



Footprint removal

NZ 3D Processing

3 August 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
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

- **Objective:**

To further remove amplitude variations due to acquisition footprint.

- **Procedure:**

- Calculate RMS amplitude at every 500ms consecutively starting from WBT-30.
- Smooth amplitudes in subline direction to remove effect of geology from the amplitude maps.
- Apply smoothing with 500m (diameter) on amplitude map to compute the scalars for each window.
- Apply the scalar on input data to remove footprint.

- **Display:**

- Amplitude map, full and angle stack.
- Selected crossline.

- **Observation & Recommendation:**

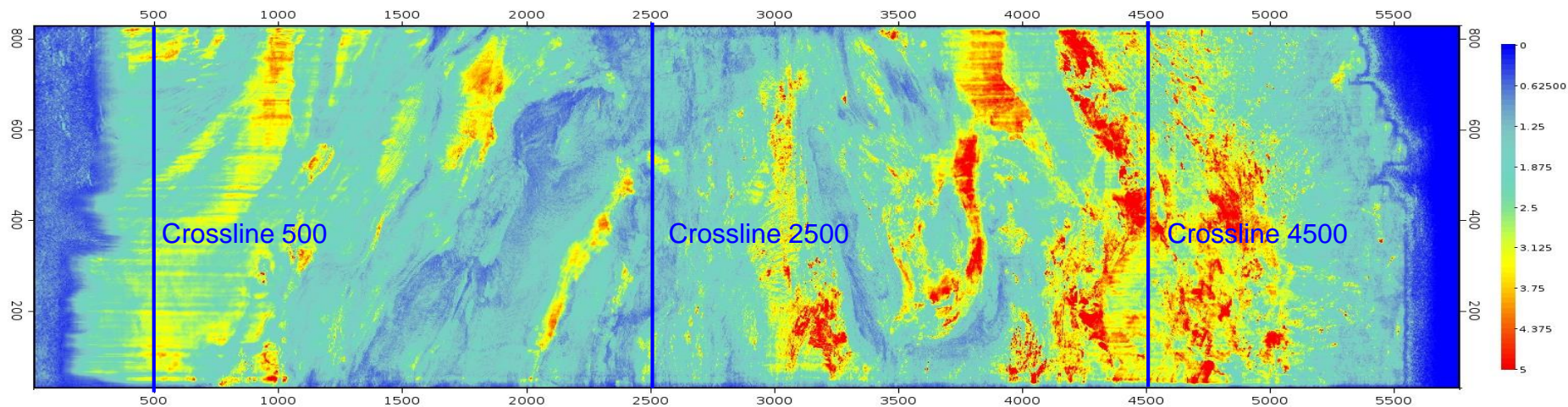
- The acquisition footprint observed on amplitude map is attenuated.
- It's recommend to apply footprint removal for production.



Display Lines location

4

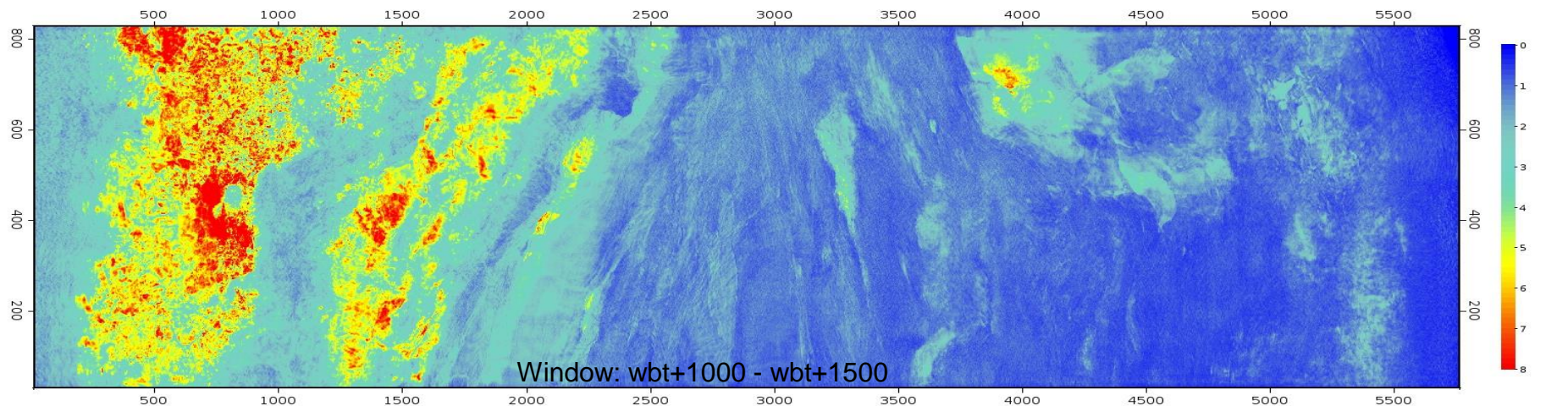
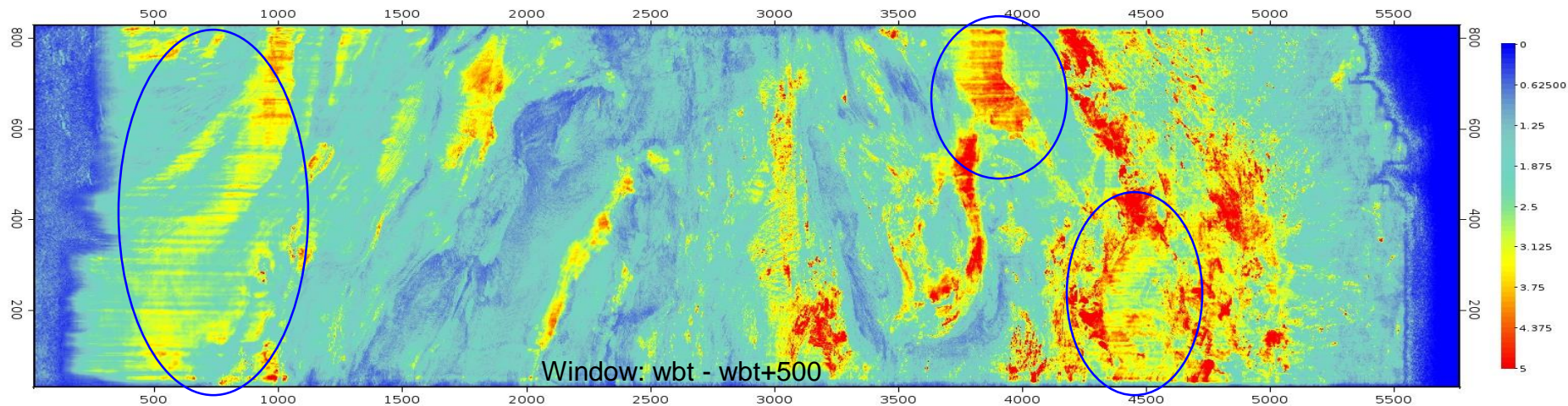
- Crossline 500, 2500, 4500



Full Stack

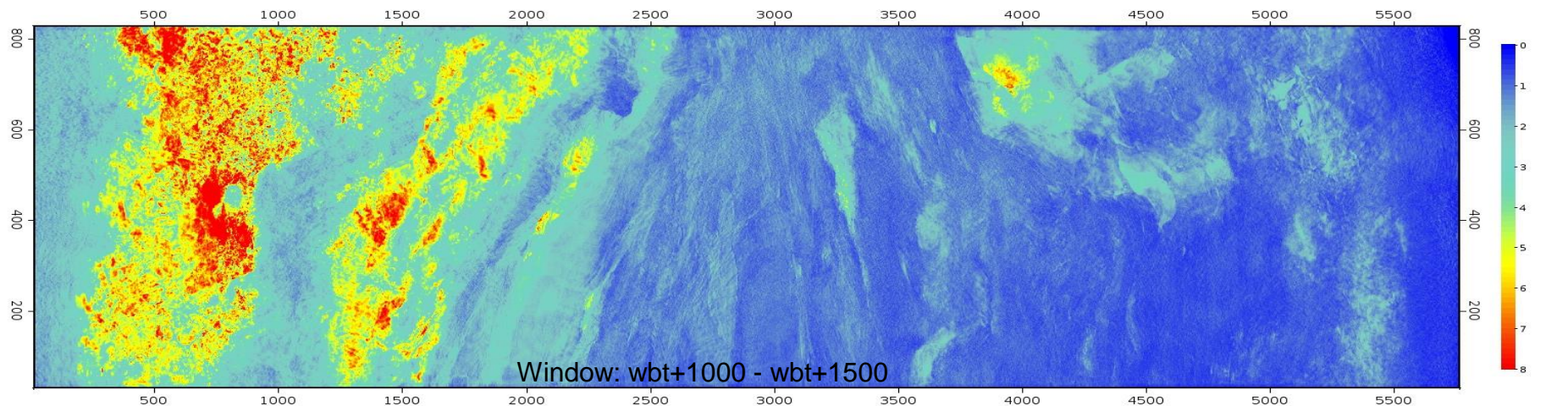
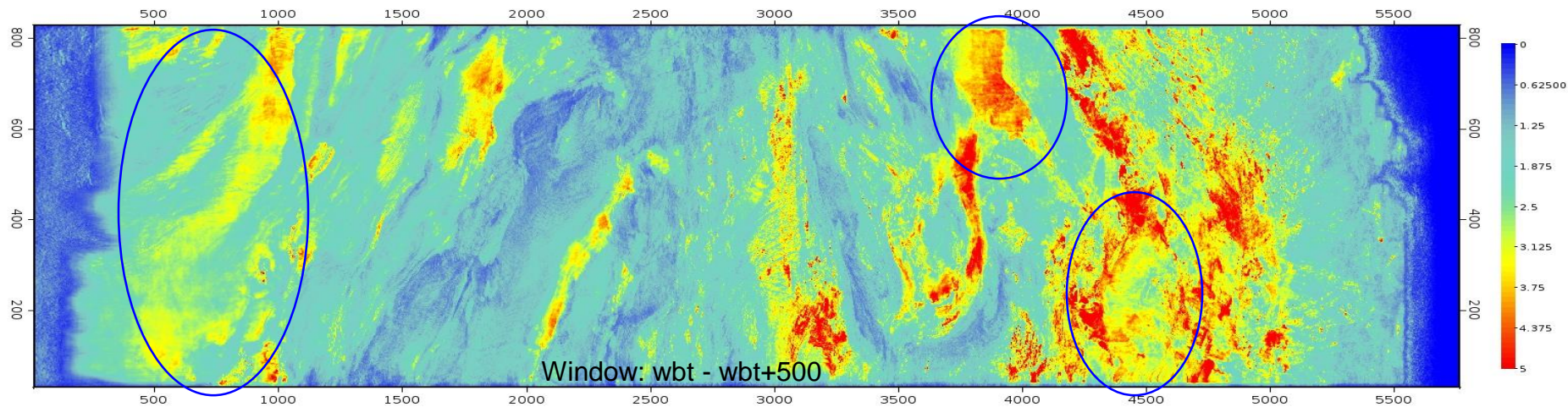
Amplitude map: before footprint removal

