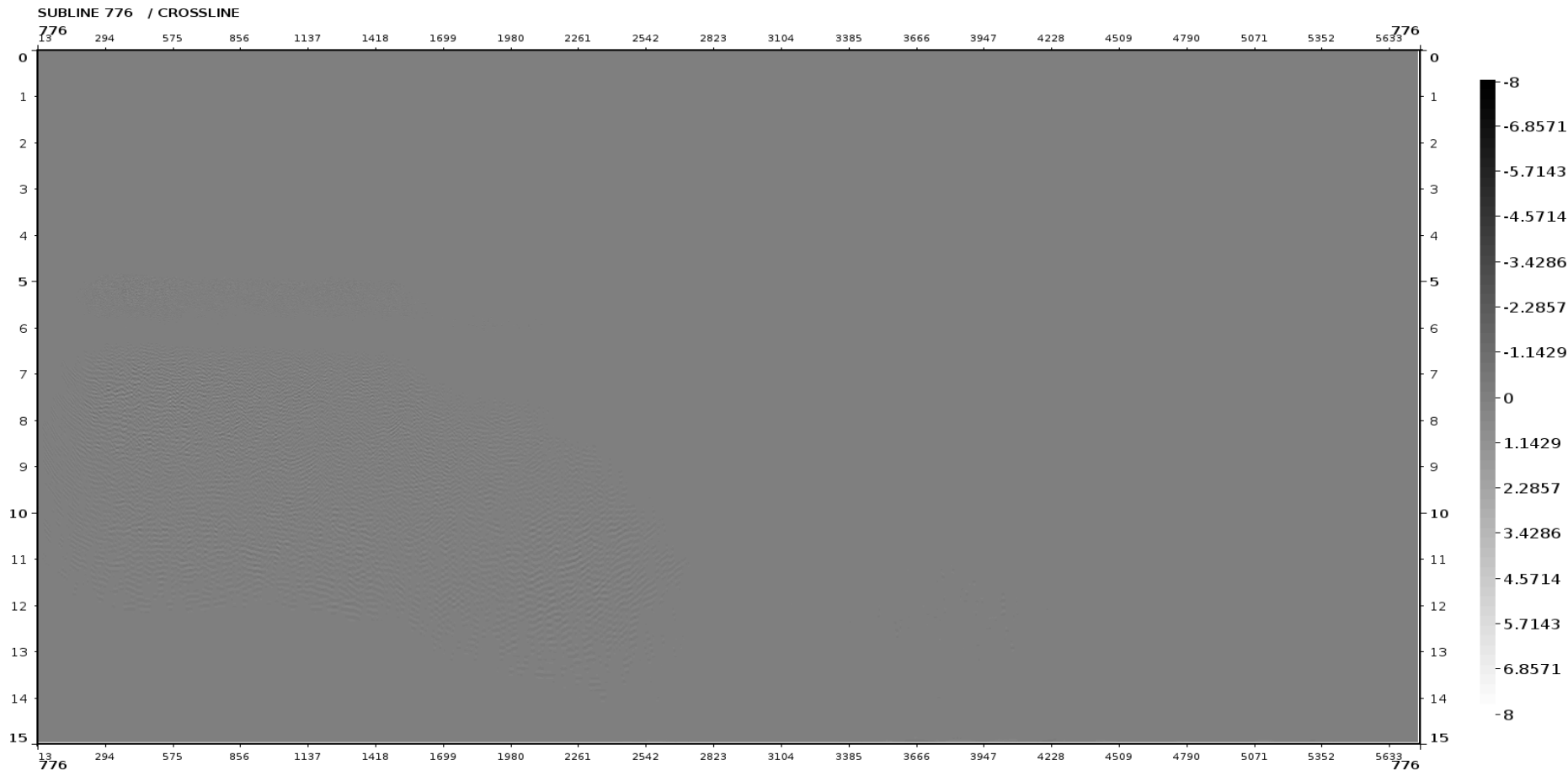






Subline 776: difference by TVF

35

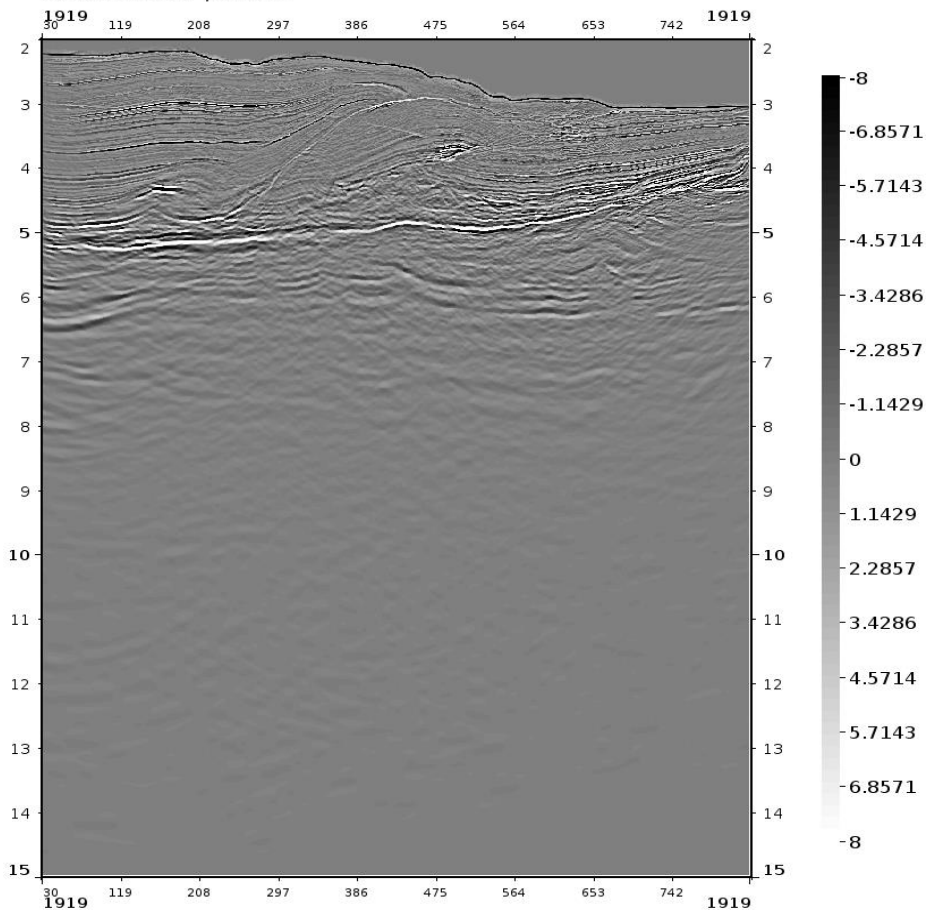




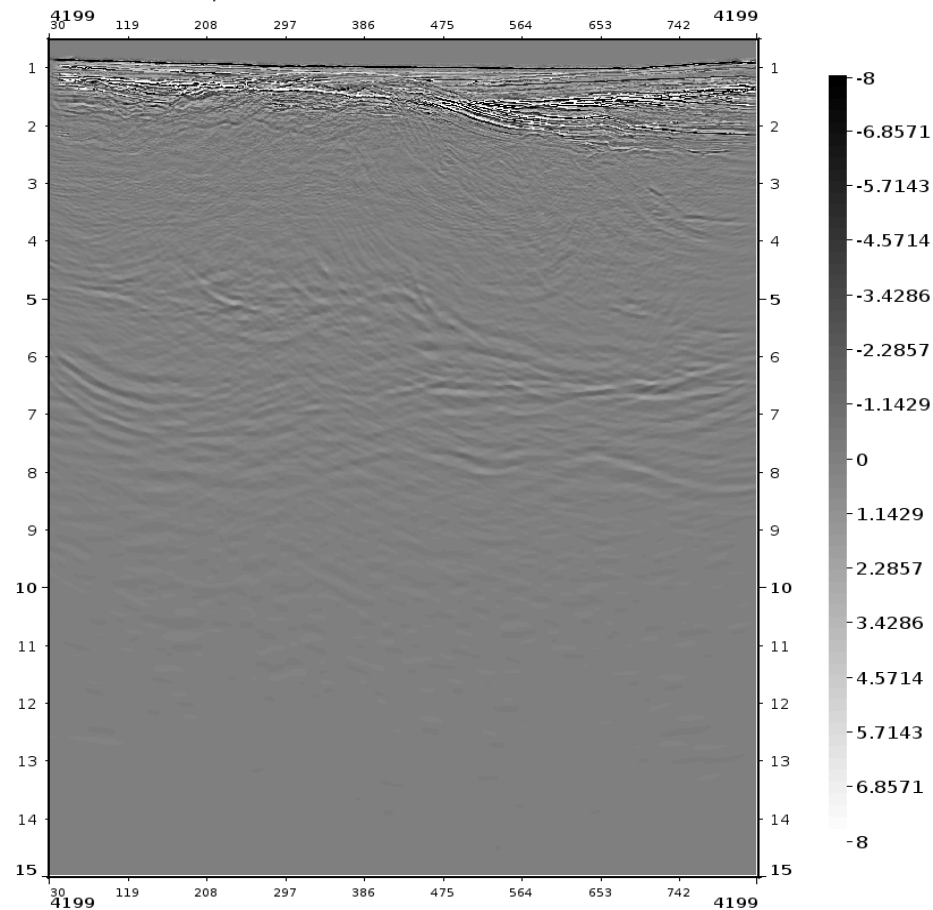
Crossline 1919 and 4199: input

36

CROSSLINE 1919 / SUBLINE



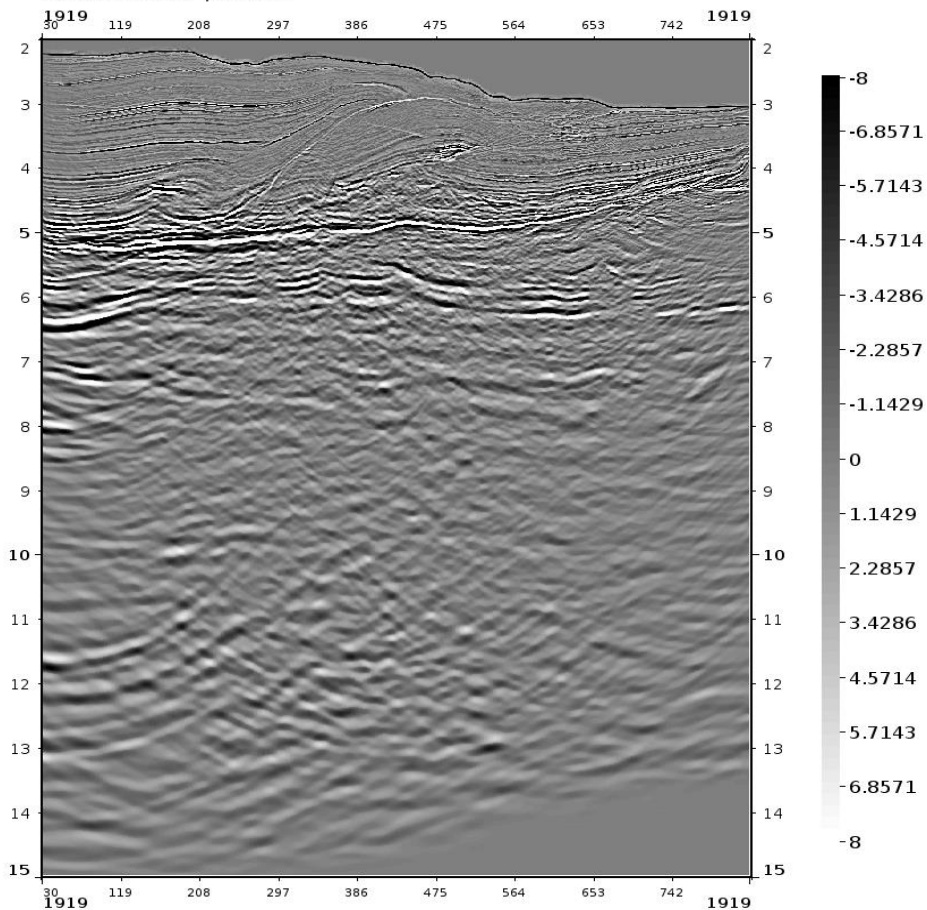
CROSSLINE 4199 / SUBLINE



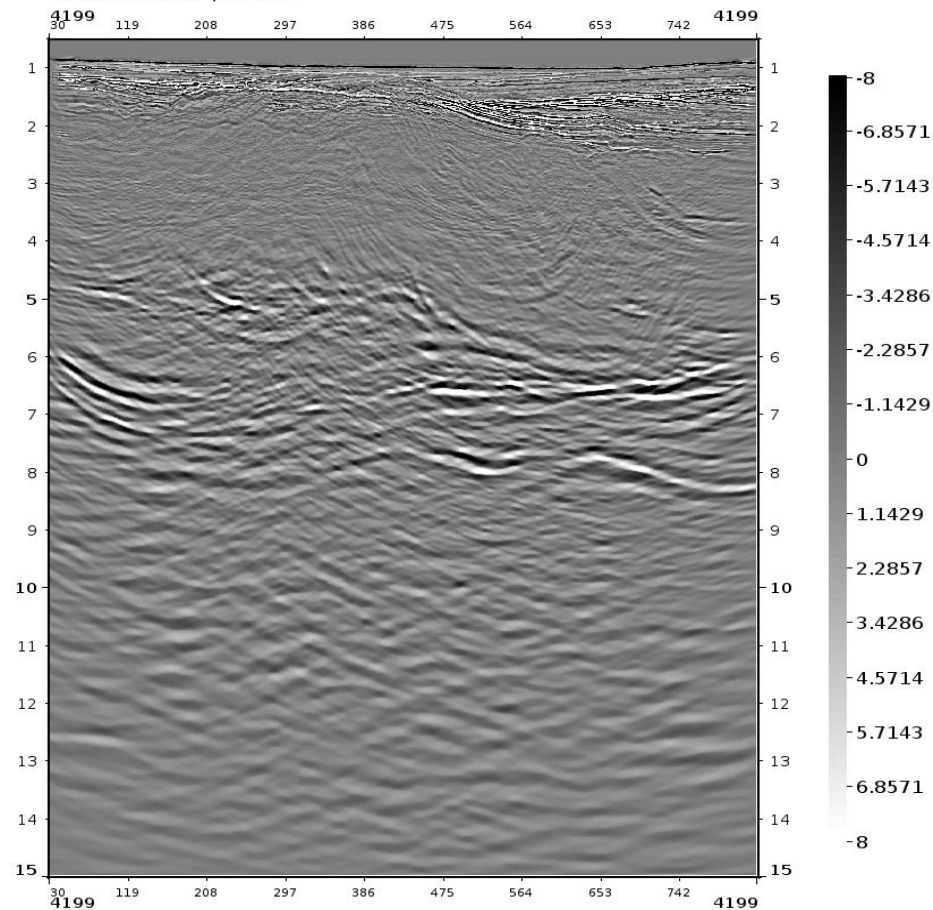
Crossline 1919 and 4199: after TVS

37

CROSSLINE 1919 / SUBLINE

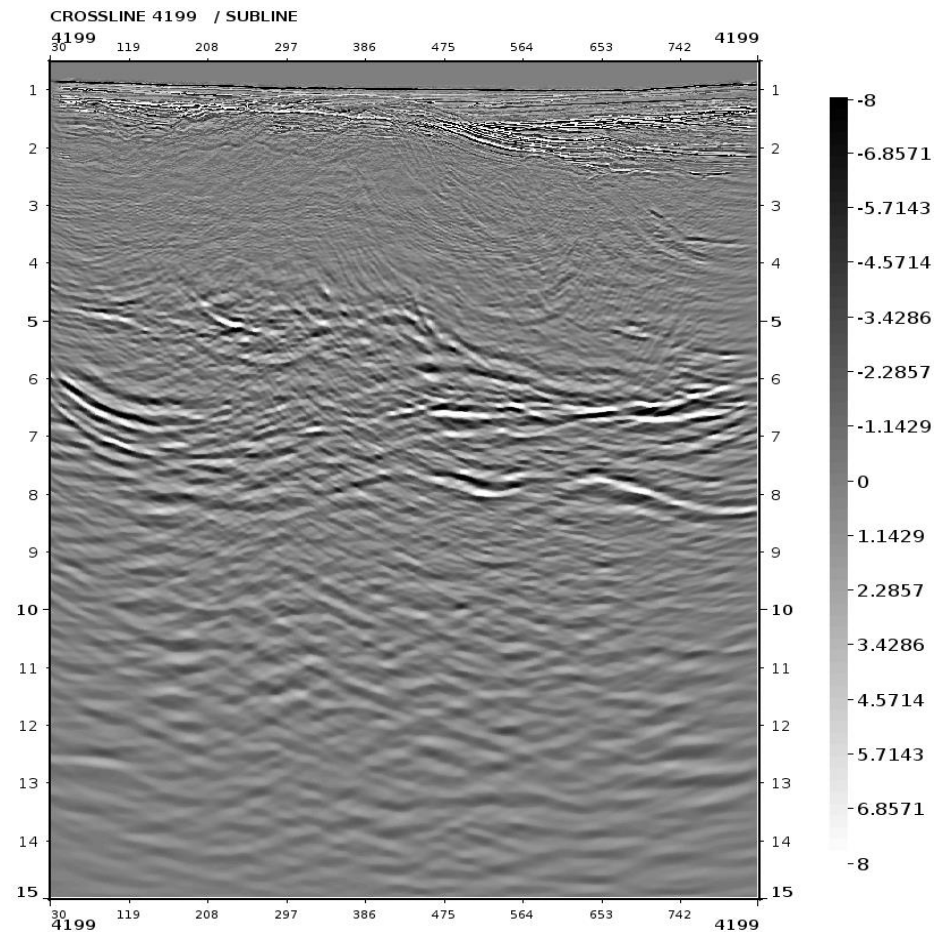
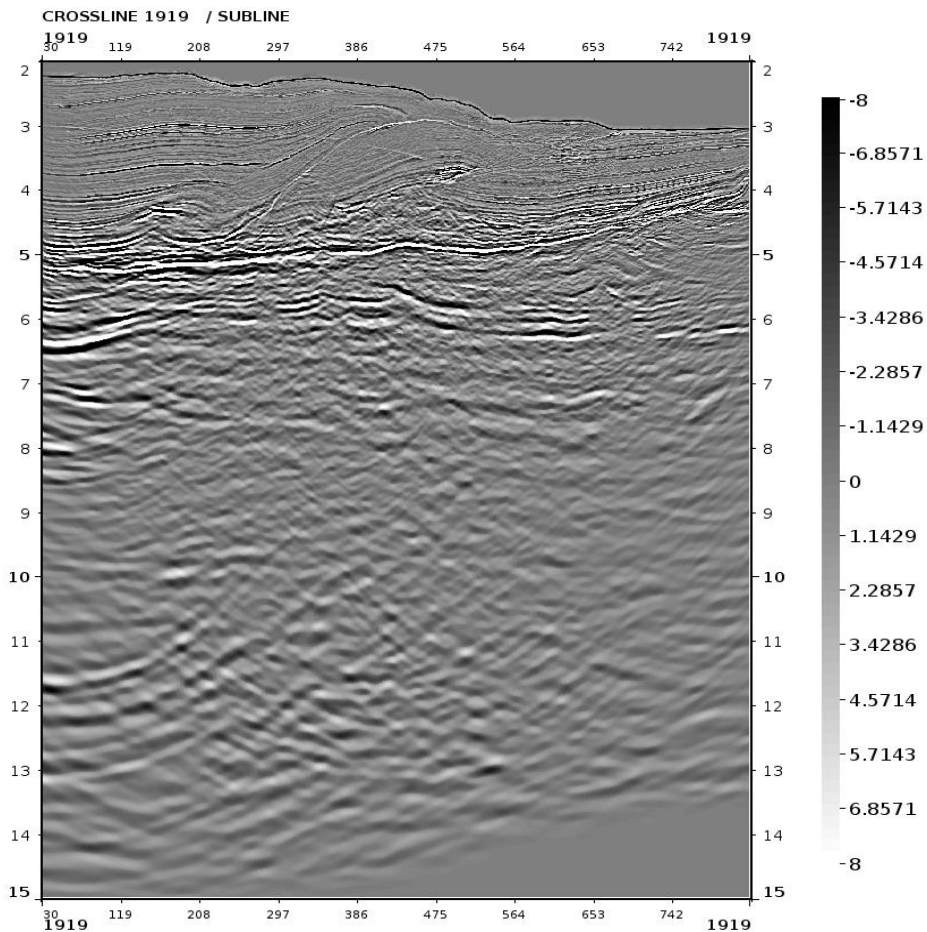


