



Spectra Offset Balancing

NZ 3D Processing

30 June 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

- **Objective:**

To balance offset spectra on CDP gathers.

- **Procedure:**

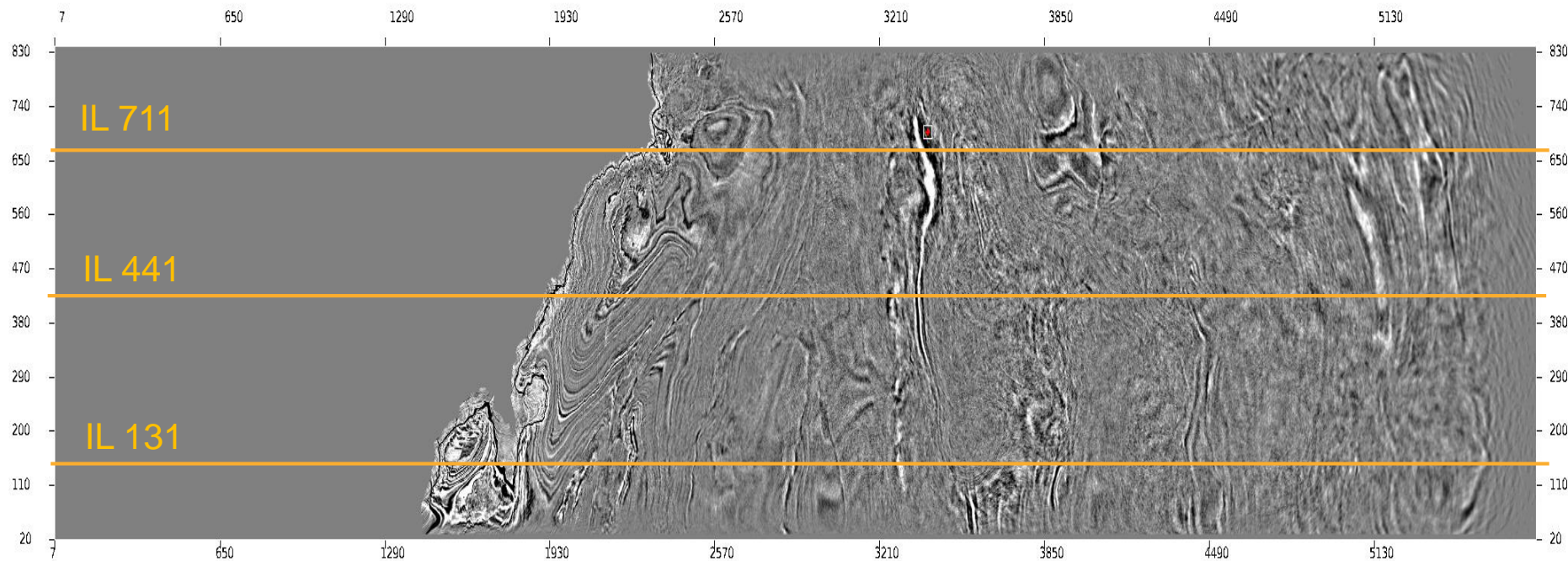
- The reference wavelet spectrum is estimated using near angles (2 degree to 8 degree) on CDP gathers.
- The reference spectrum is used to calculate the frequency compensation for all the offsets.
- Compensation is applied to boost up the high frequencies of the mid & far-offset data.

- **Display:**

CDP Gathers, time stack (near, mid & far angle stack), amplitude spectra.

- **Observation & Recommendation:**

After offset spectra balancing, high frequencies at mid and far offset get compensated. And the amplitude spectra of mid and far angle stack shows a broader bandwidth. We recommend to apply for production.



Subline



Crossline

IL 131

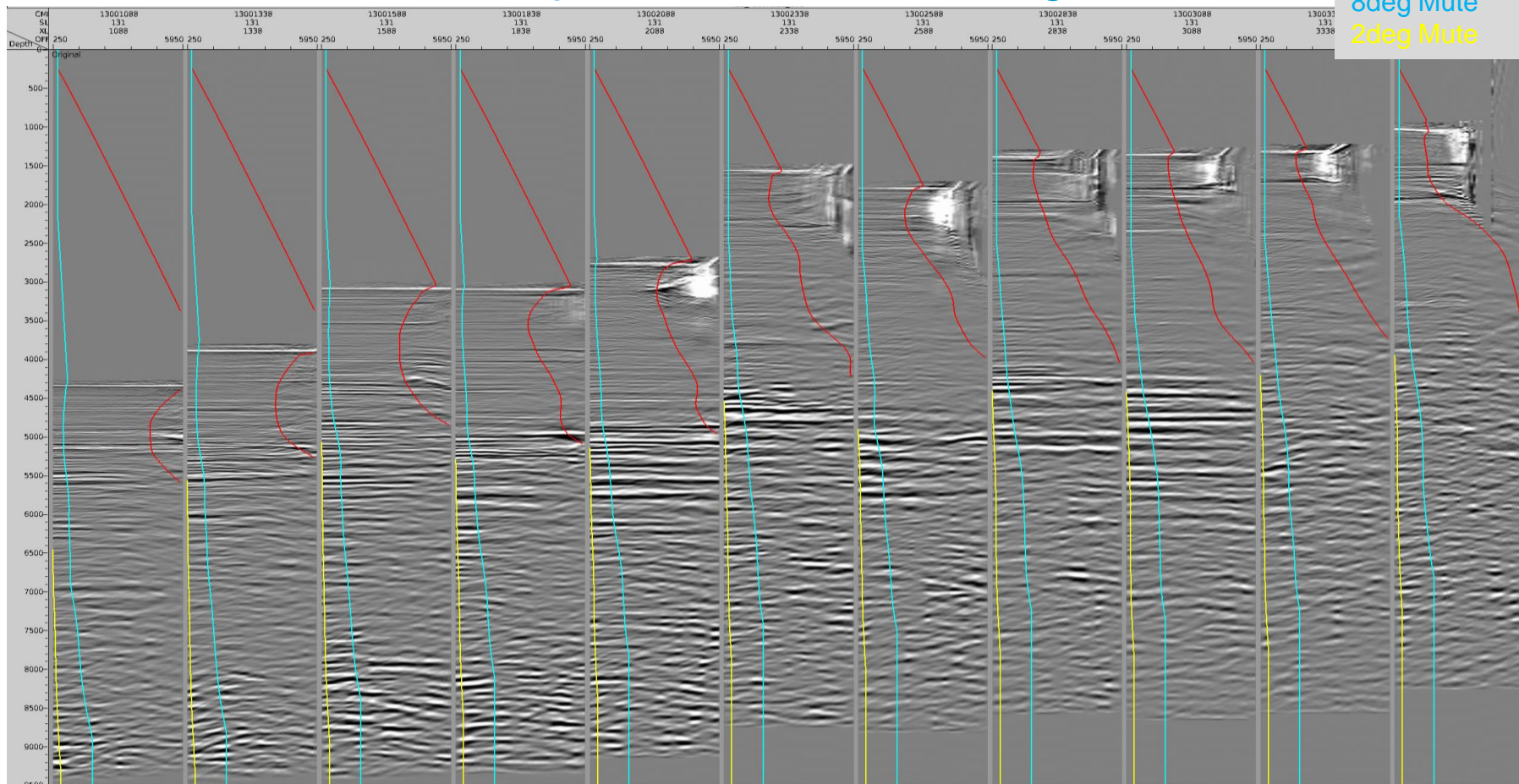
- CDP Gathers
- Near Angel (0 -11 deg) Time stack
- Mid Angel (11 -23 deg) Time stack
- Far Angel (23 -35 deg) Time stack
- Amplitude Spectra.