6



Amplitude map: after footprint removal

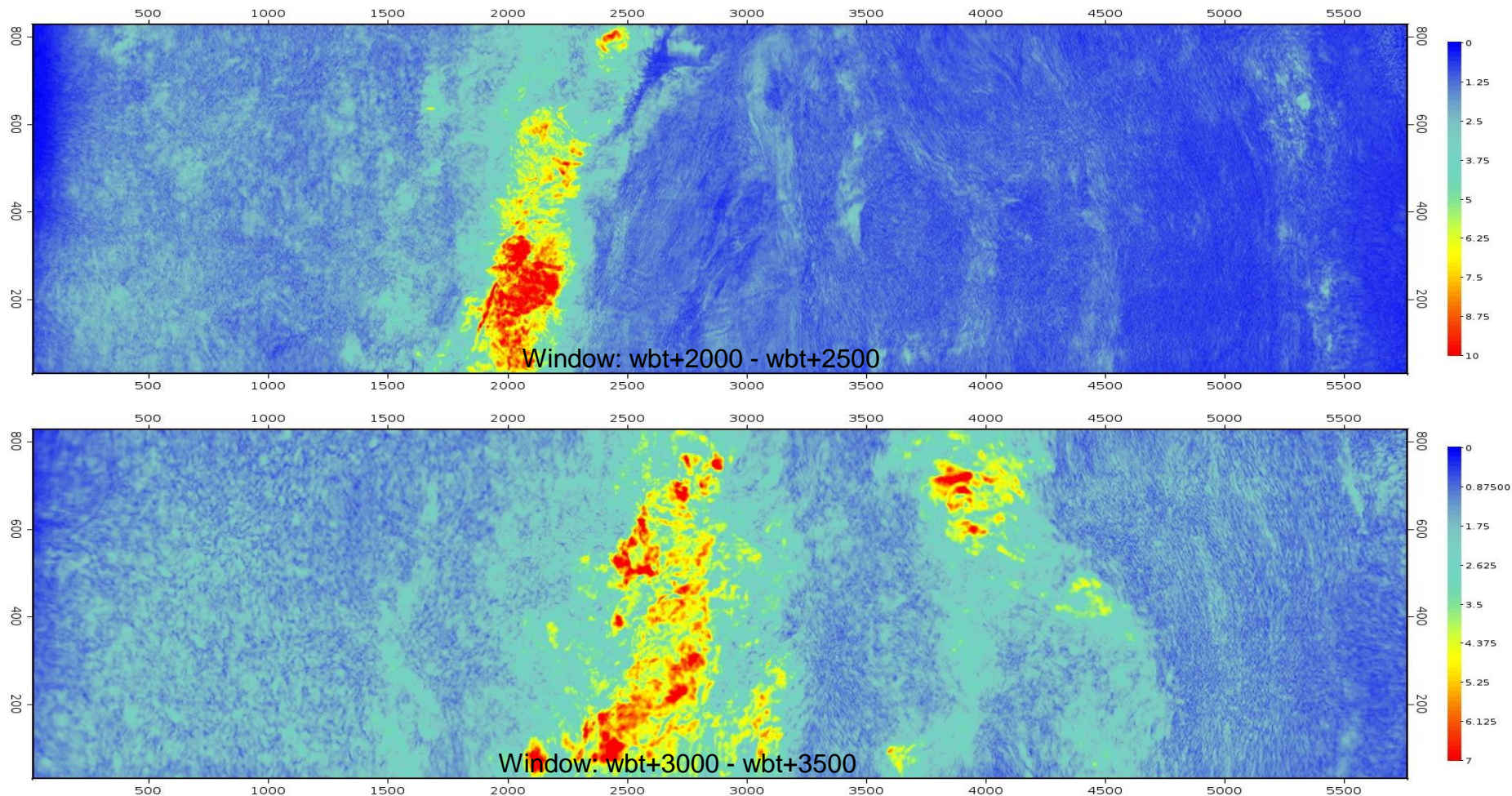
7



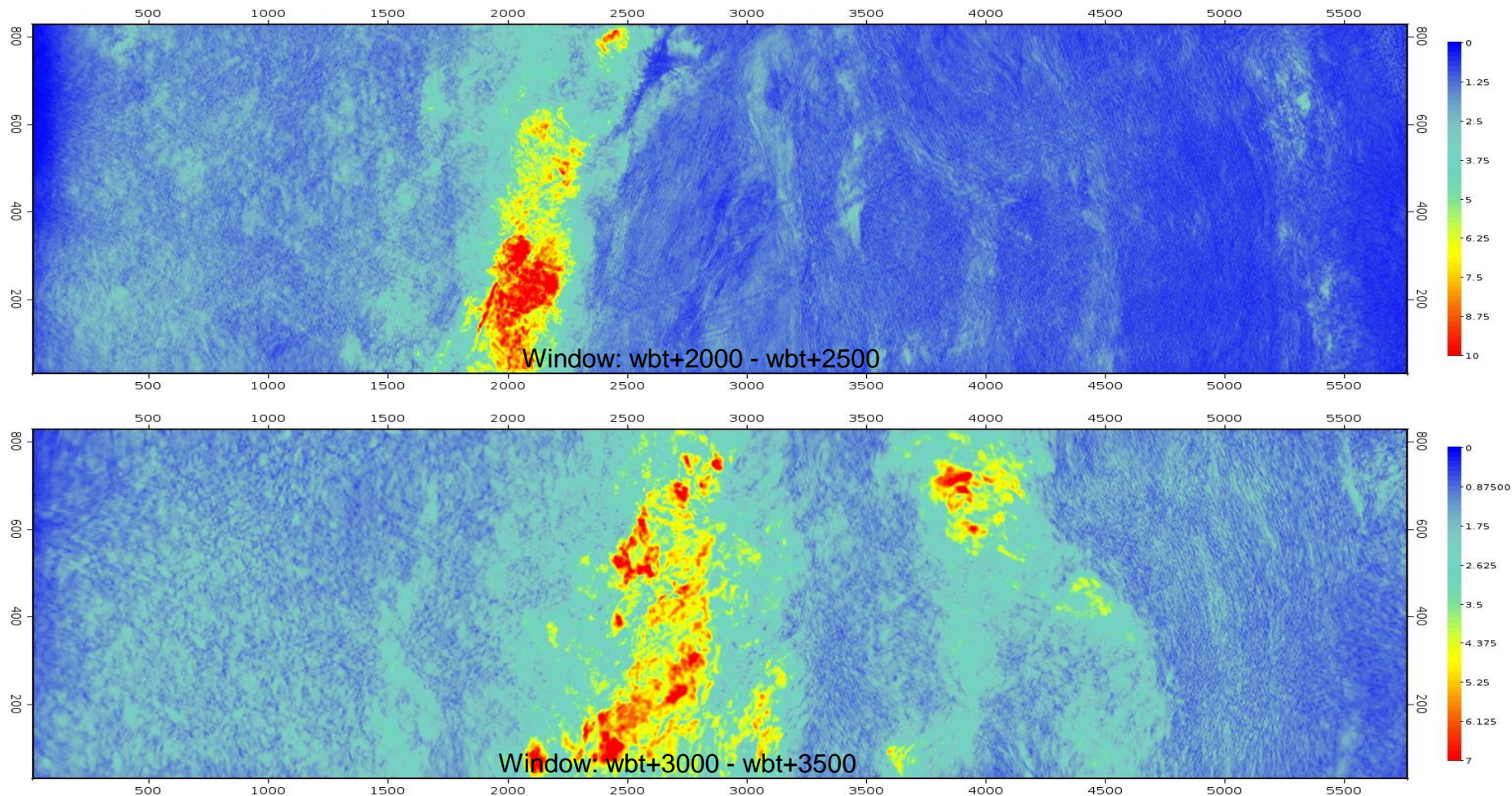


Amplitude map: before footprint removal

8



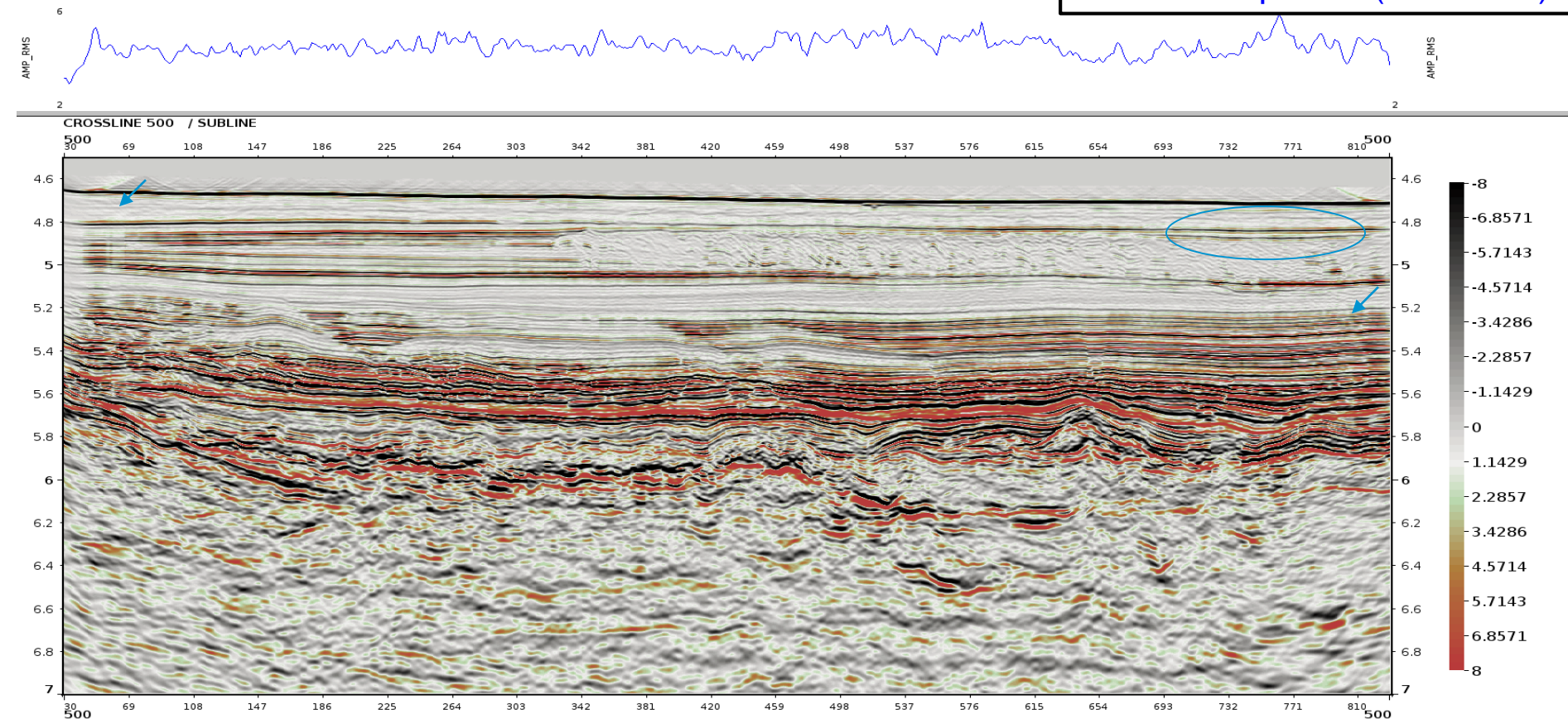
Amplitude map: after footprint removal



Crossline 500: before footprint removal

10

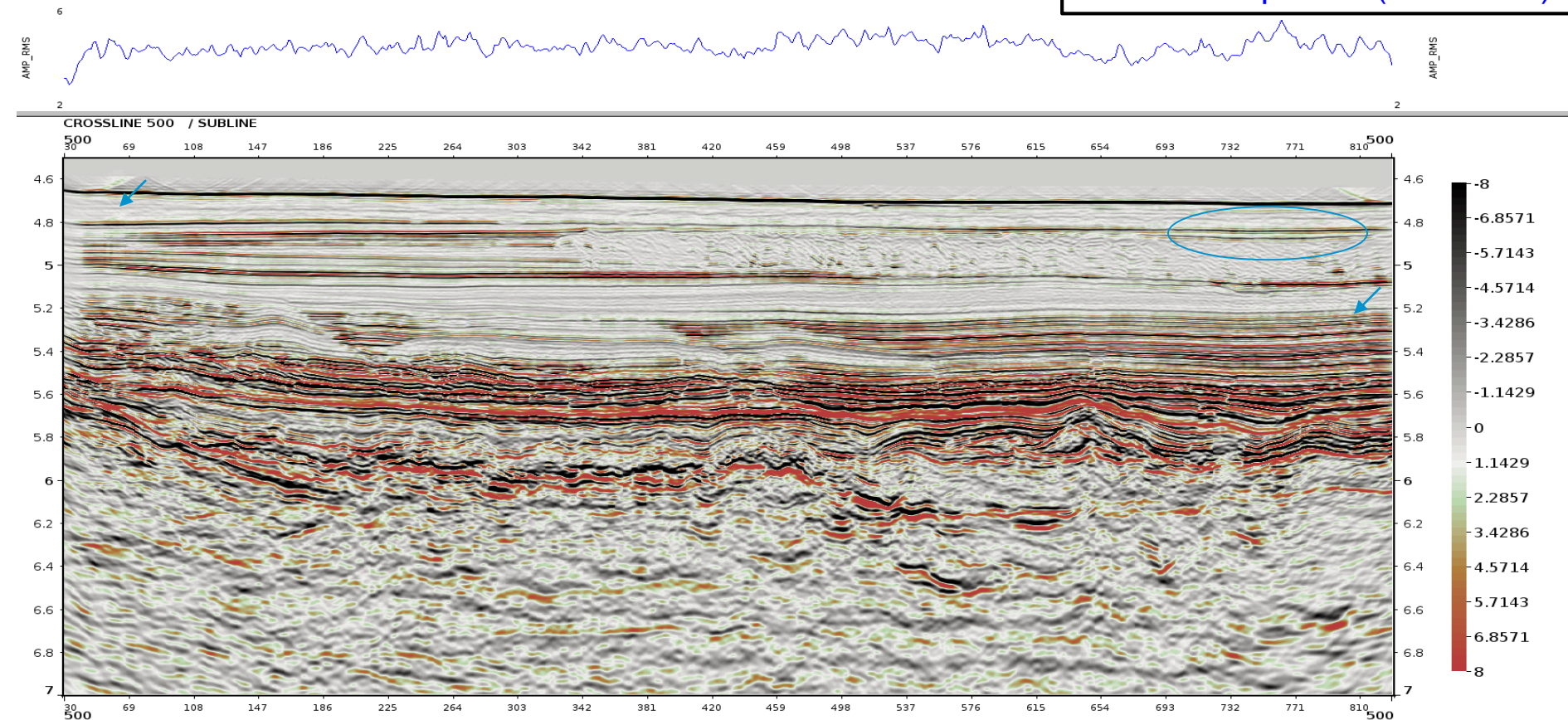
— RMS amplitude (wbt - 9.5s)



Crossline 500: after footprint removal

11

— RMS amplitude (wbt - 9.5s)

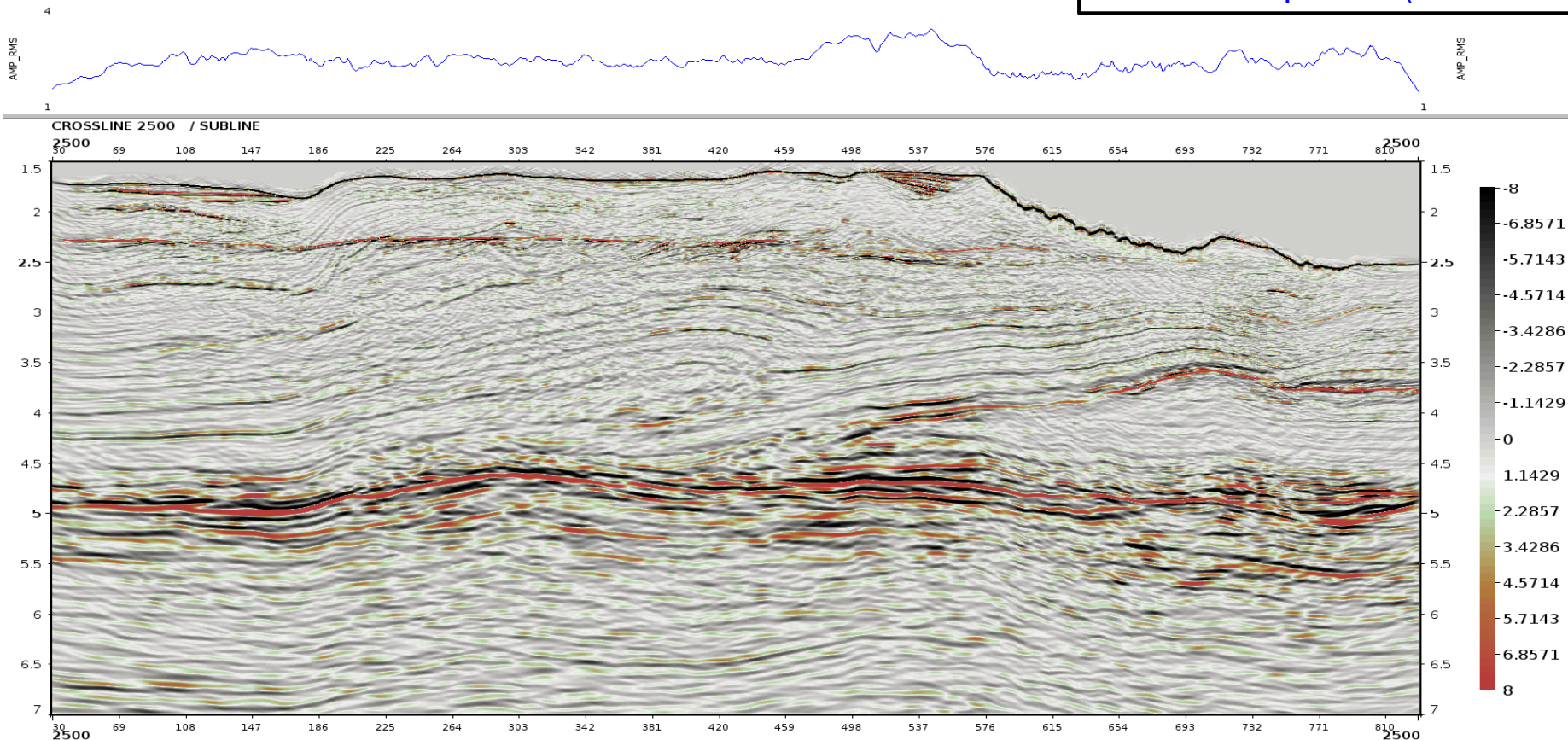




Crossline 2500: before footprint removal

12

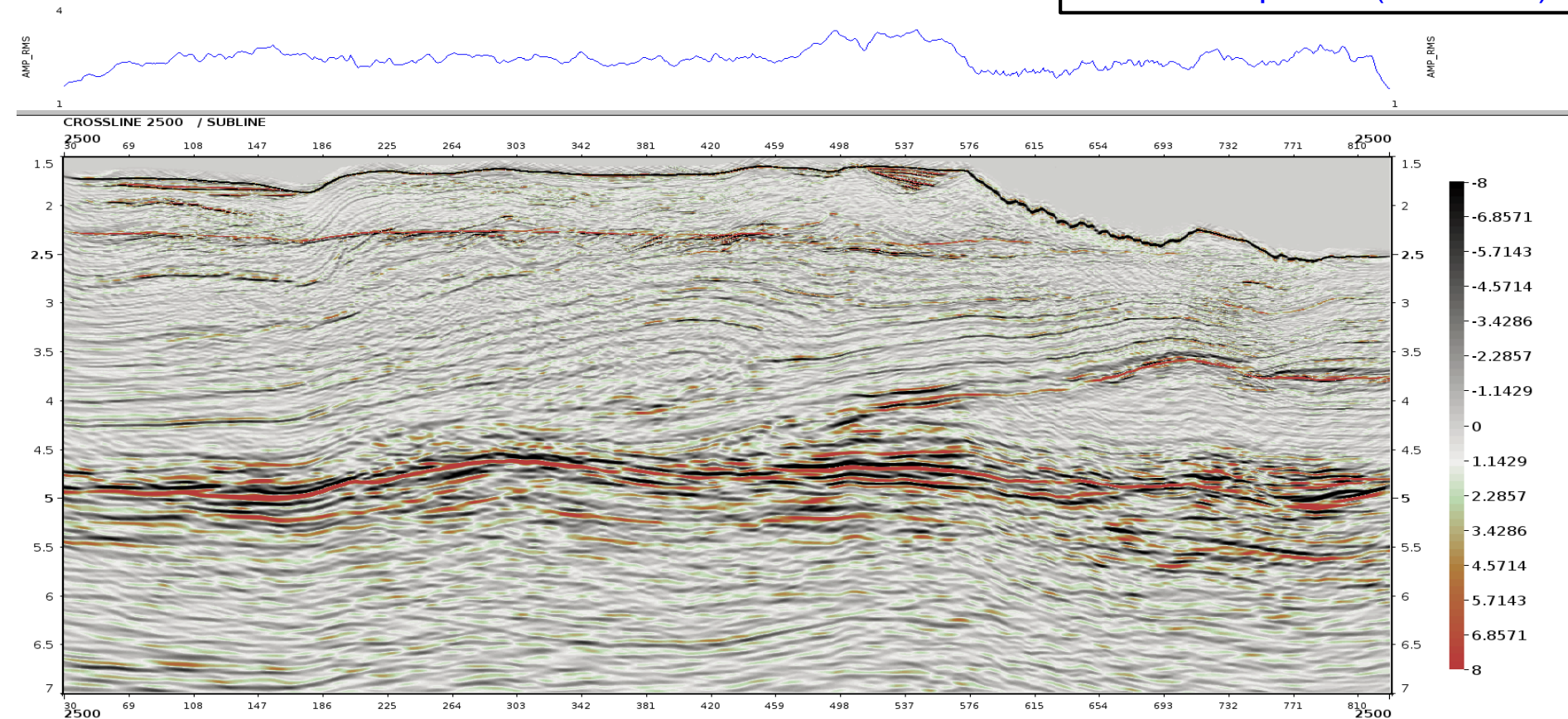
— RMS amplitude (wbt - 9.5s)



Crossline 2500: after footprint removal

13

— RMS amplitude (wbt - 9.5s)

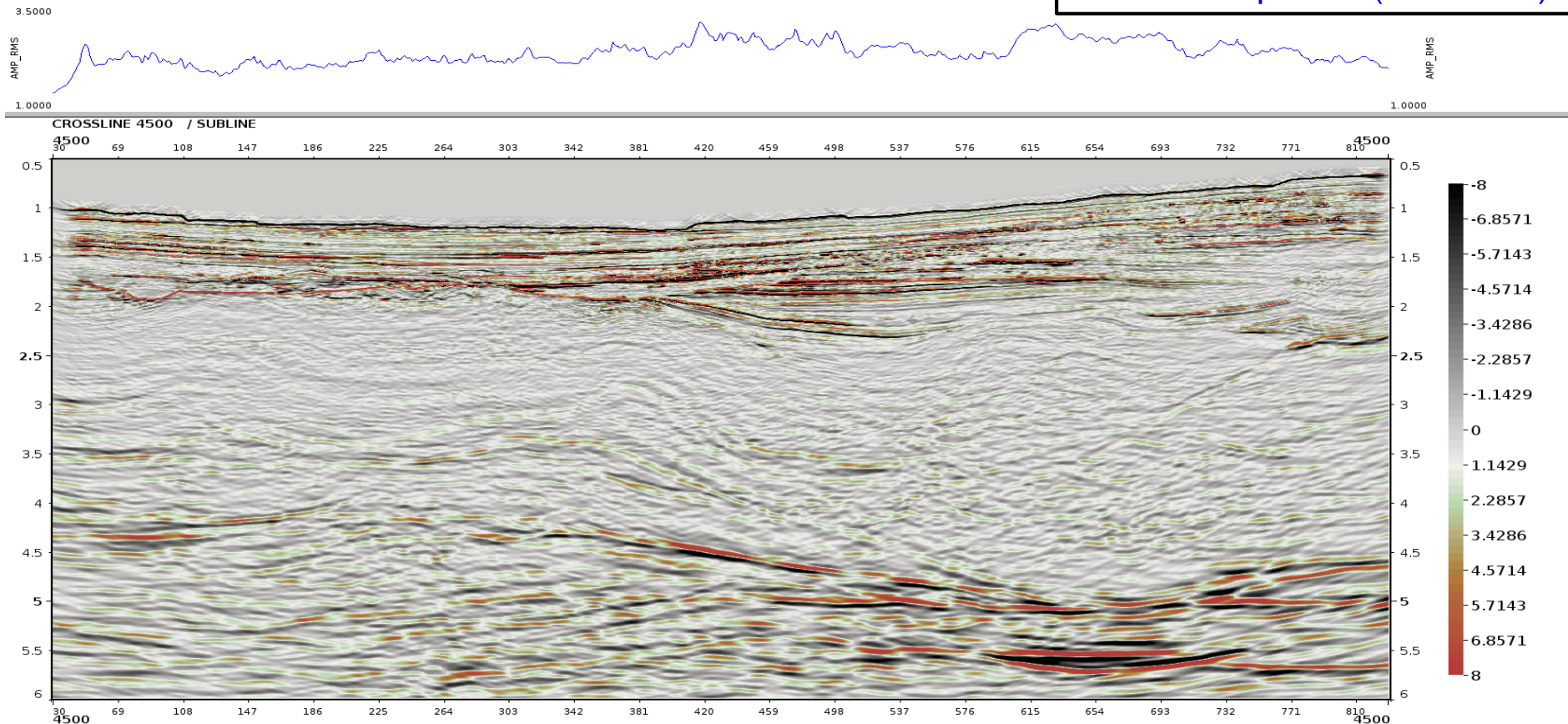




Crossline 4500: before footprint removal

14

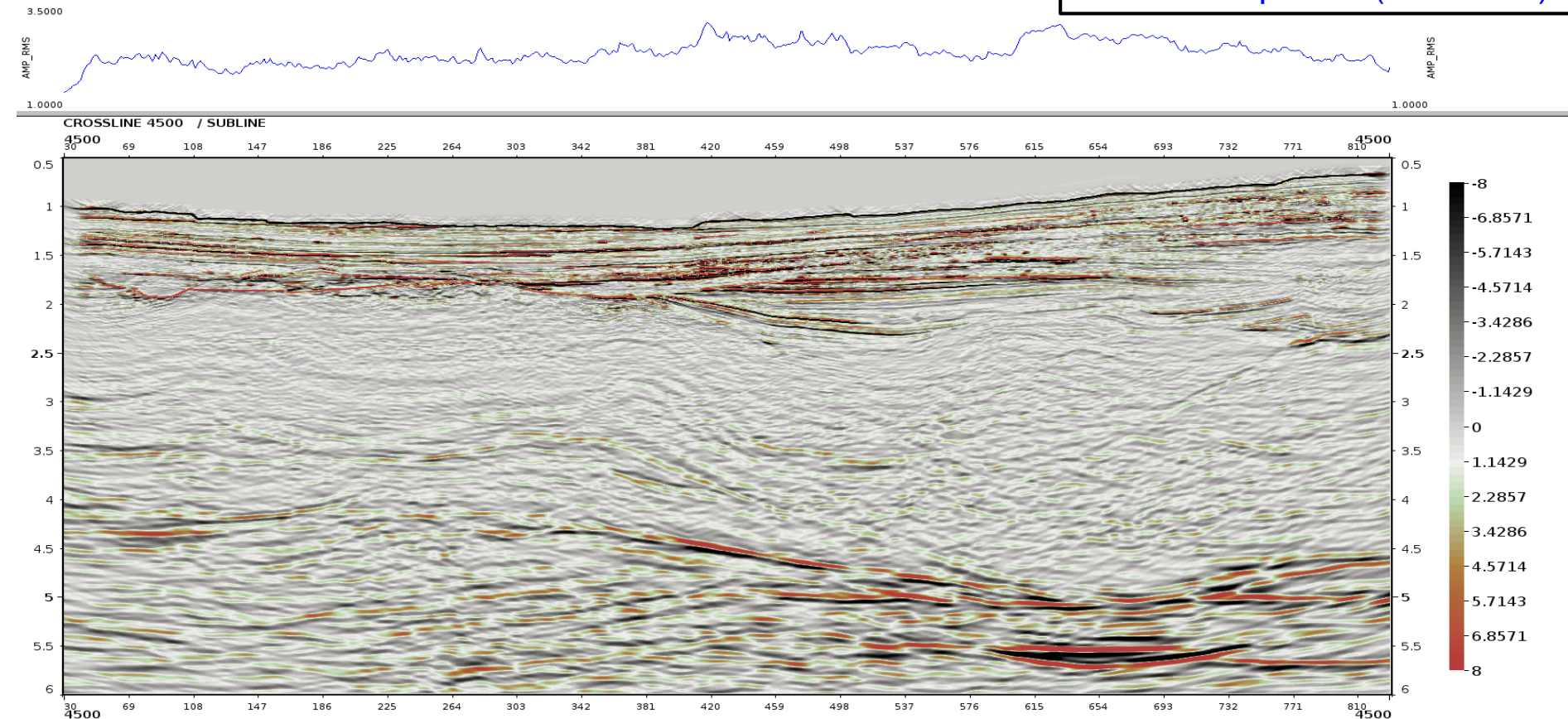
— RMS amplitude (wbt - 9.5s)