CROSSLINE 4199 / SUBLINE



Crossline 1919 and 4199: after TVF

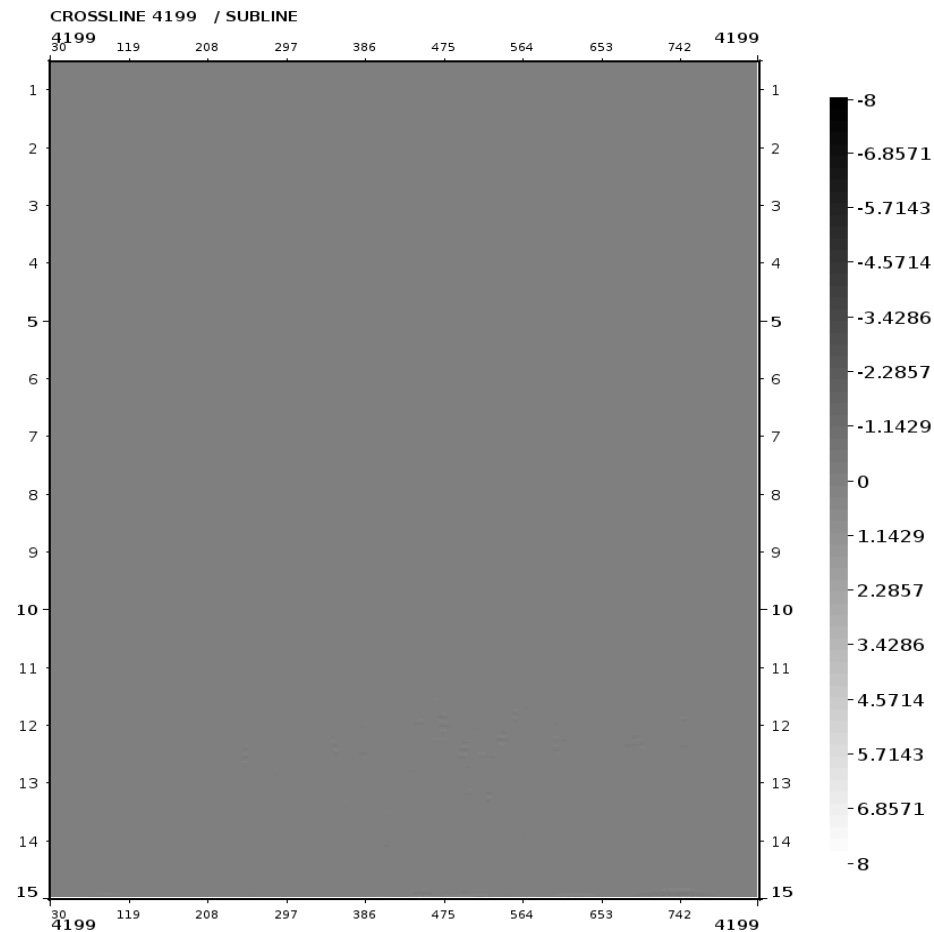
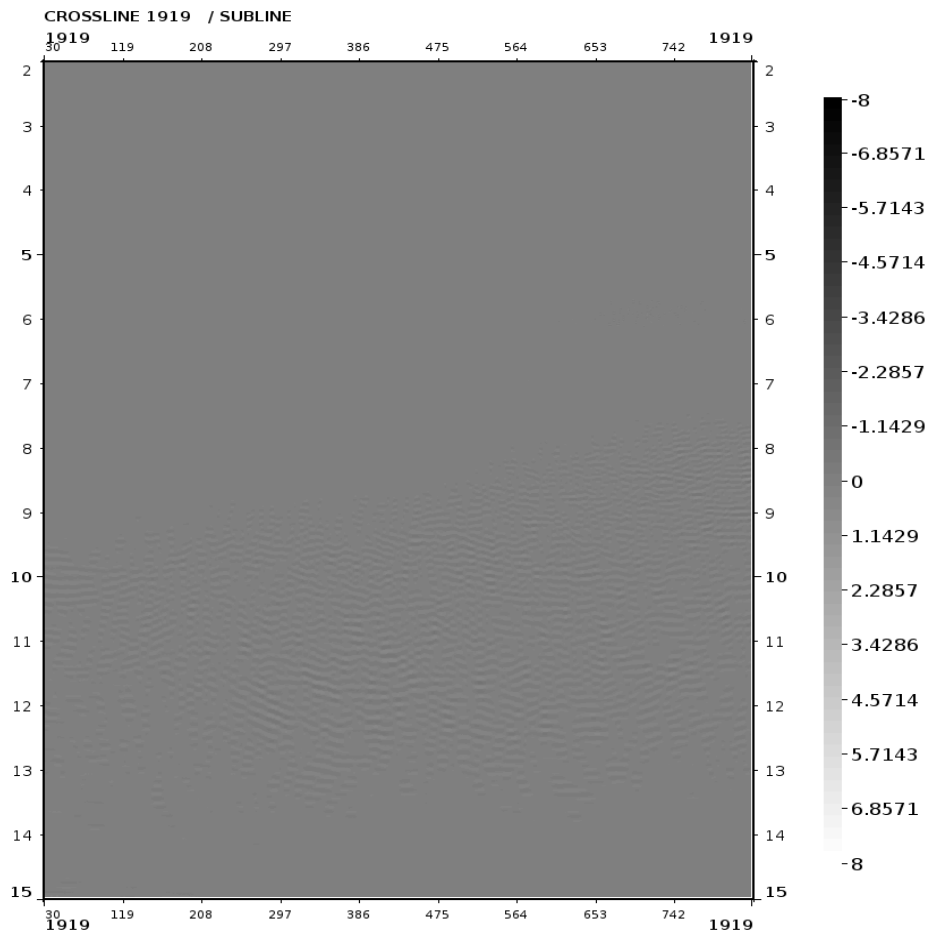
38



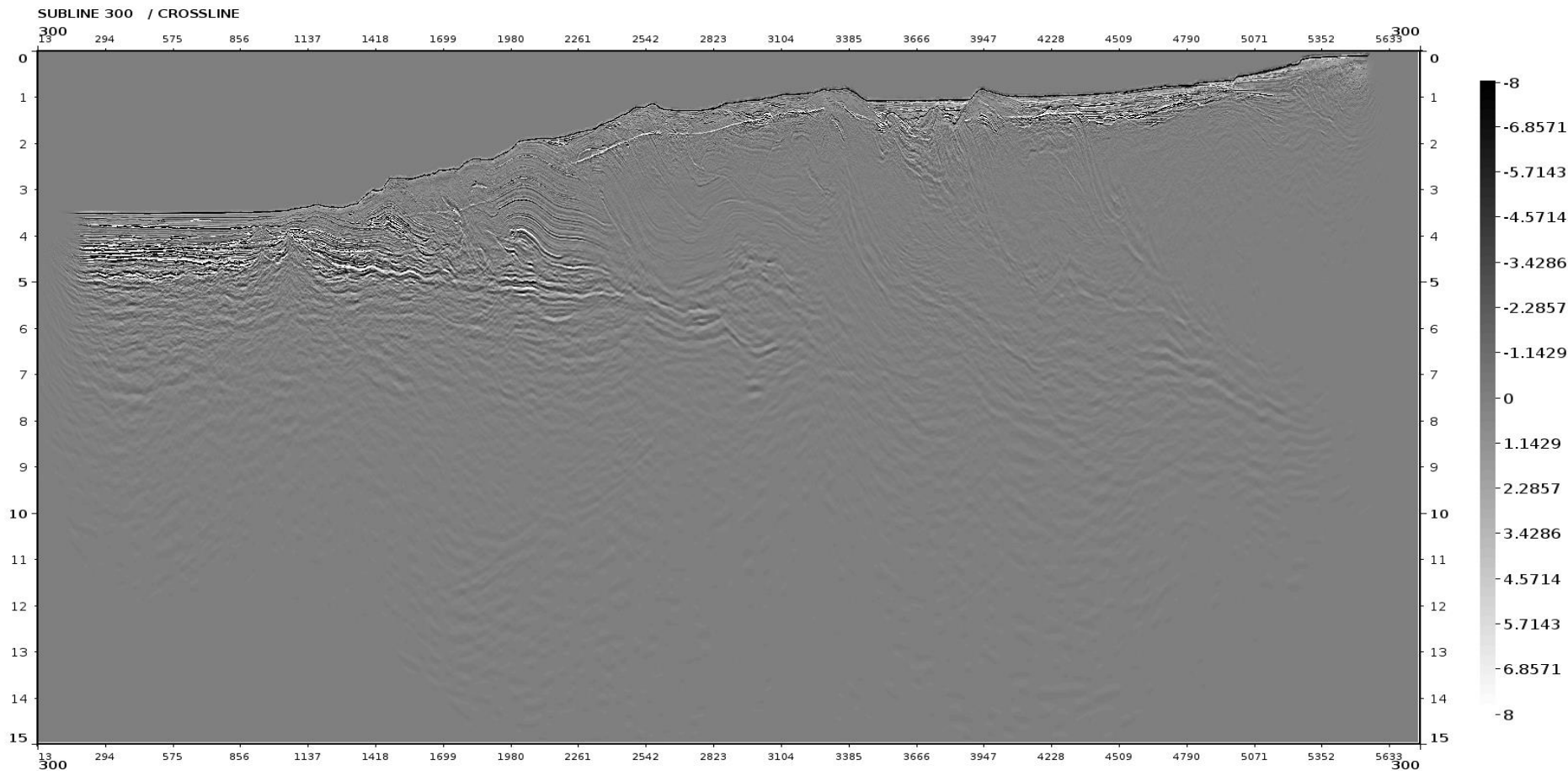


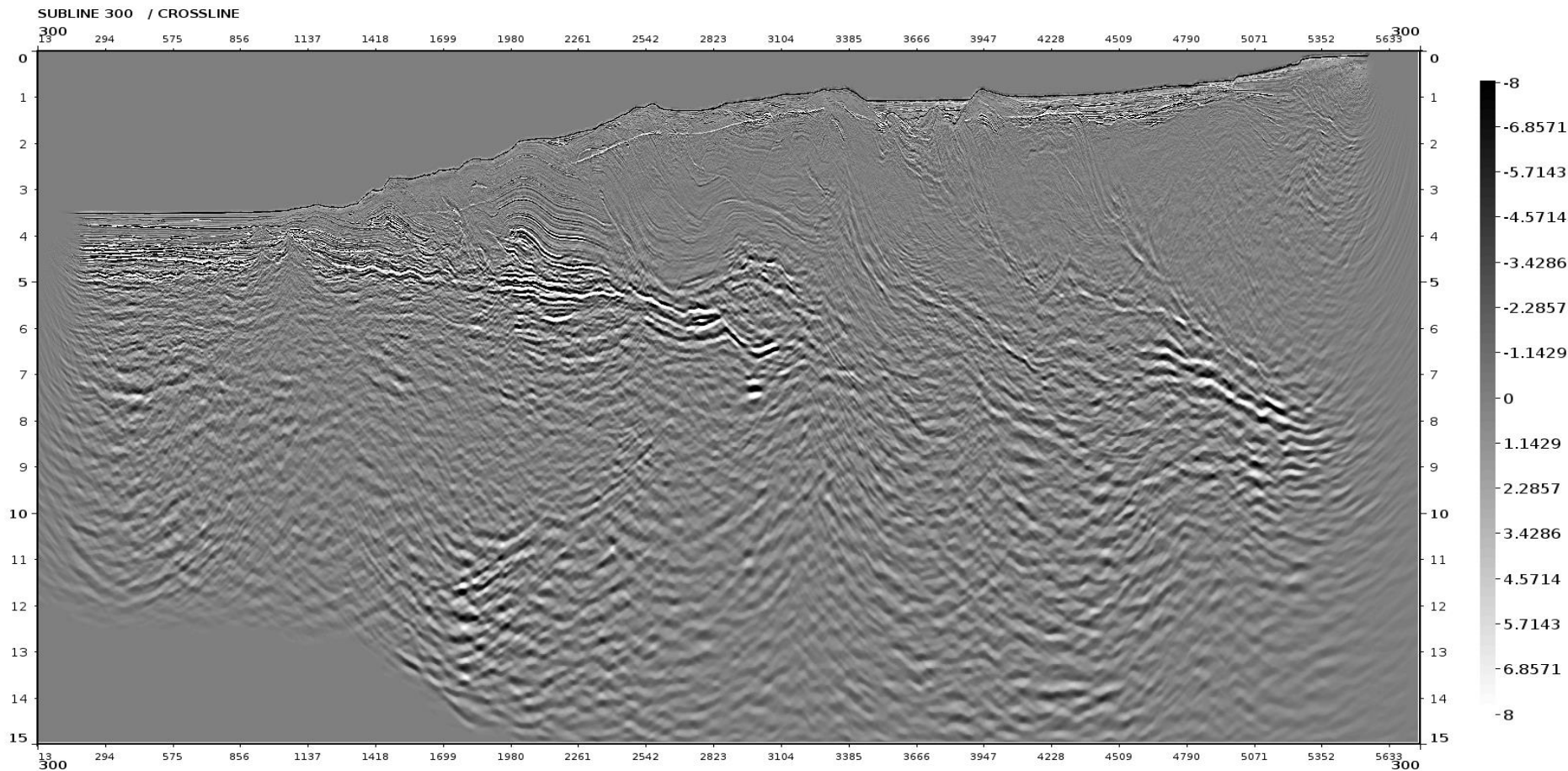
Crossline 1919 and 4199: difference by TVF