CDP Gathers before Spectra Offset Balancing

50deg Mute
8deg Mute
2deg Mute

6

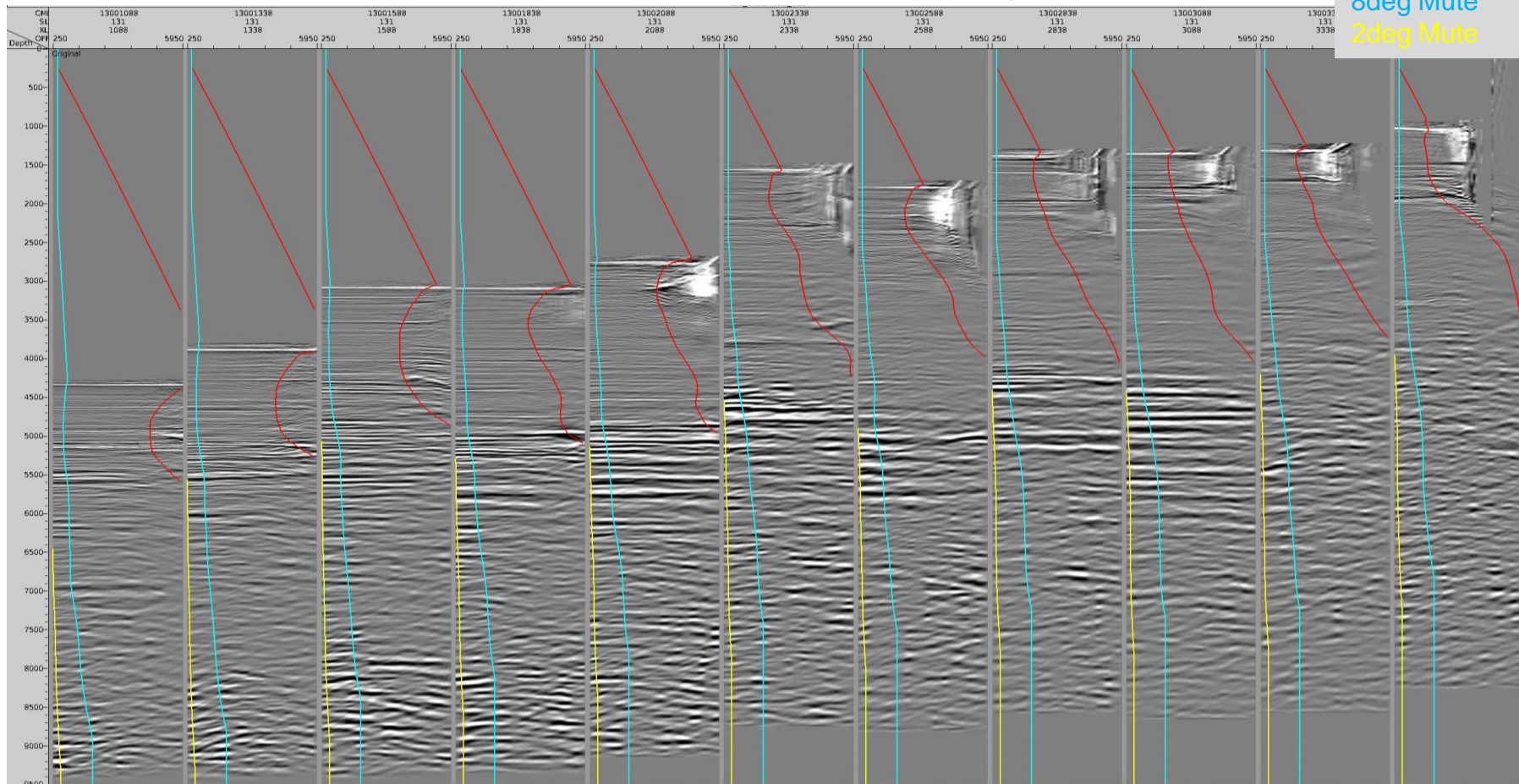




CDP Gathers after Spectra Offset Balancing

50deg Mute
8deg Mute
2deg Mute

7

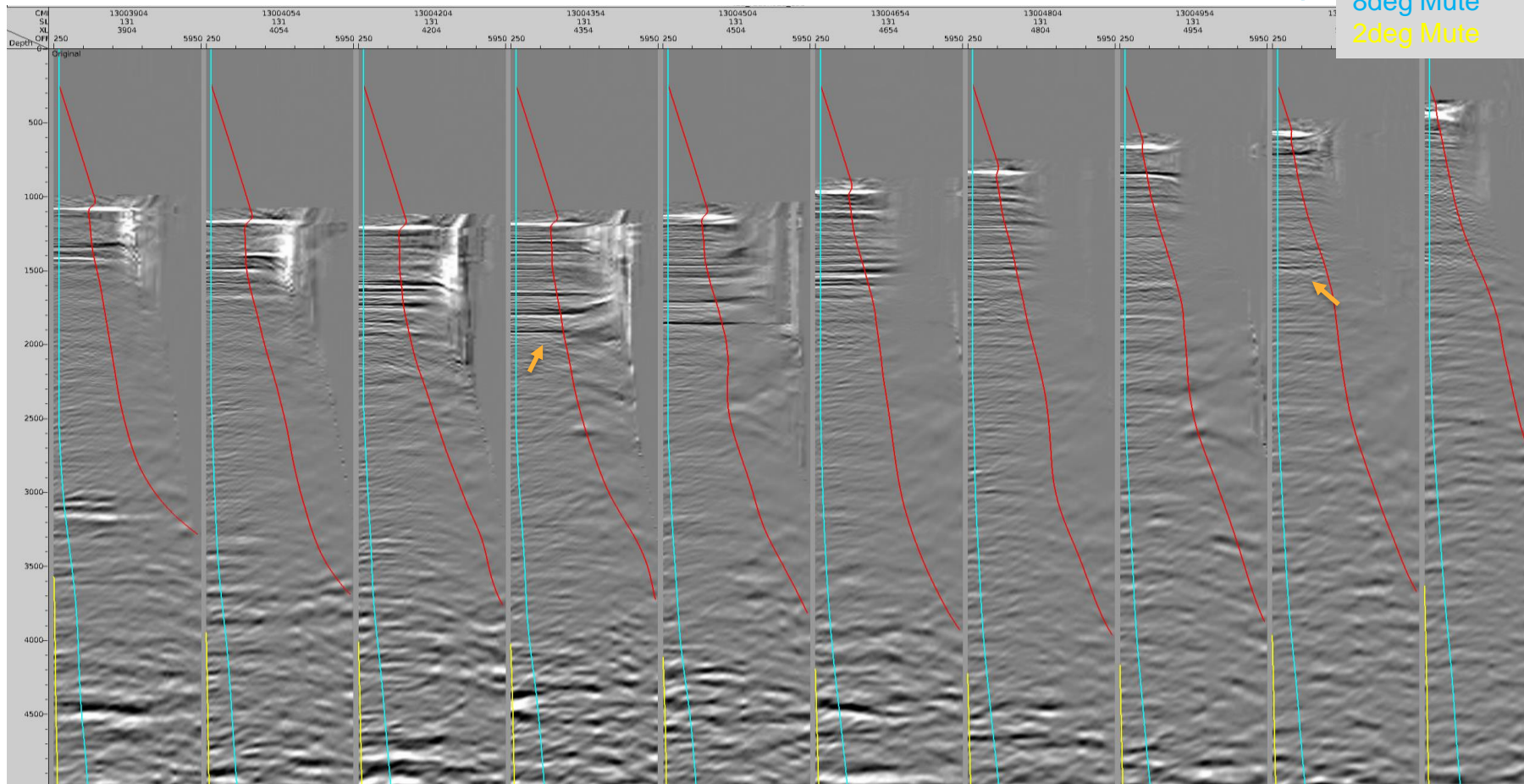




Zoomed in CDP Gathers before Spectra Offset Balancing

50deg Mute
8deg Mute
2deg Mute

8

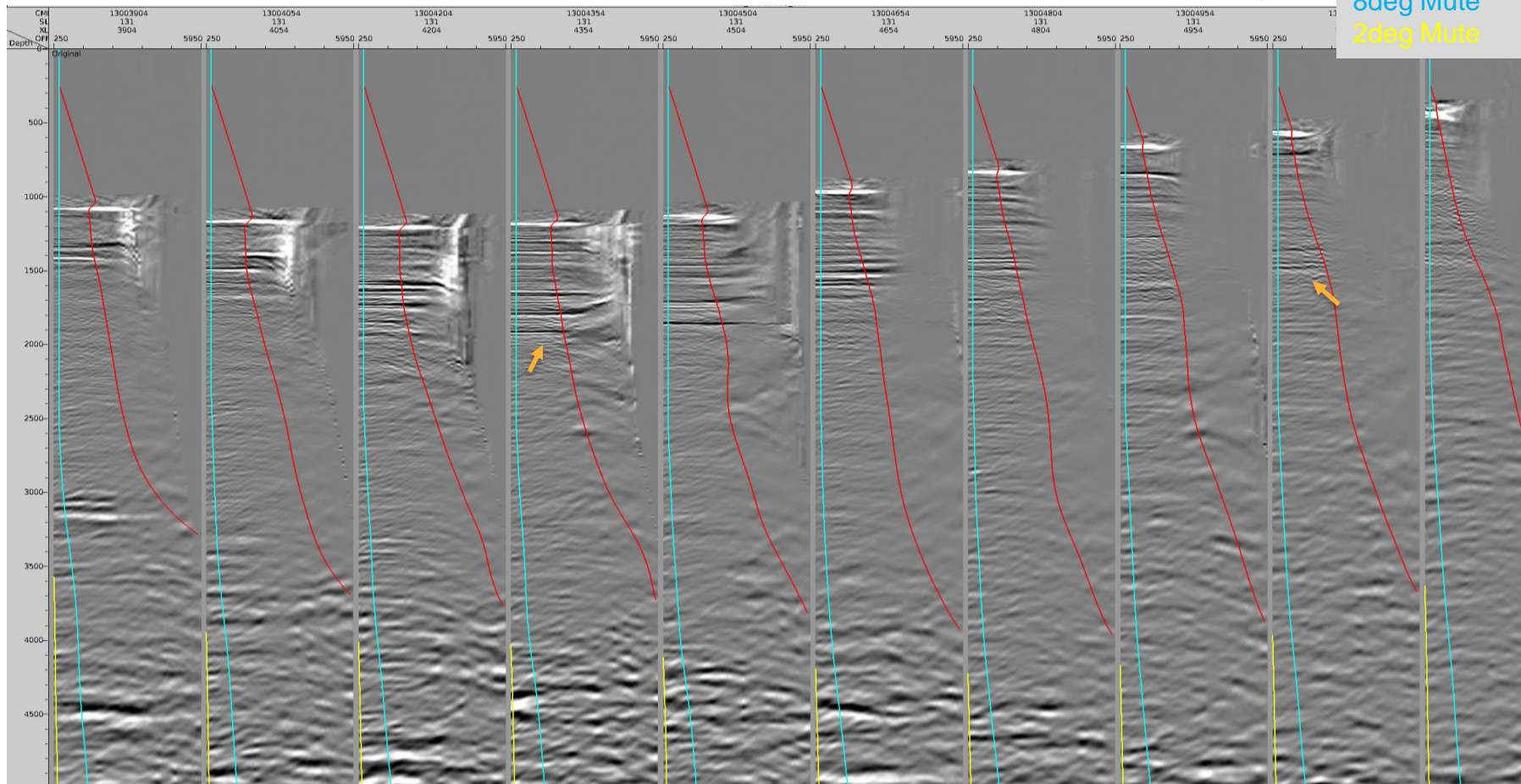


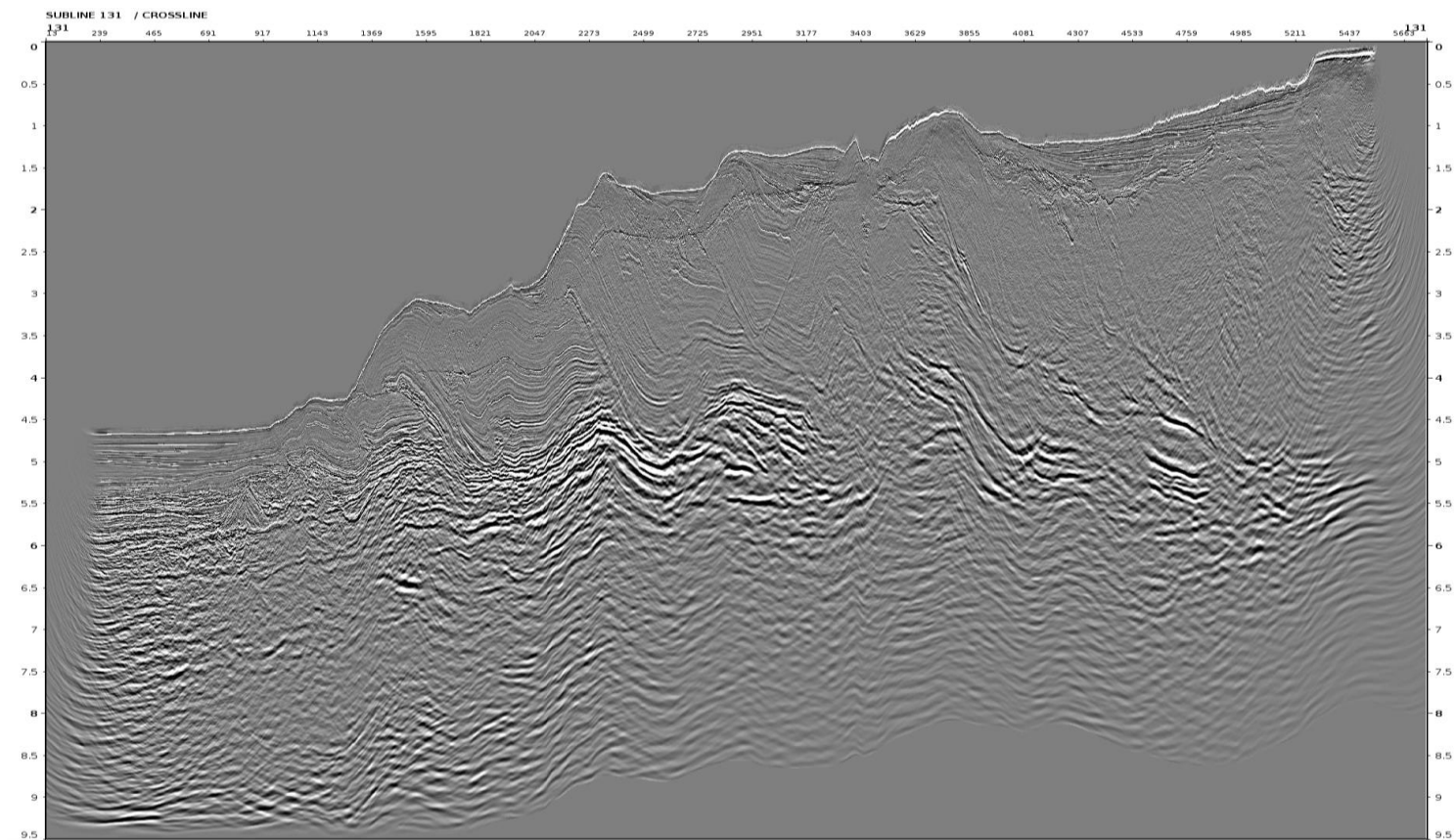


Zoomed in CDP Gathers **after** Spectra Offset Balancing

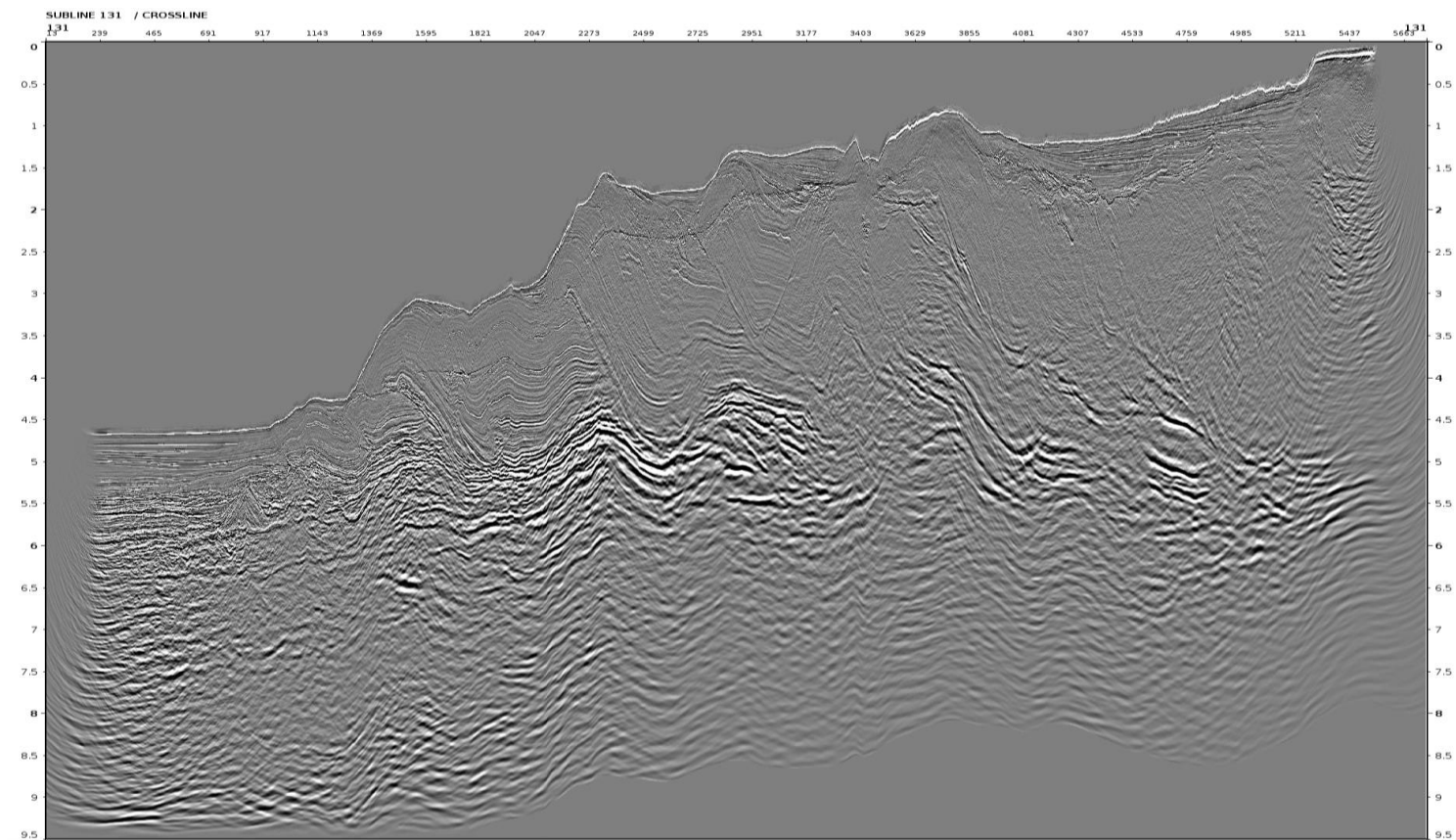
50deg Mute
8deg Mute
2deg Mute

9





- No visible changes on near angle stack

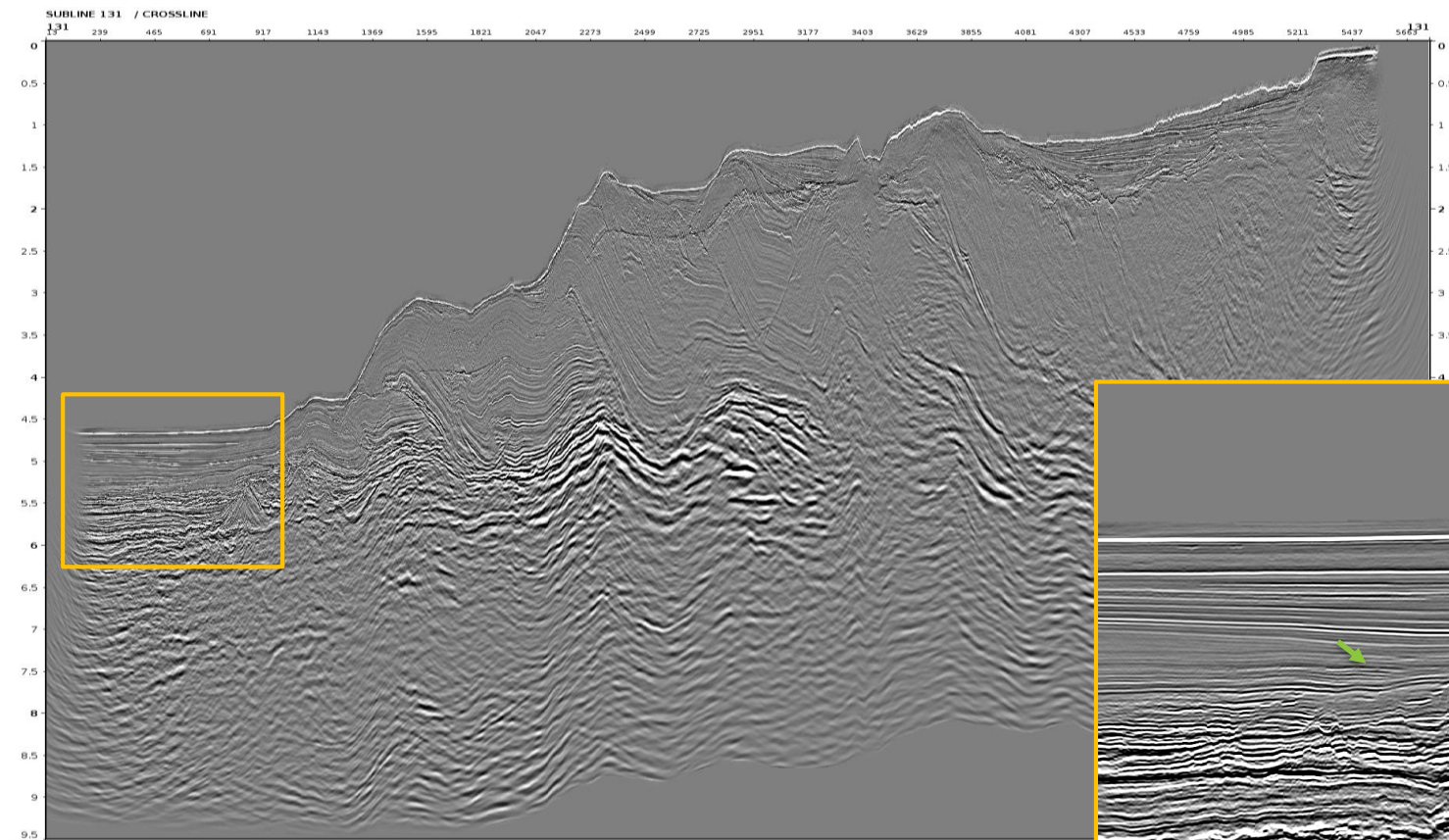