Crossline 4500: after footprint removal

15

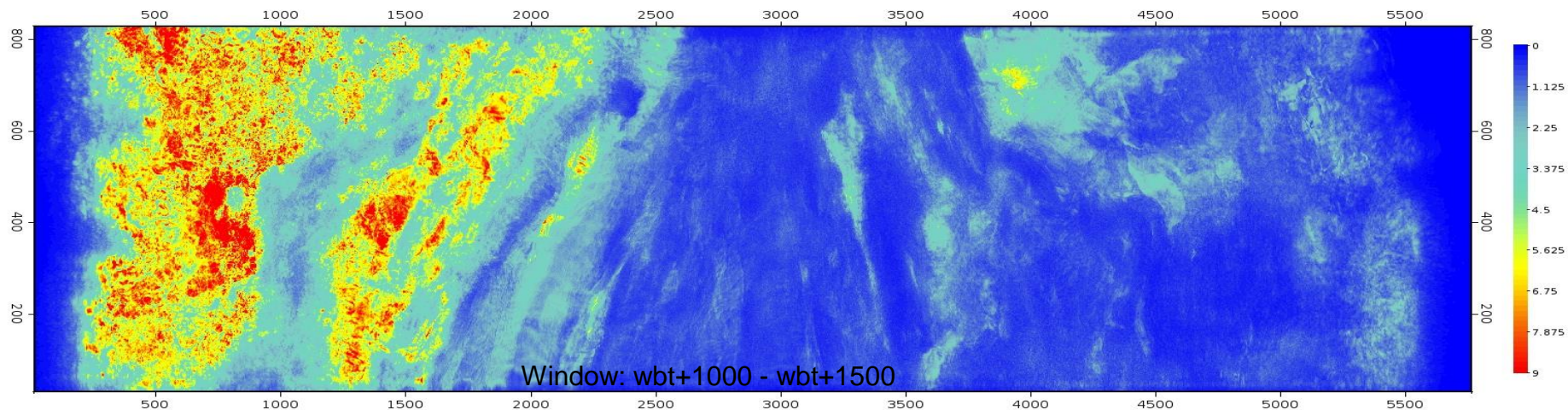
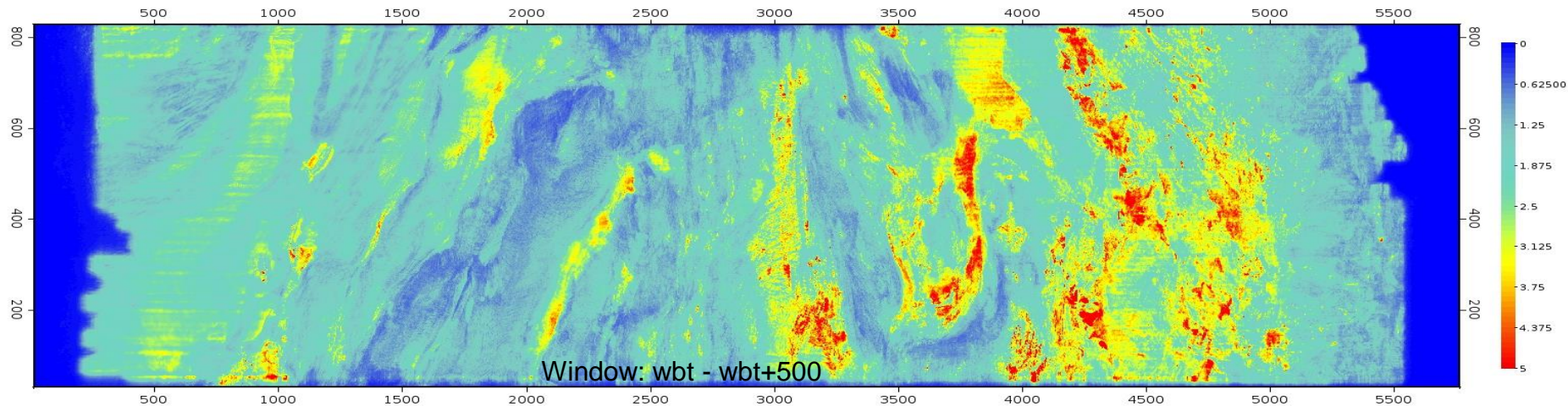
— RMS amplitude (wbt - 9.5s)



Near Stack

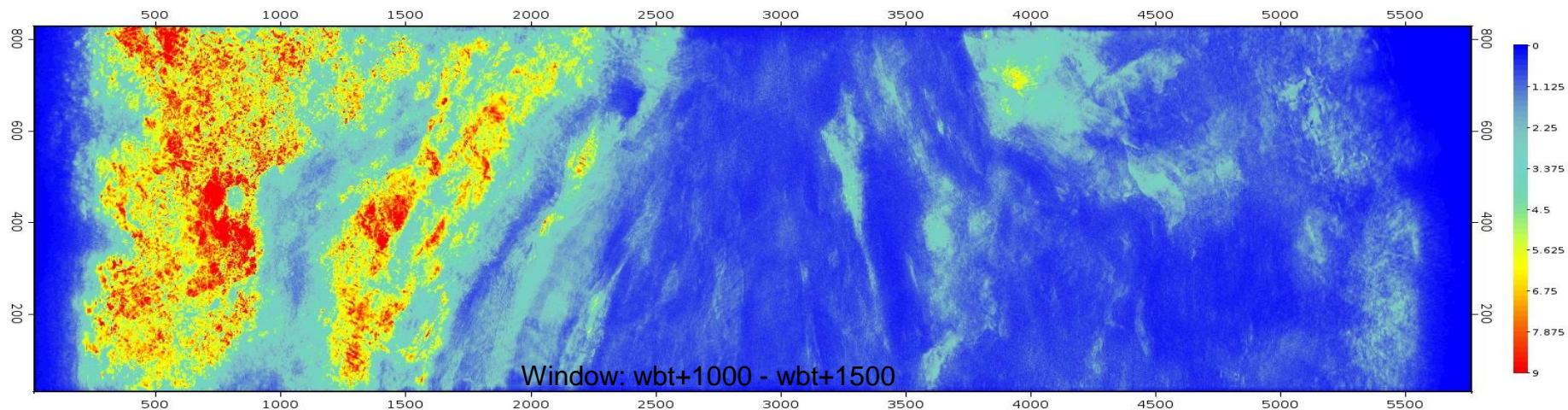
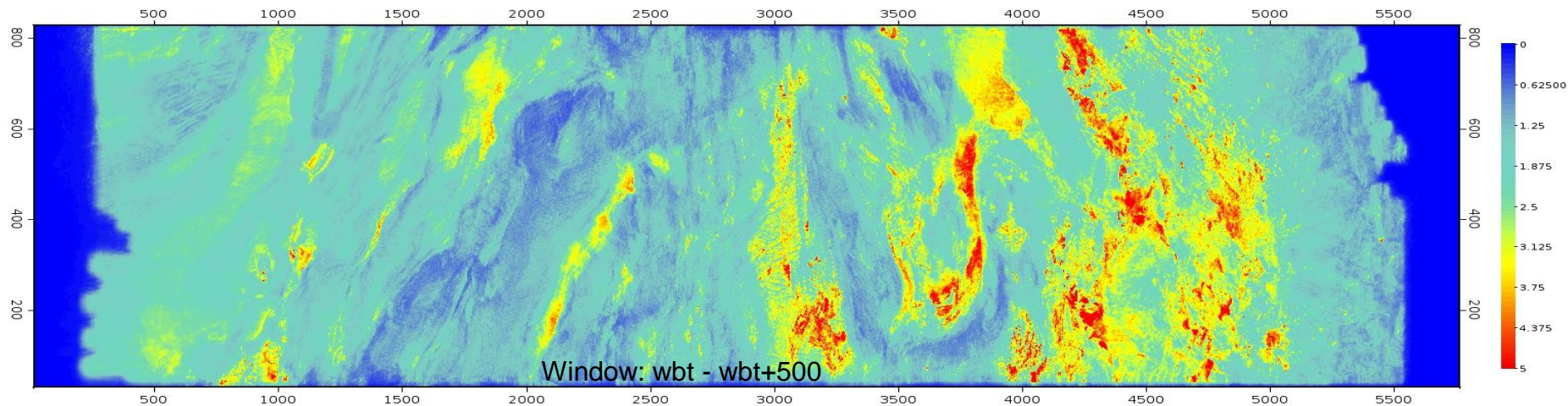
Amplitude map: before footprint removal