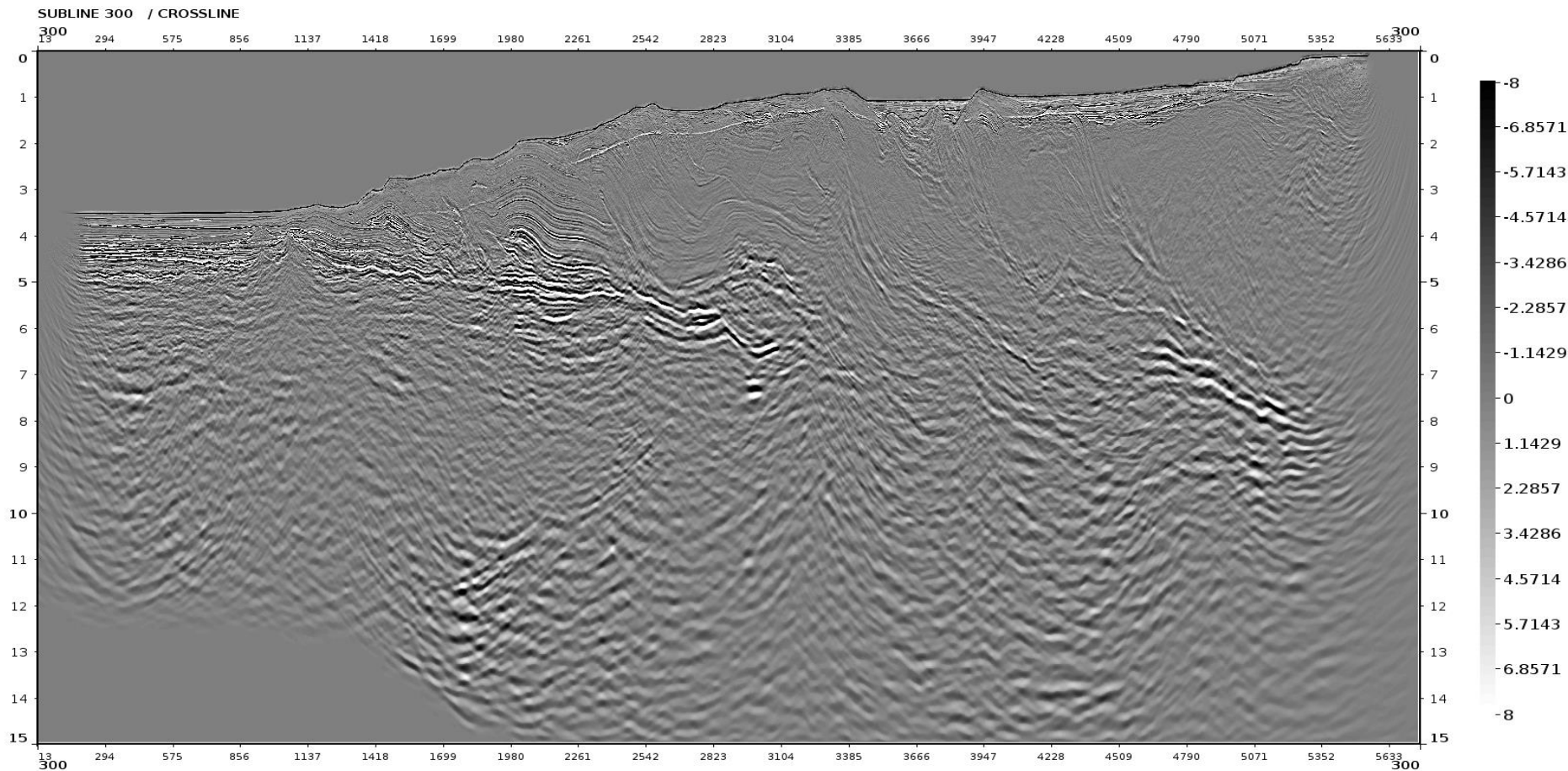
39



Middle Stack



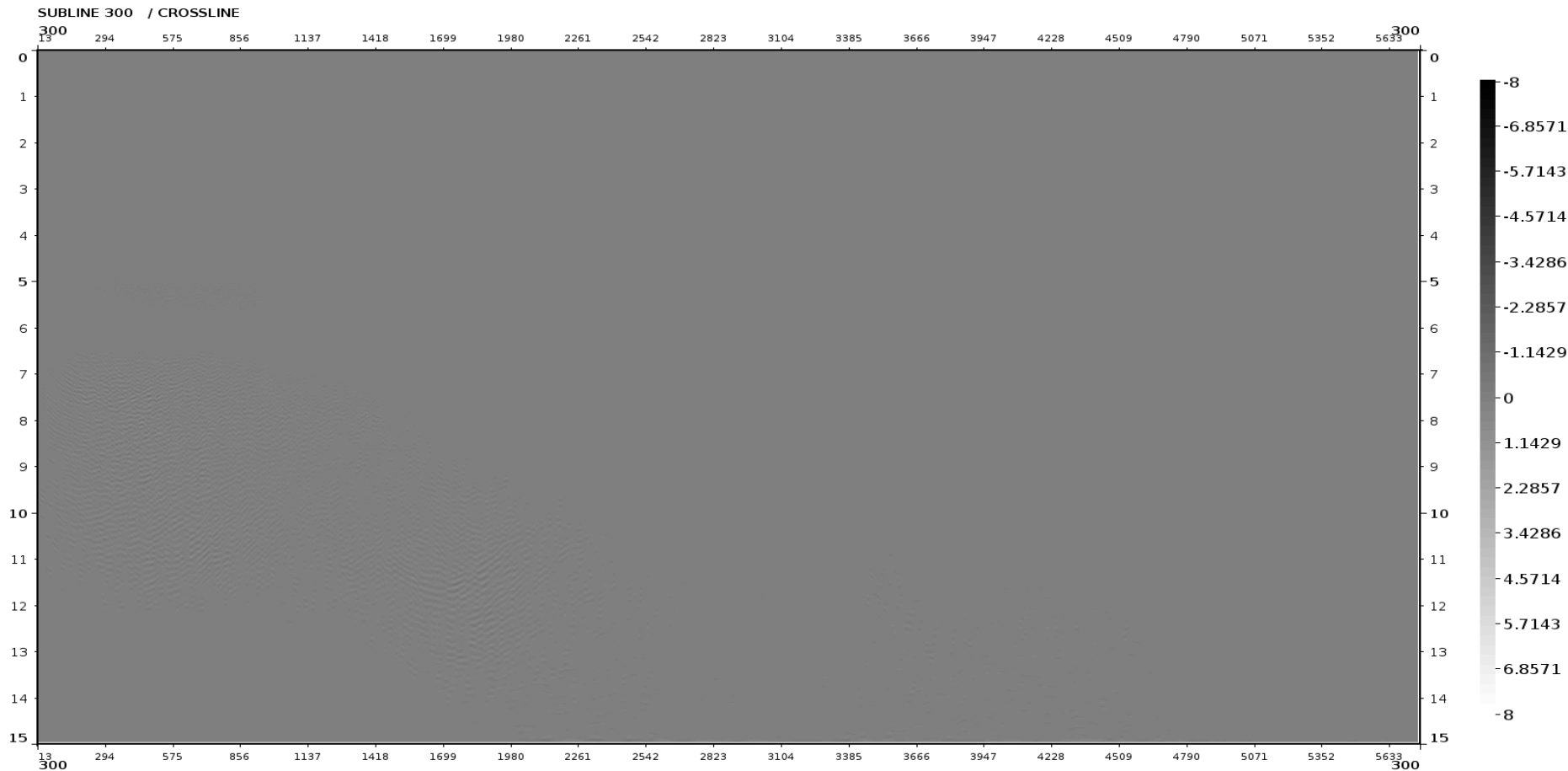


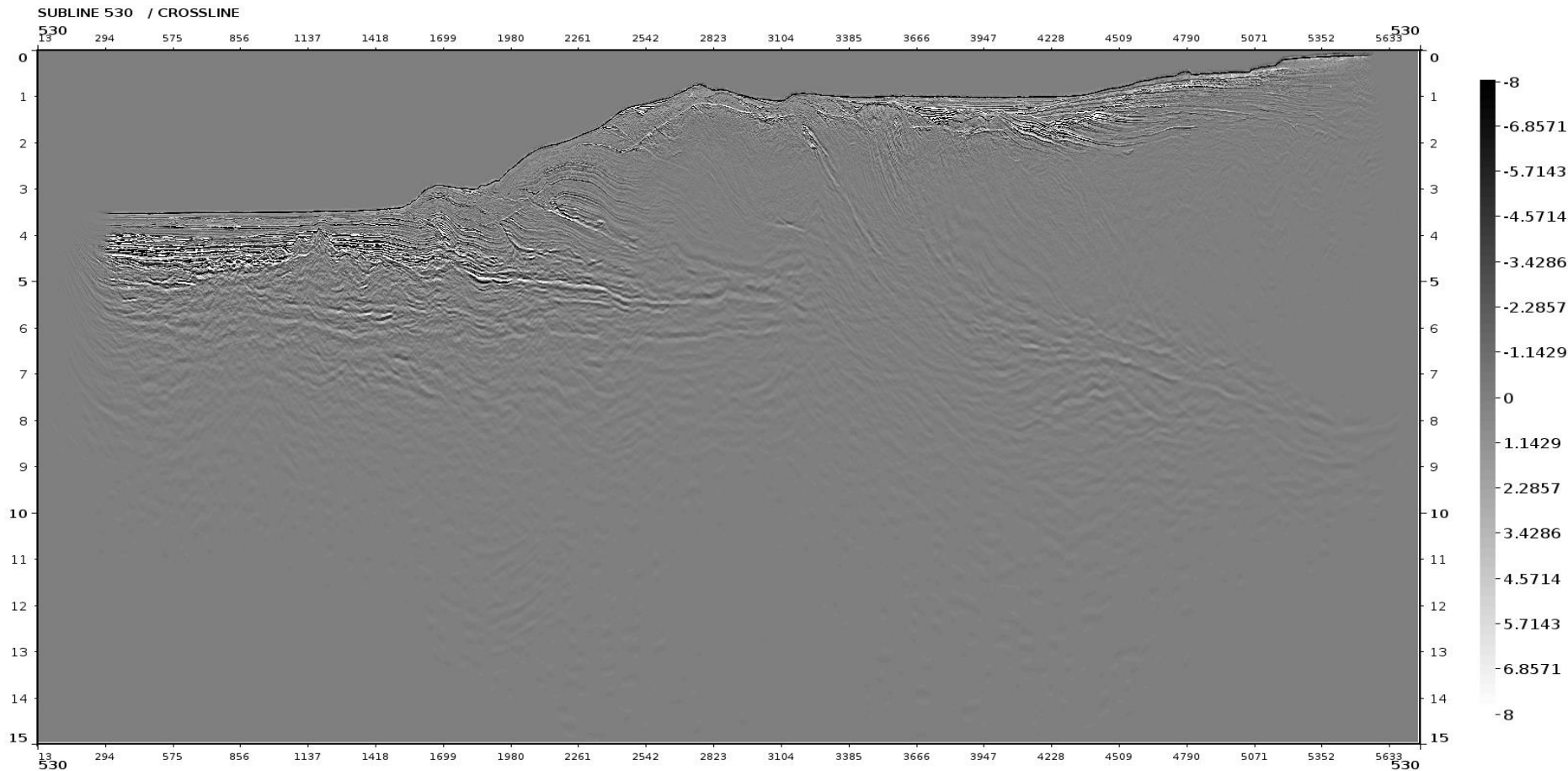




Subline 300: difference by TVF

44

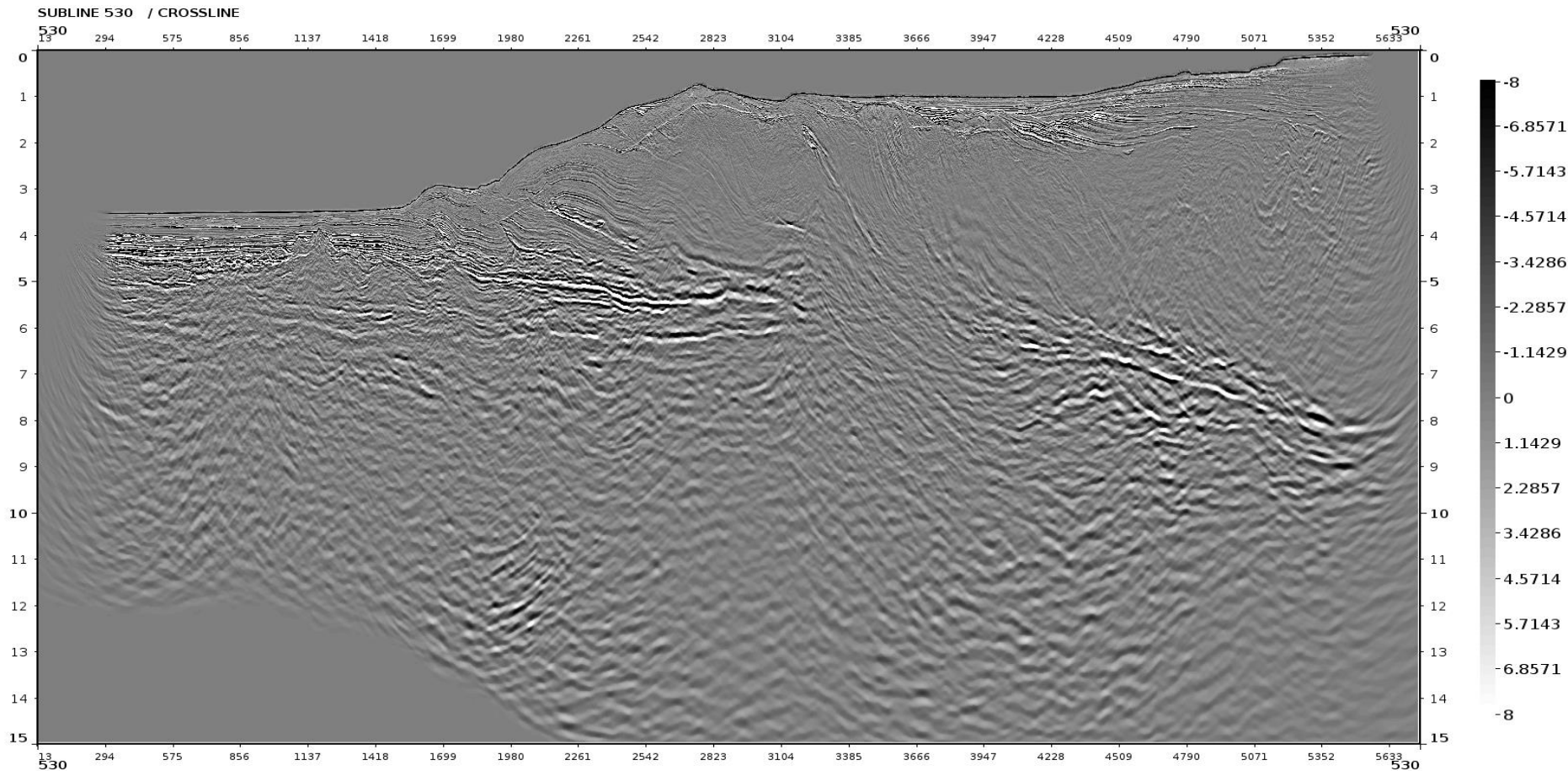






Subline 530: after TVS

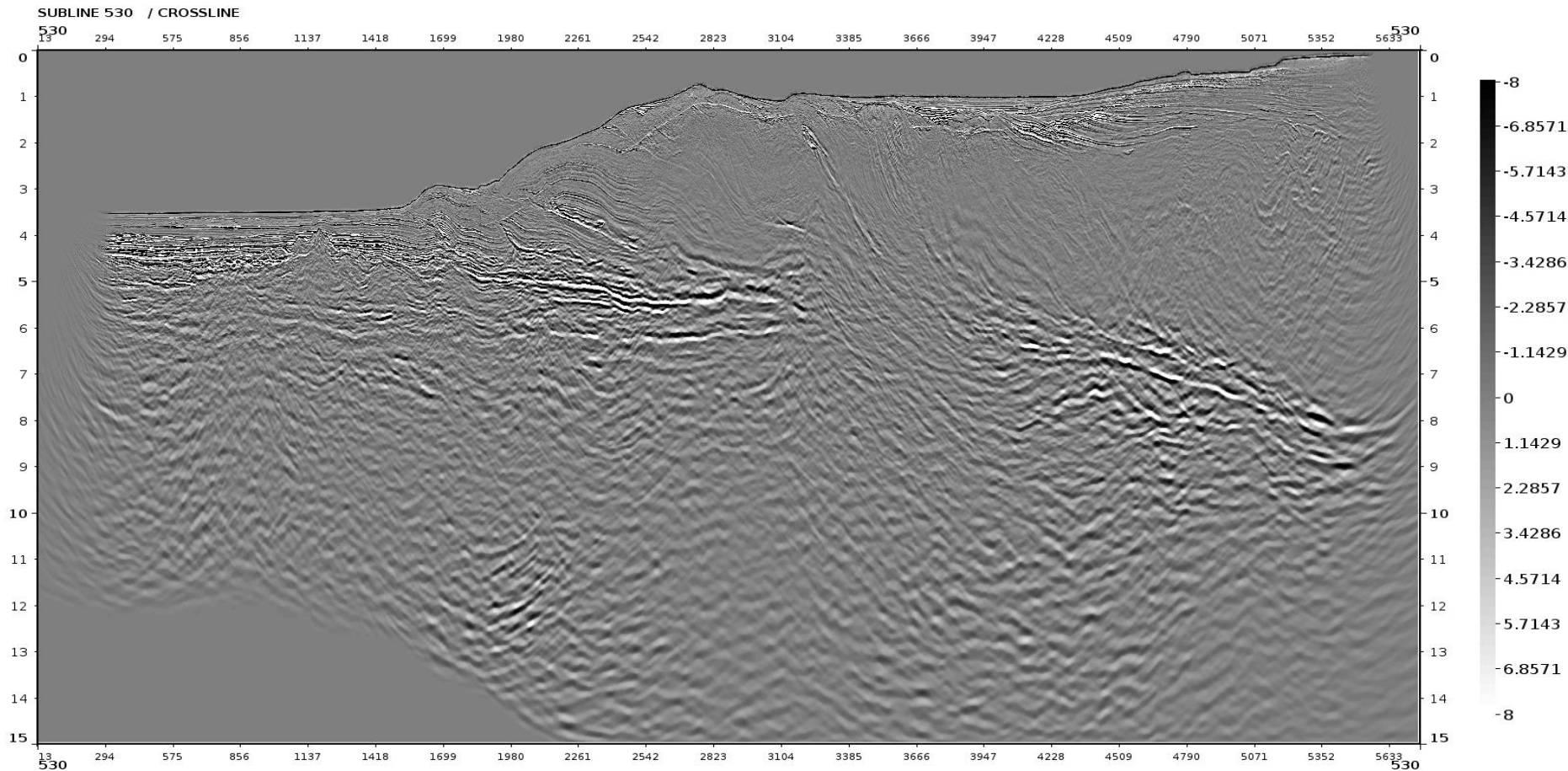
46





Subline 530: after TVF

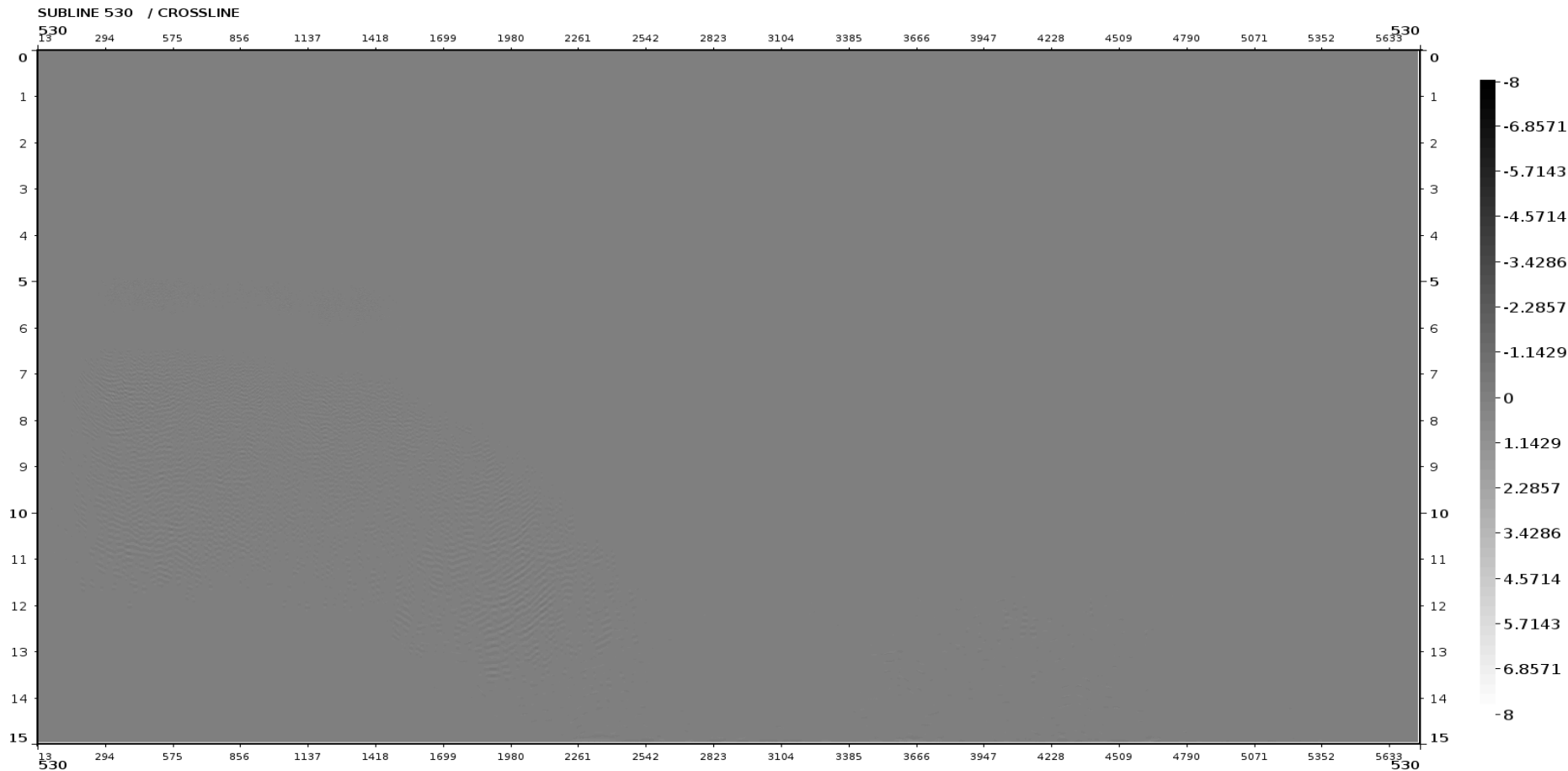
47