- No visible changes on near angle stack

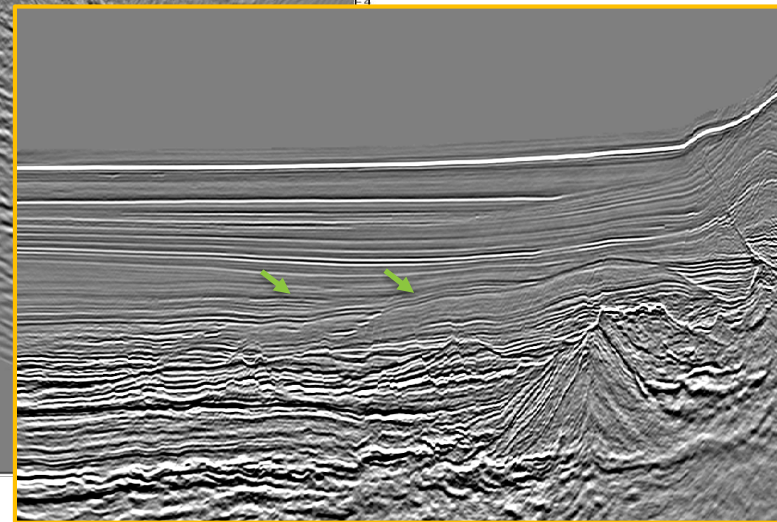


Mid Angle Time Stack **before** Spectra Offset Balancing

12



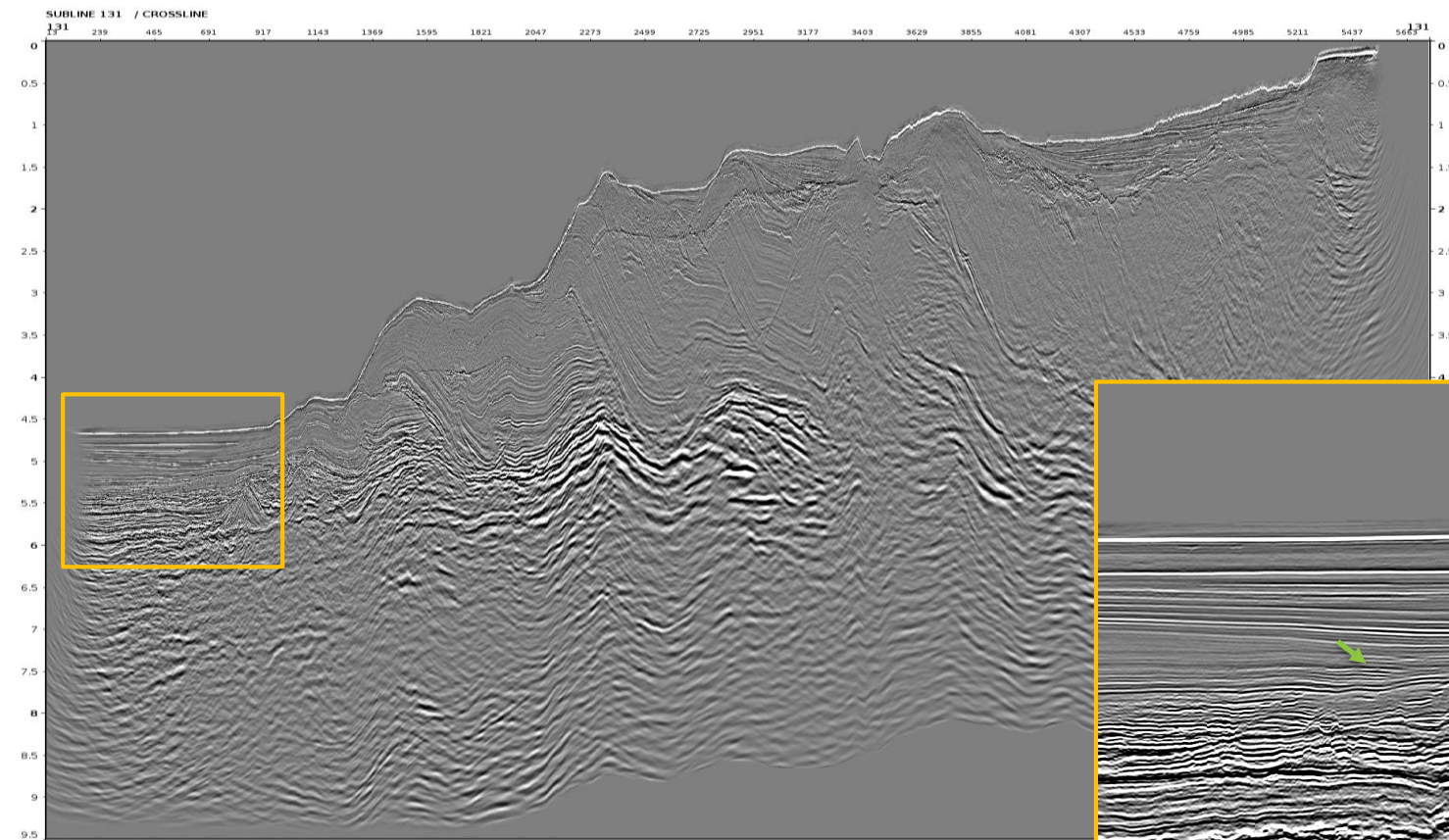
- High frequency compensation is observed on mid angle stack



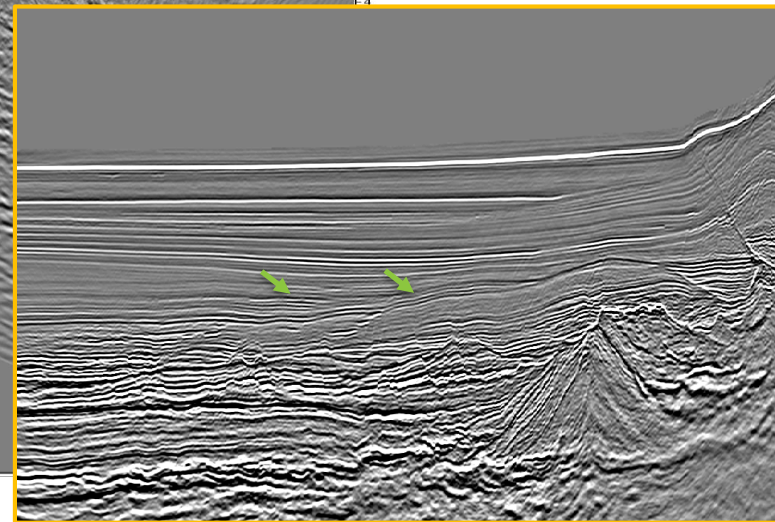


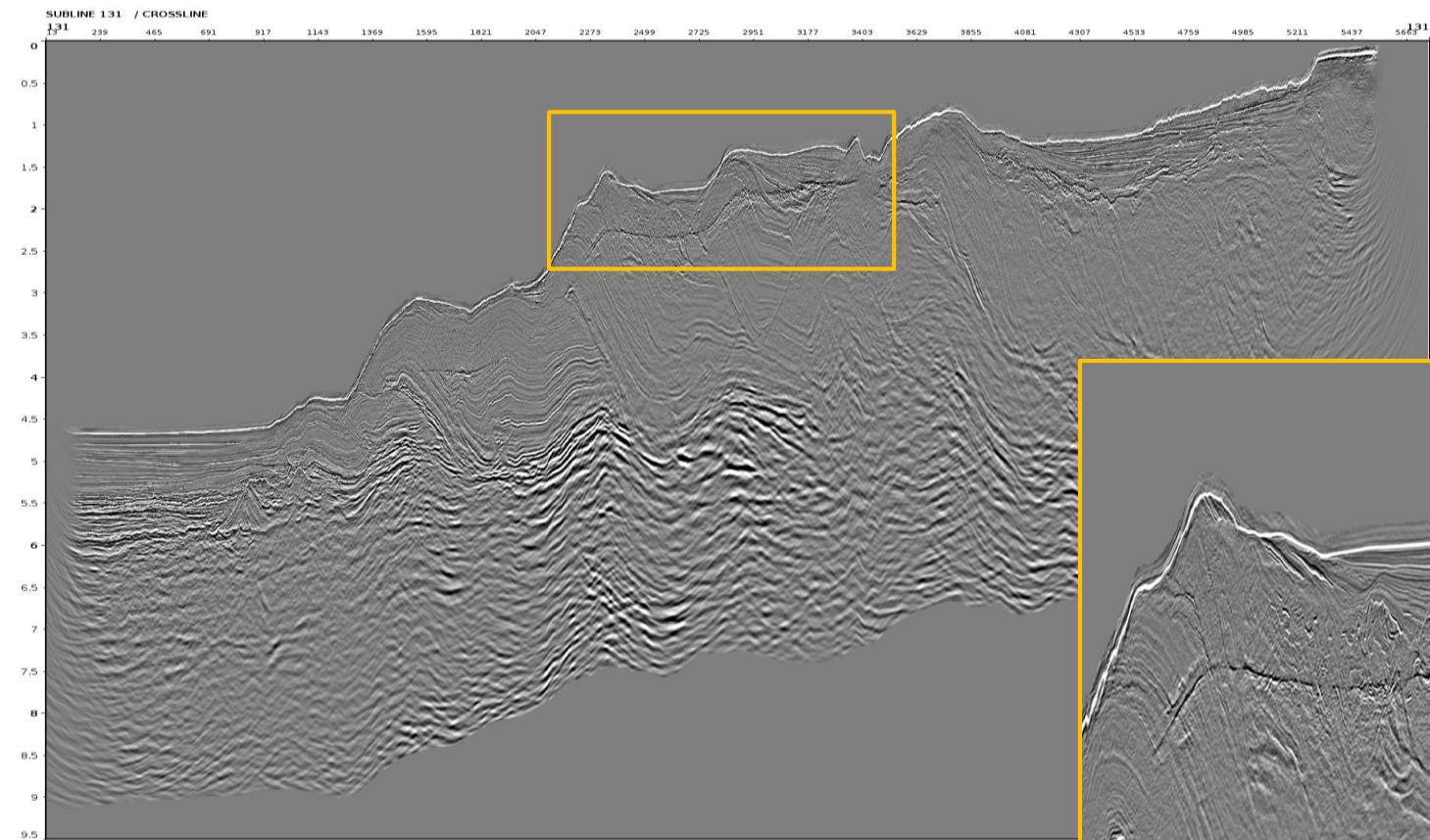
Mid Angle Time Stack **after** Spectra Offset Balancing

13

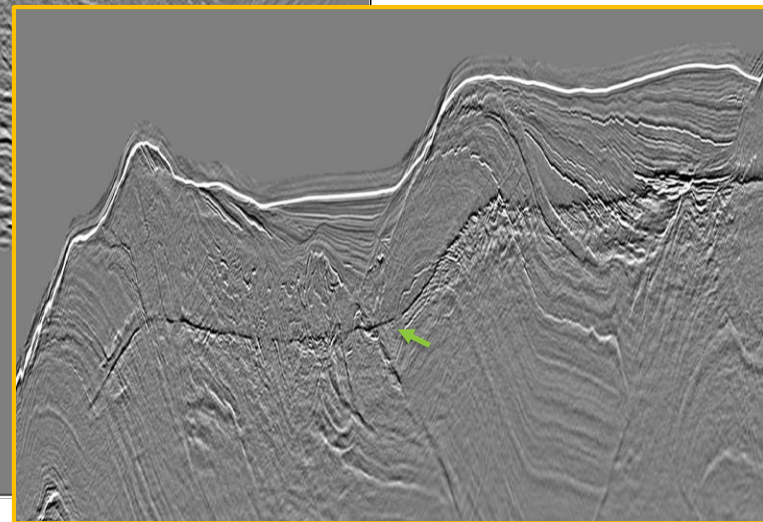


- High frequency compensation is observed on mid angle stack





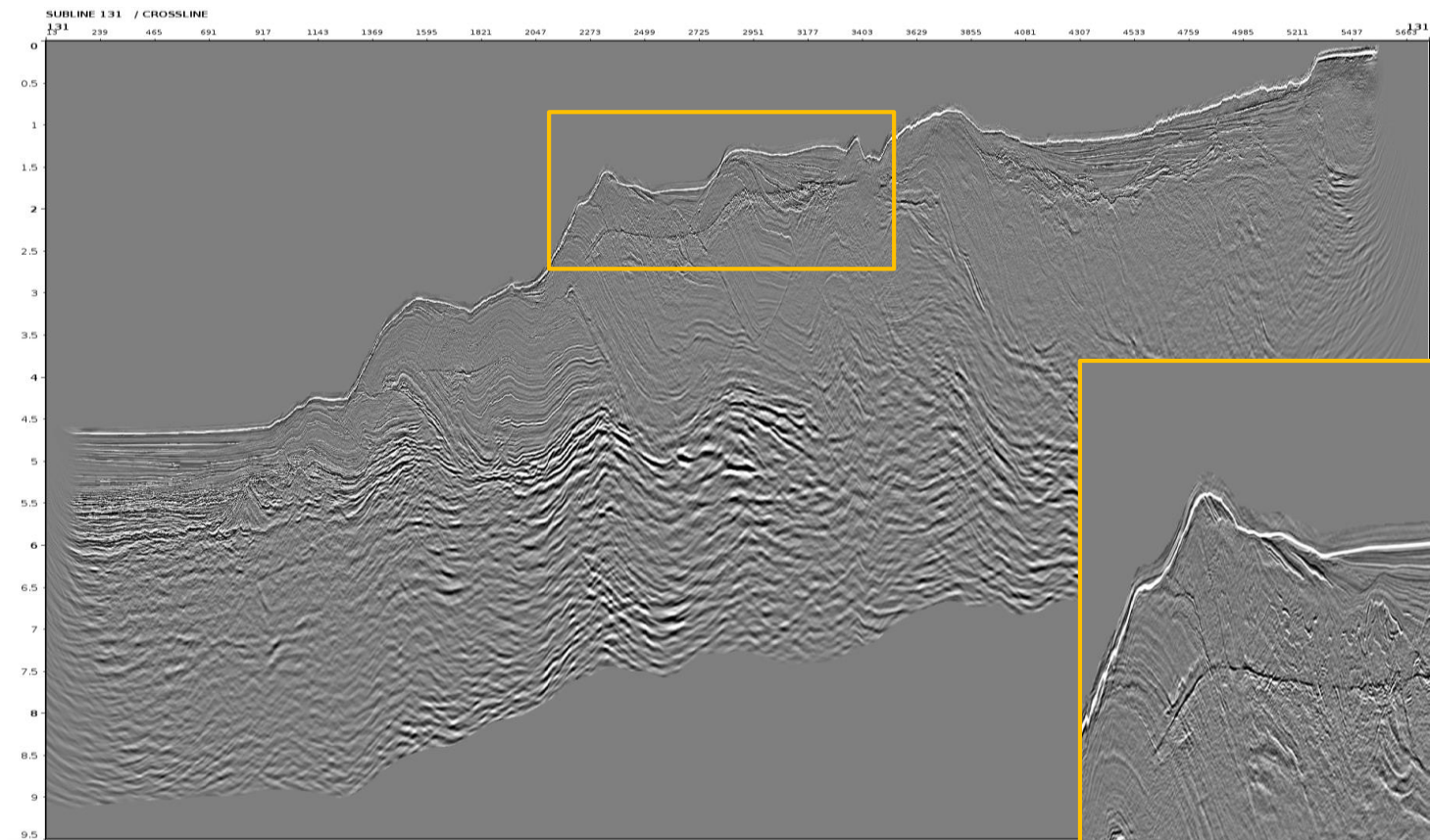
- High frequency compensation is observed on far angle stack