17



Amplitude map: after footprint removal

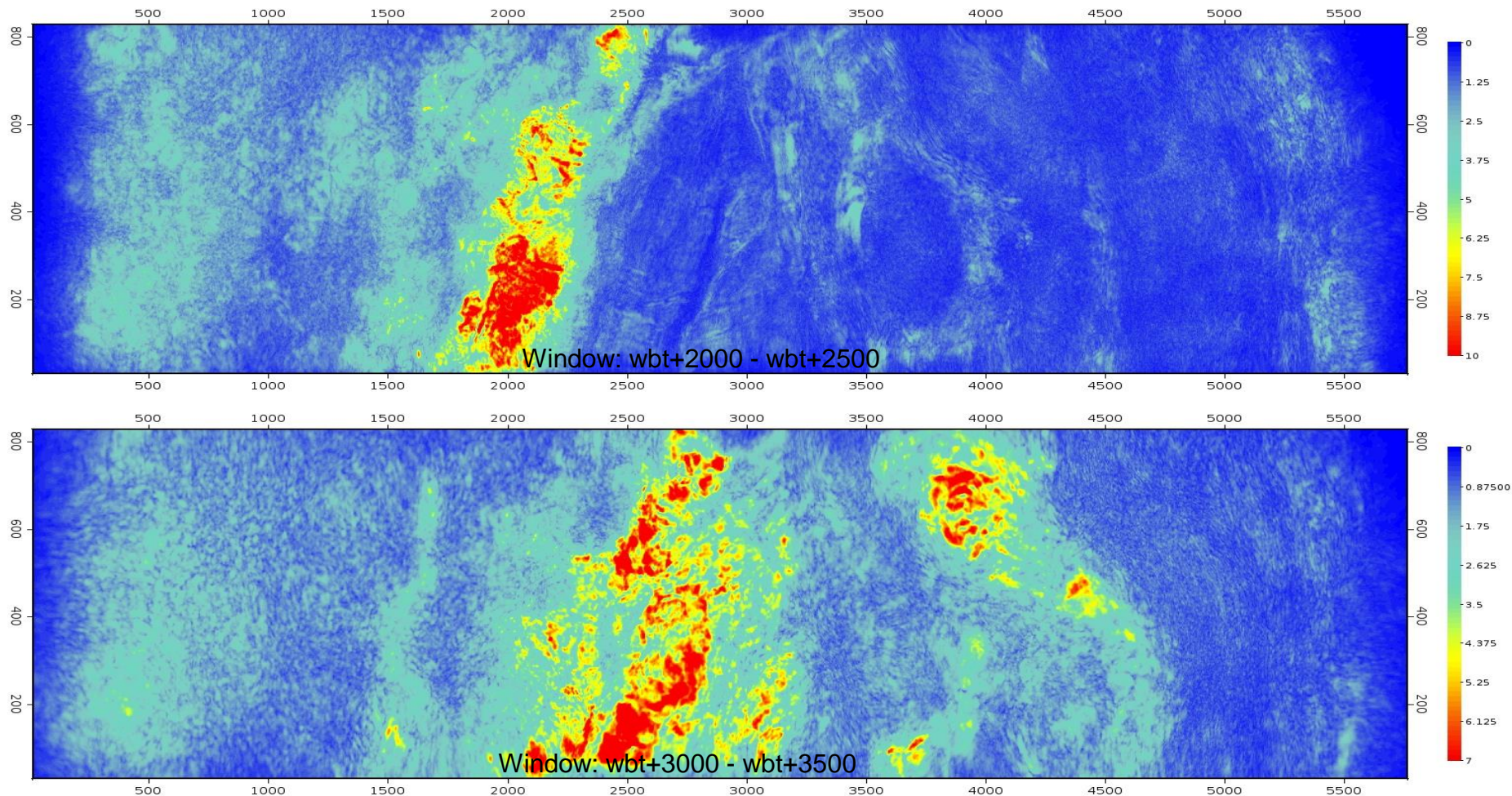
18





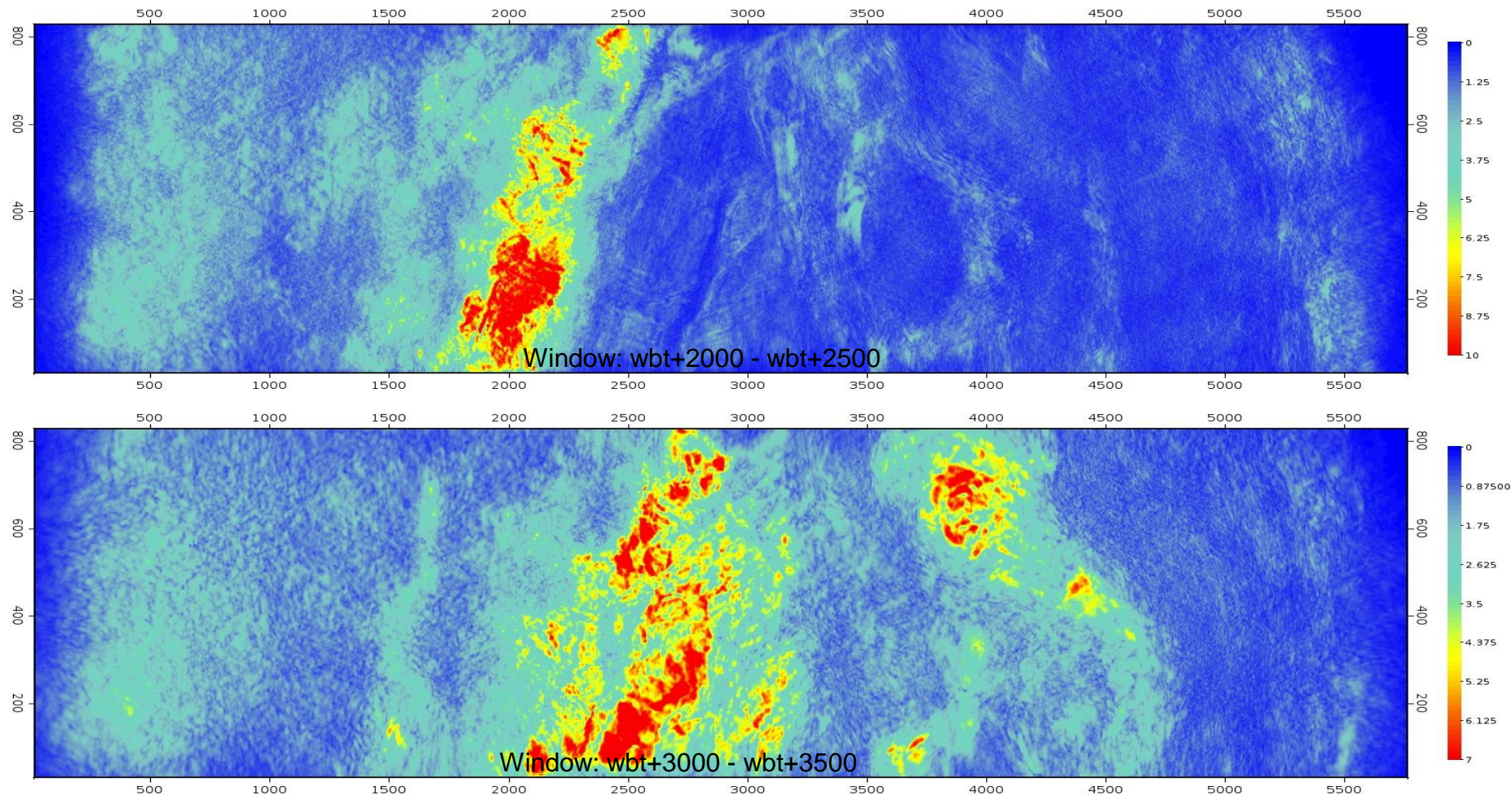
Amplitude map: before footprint removal

19



Amplitude map: after footprint removal

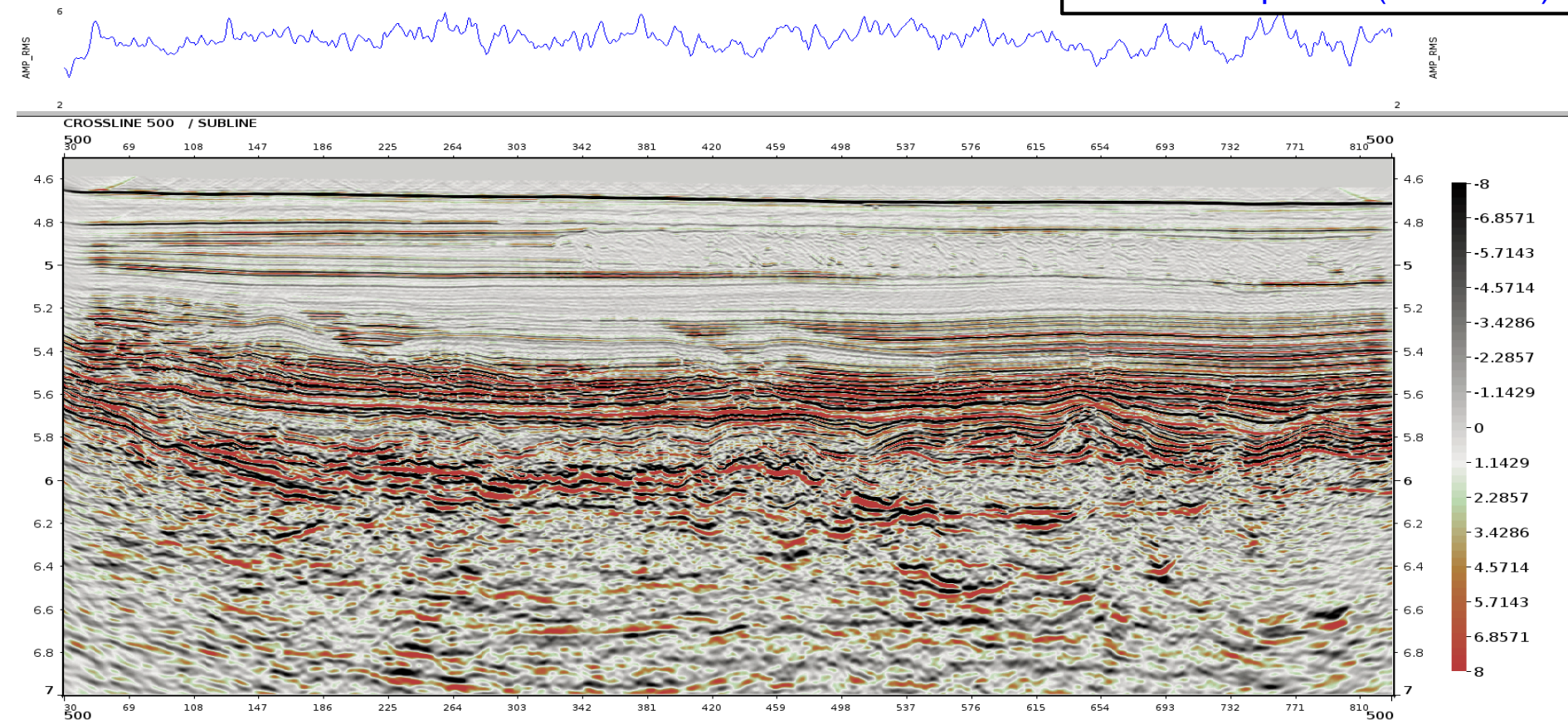
20



Crossline 500: before footprint removal

21

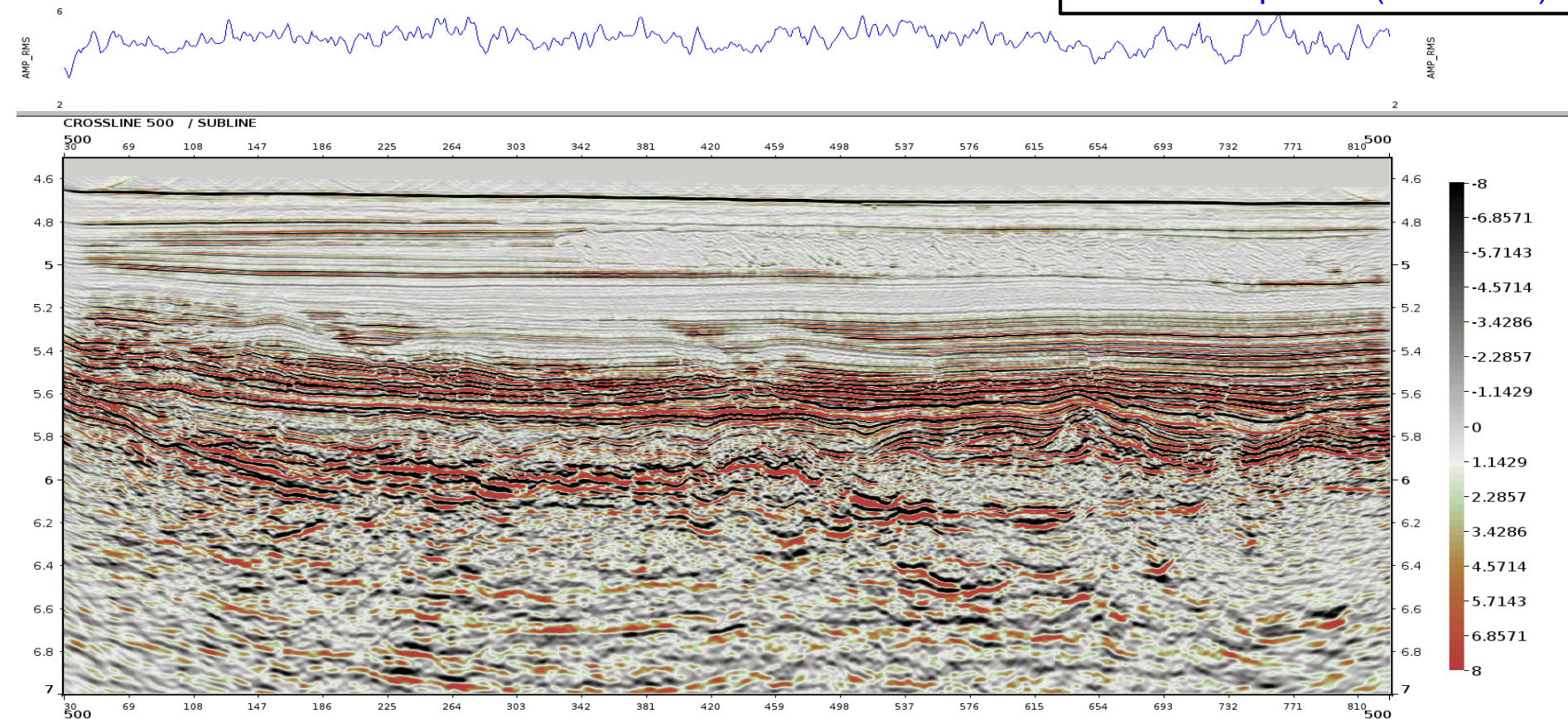
— RMS amplitude (wbt - 9.5s)



Crossline 500: after footprint removal

22

— RMS amplitude (wbt - 9.5s)

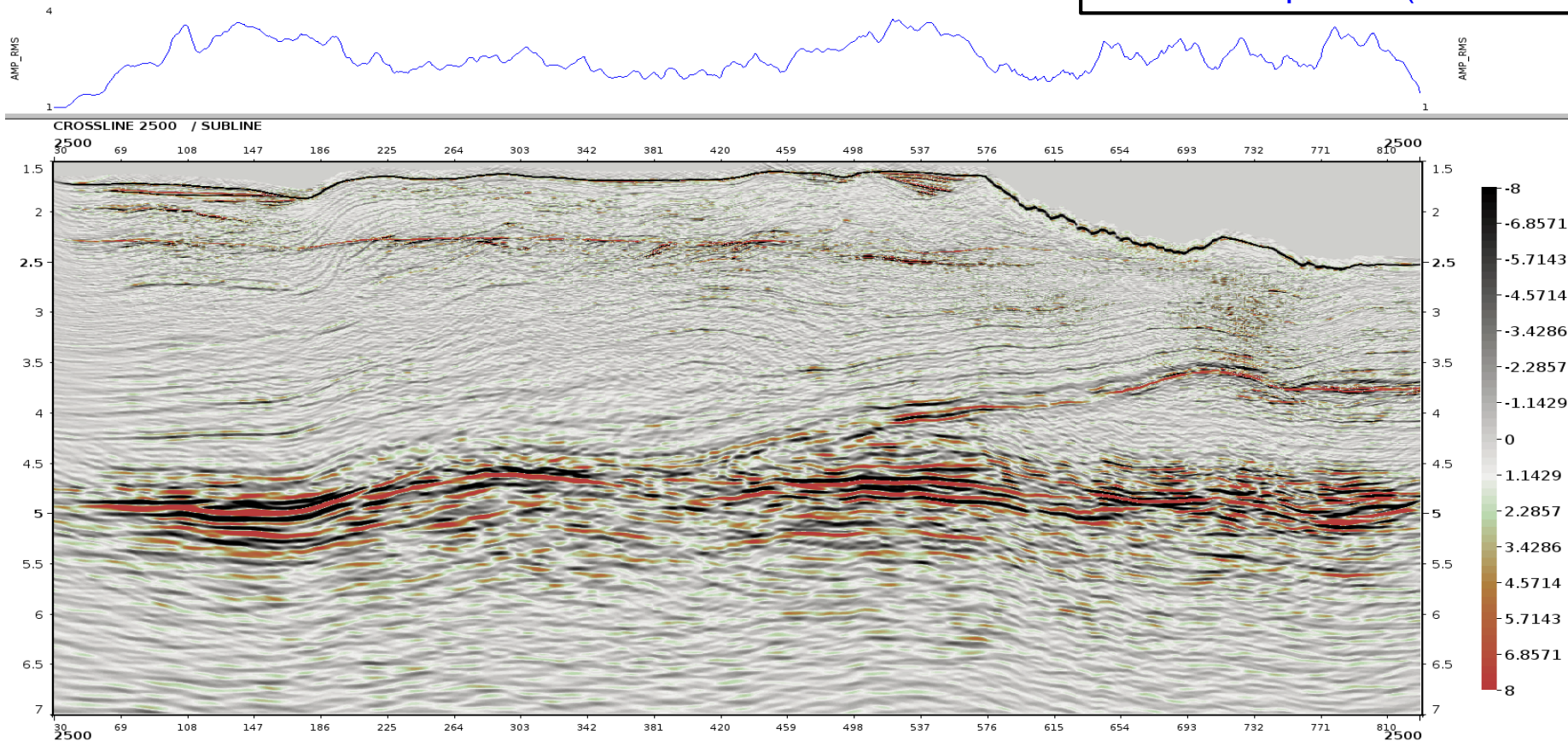




Crossline 2500: before footprint removal

23

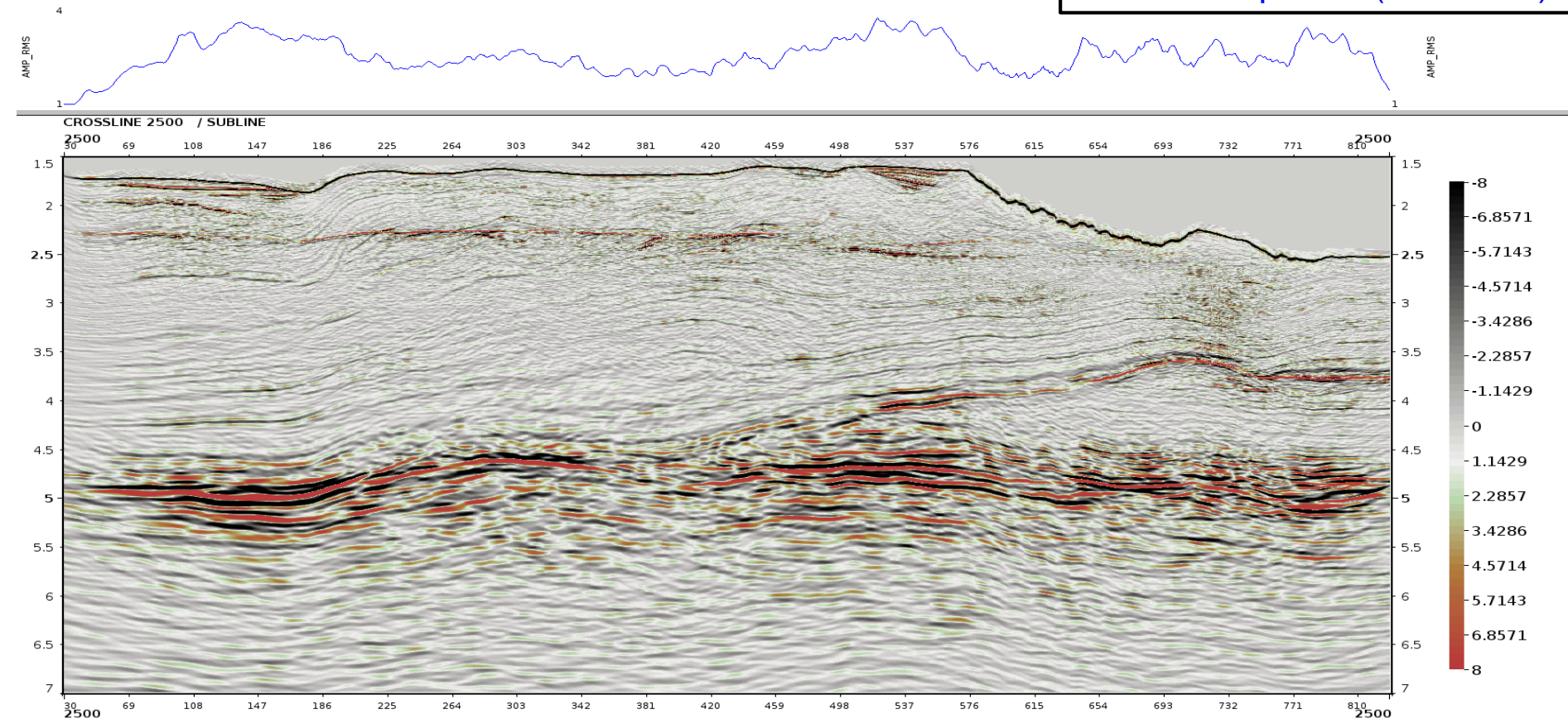
— RMS amplitude (wbt - 9.5s)



Crossline 2500: after footprint removal

24

— RMS amplitude (wbt - 9.5s)