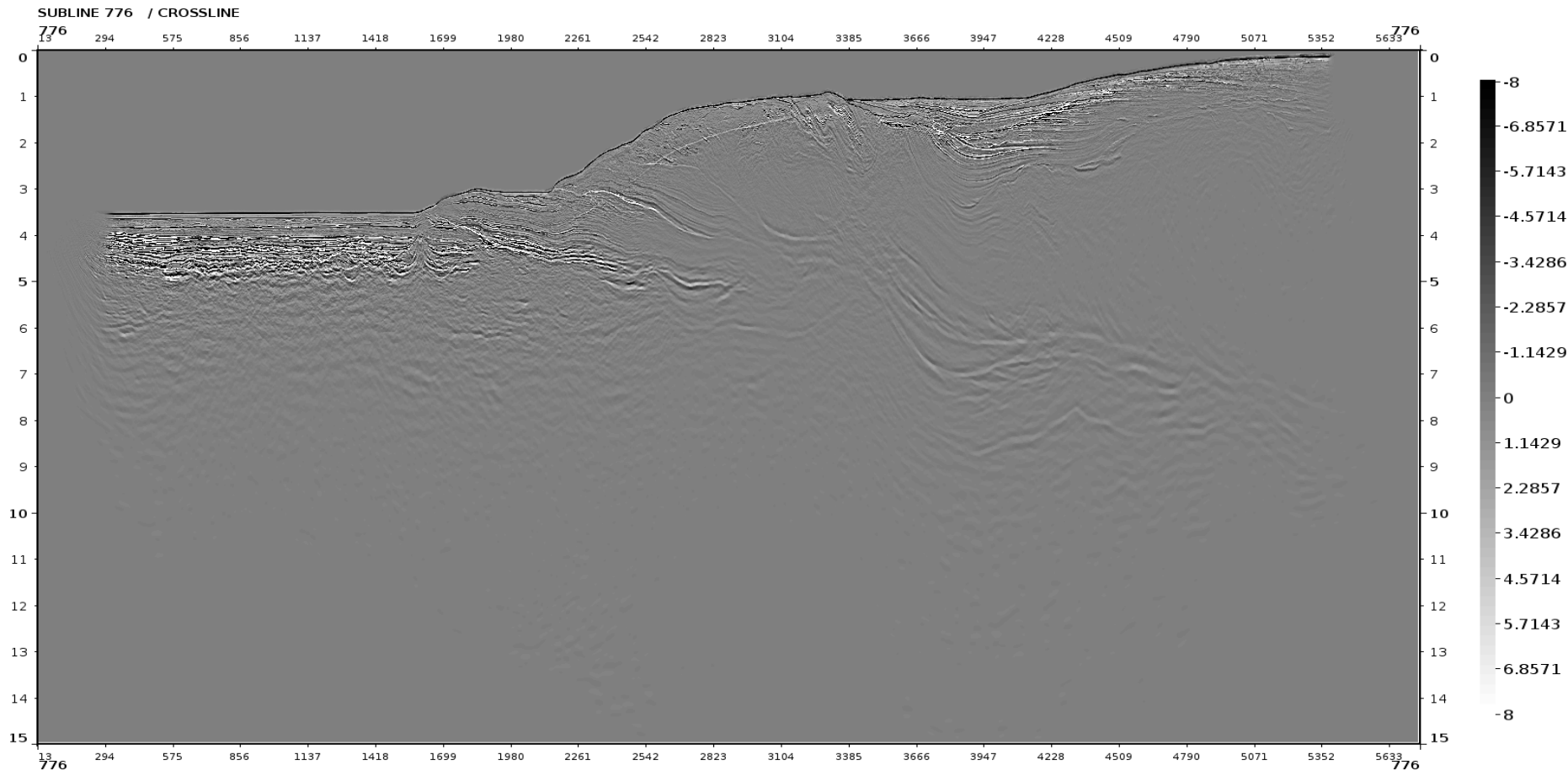




Subline 530: difference by TVF

48

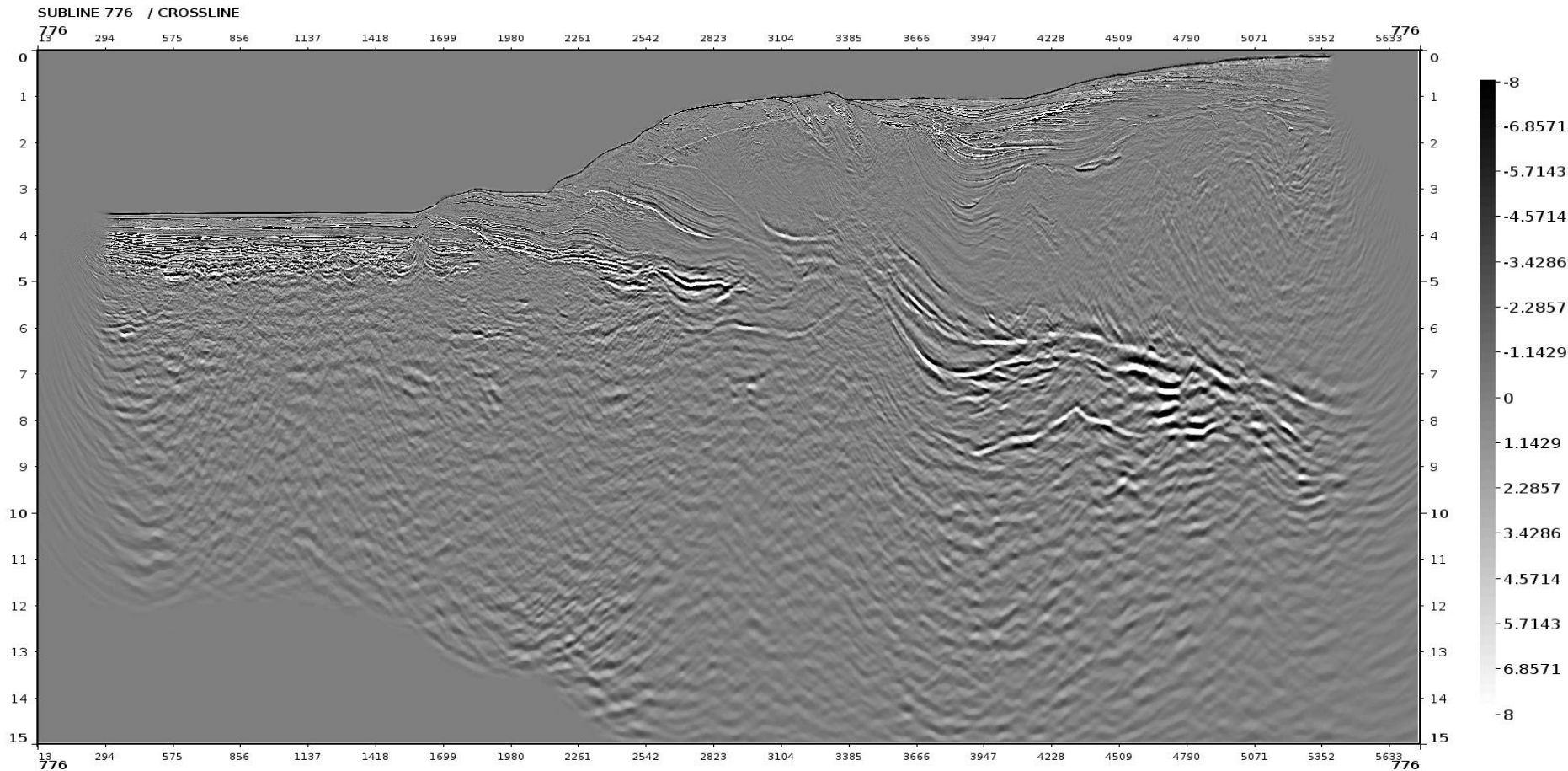






Subline 776: after TVS

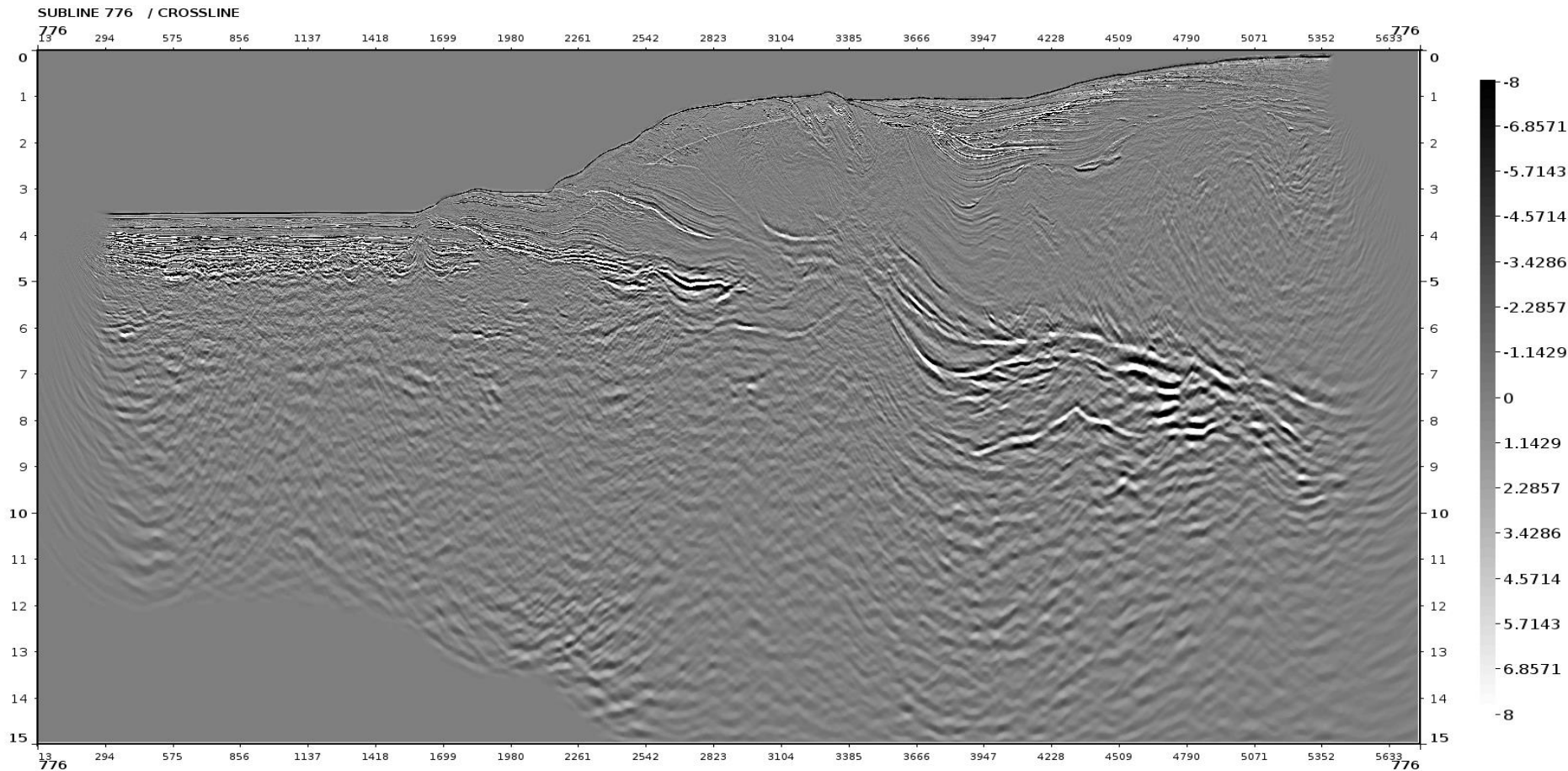
50





Subline 776: after TVF

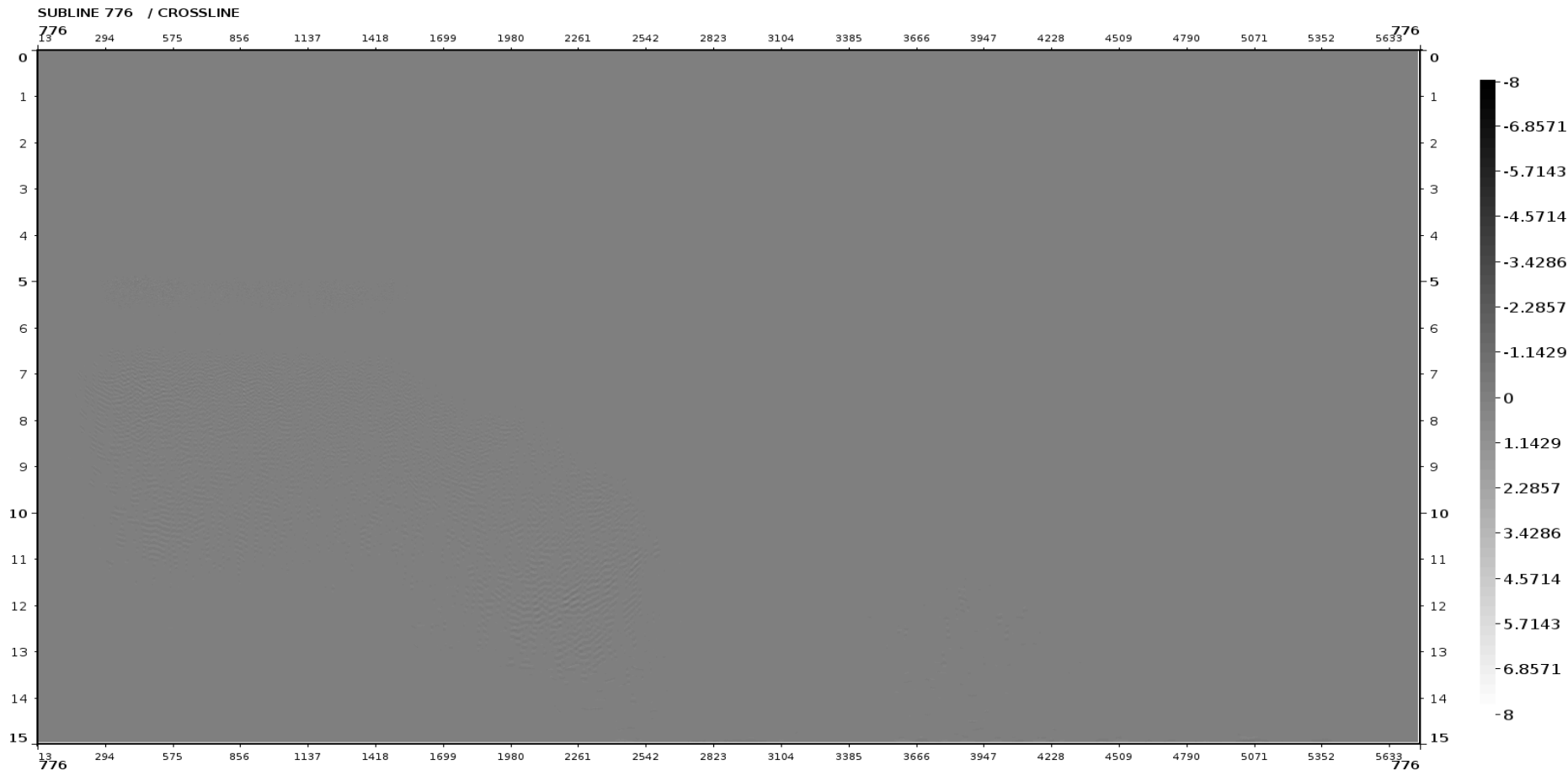
51





Subline 776: difference by TVF

52

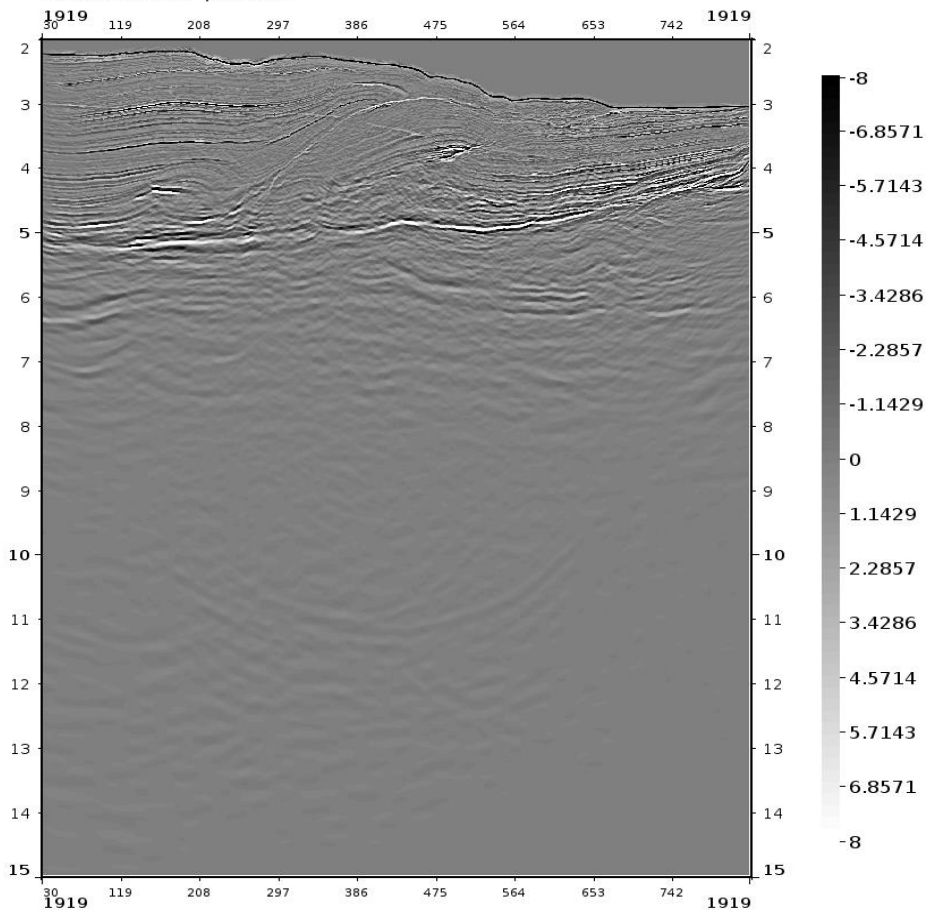




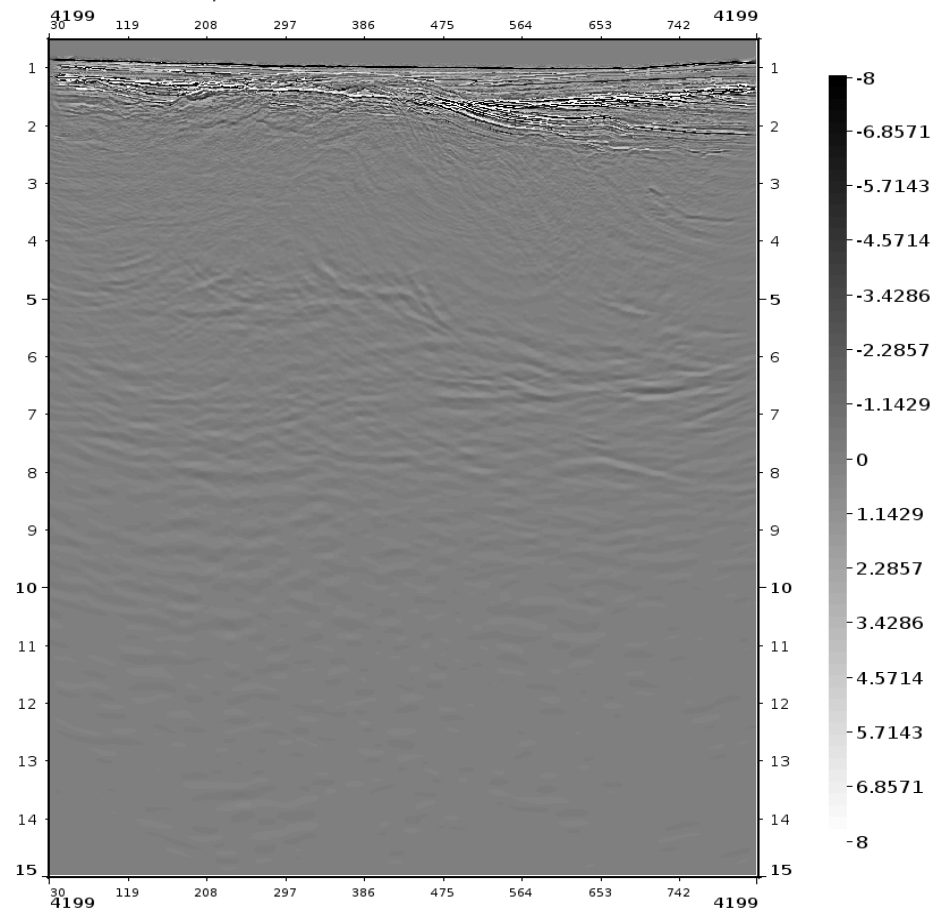
Crossline 1919 and 4199: input