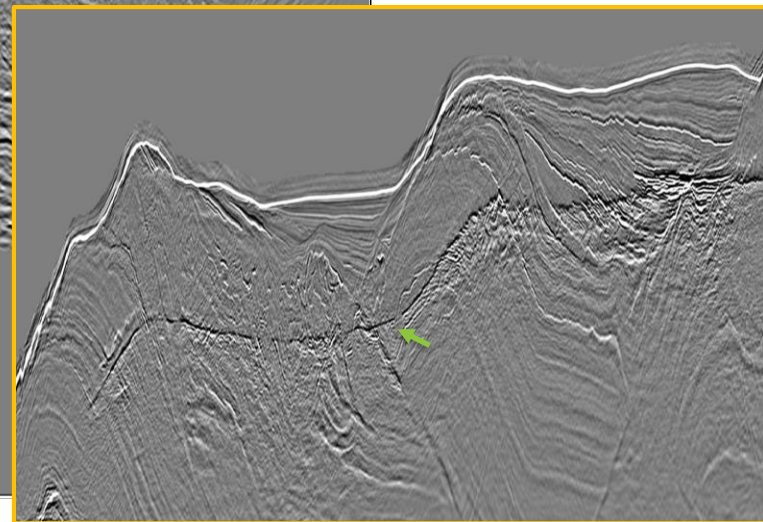


Far Angle Time Stack **after** Spectra Offset Balancing

15



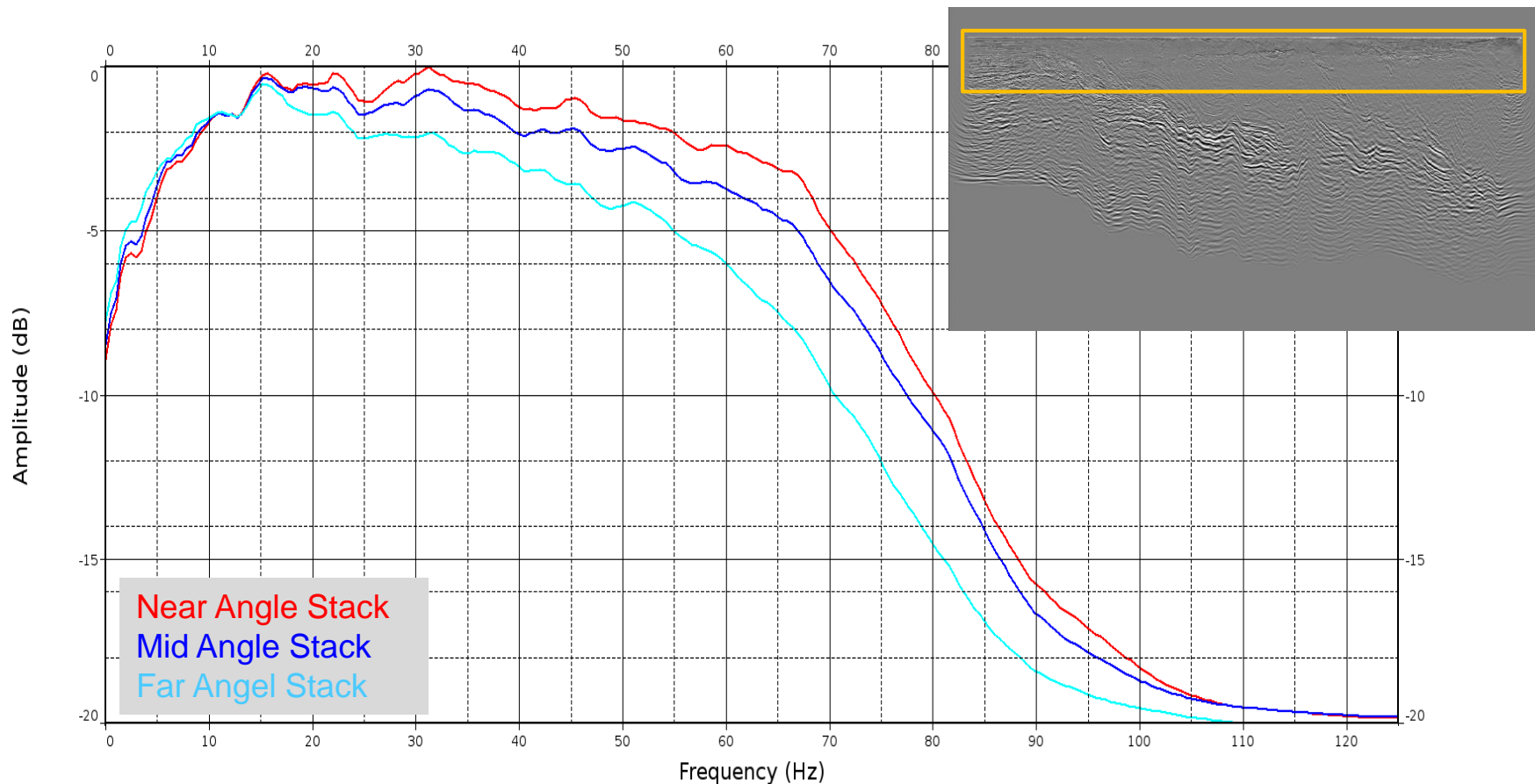
- High frequency compensation is observed on far angle stack





Amplitude Spectra before Spectra Offset Balancing

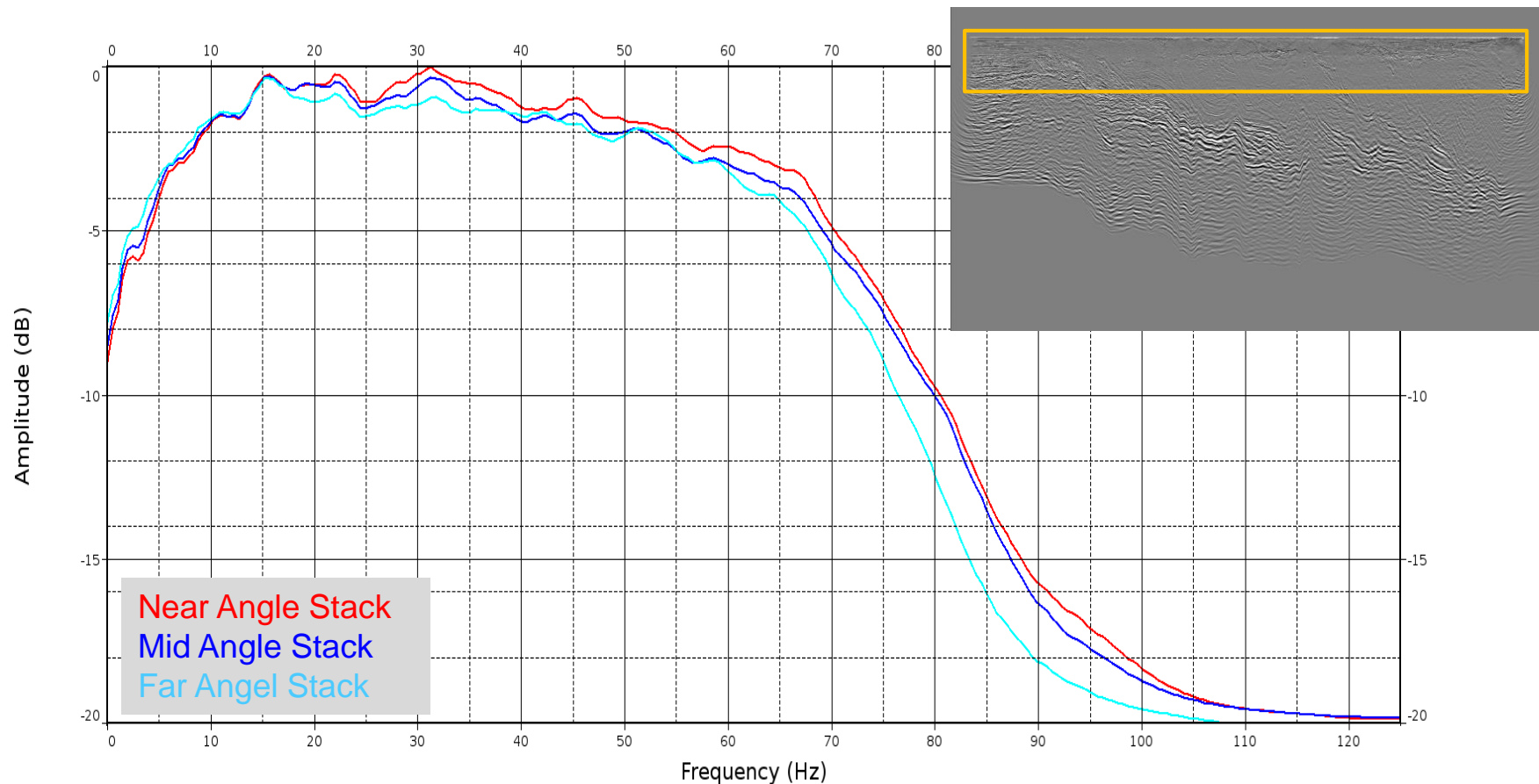
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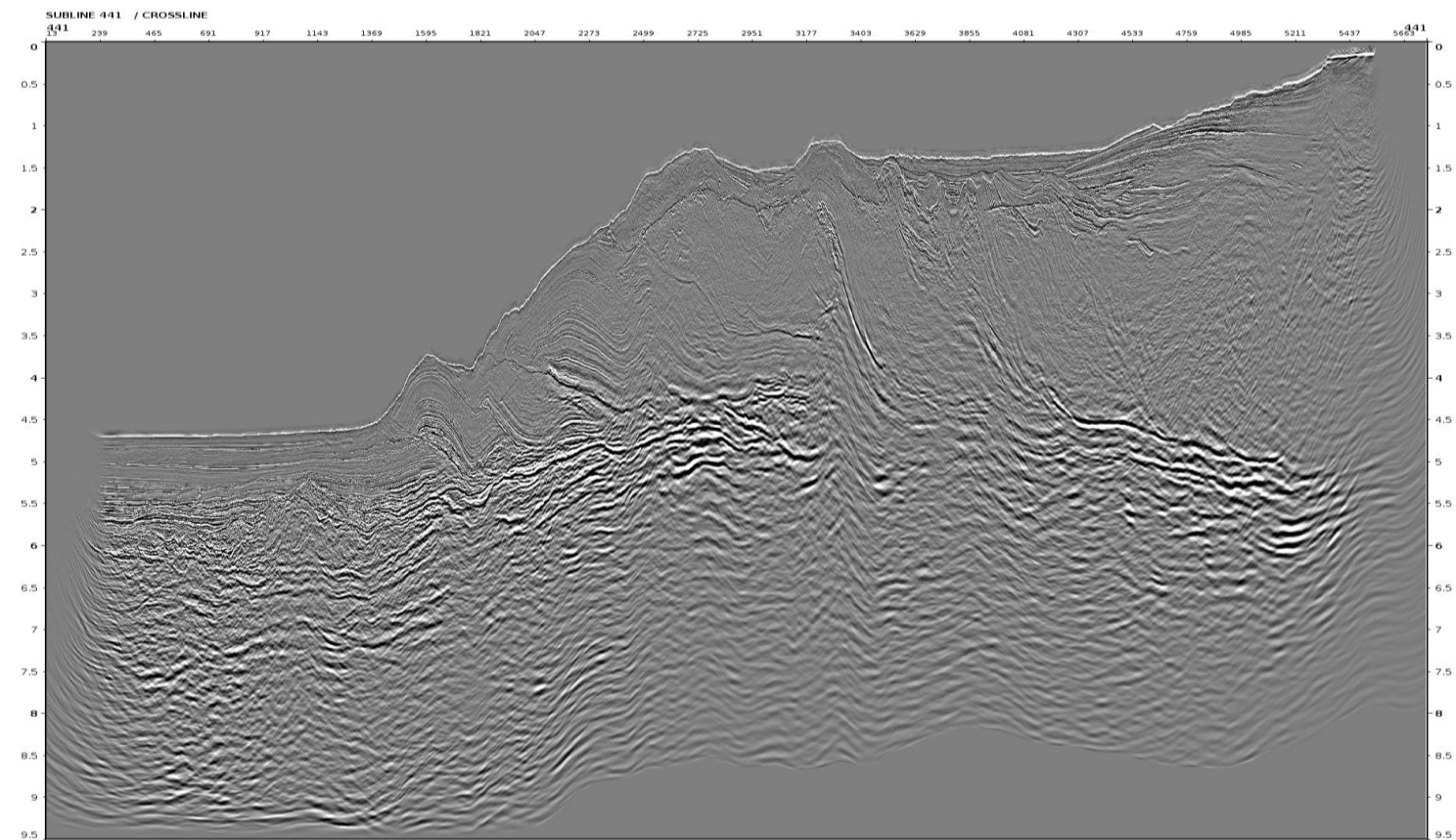
Amplitude Spectra **after** Spectra Offset Balancing