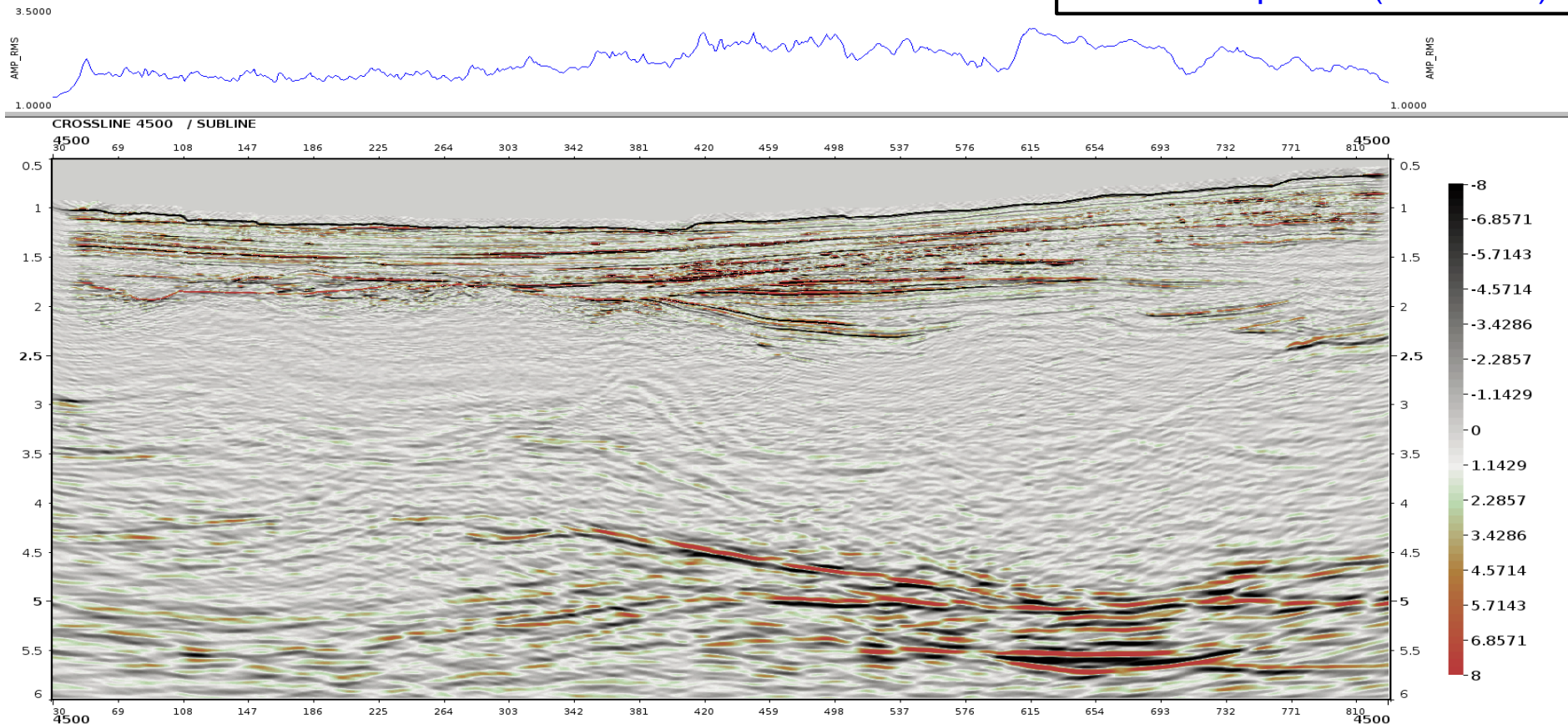




Crossline 4500: before footprint removal

25

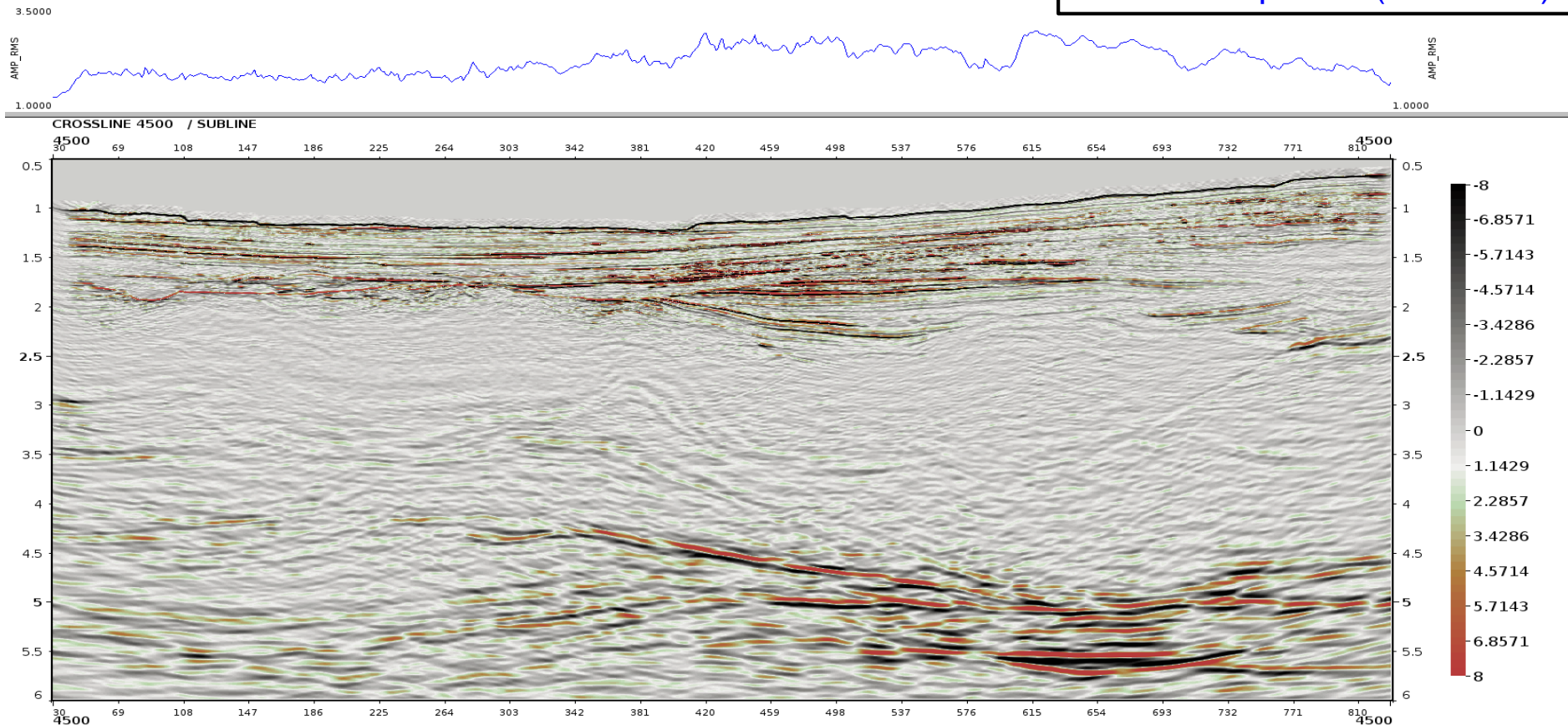
— RMS amplitude (wbt - 9.5s)



Crossline 4500: after footprint removal

26

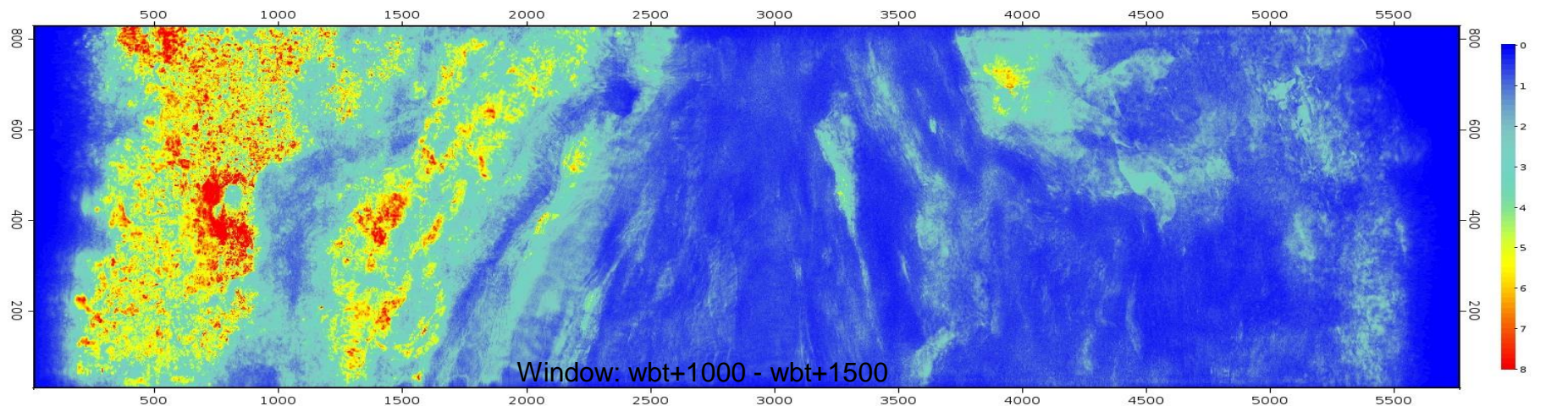
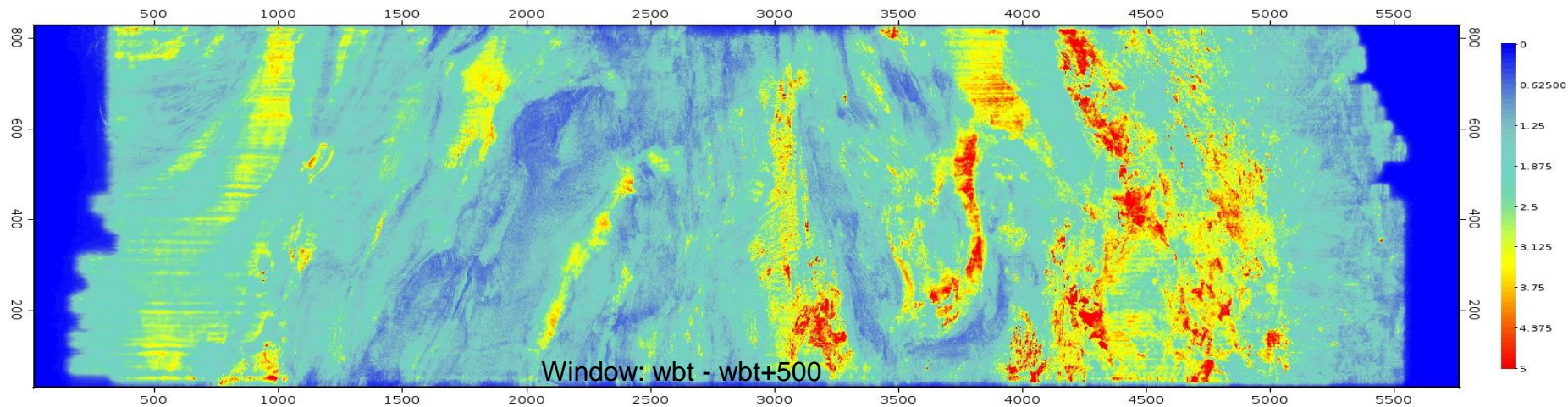
— RMS amplitude (wbt - 9.5s)



Middle Stack

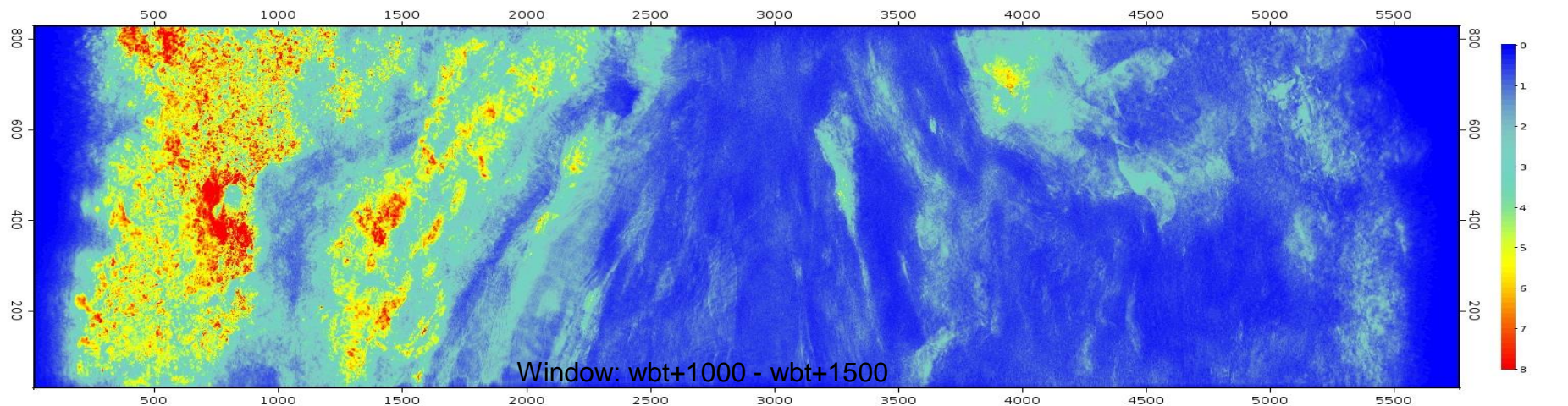
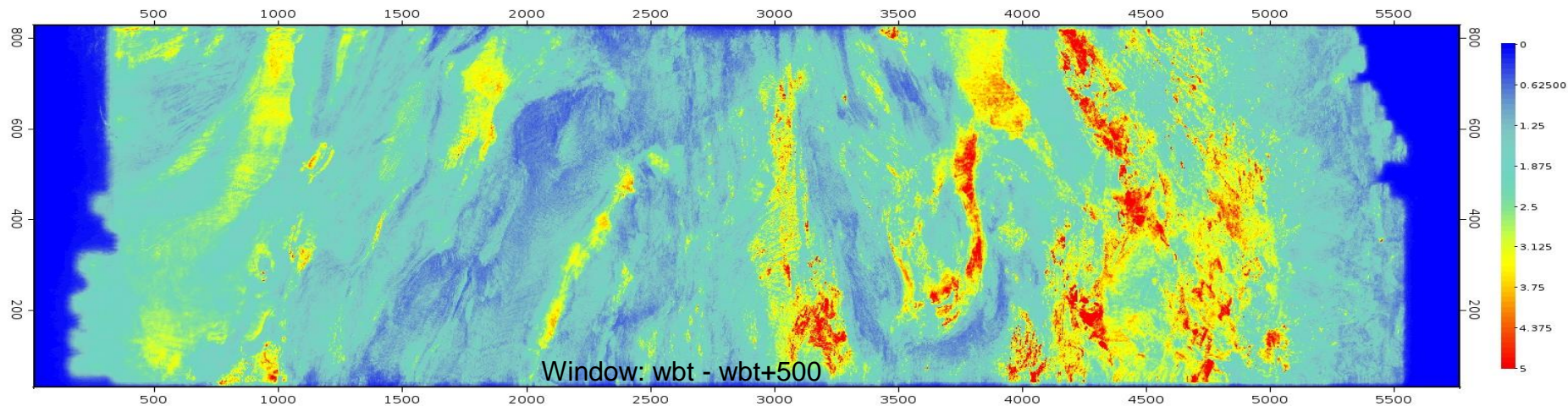
Amplitude map: before footprint removal