53

CROSSLINE 1919 / SUBLINE

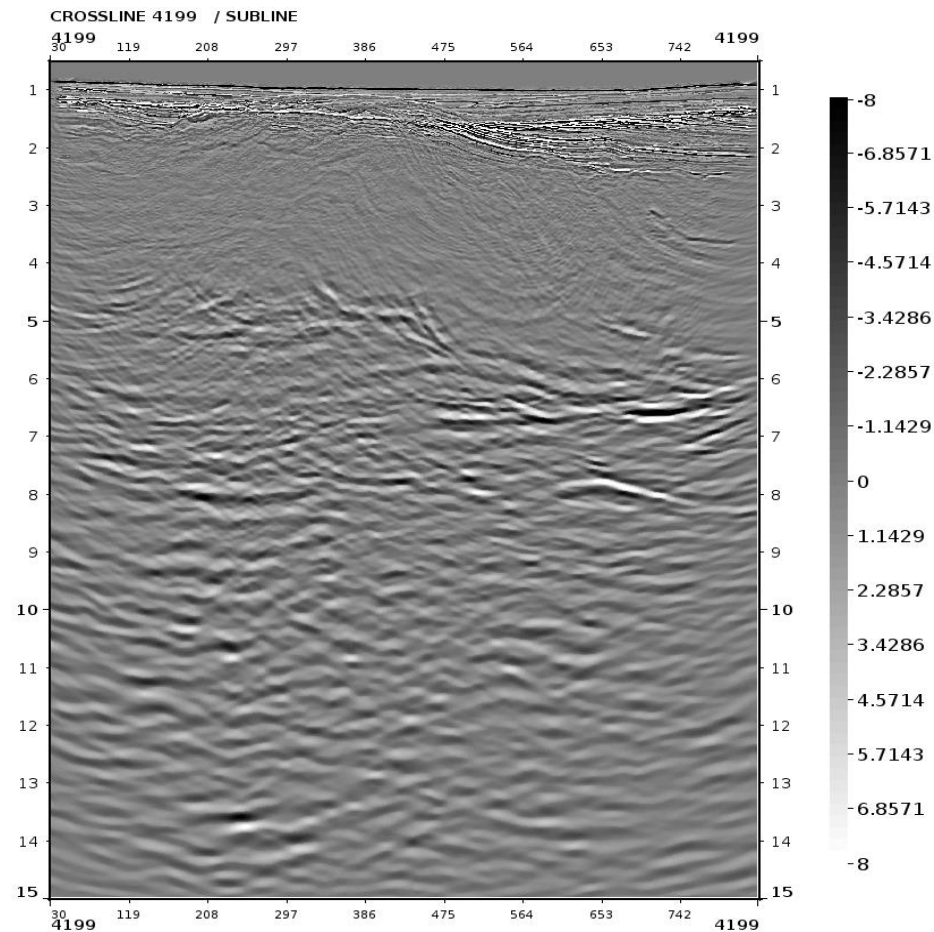
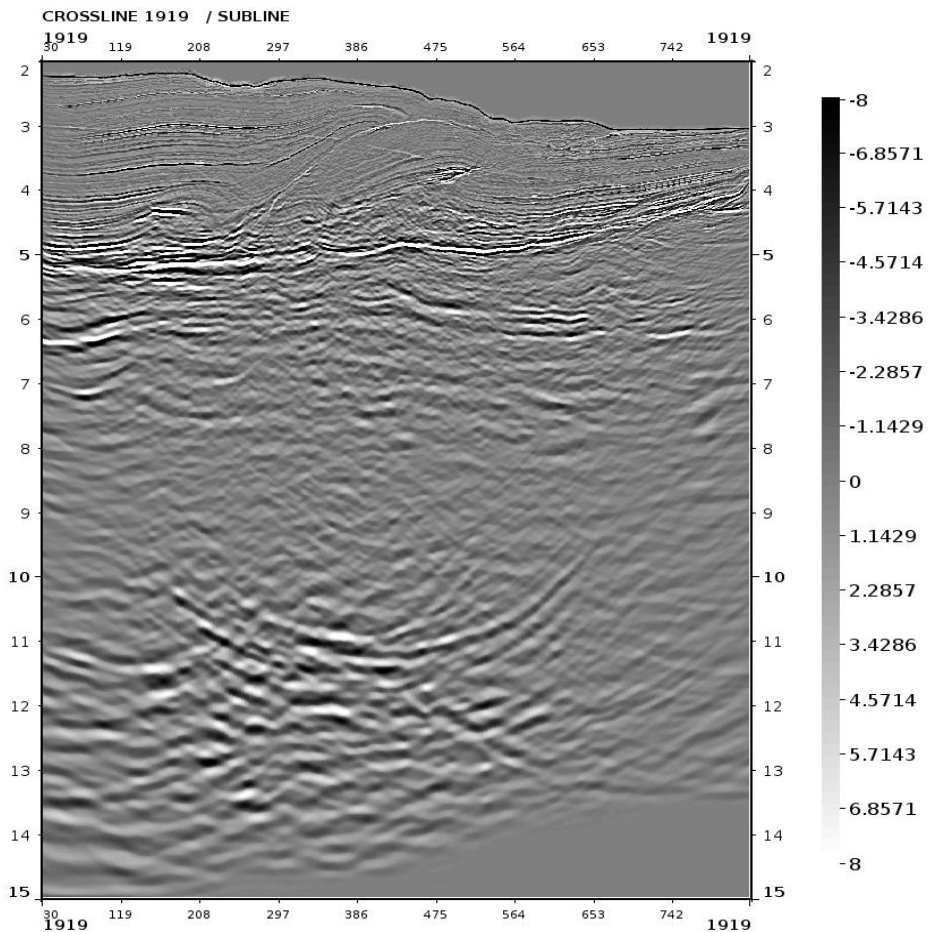


CROSSLINE 4199 / SUBLINE



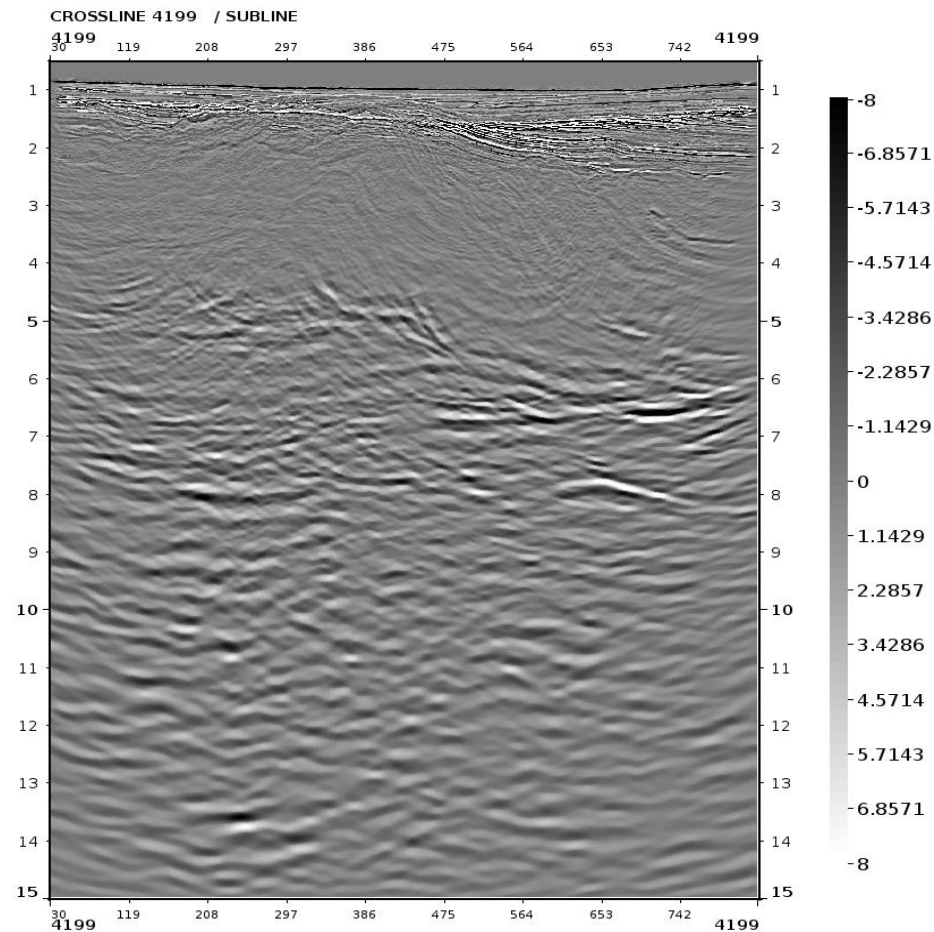
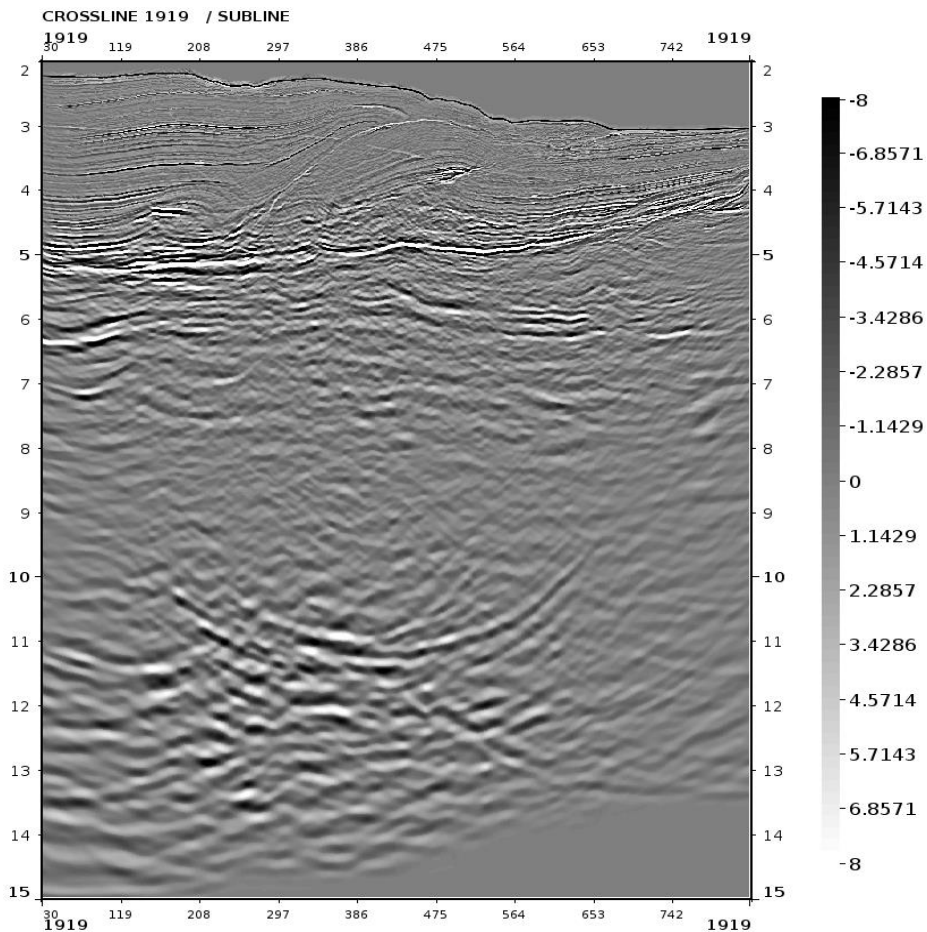
Crossline 1919 and 4199: after TVS

54



Crossline 1919 and 4199: after TVF

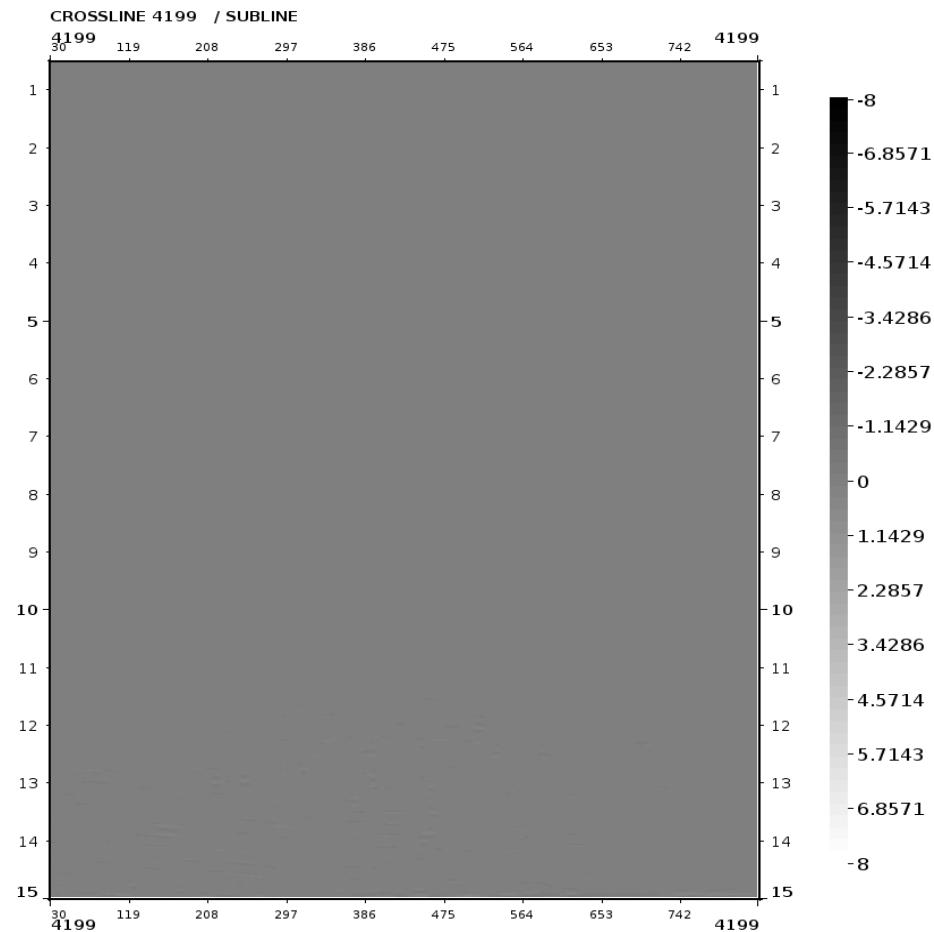
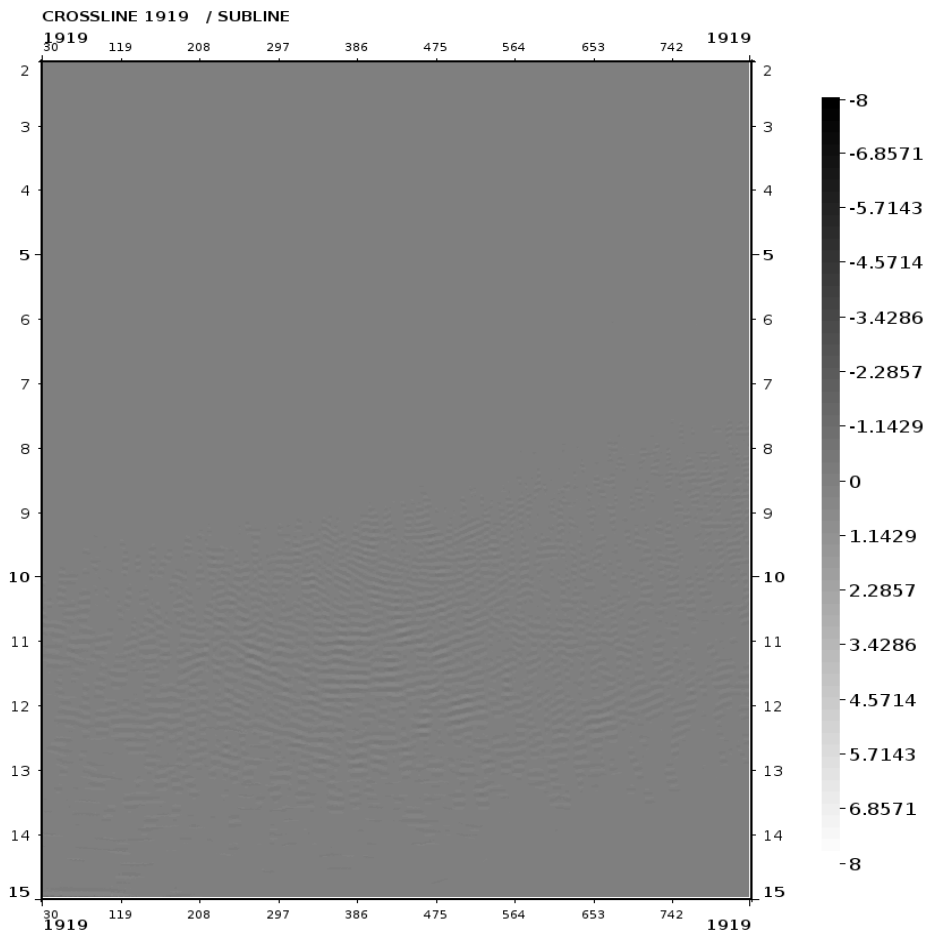
55