17

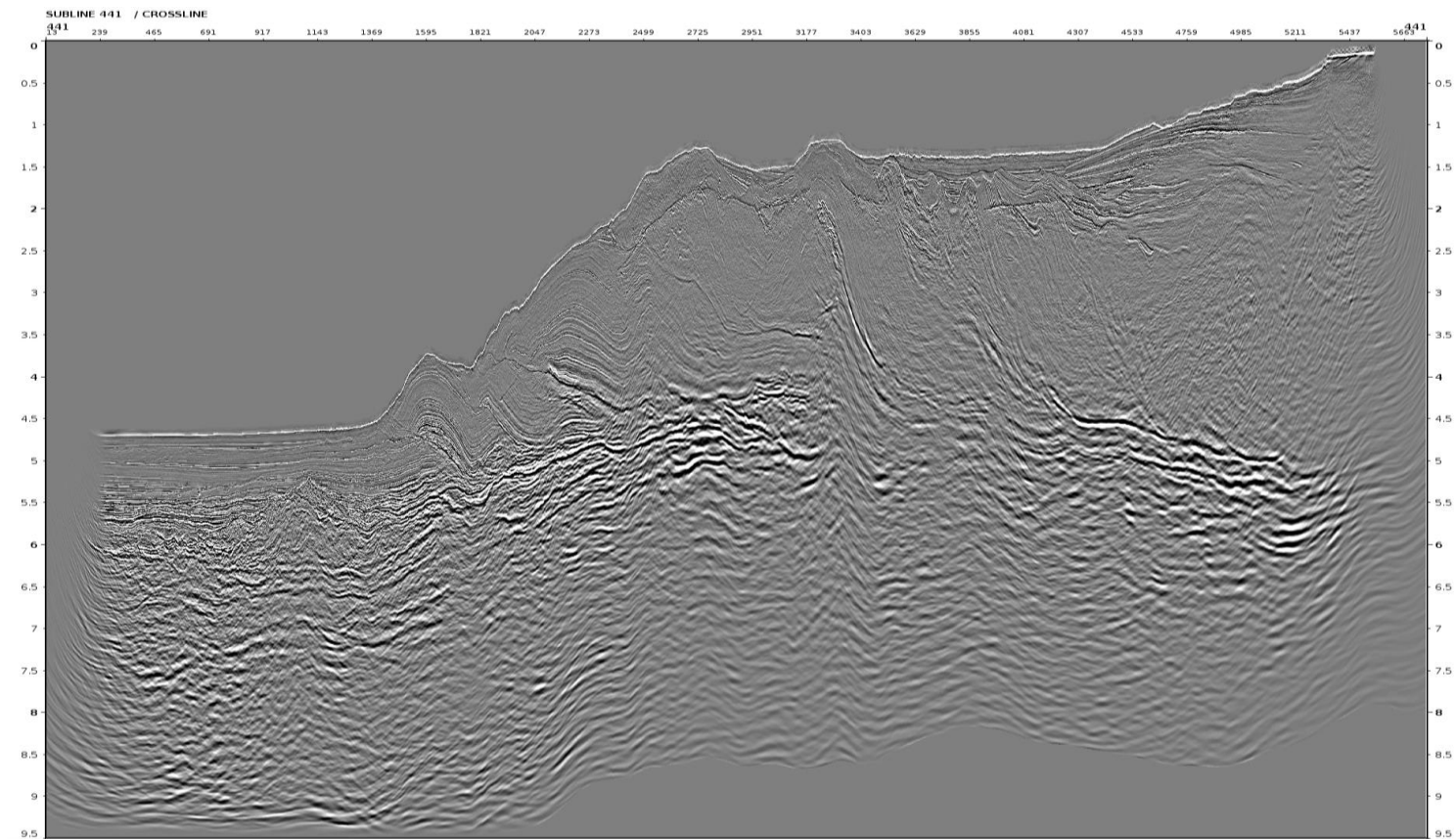


IL 441

- Near Angel (0 -11 deg) Time stack
- Mid Angel (11 -23 deg) Time stack
- Far Angel (23 -35 deg) Time stack
- Amplitude Spectra.



- No visible changes on near angle stack

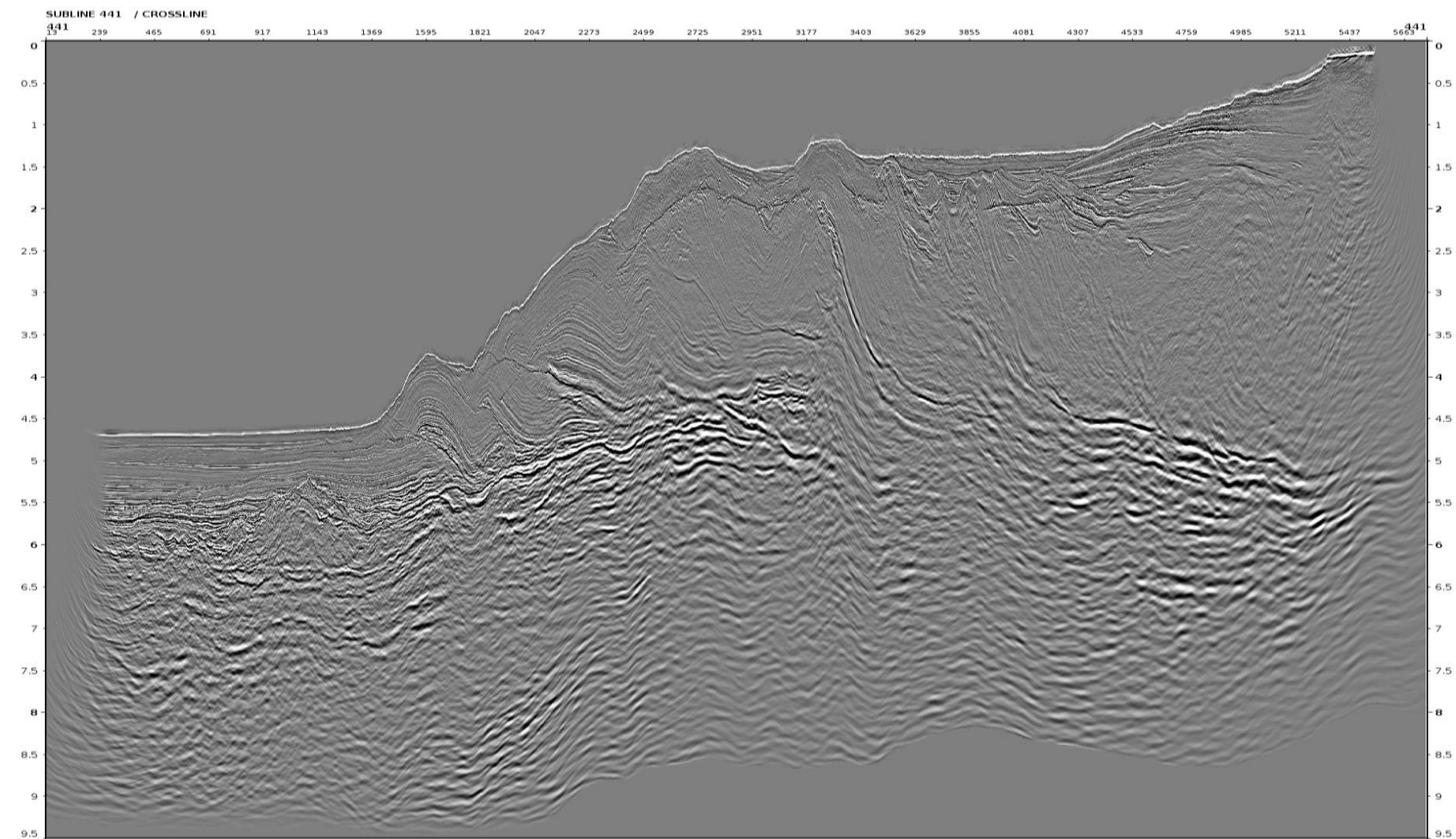


- No visible changes on near angle stack

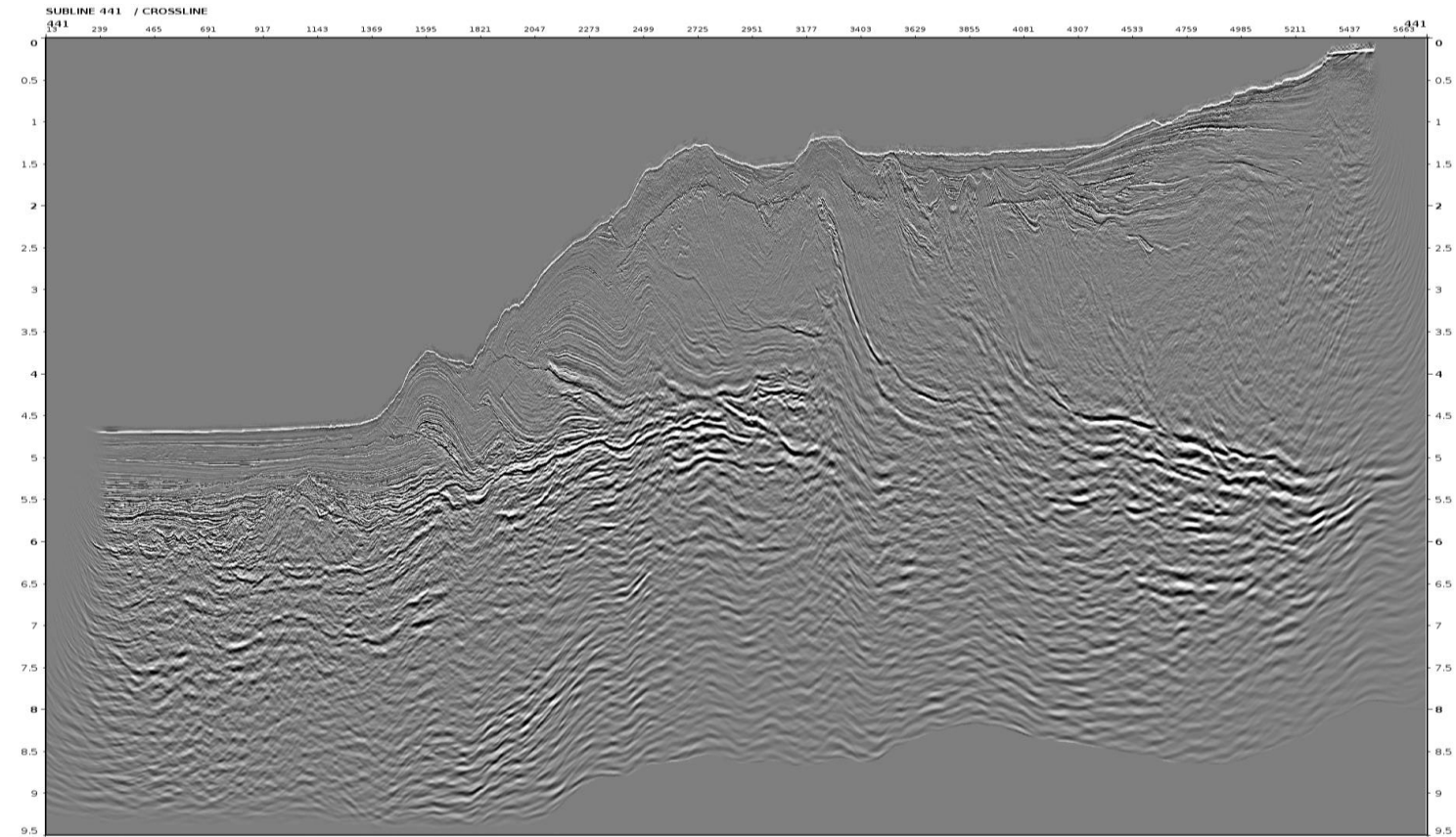


Mid Angle Time Stack **before** Spectra Offset Balancing

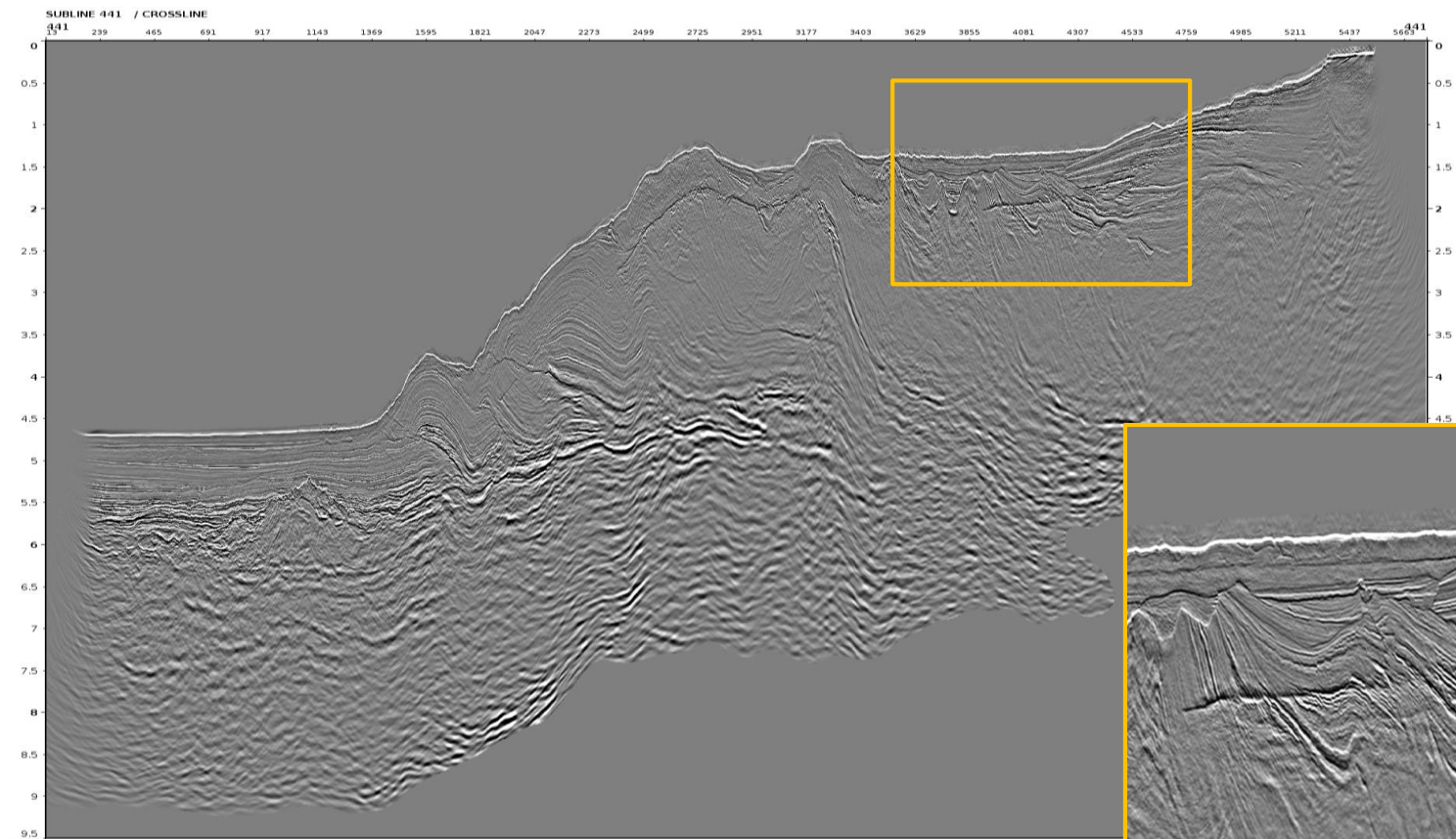
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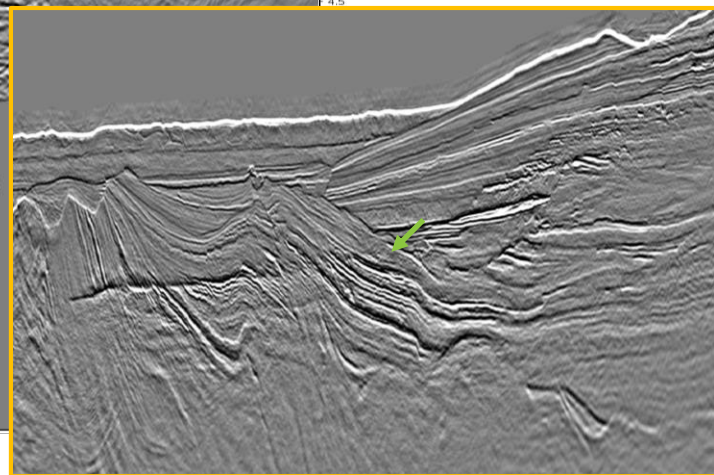
- High frequency compensation is observed on mid angle stack