28



Amplitude map: after footprint removal

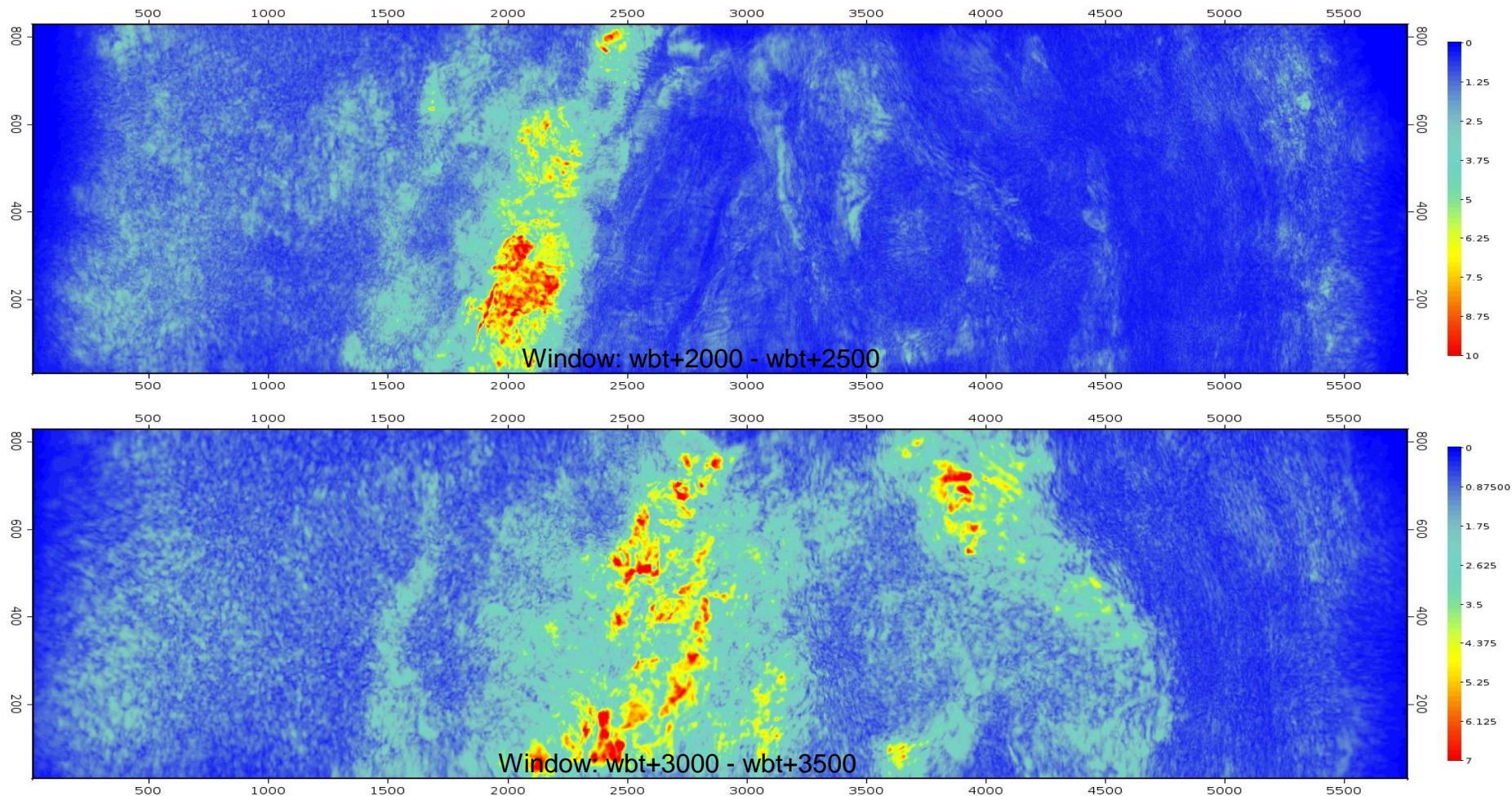
29





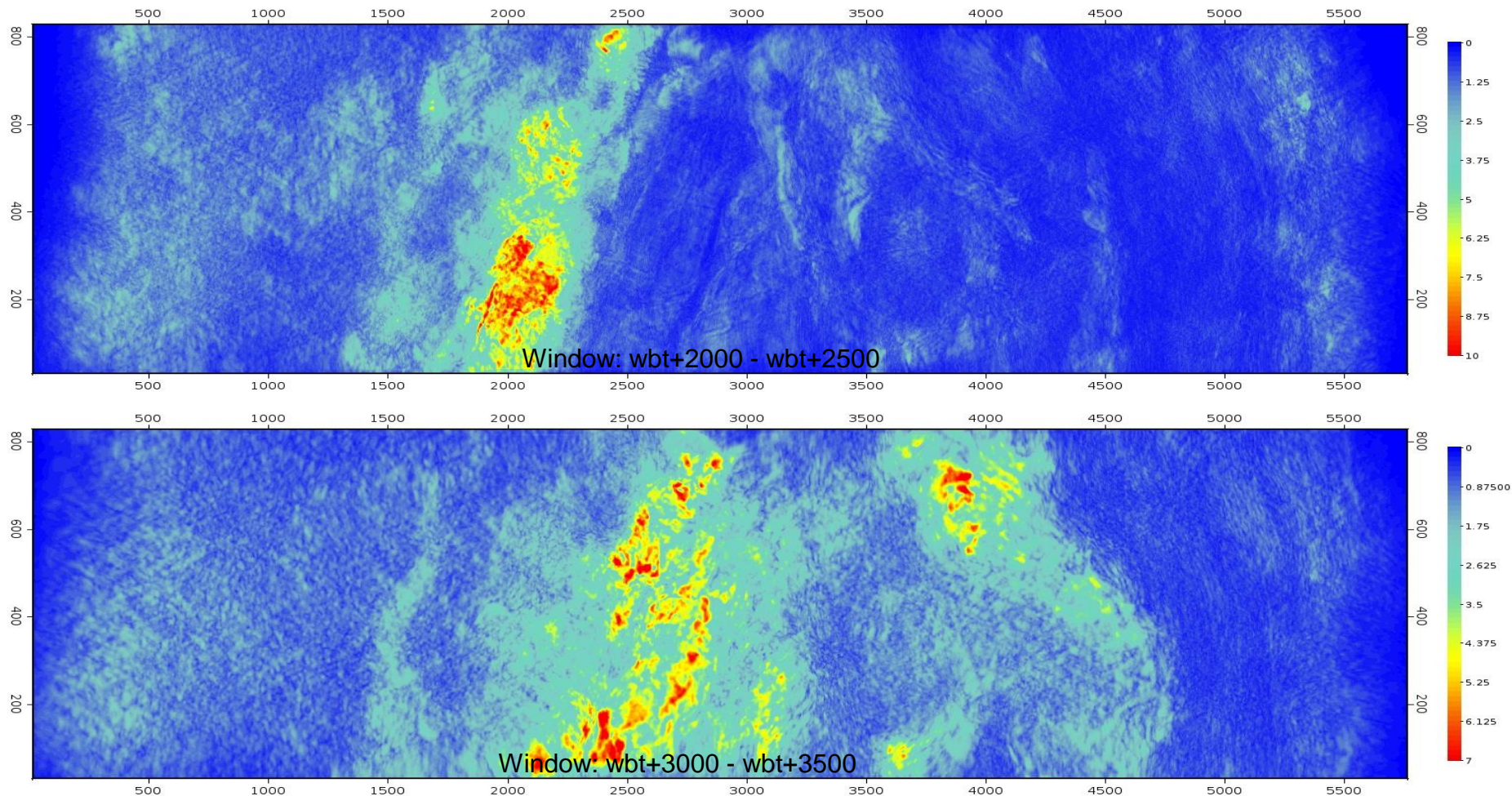
Amplitude map: before footprint removal

30



Amplitude map: **after** footprint removal

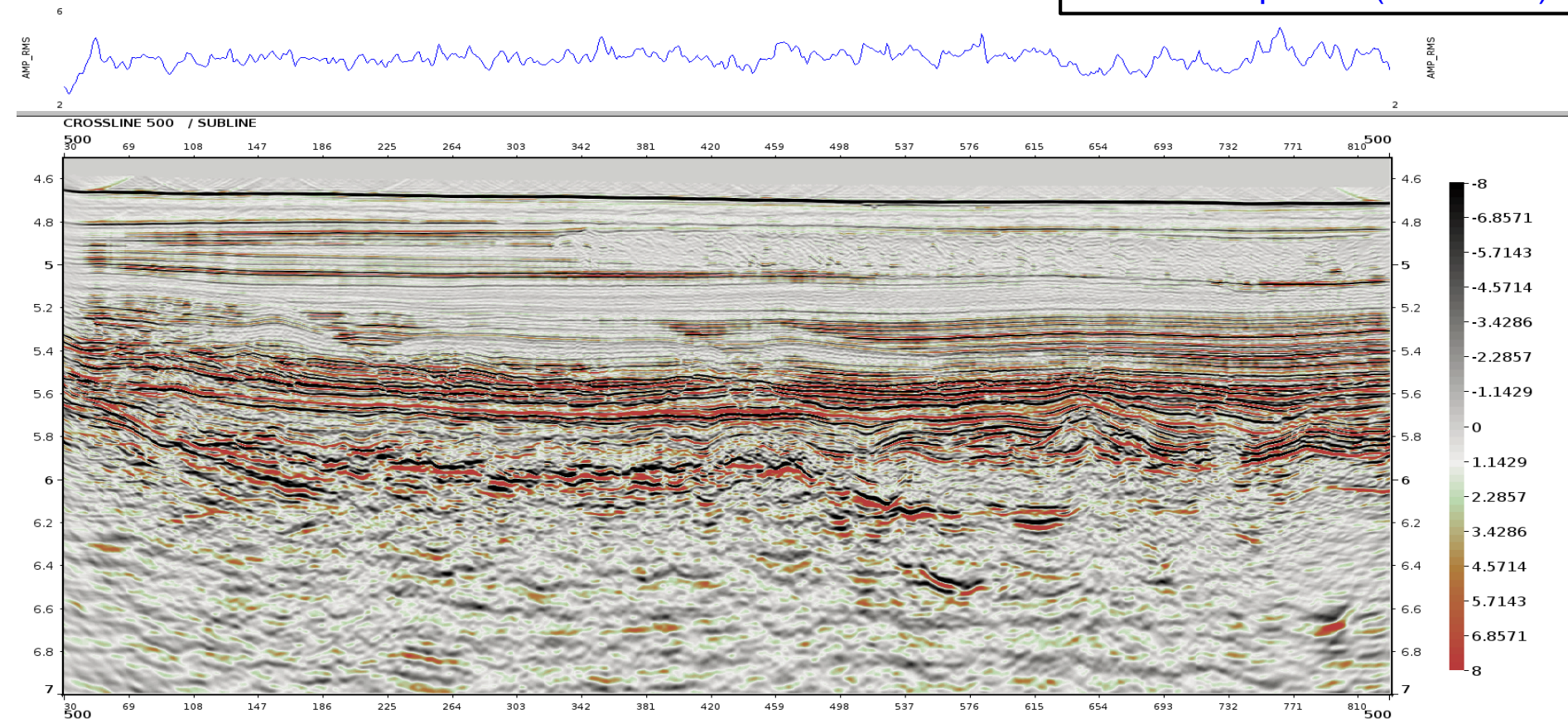
31



Crossline 500: before footprint removal

32

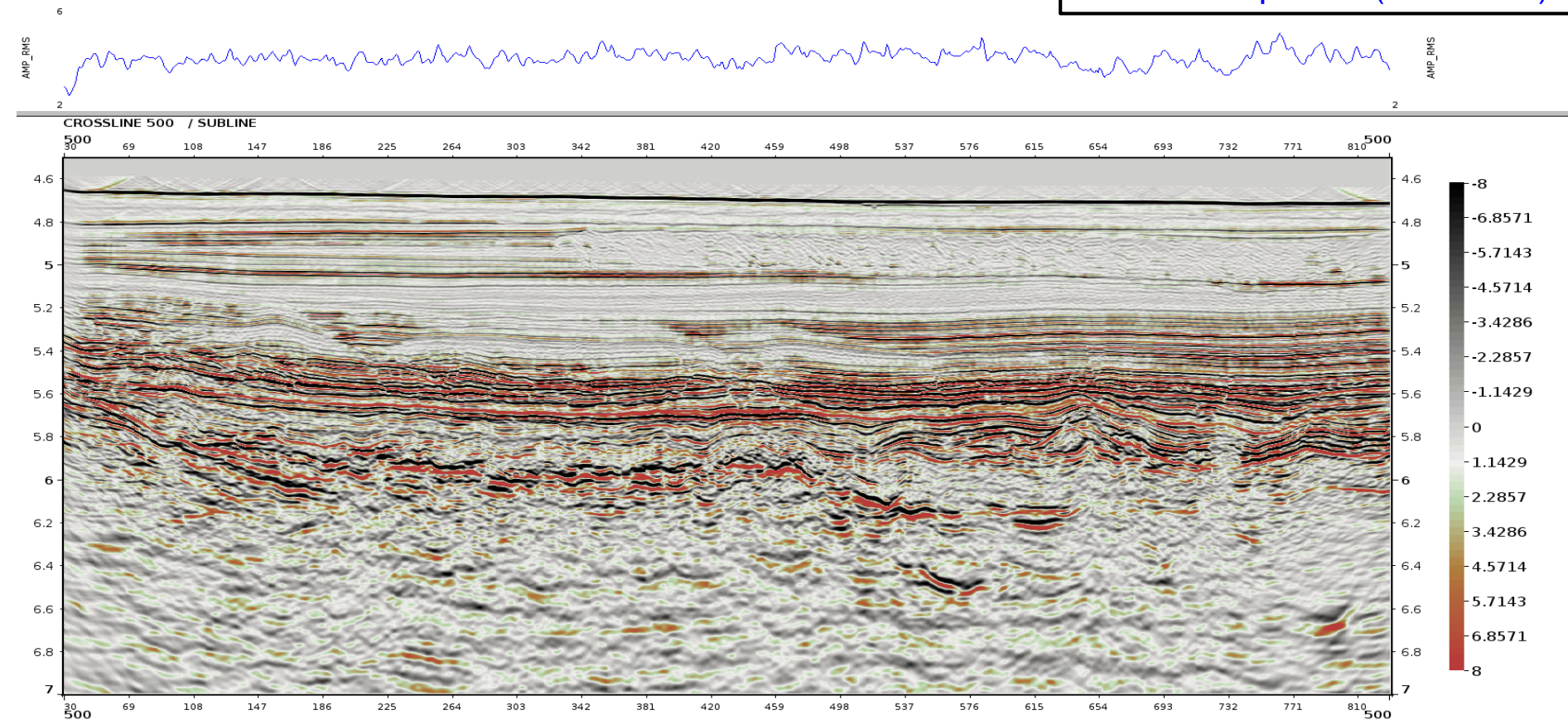
— RMS amplitude (wbt - 9.5s)



Crossline 500: after footprint removal

33

— RMS amplitude (wbt - 9.5s)

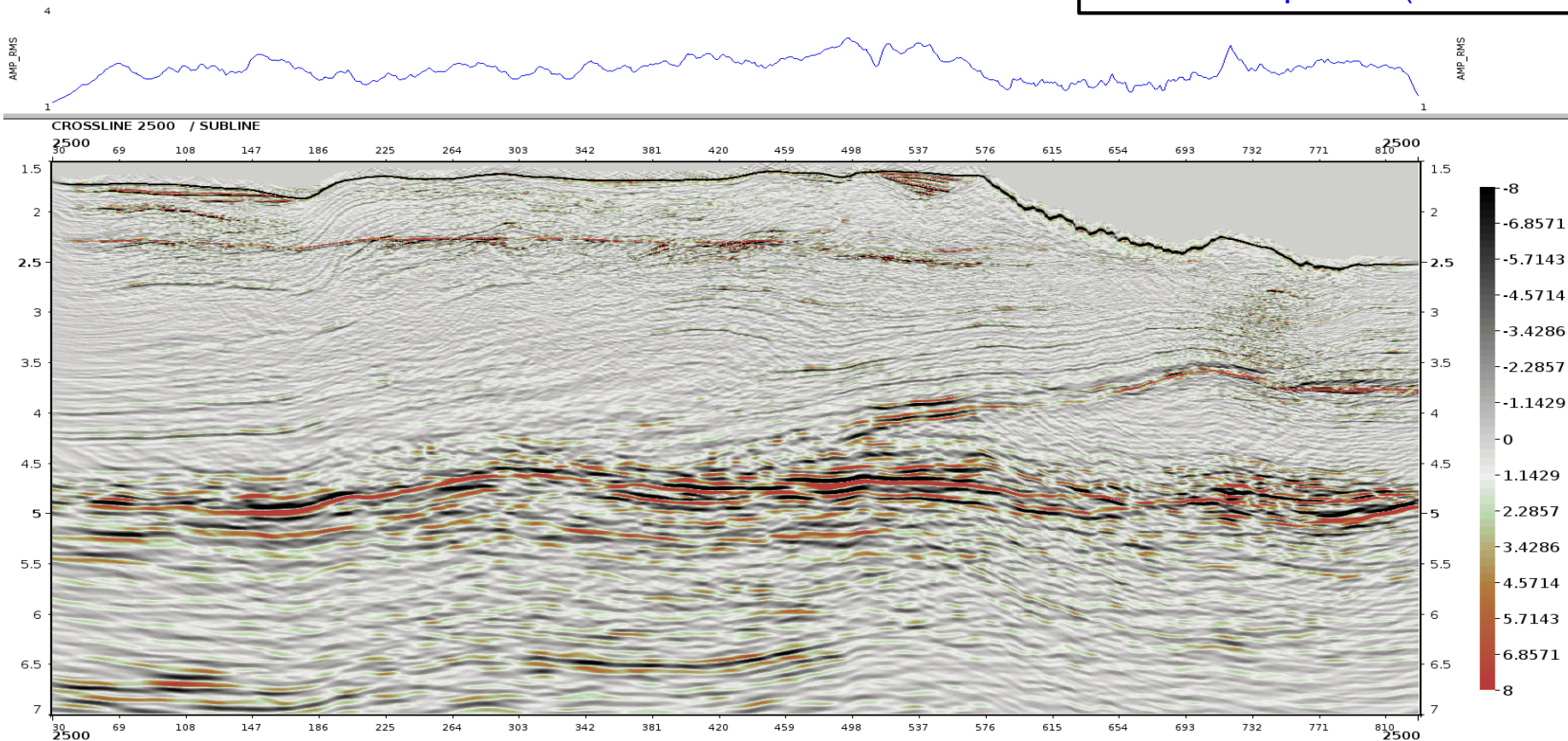




Crossline 2500: before footprint removal

34

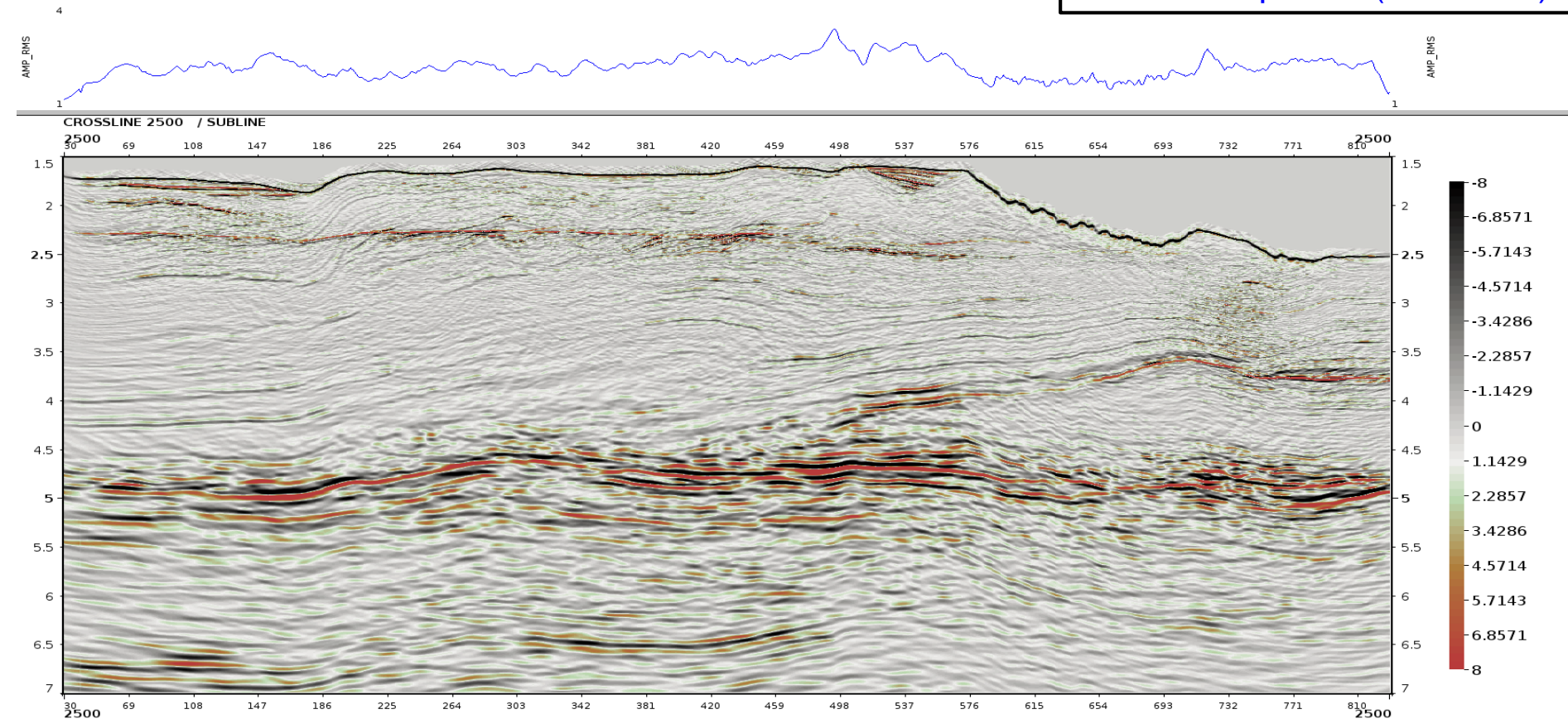
— RMS amplitude (wbt - 9.5s)



Crossline 2500: after footprint removal

35

— RMS amplitude (wbt - 9.5s)