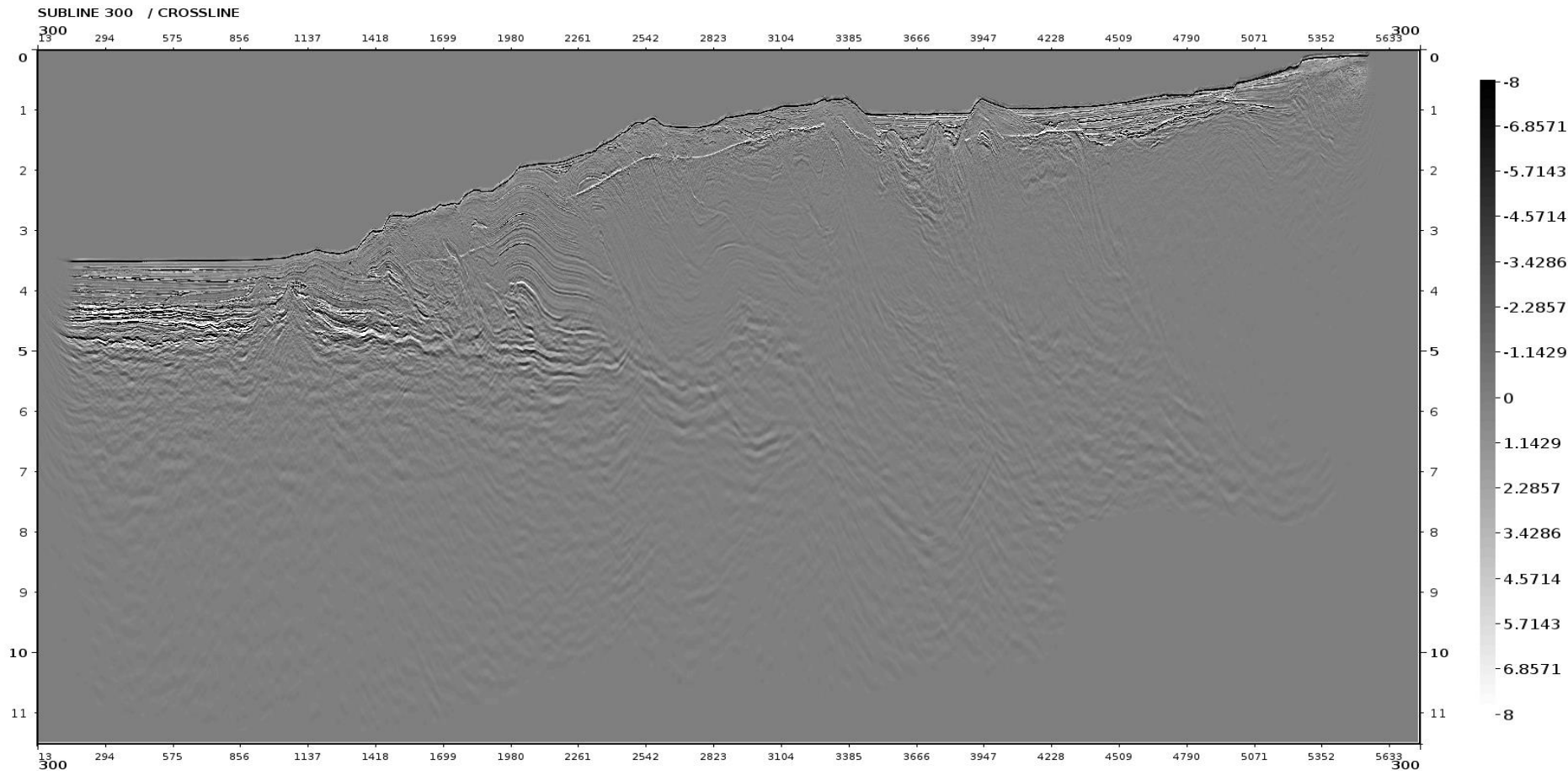


Crossline 1919 and 4199: difference by TVF

56



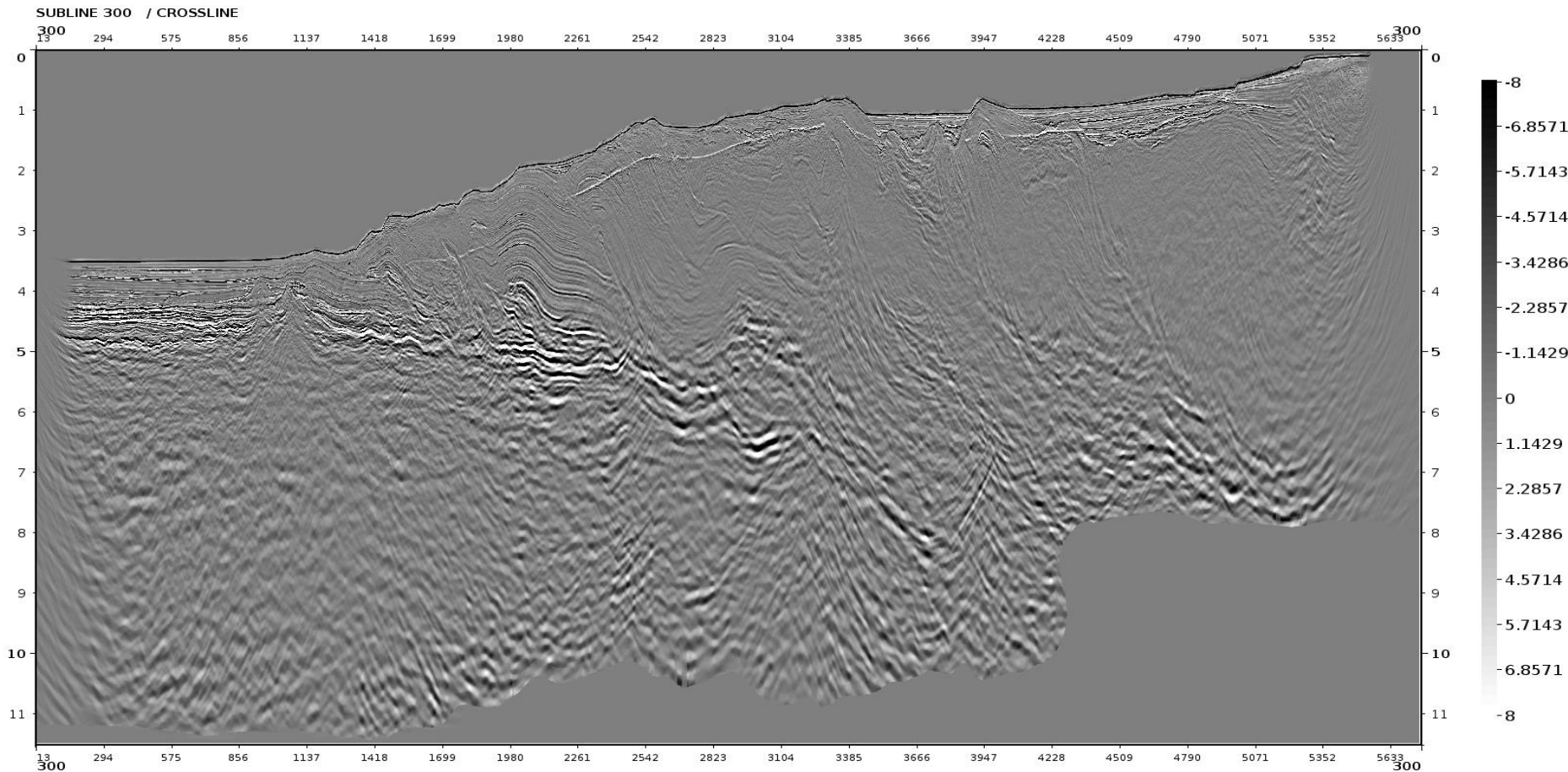
Far Stack

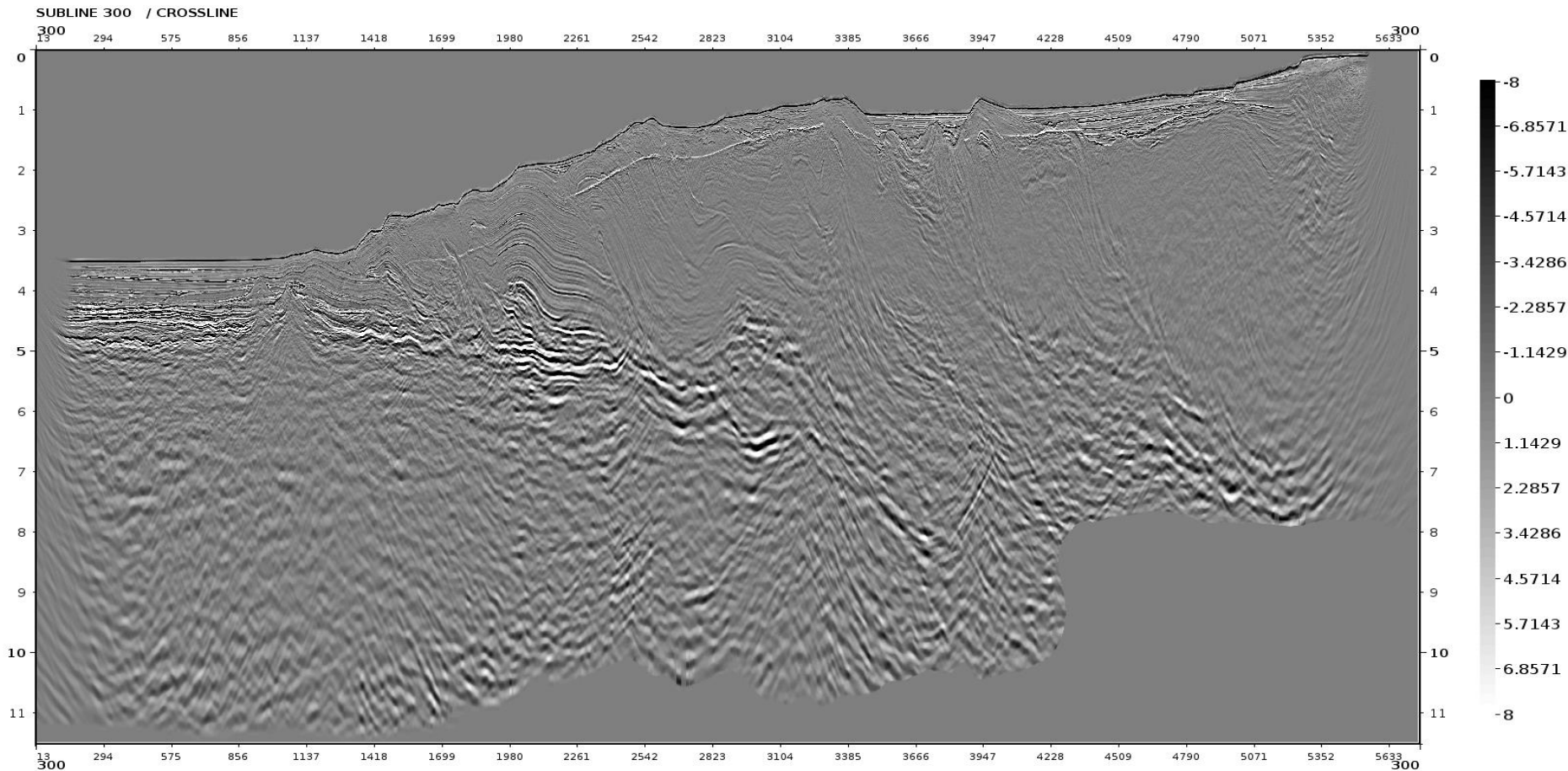




Subline 300: after TVS

59



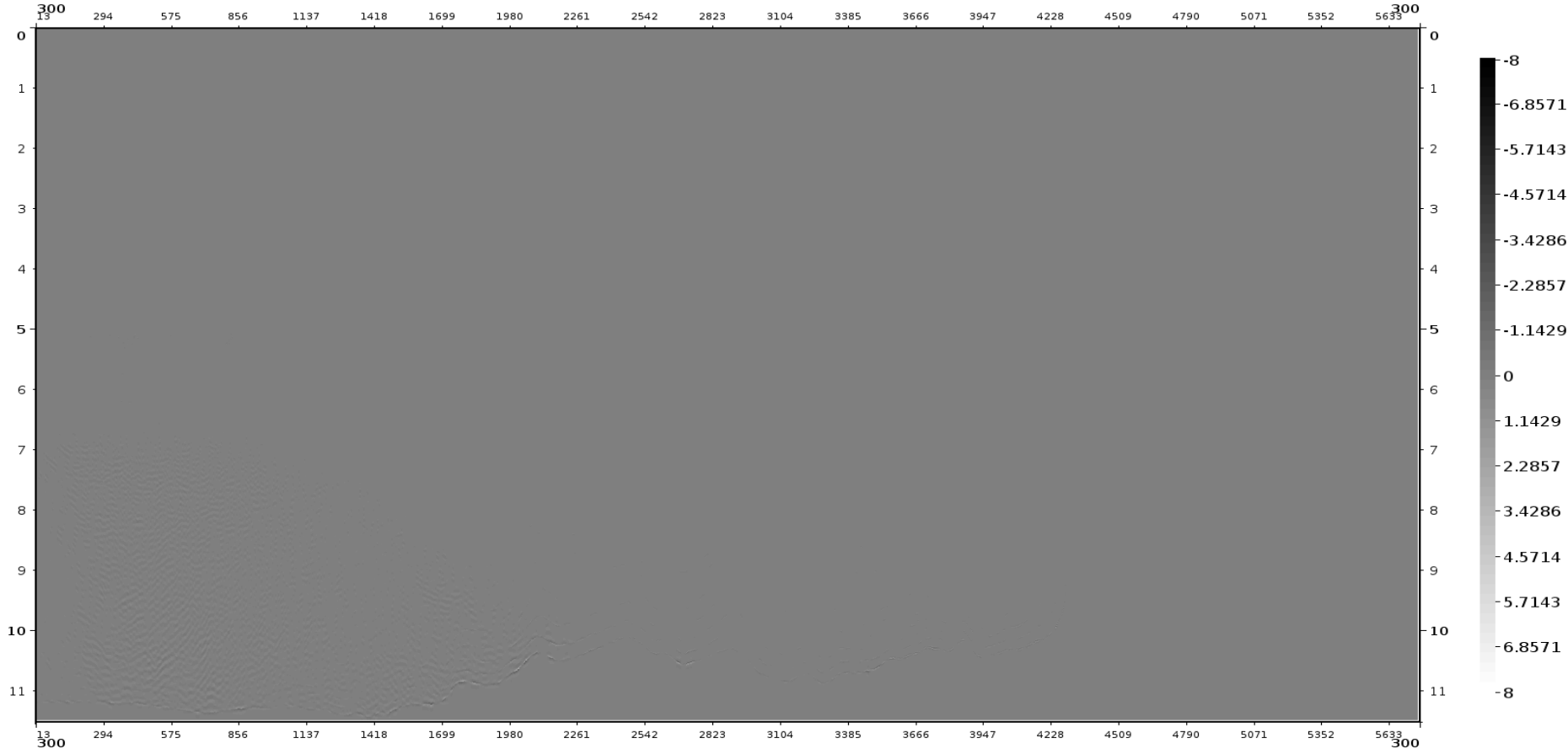


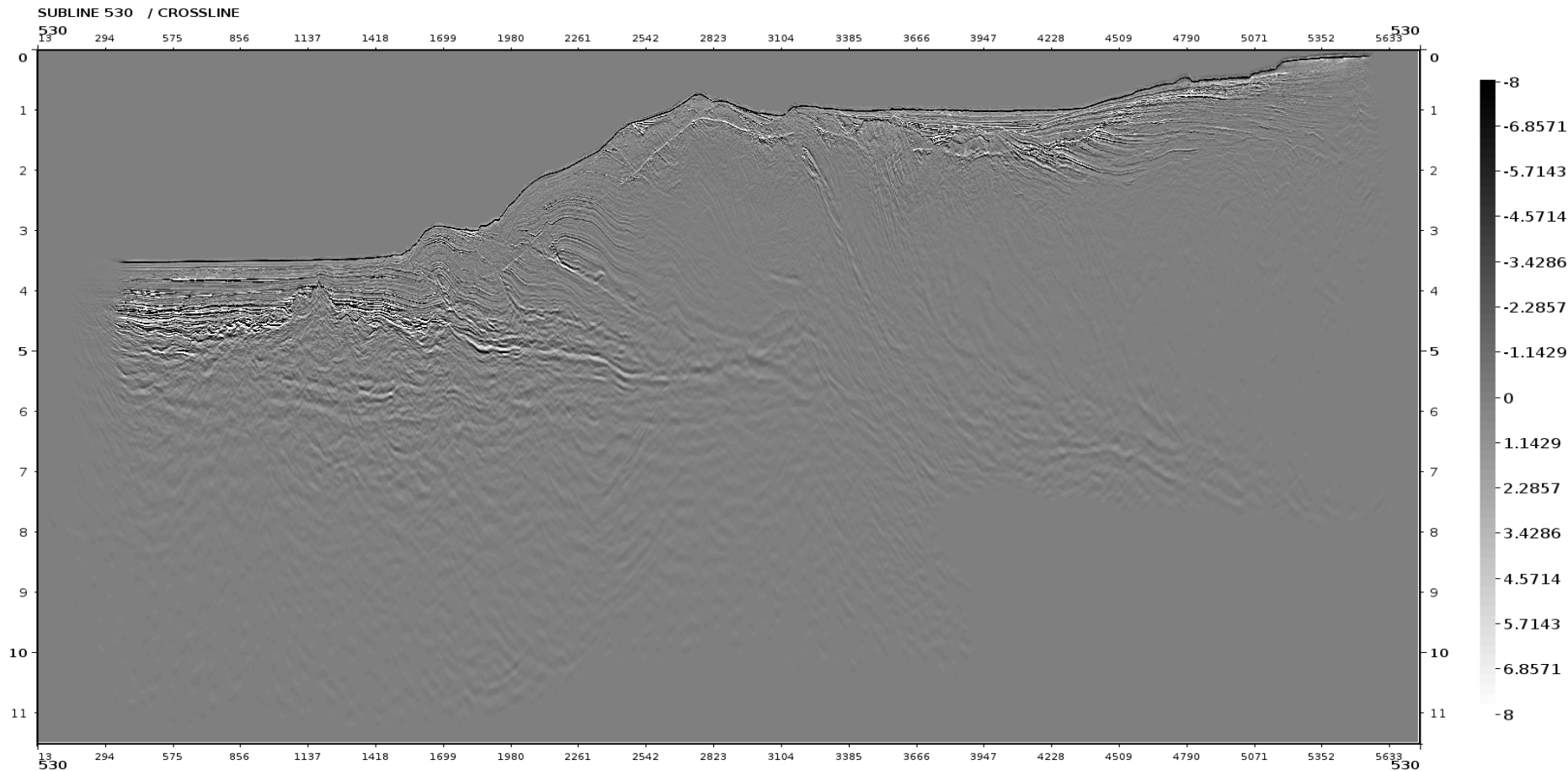


Subline 300: difference by TVF

61

SUBLINE 300 / CROSSLINE

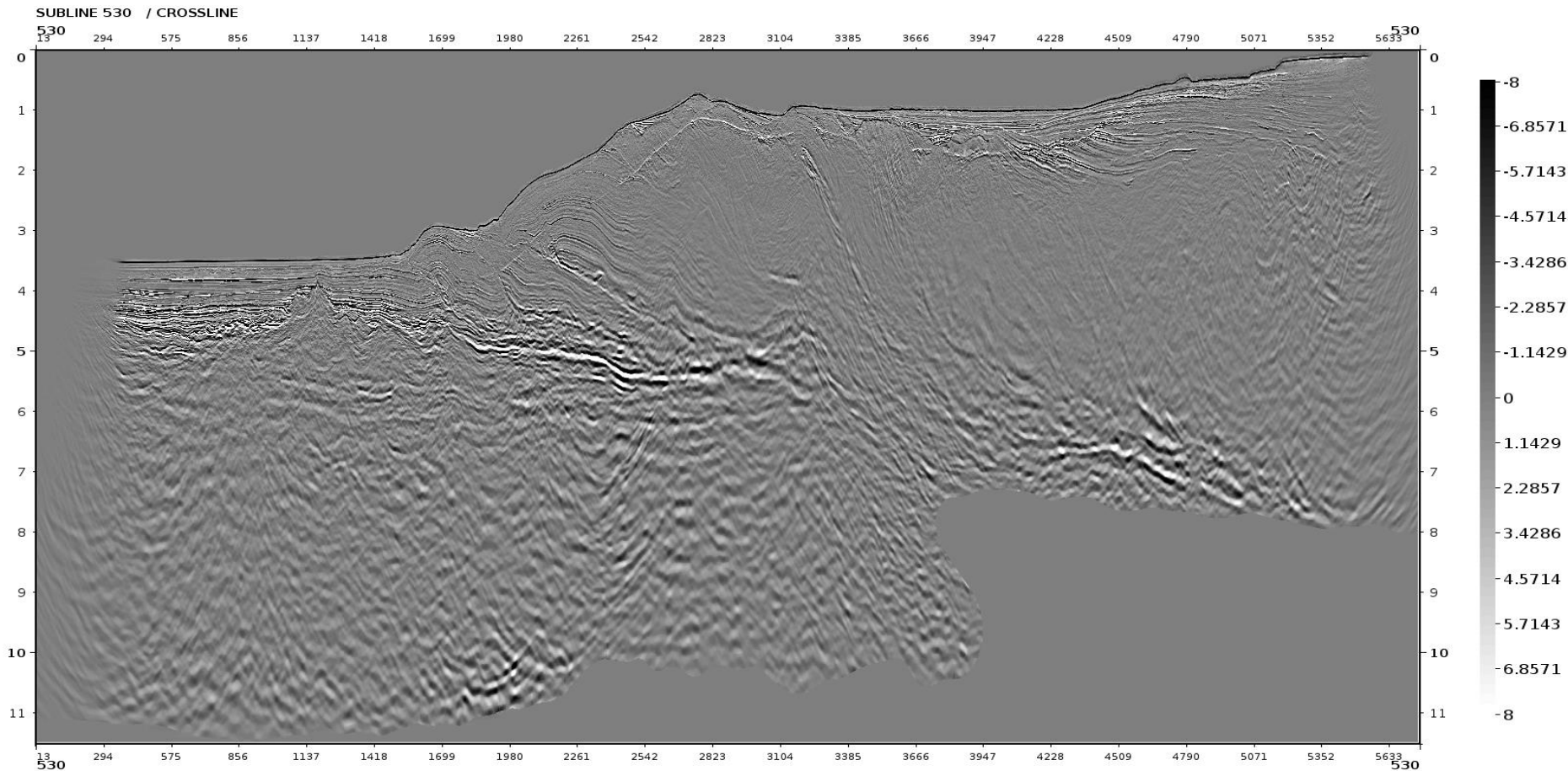






Subline 530: after TVS