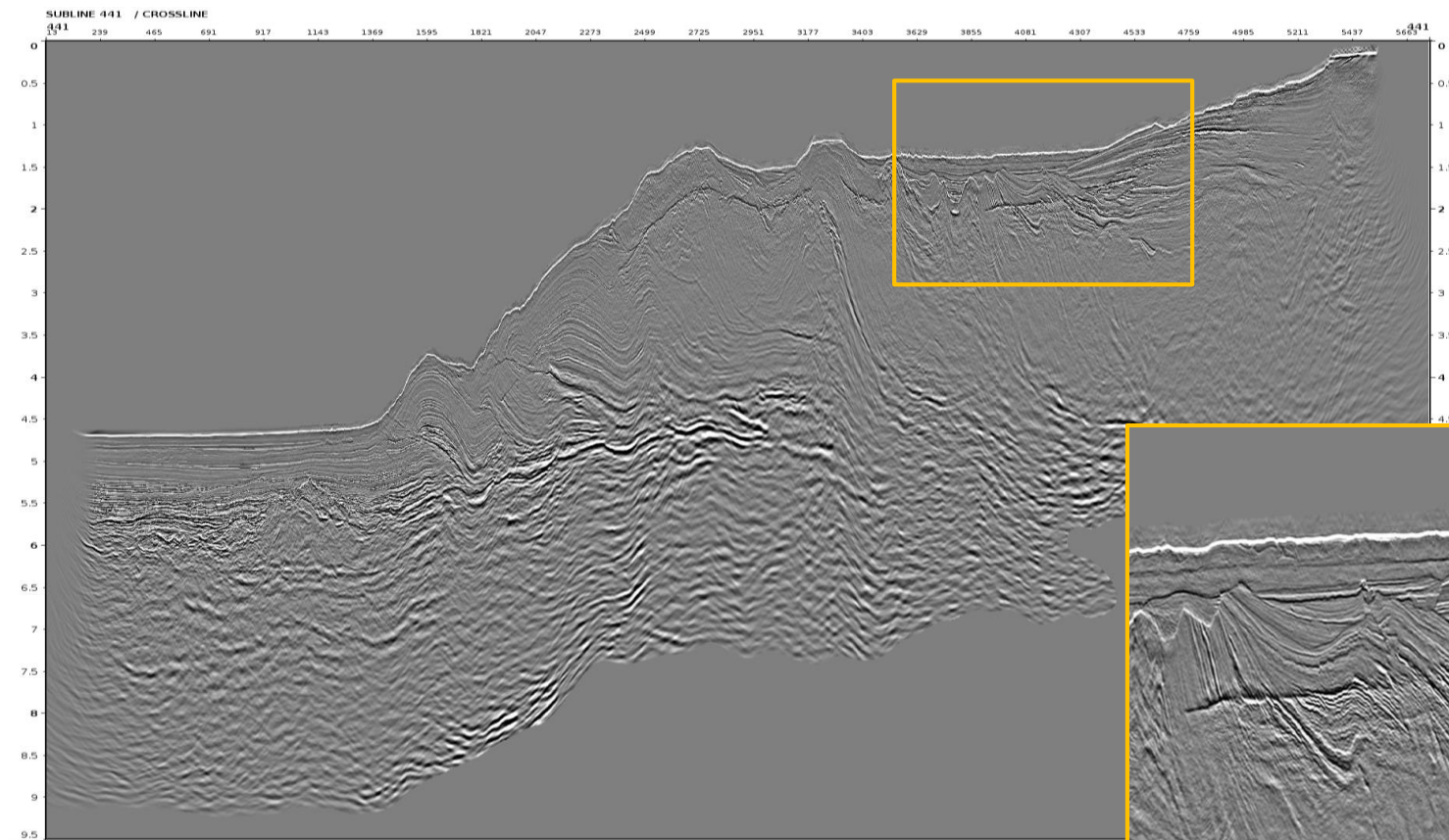


- High frequency compensation is observed on mid angle stack

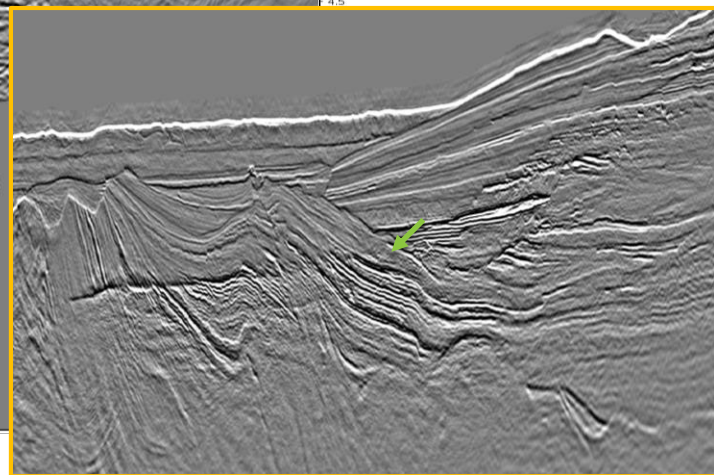


- High frequency compensation is observed on far angle stack





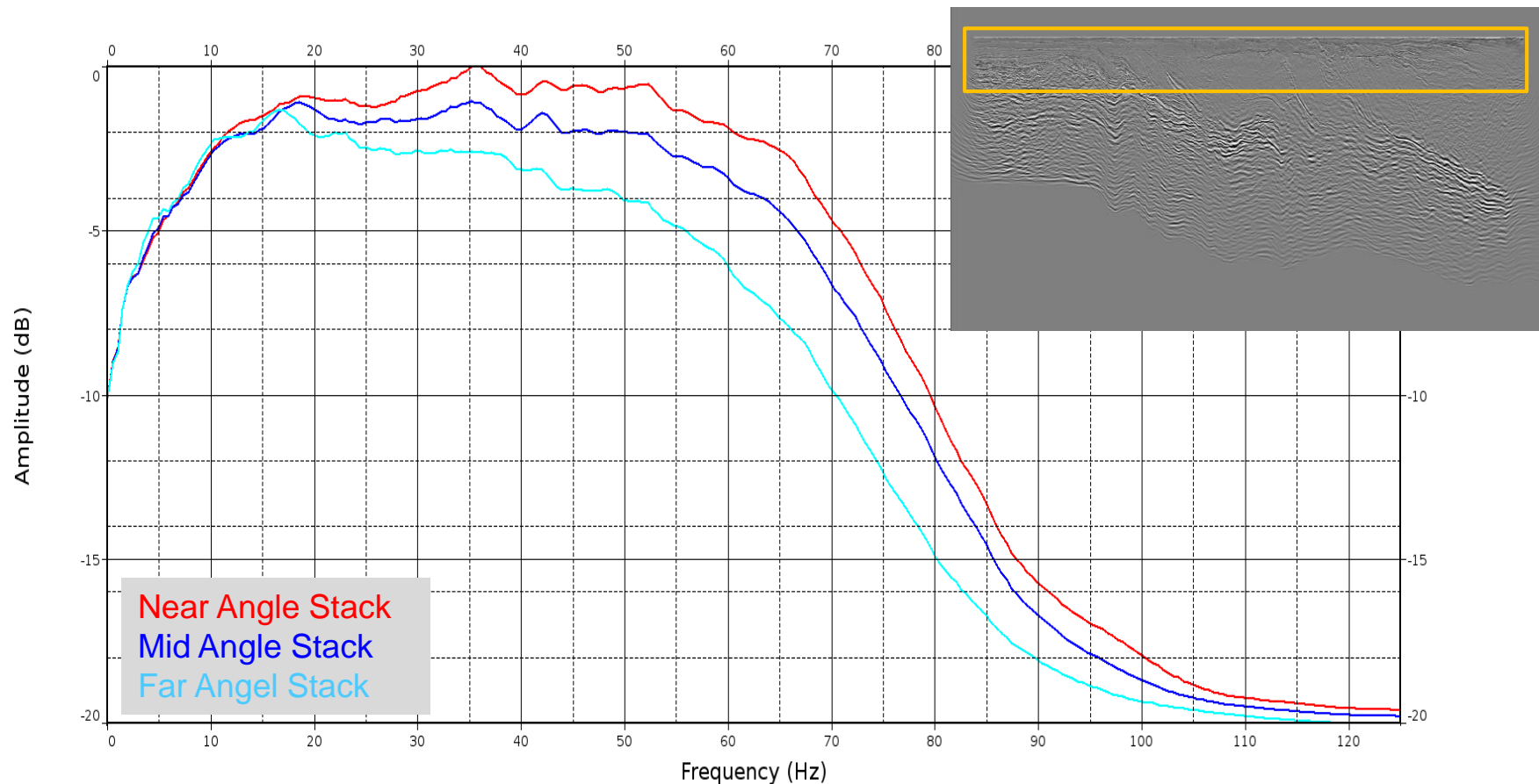
- High frequency compensation is observed on far angle stack





Amplitude Spectra before Spectra Offset Balancing

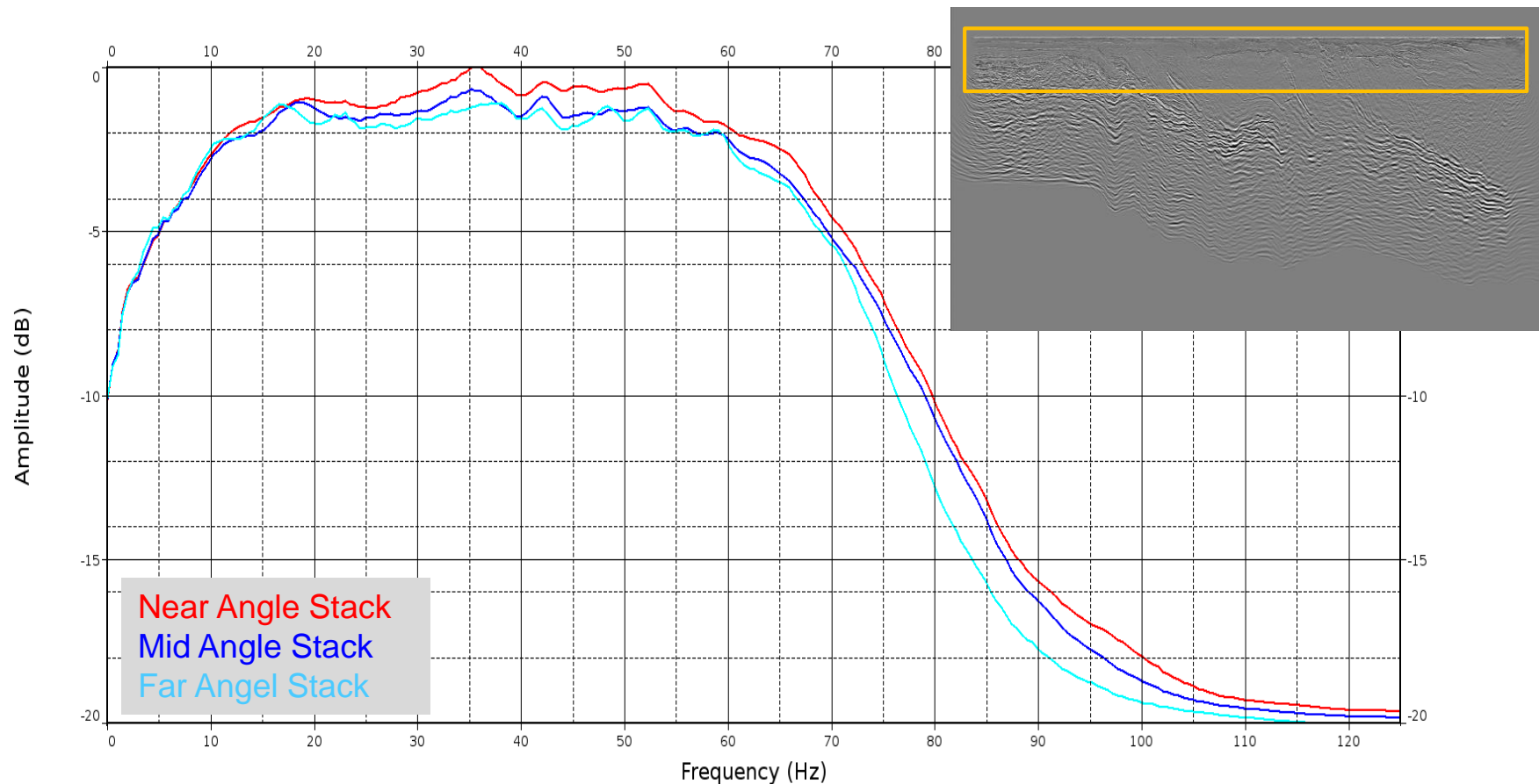
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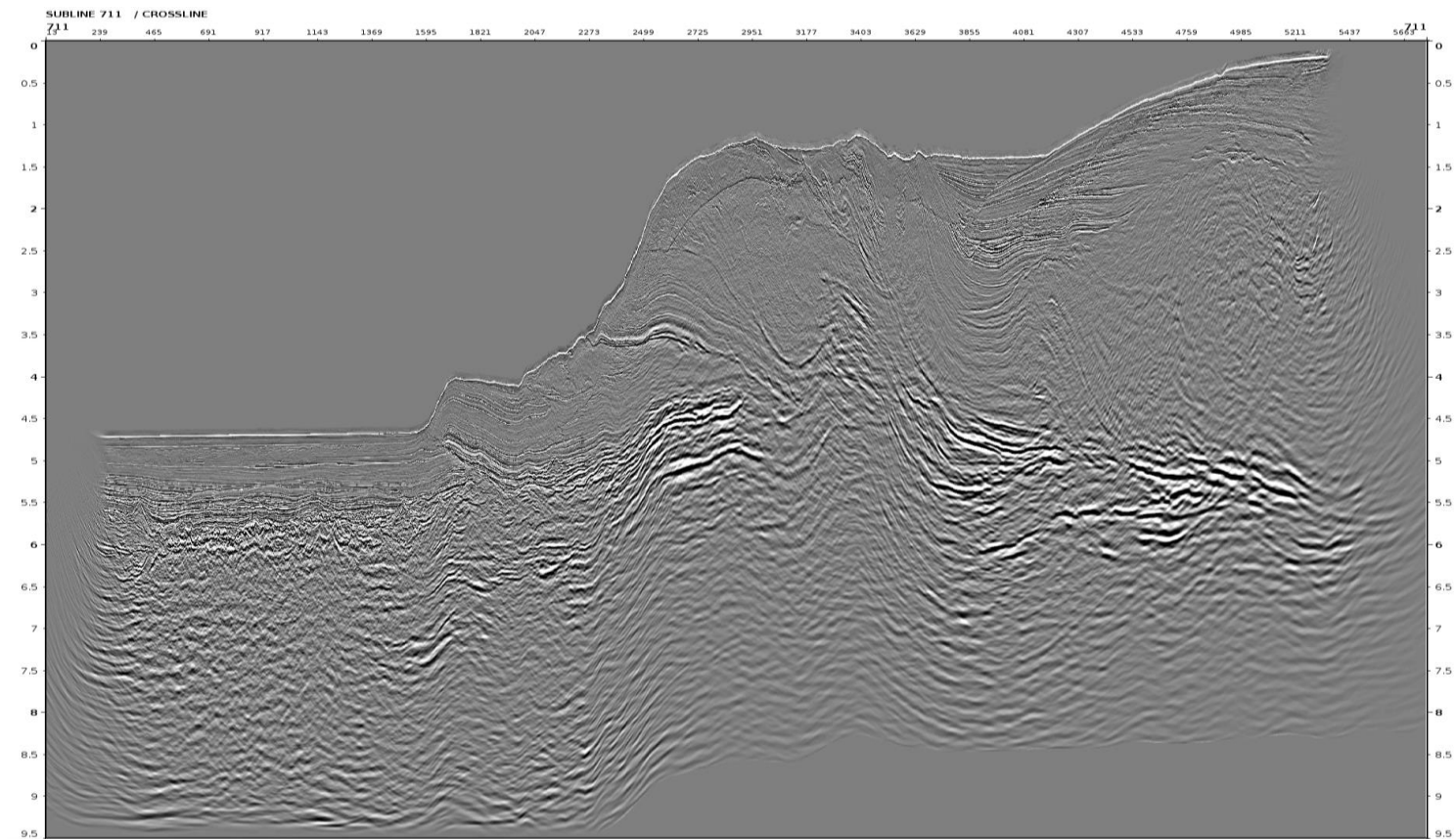
Amplitude Spectra **after** Spectra Offset Balancing