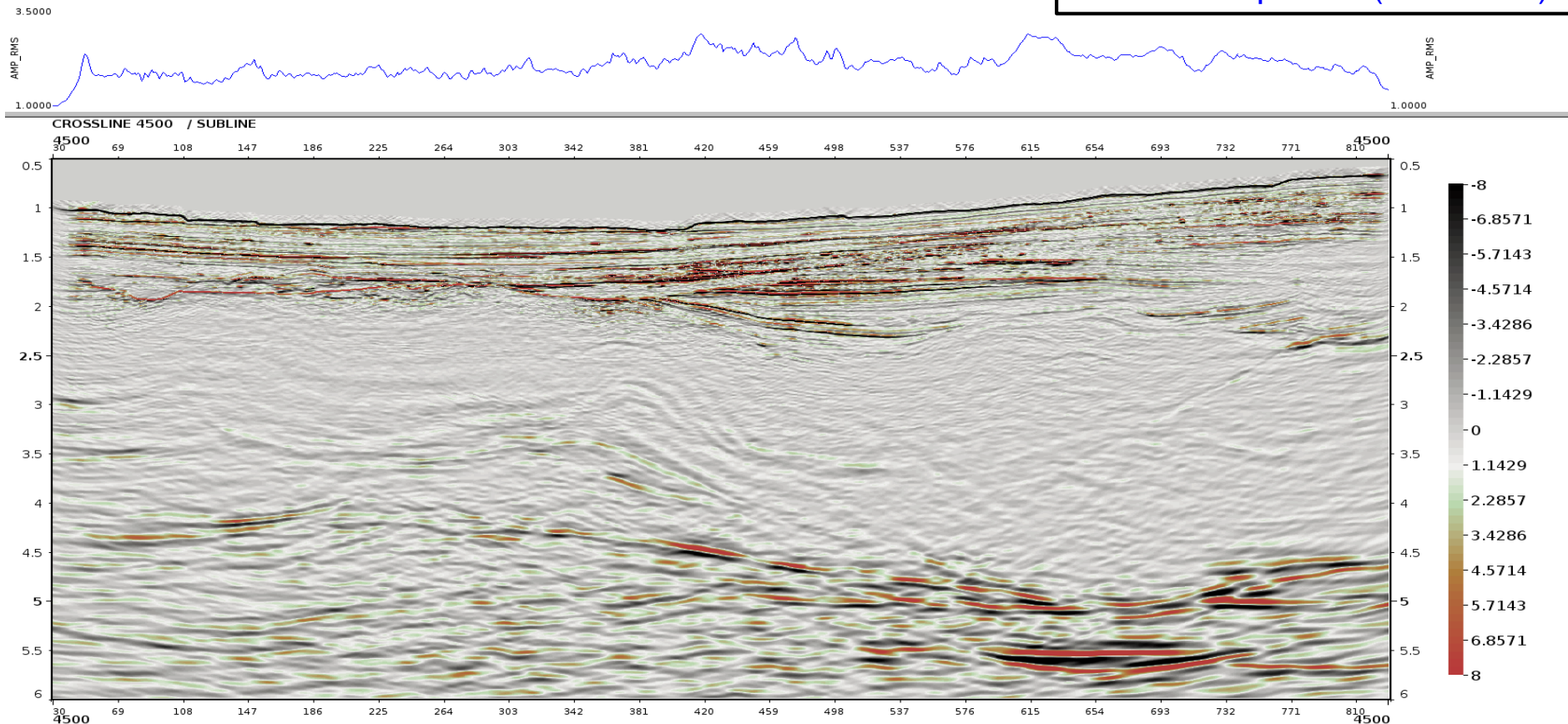




Crossline 4500: before footprint removal

36

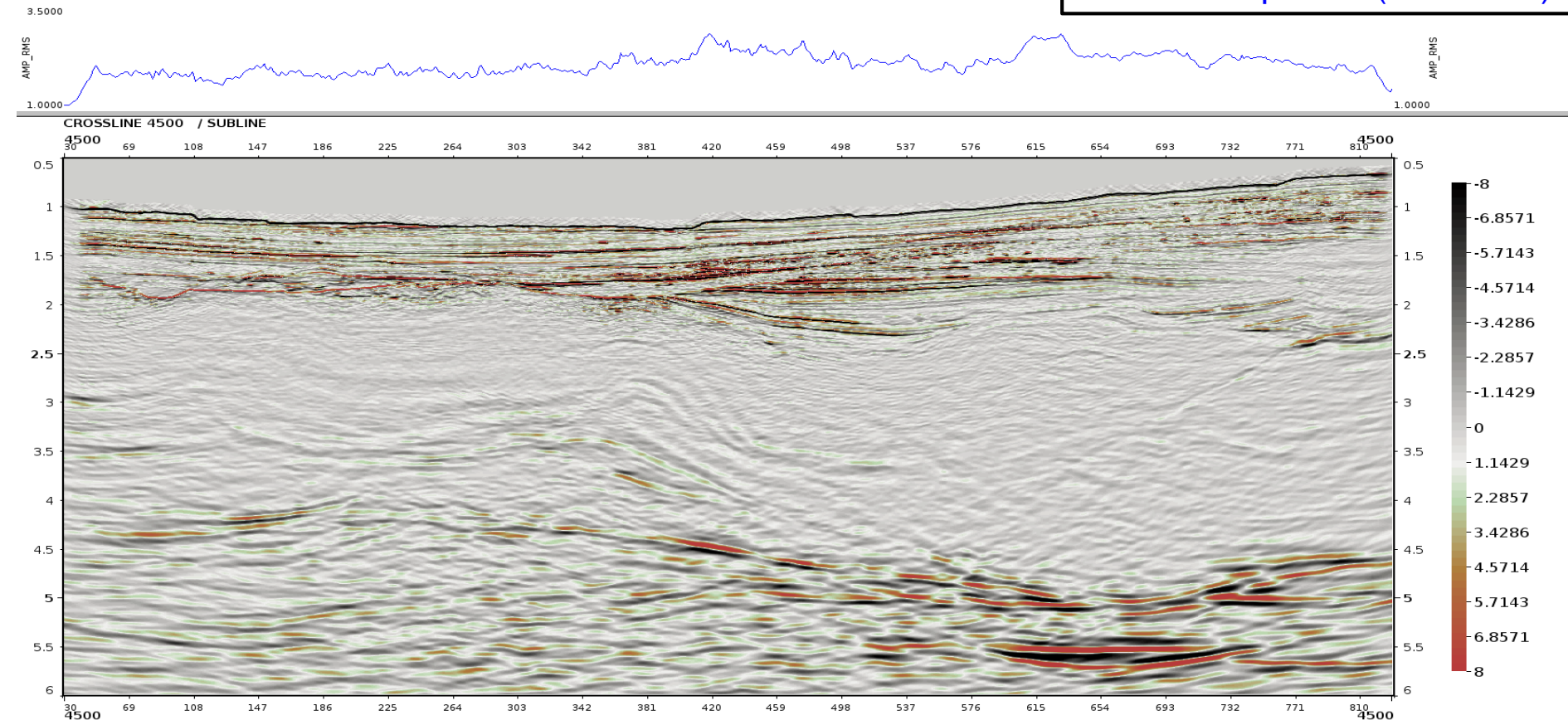
— RMS amplitude (wbt - 9.5s)



Crossline 4500: after footprint removal

37

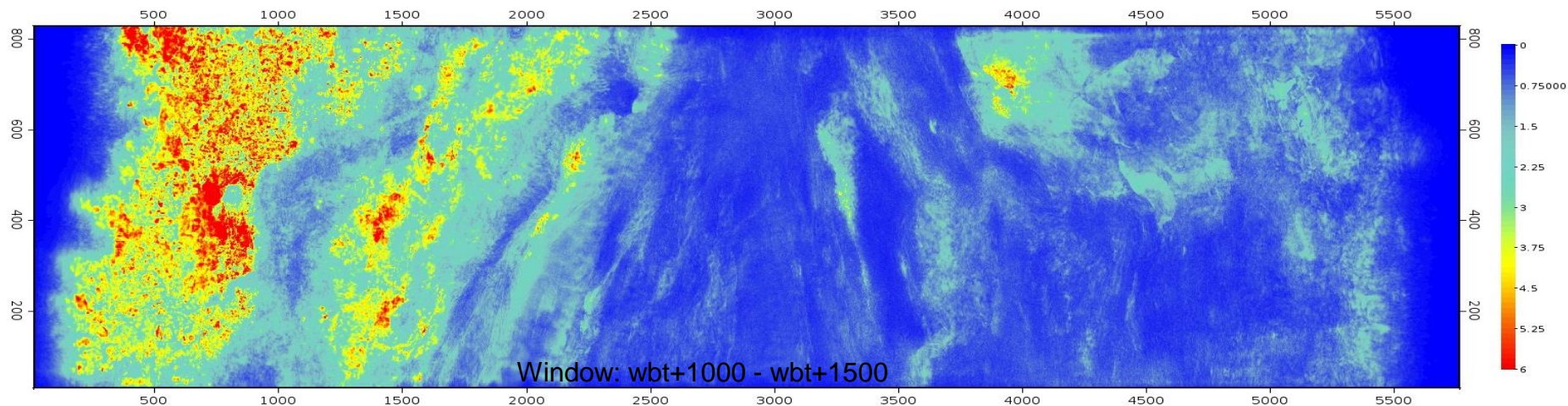
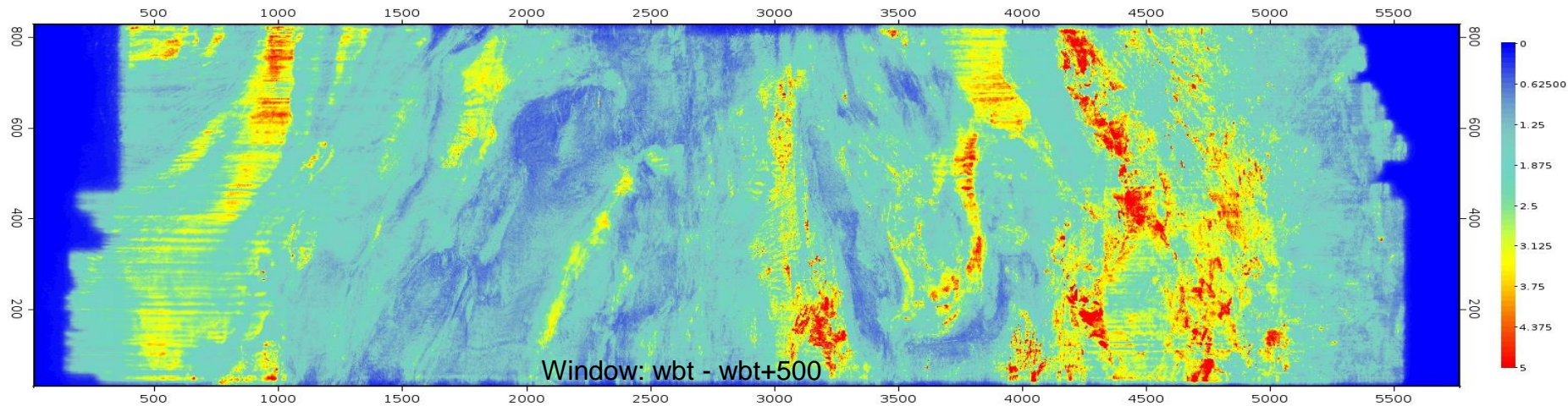
— RMS amplitude (wbt - 9.5s)



Far Stack

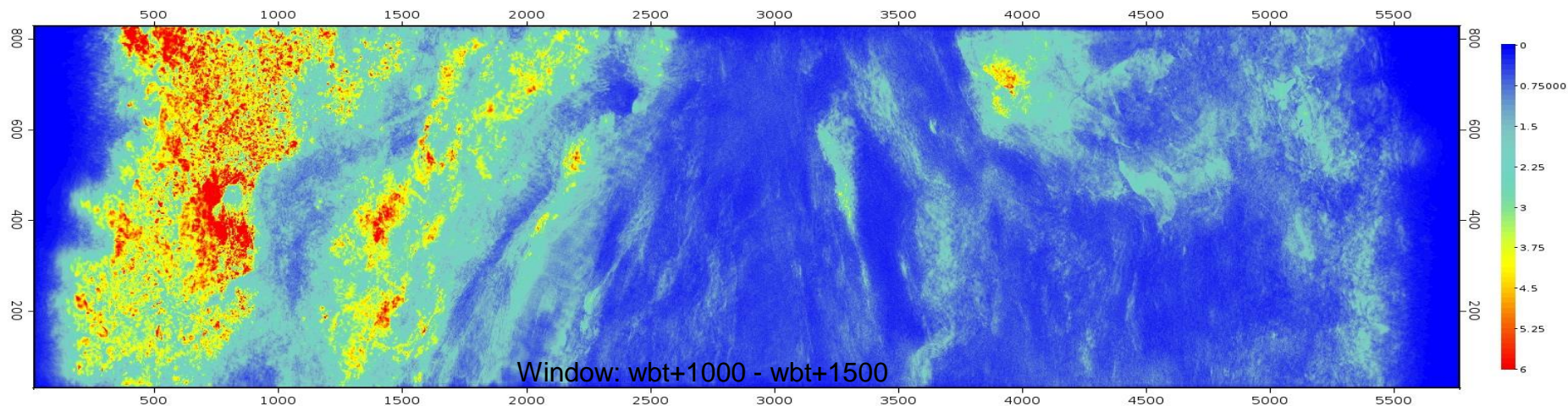
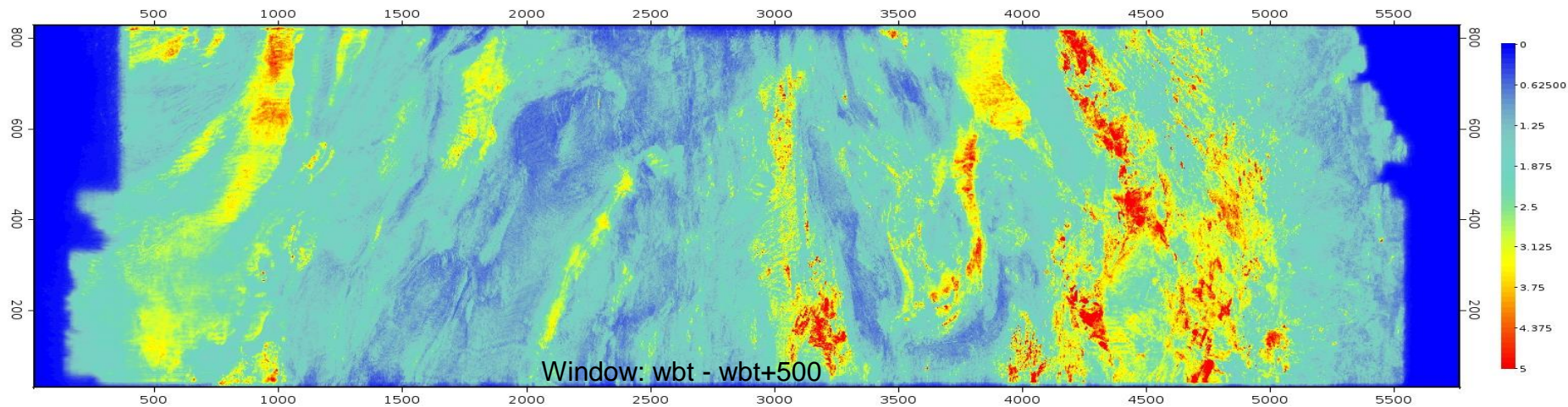
Amplitude map: before footprint removal

39



Amplitude map: after footprint removal

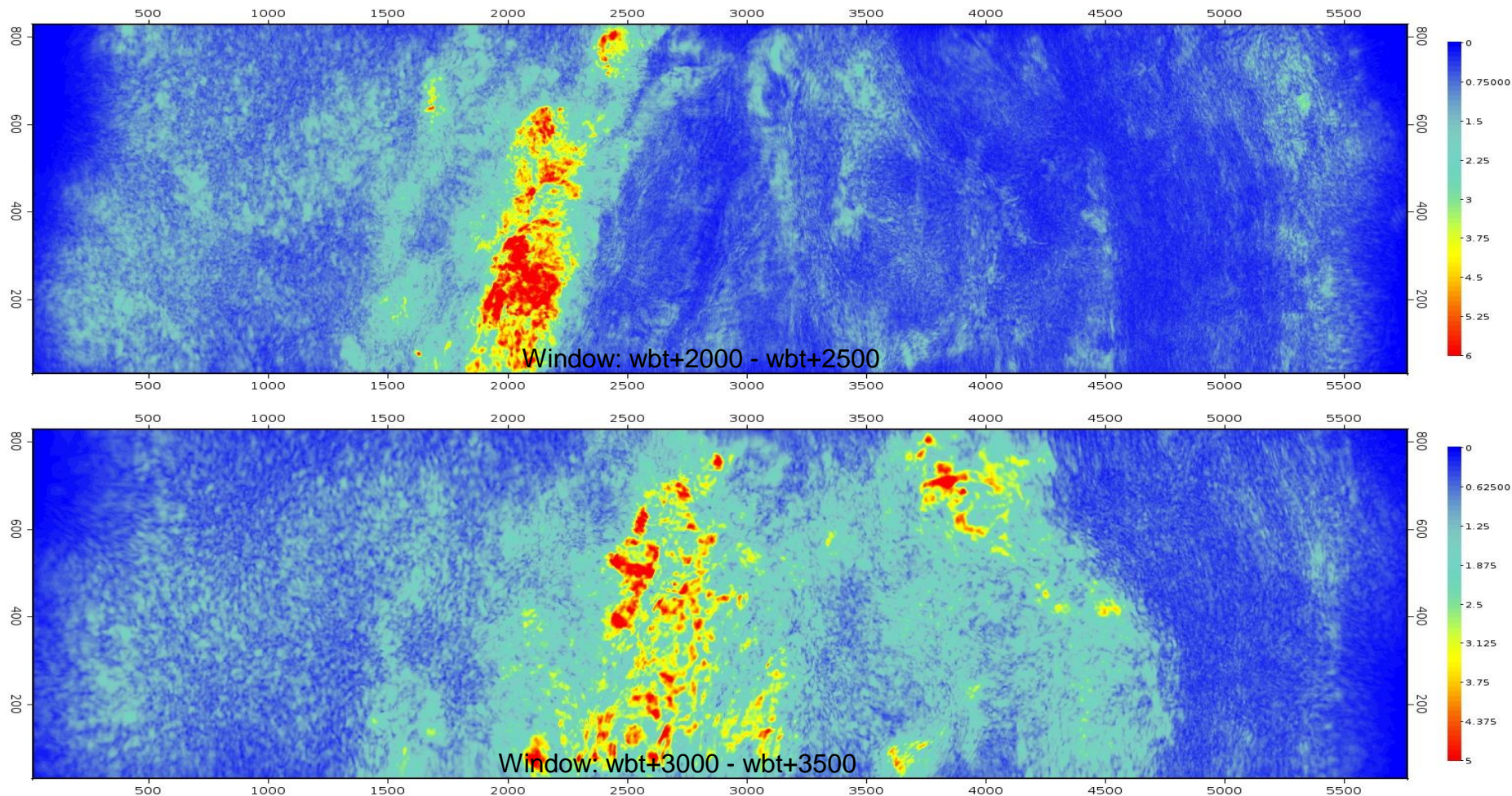
40





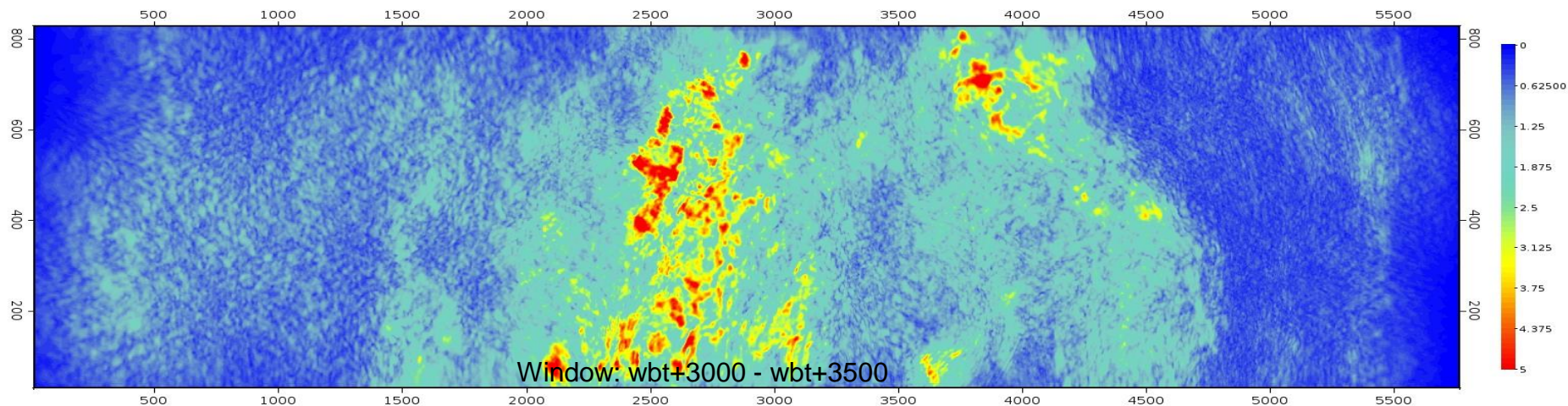
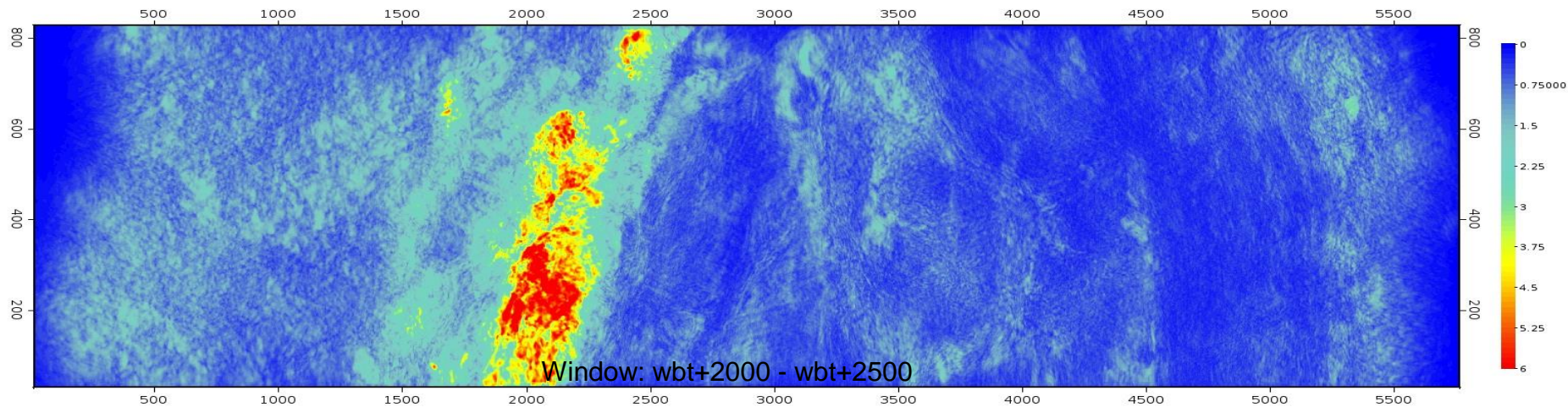
Amplitude map: before footprint removal