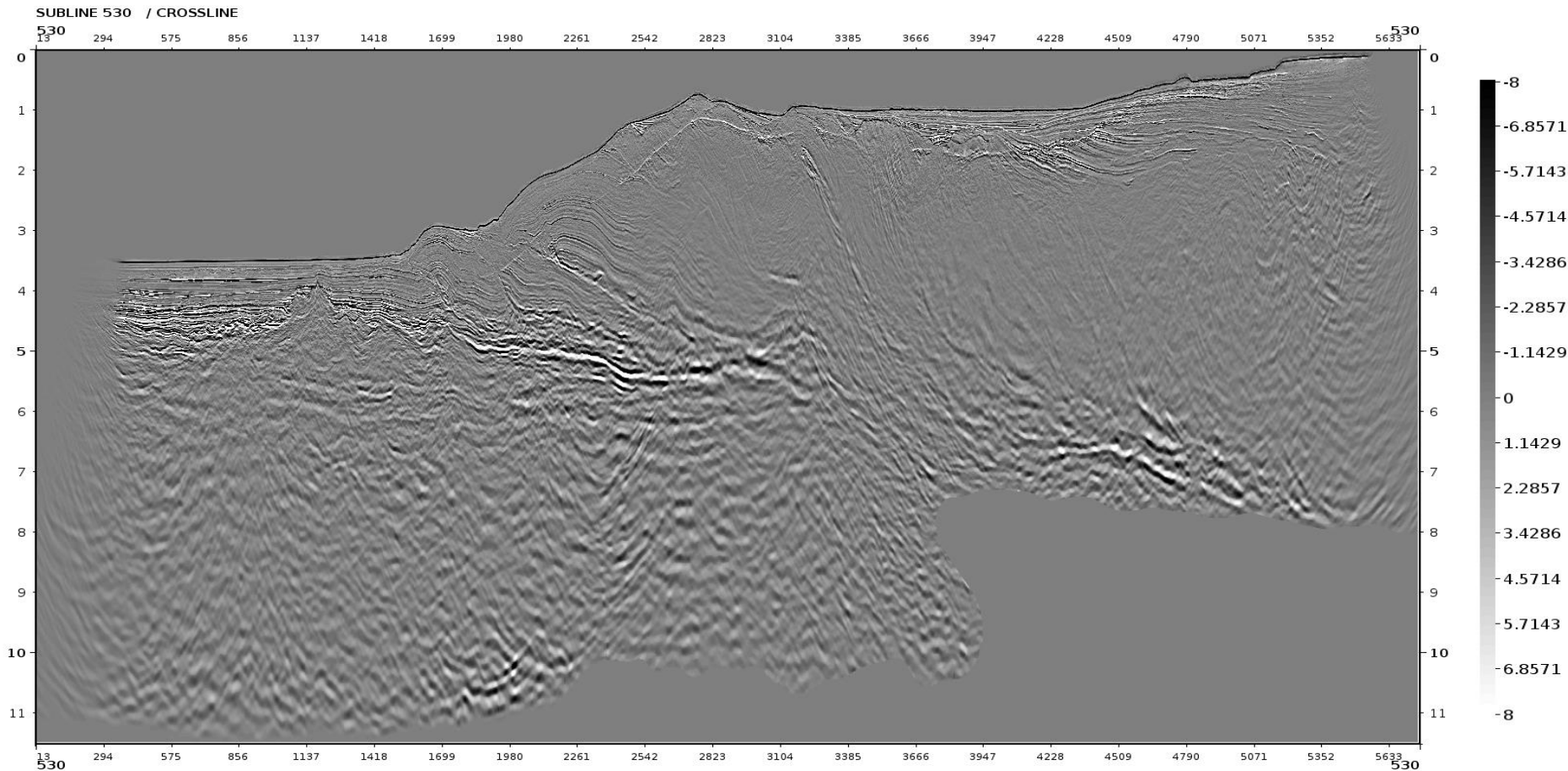
63





Subline 530: after TVF

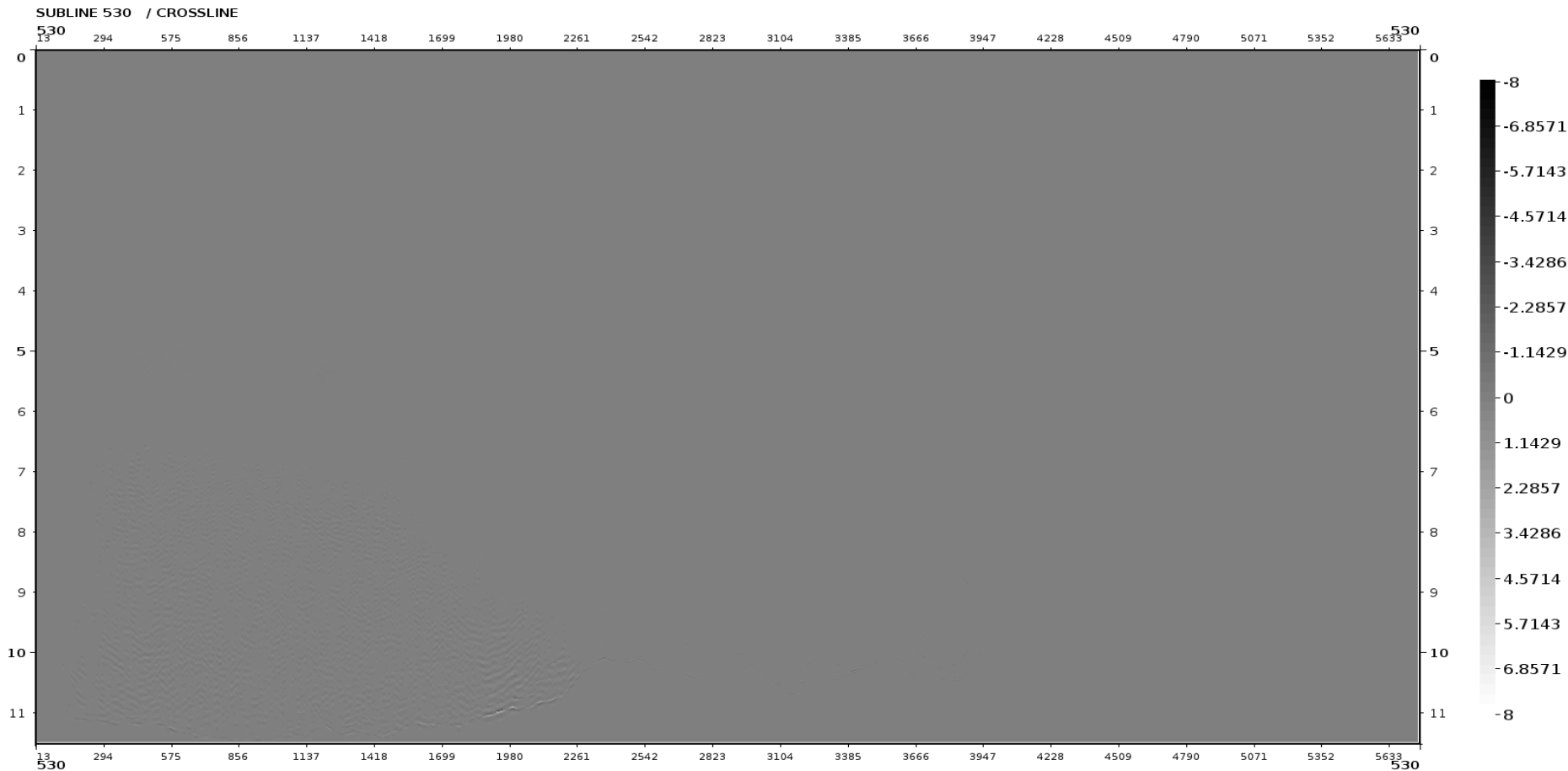
64

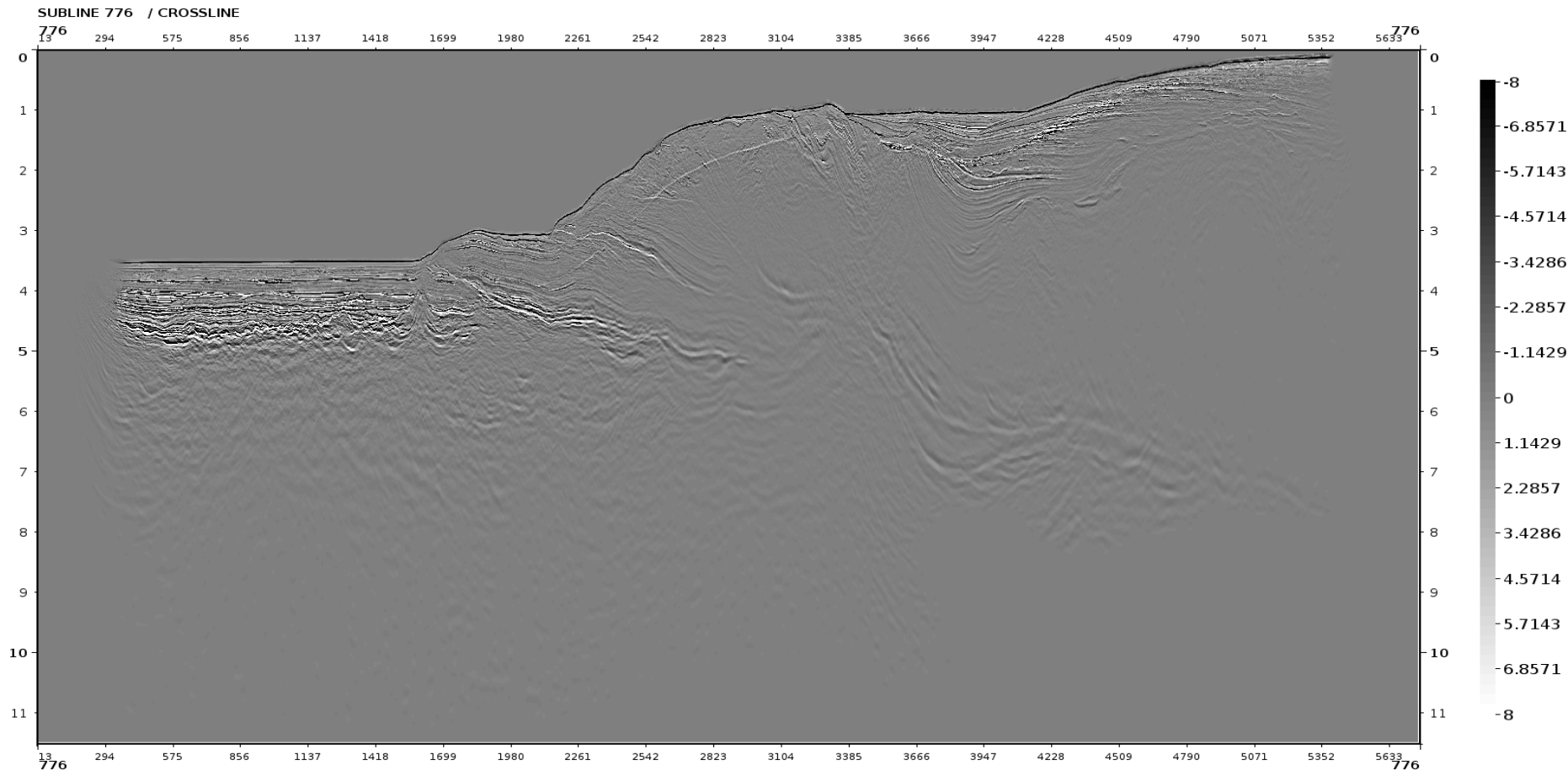


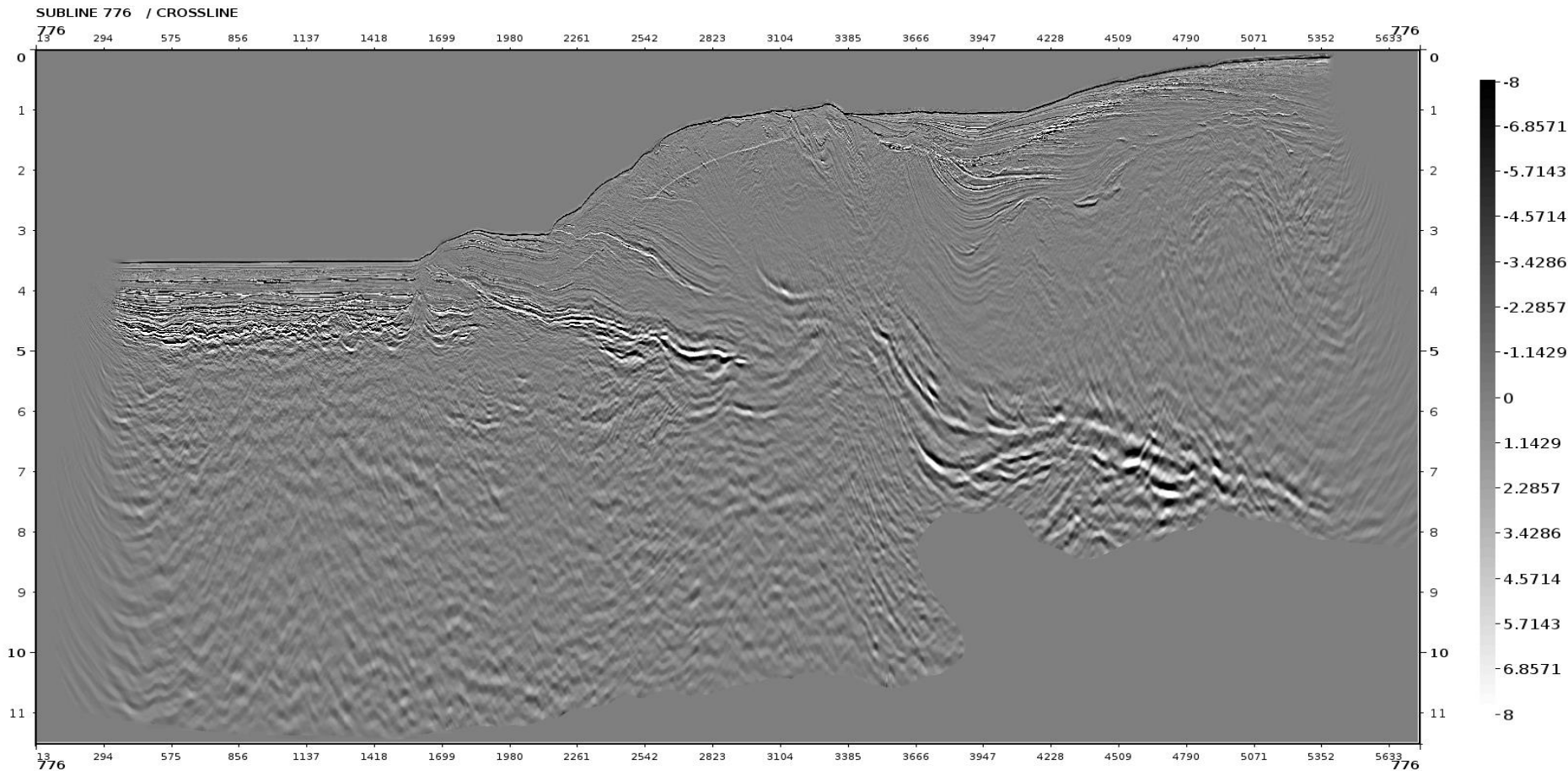


Subline 530: difference by TVF

65



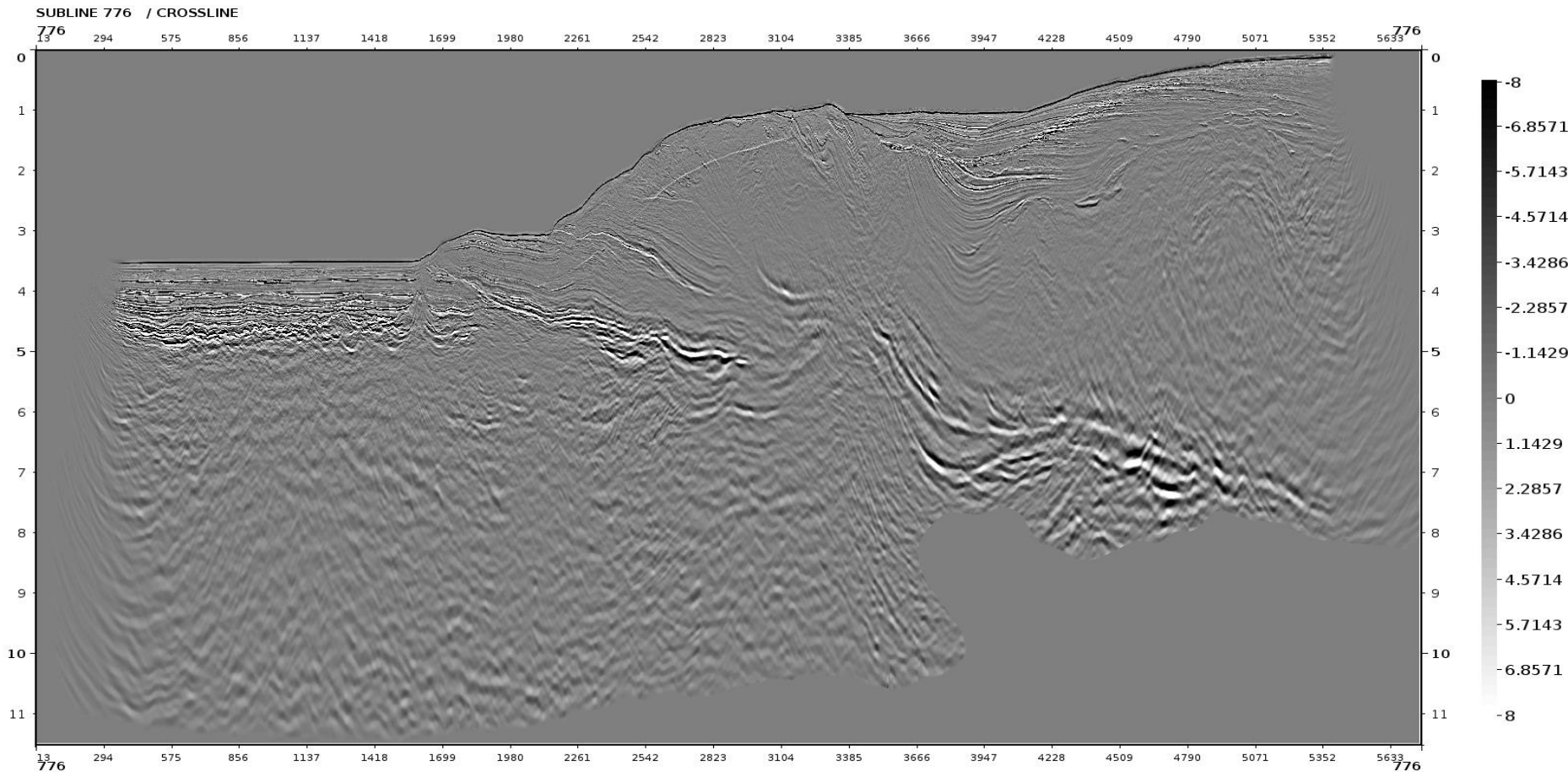






Subline 776: after TVF

68

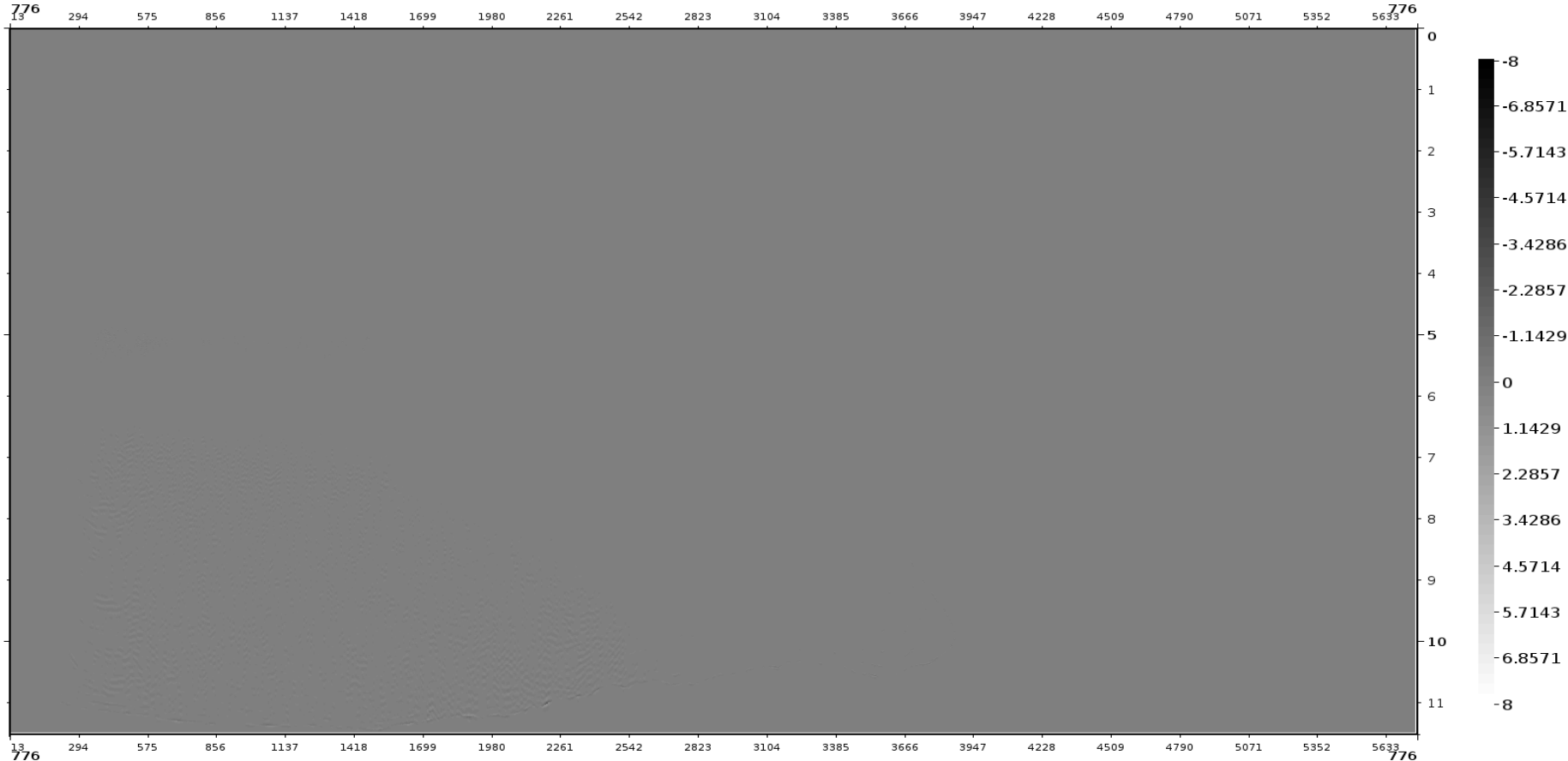




Subline 776: difference by TVF

69