26

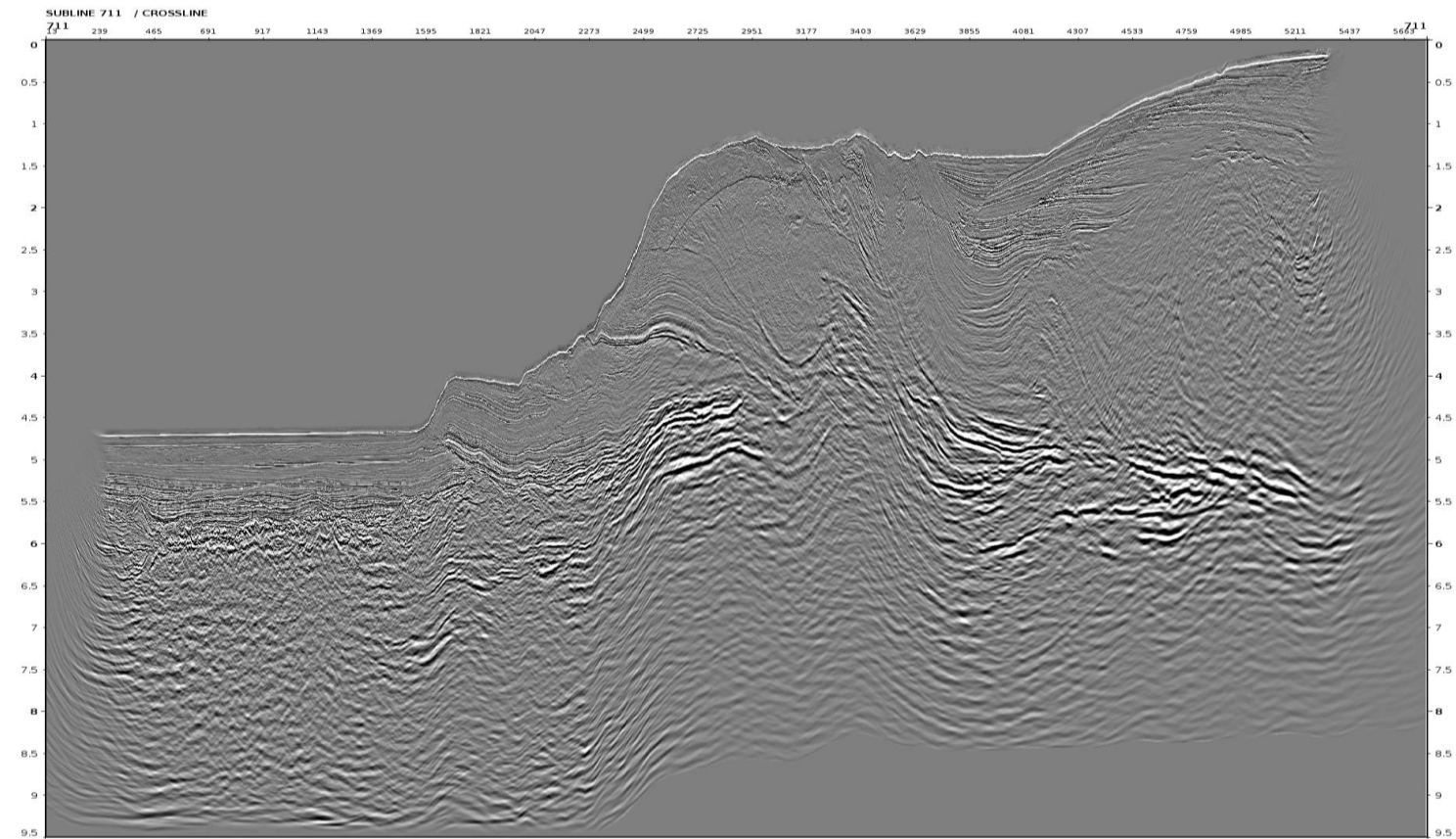


IL 711

- Near Angel (0 -11 deg) Time stack
- Mid Angel (11 -23 deg) Time stack
- Far Angel (23 -35 deg) Time stack
- Amplitude Spectra.



- No visible changes on near angle stack

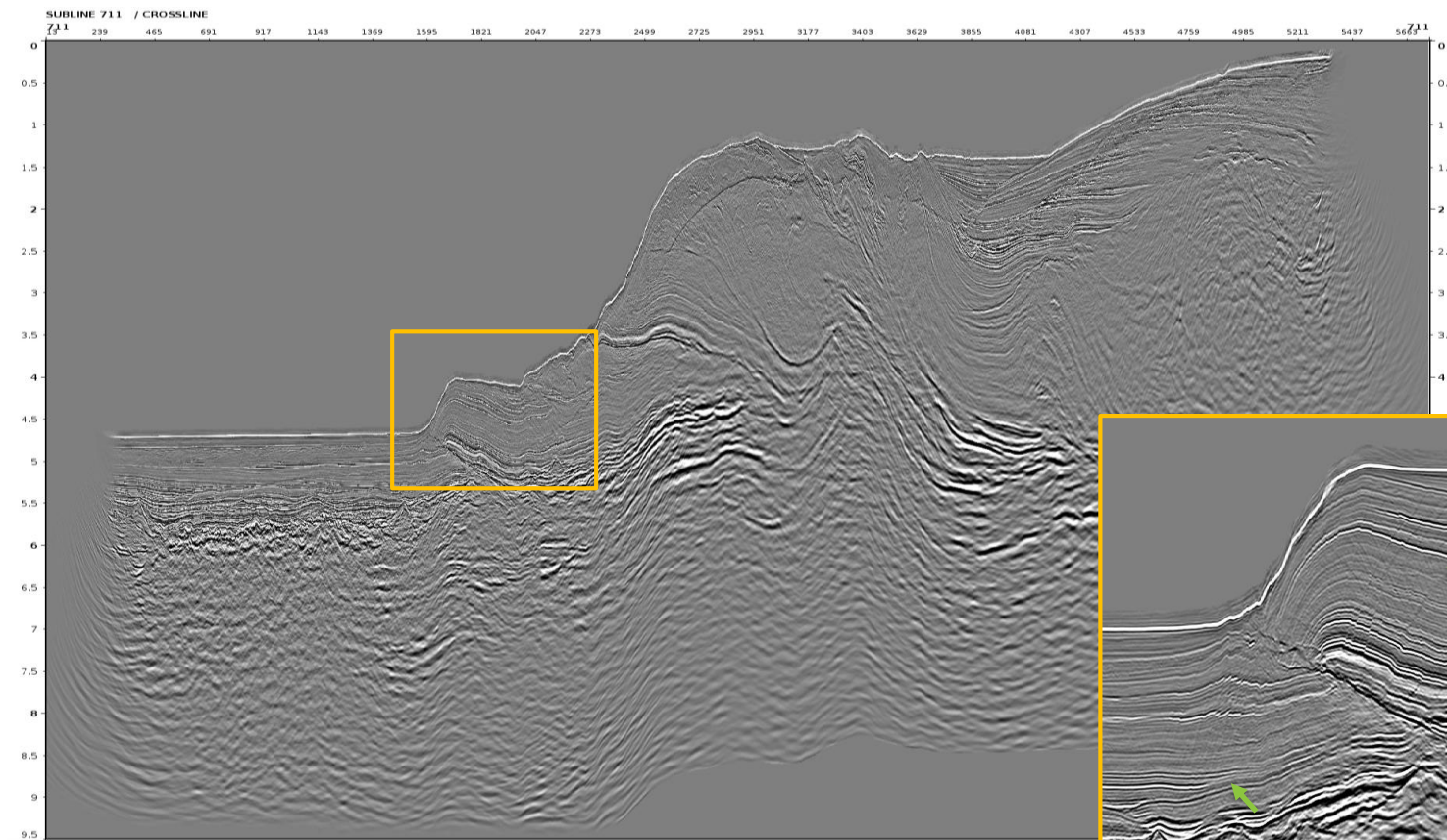


- No visible changes on near angle stack

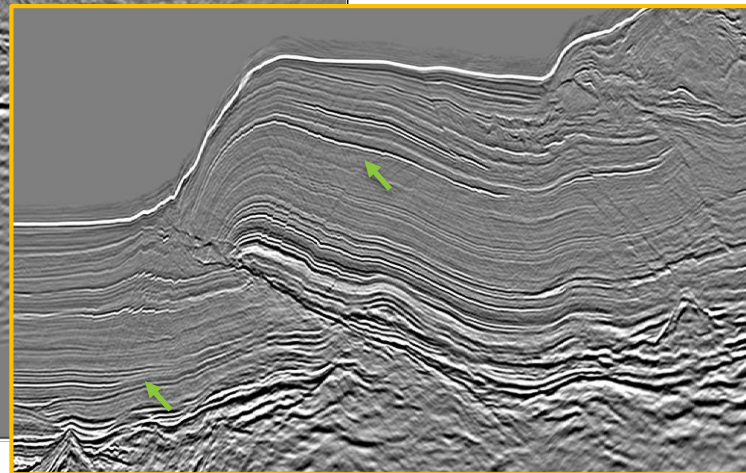


Mid Angle Time Stack **before** Spectra Offset Balancing

30



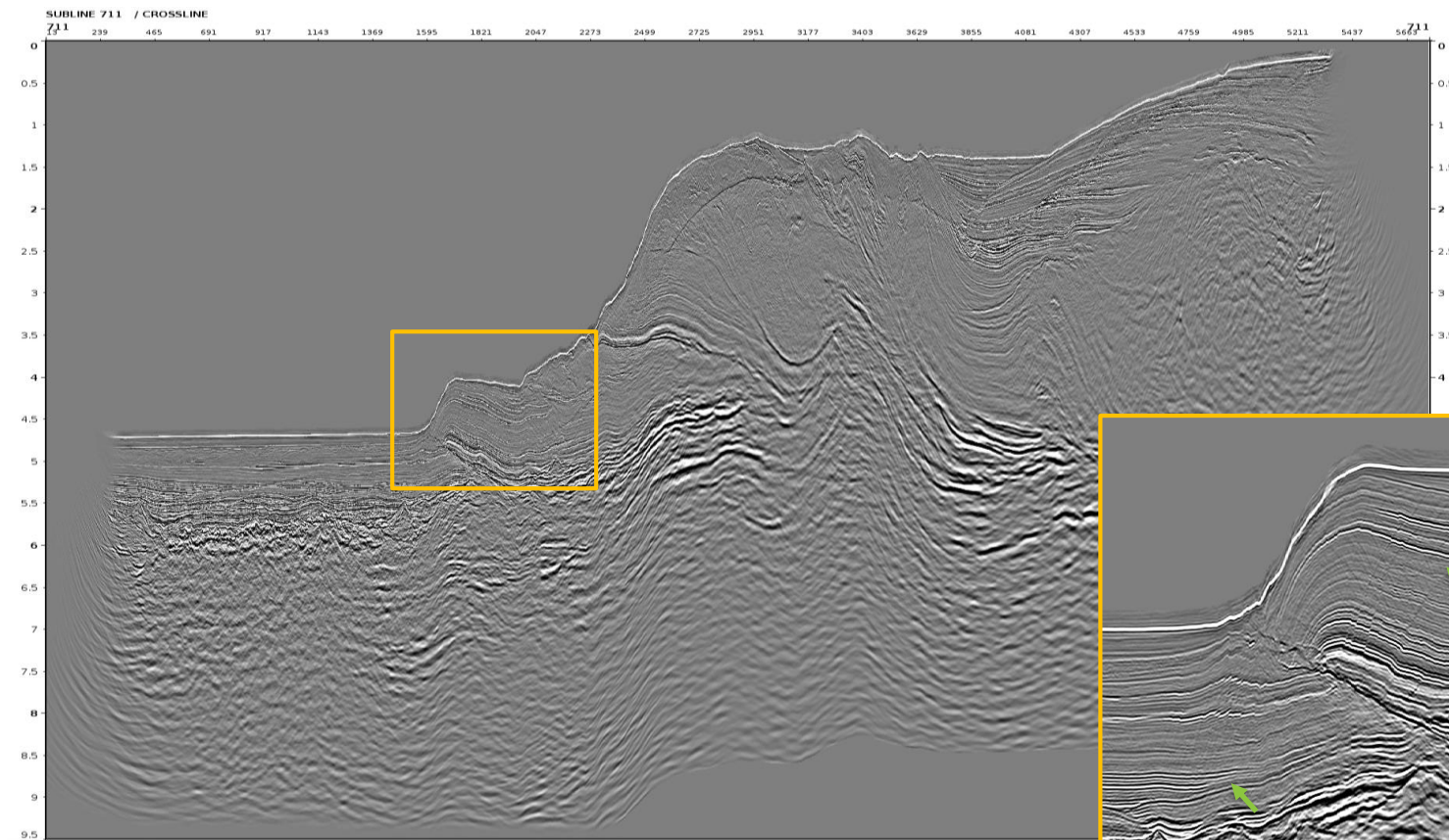
- High frequency compensation is observed on mid angle stack