41



Amplitude map: after footprint removal

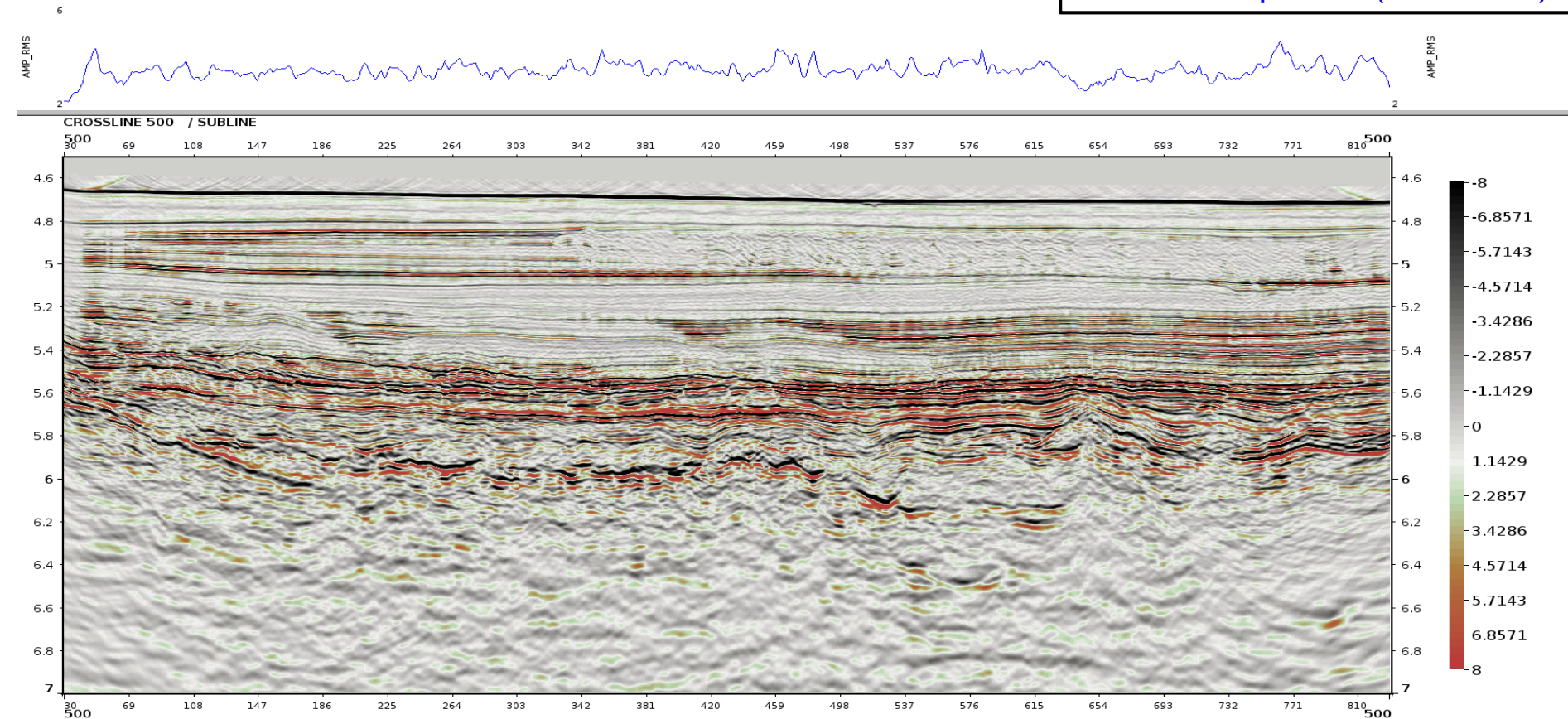
42



Crossline 500: before footprint removal

43

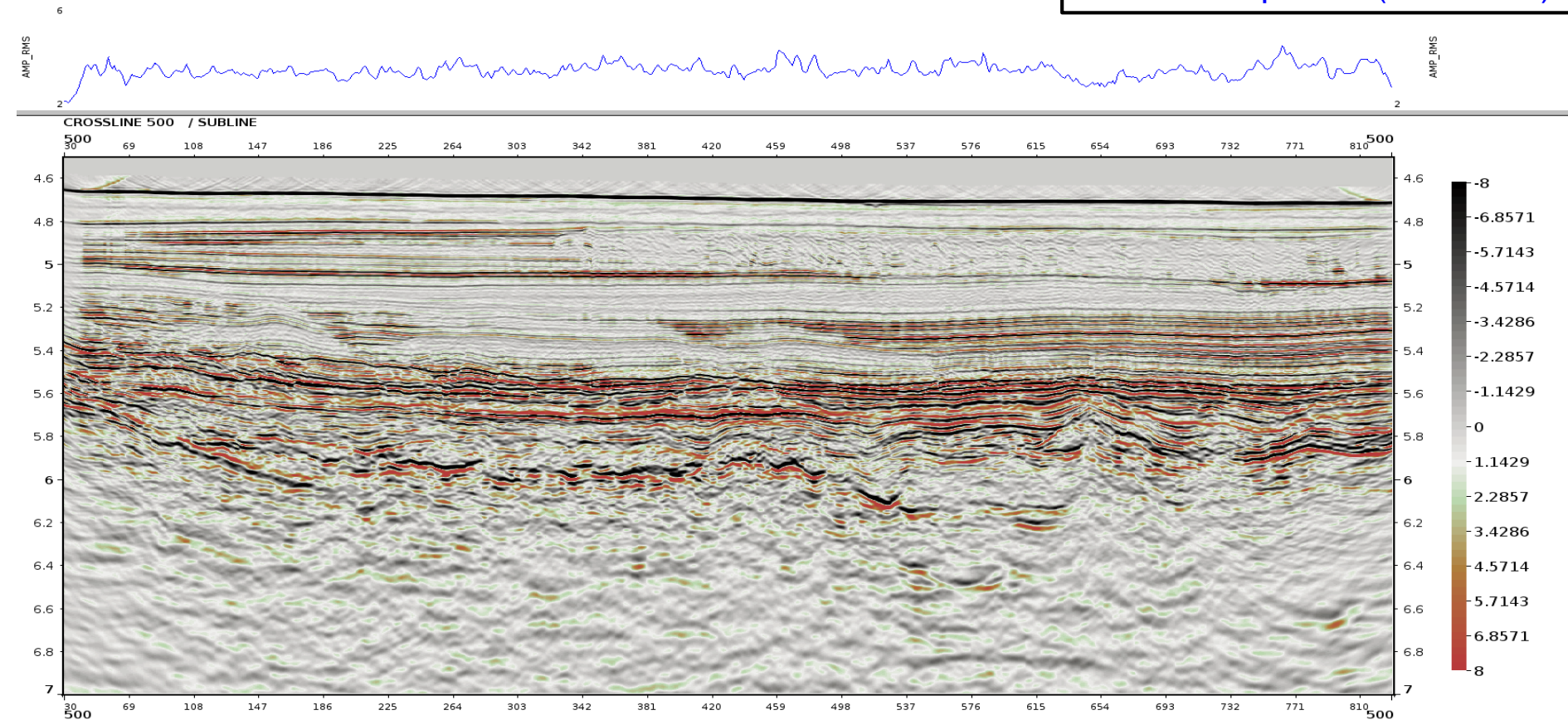
— RMS amplitude (wbt - 9.5s)



Crossline 500: after footprint removal

44

— RMS amplitude (wbt - 9.5s)

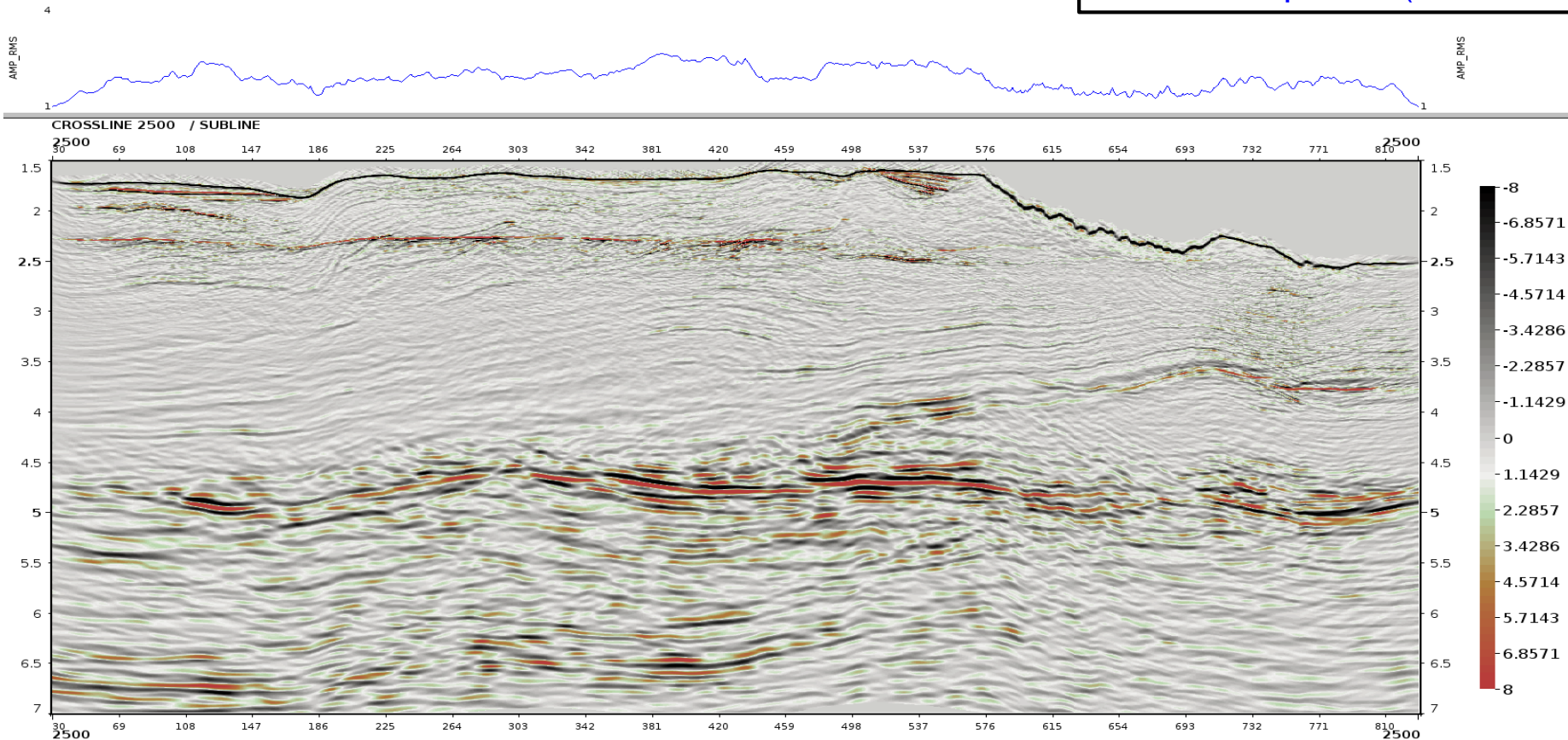




Crossline 2500: before footprint removal

45

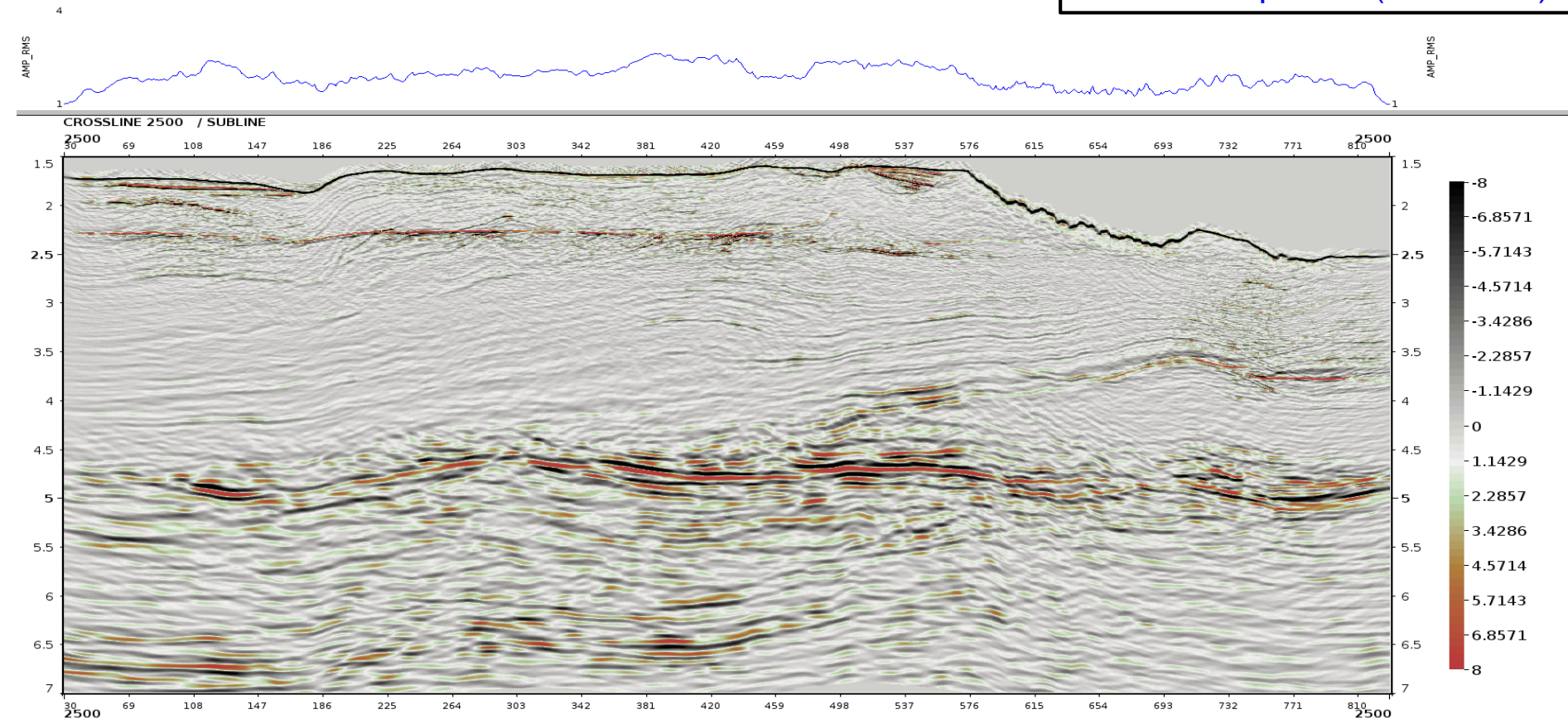
— RMS amplitude (wbt - 9.5s)



Crossline 2500: after footprint removal

46

— RMS amplitude (wbt - 9.5s)

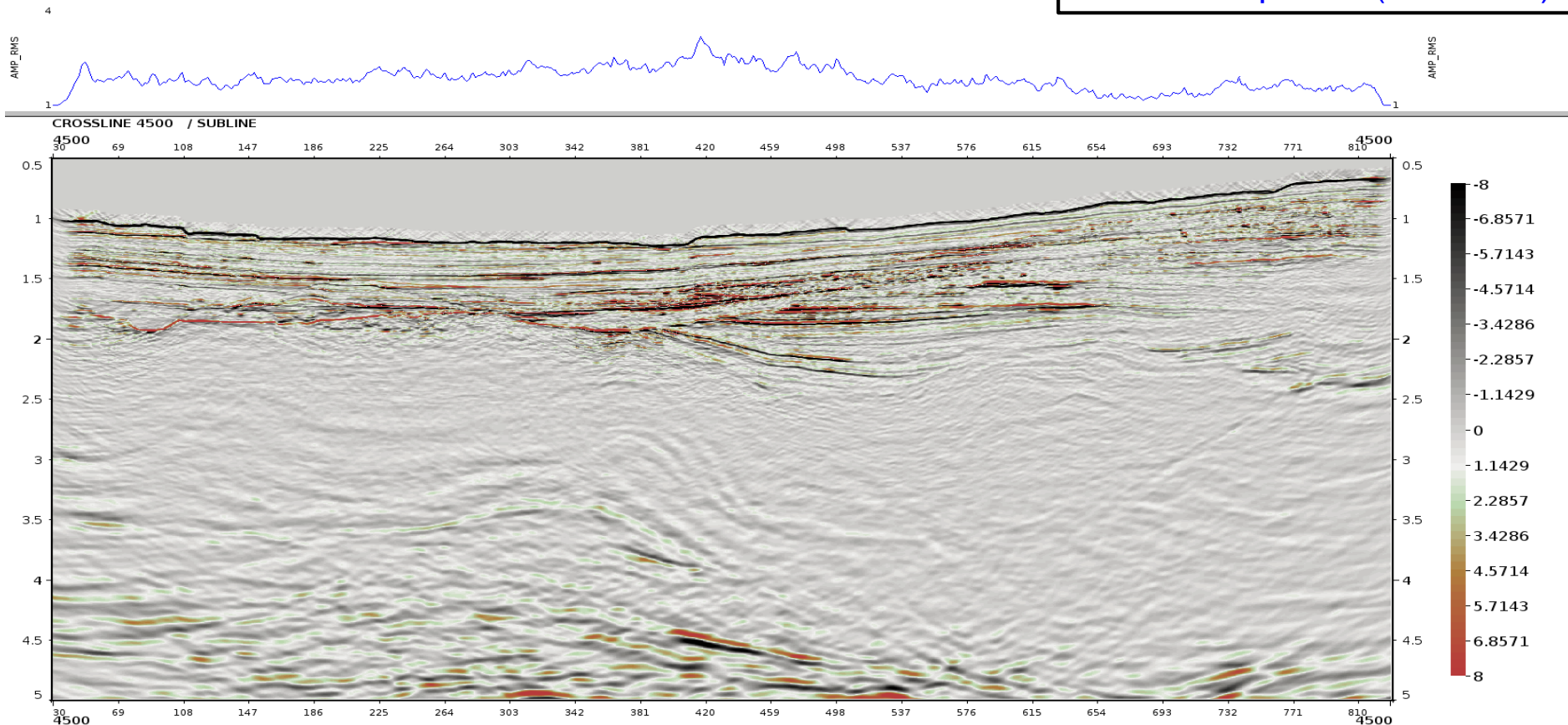




Crossline 4500: before footprint removal

47

— RMS amplitude (wbt - 9.5s)



Crossline 4500: after footprint removal

48

— RMS amplitude (wbt - 9.5s)