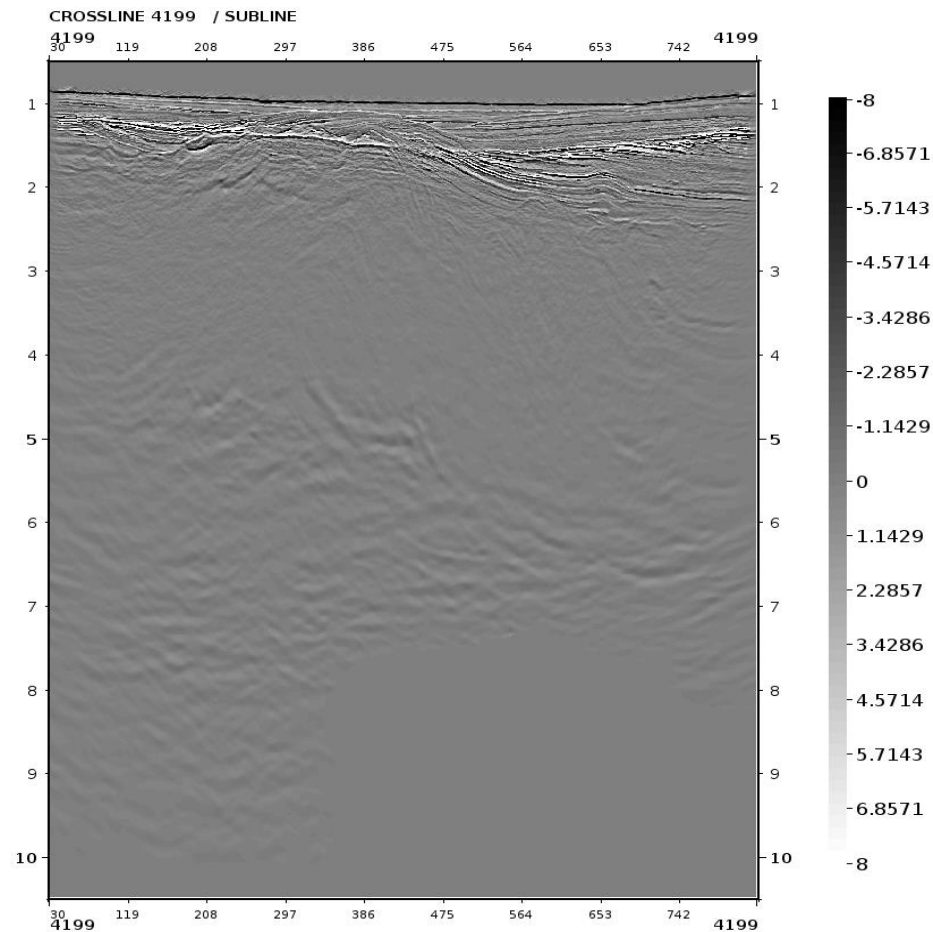
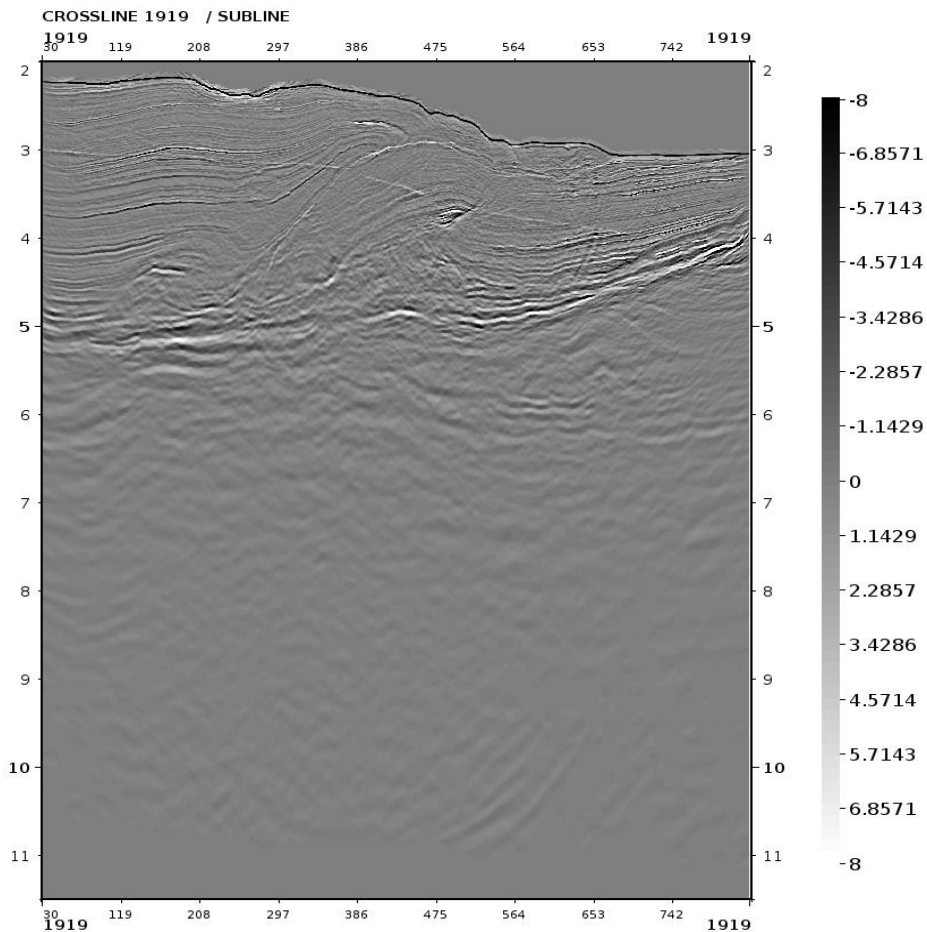
SUBLINE 776 / CROSSLINE





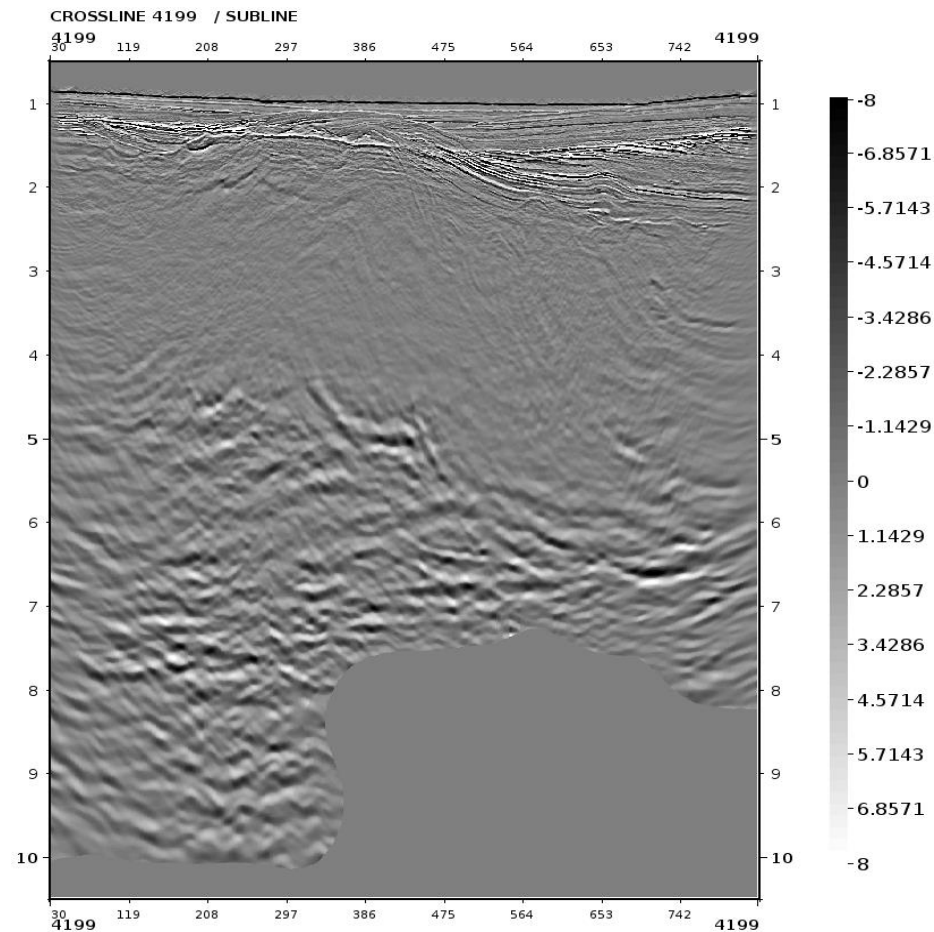
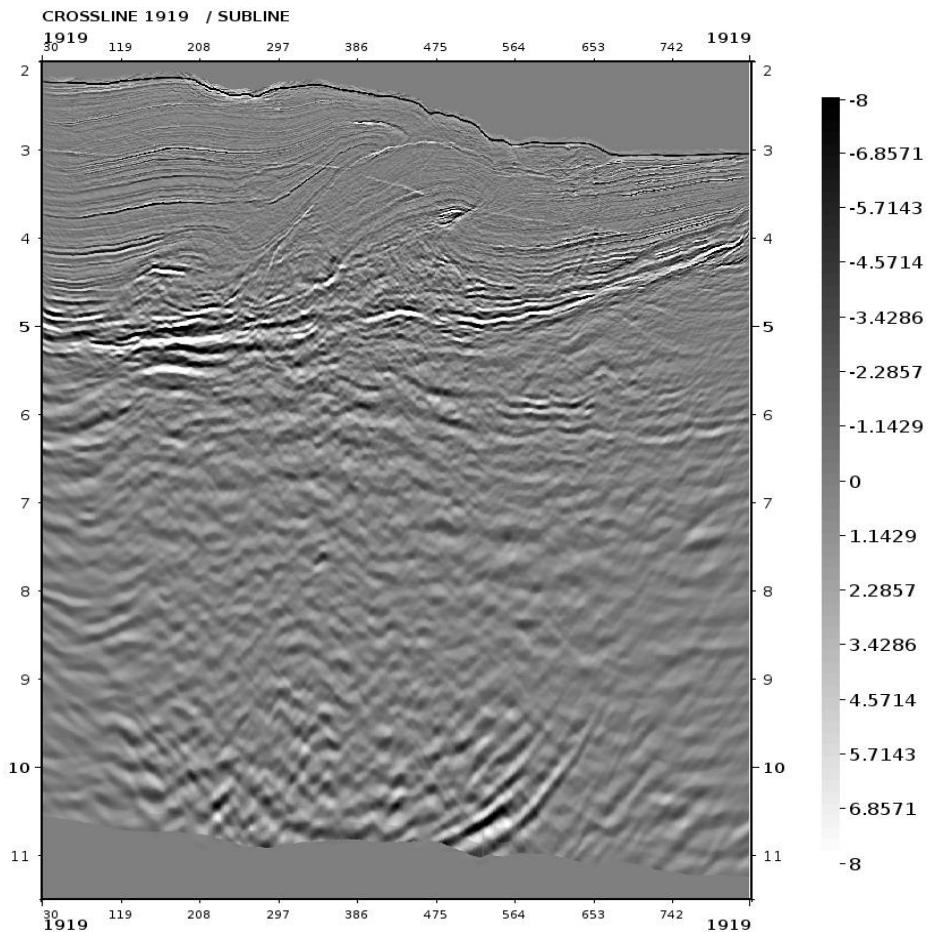
Crossline 1919 and 4199: input

70



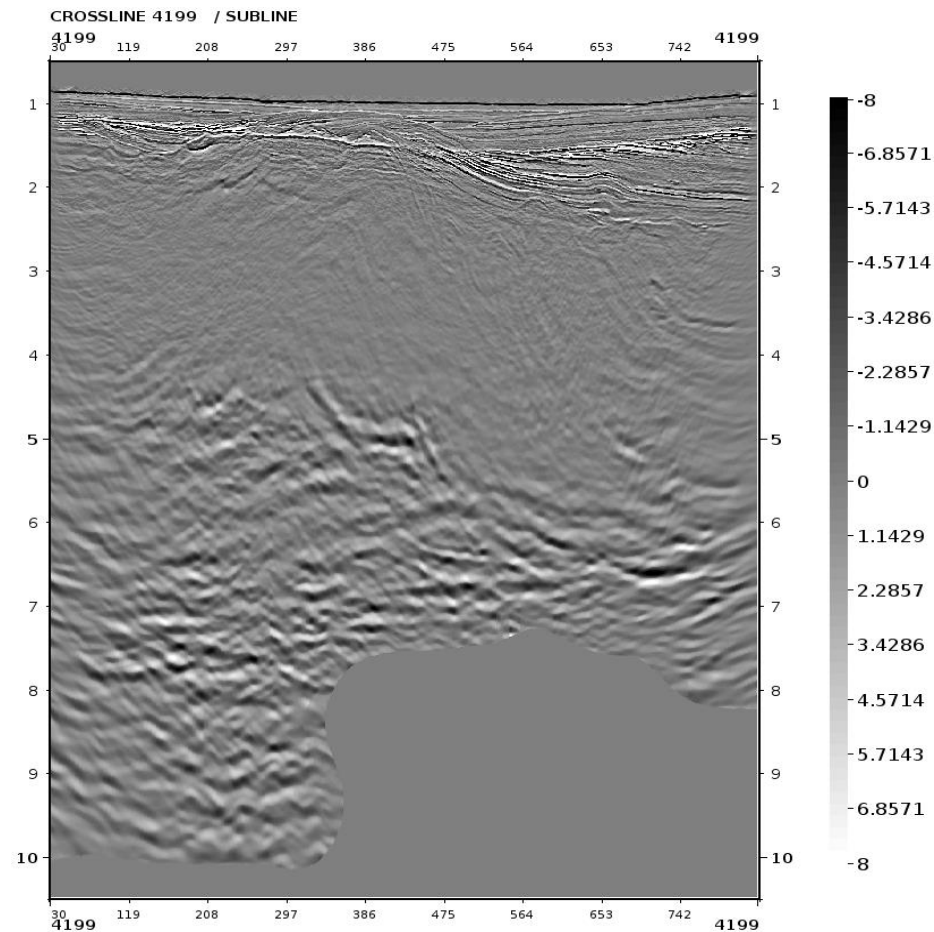
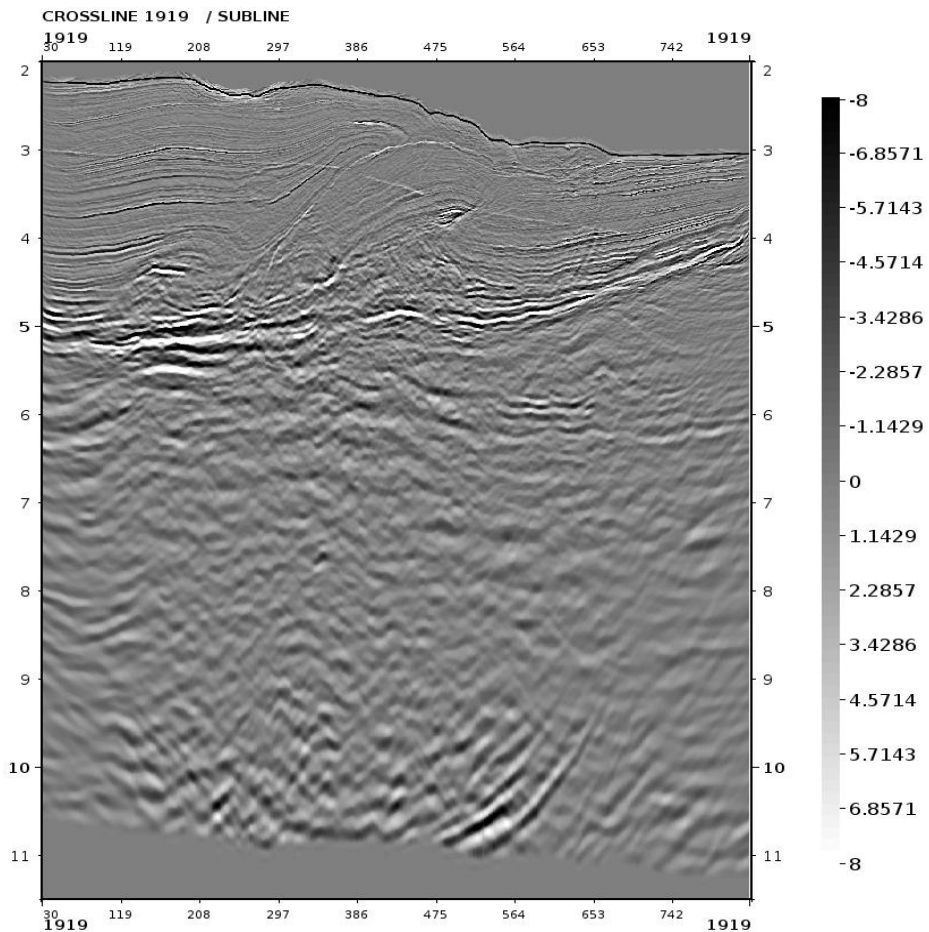
Crossline 1919 and 4199: after TVS

71



Crossline 1919 and 4199: after TVF

72





Crossline 1919 and 4199: difference by TVF

73