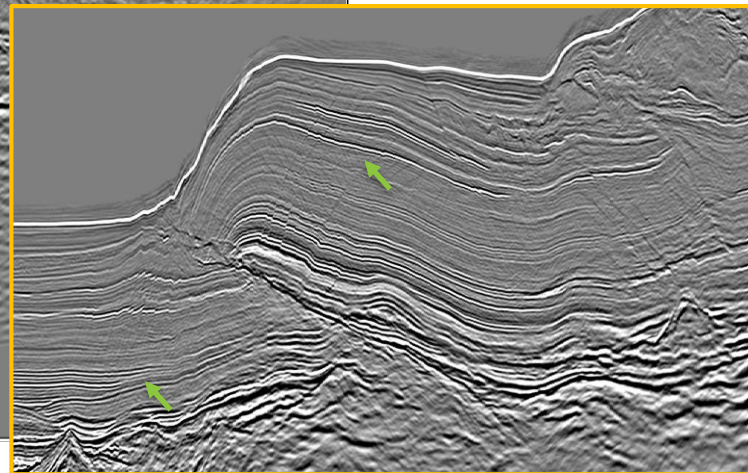


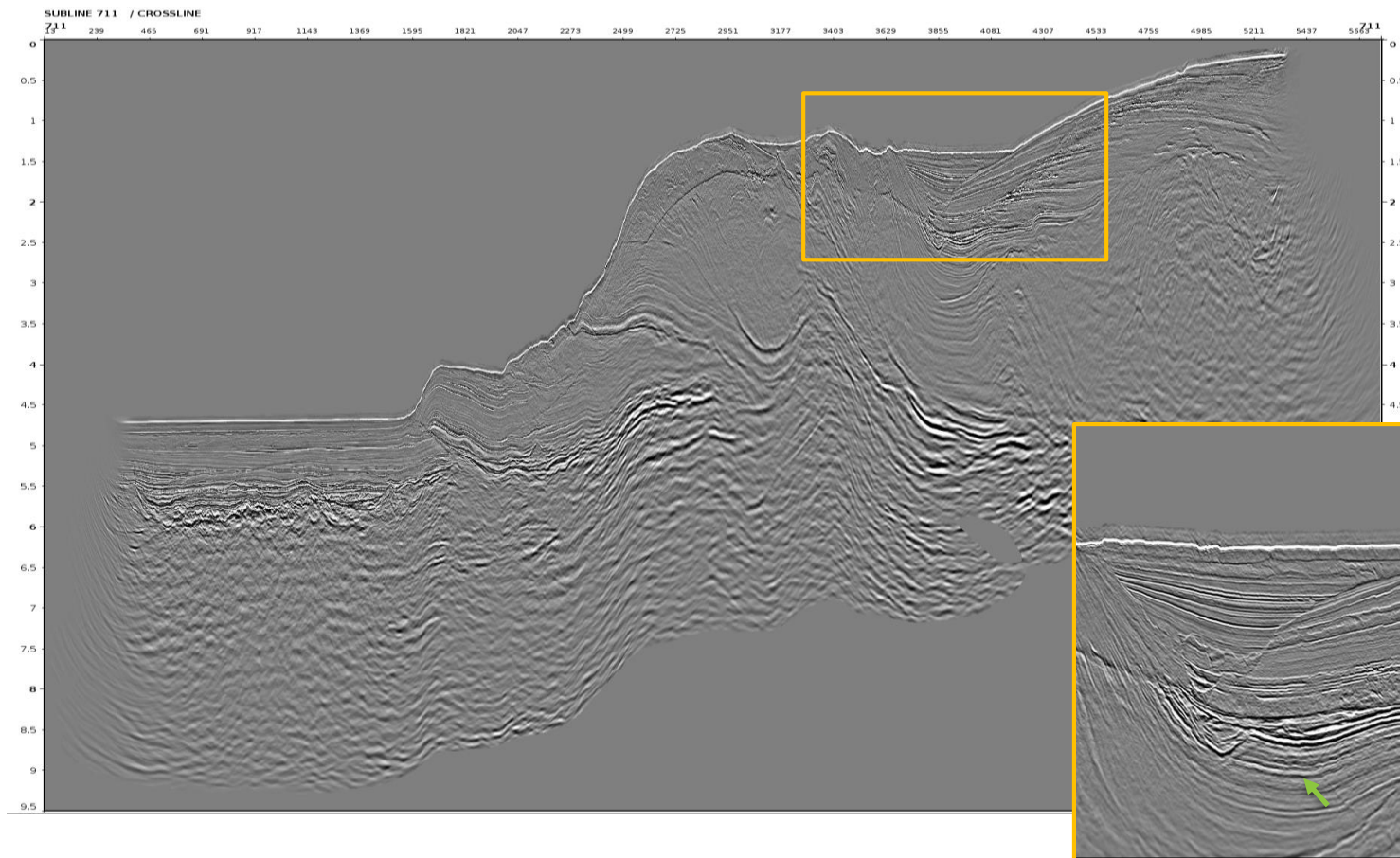
Mid Angle Time Stack **after** Spectra Offset Balancing

31

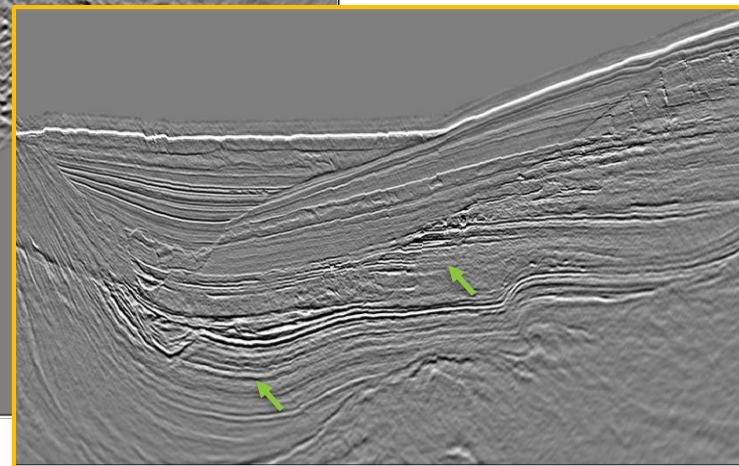


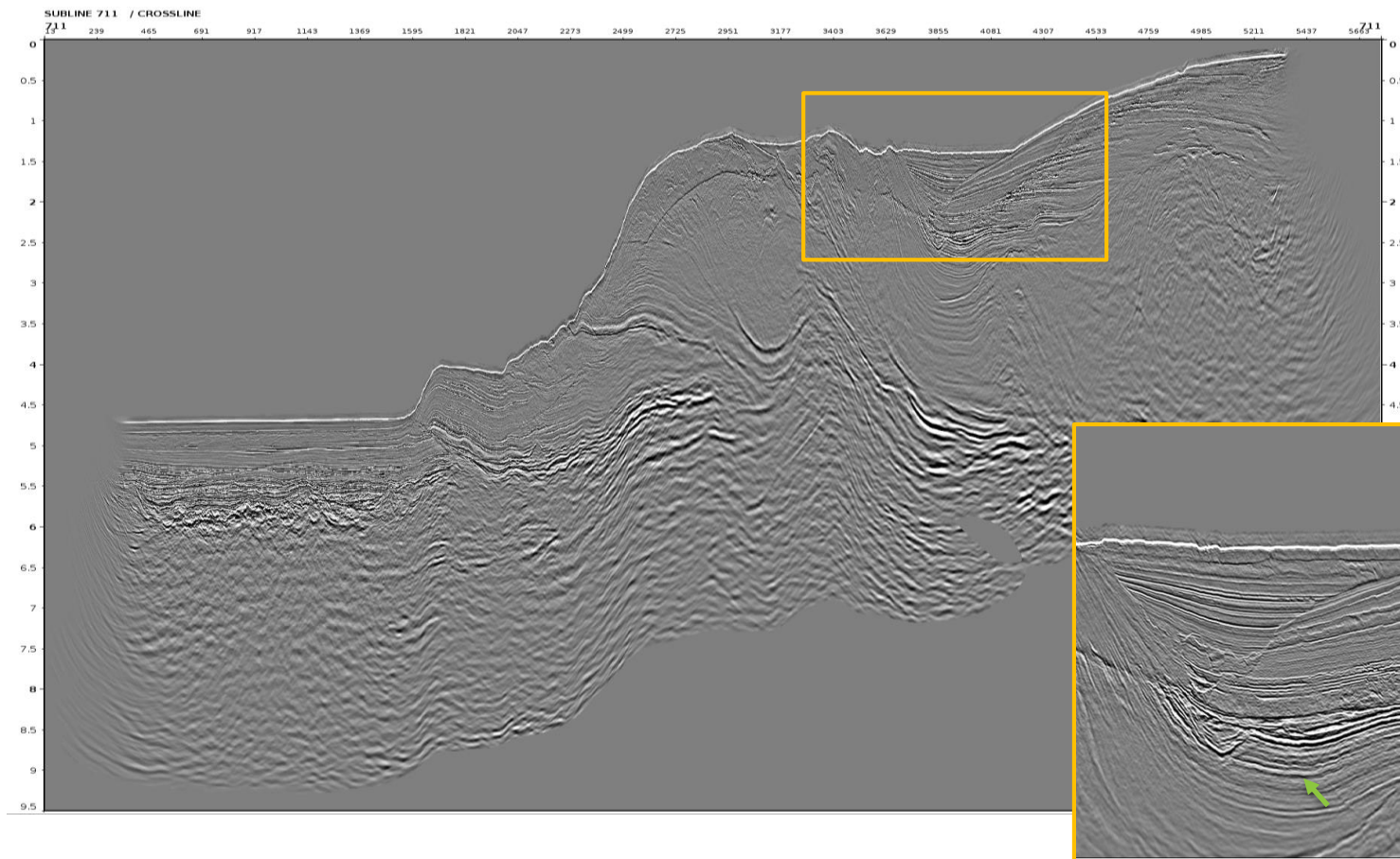
- High frequency compensation is observed on mid angle stack



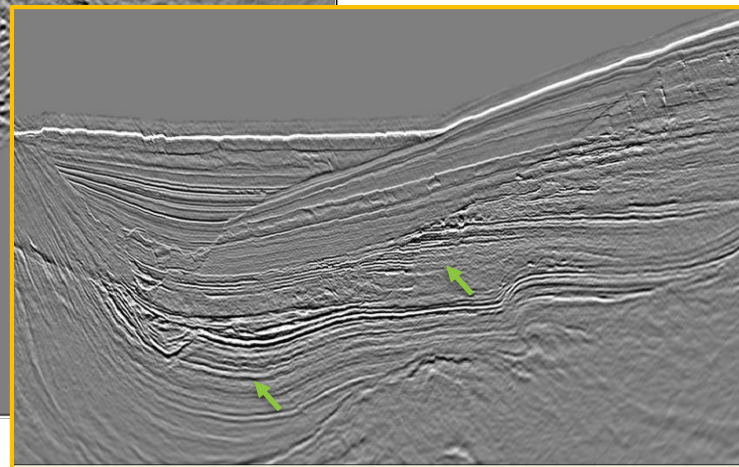


- High frequency compensation is observed on far angle stack





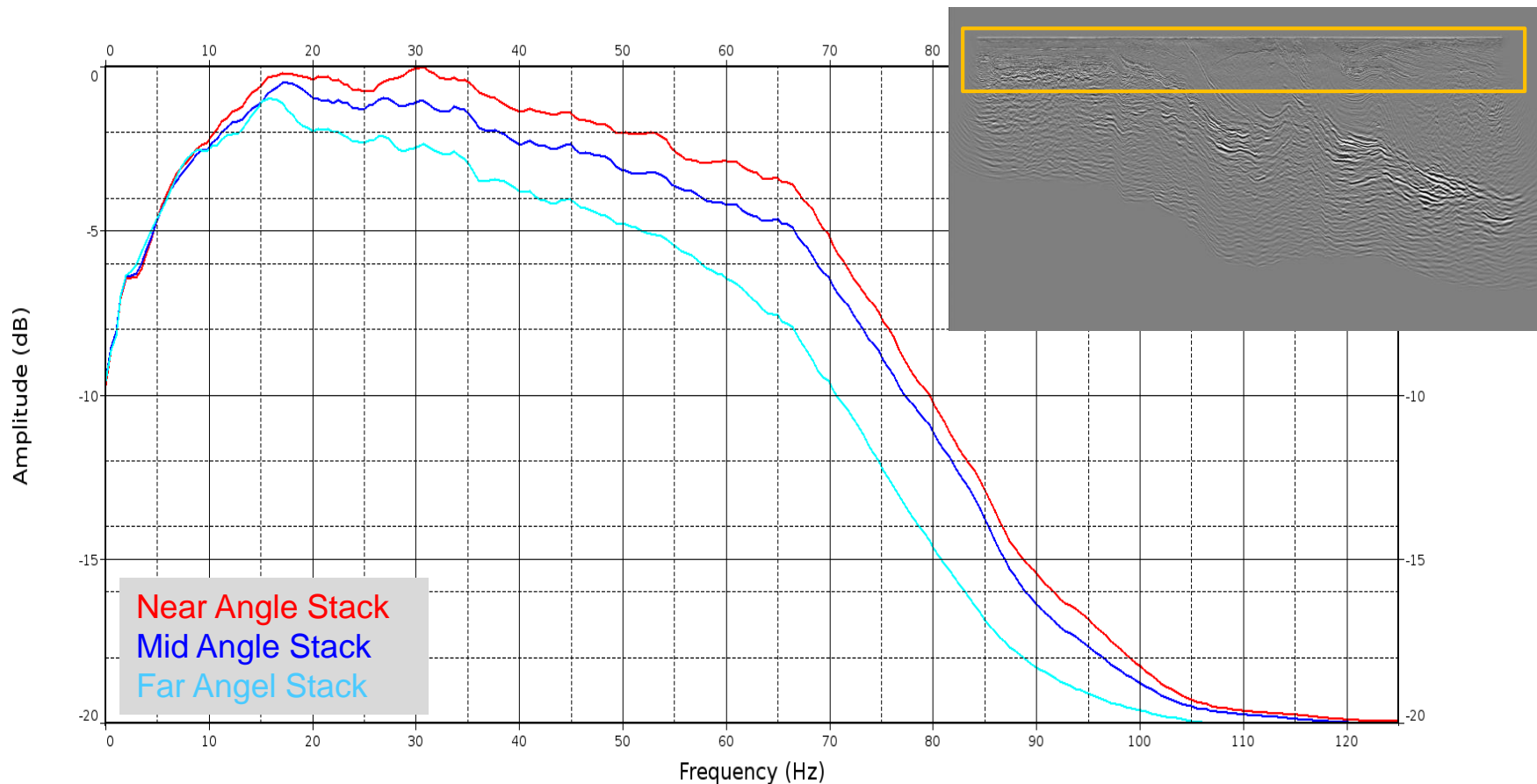
- High frequency compensation is observed on far angle stack





Amplitude Spectra before Spectra Offset Balancing

34





Amplitude Spectra **after** Spectra Offset Balancing

35

