Q Compensation (Amplitude)

NZ 3D Processing

16 June 2021

INSTITUTE FOR GEOPHYSICS

cgg.com

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Processing flow

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)

Outline

- **Objective:**

  To apply Q value which account for the earth absorption effect for amplitude compensation.

- **Procedure:**

  Q value : 105
  Reference frequency: 35Hz
  Q value compensation limitation: (1) 5dB (2) 10dB (3) 15dB

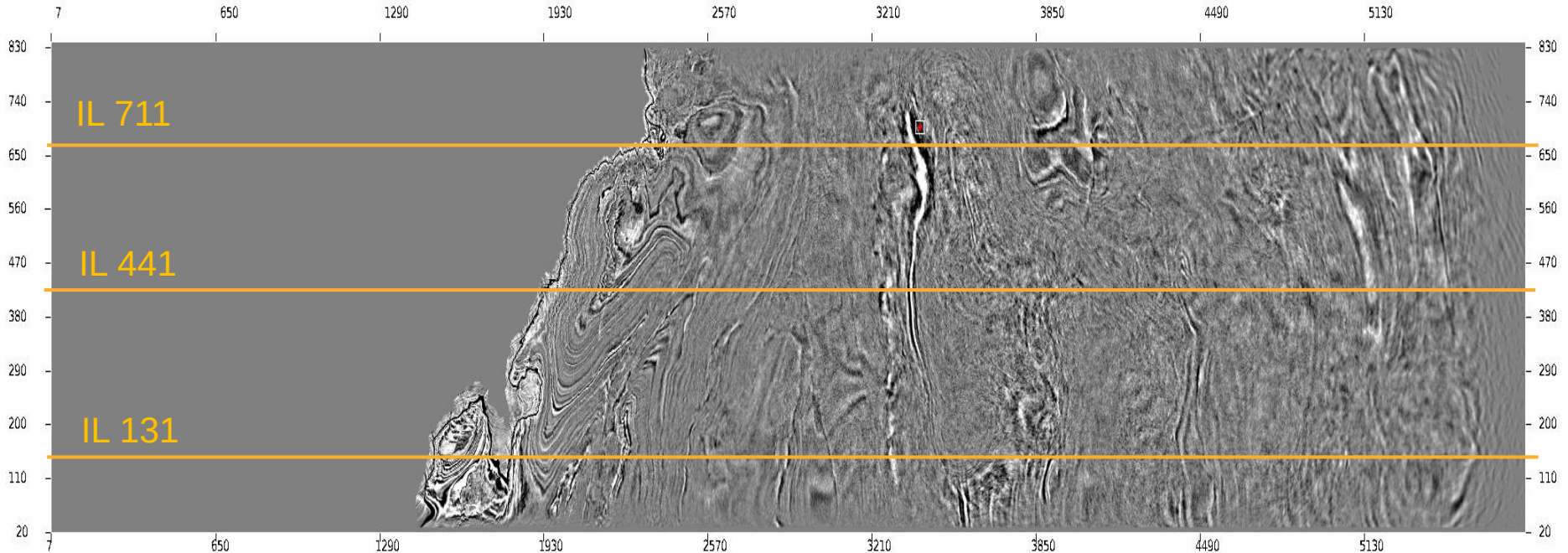
- **Display:**

  Time stack, amplitude spectra.

- **Observation & Recommendation:**

  Q compensation limited at 10 dB is recommended, where high frequency energy get compensated and noise energy boost remains low.

Test location



Subline

Crossline

IL 131

- Time stack without Q compensation
- Time stack with Q limited at 5 dB
- Time stack with Q limited at 10 dB
- Time stack with Q limited at 15 dB

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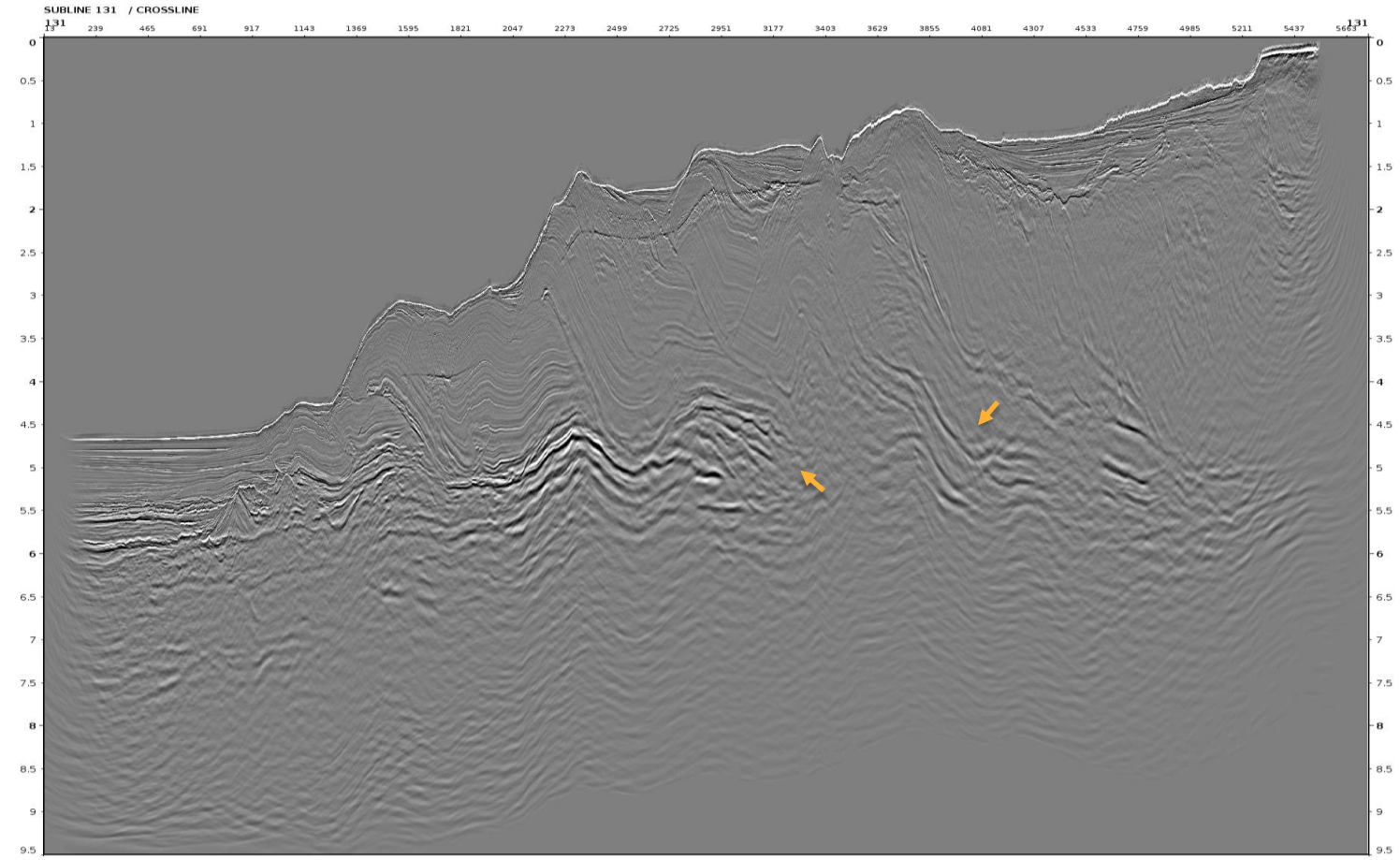
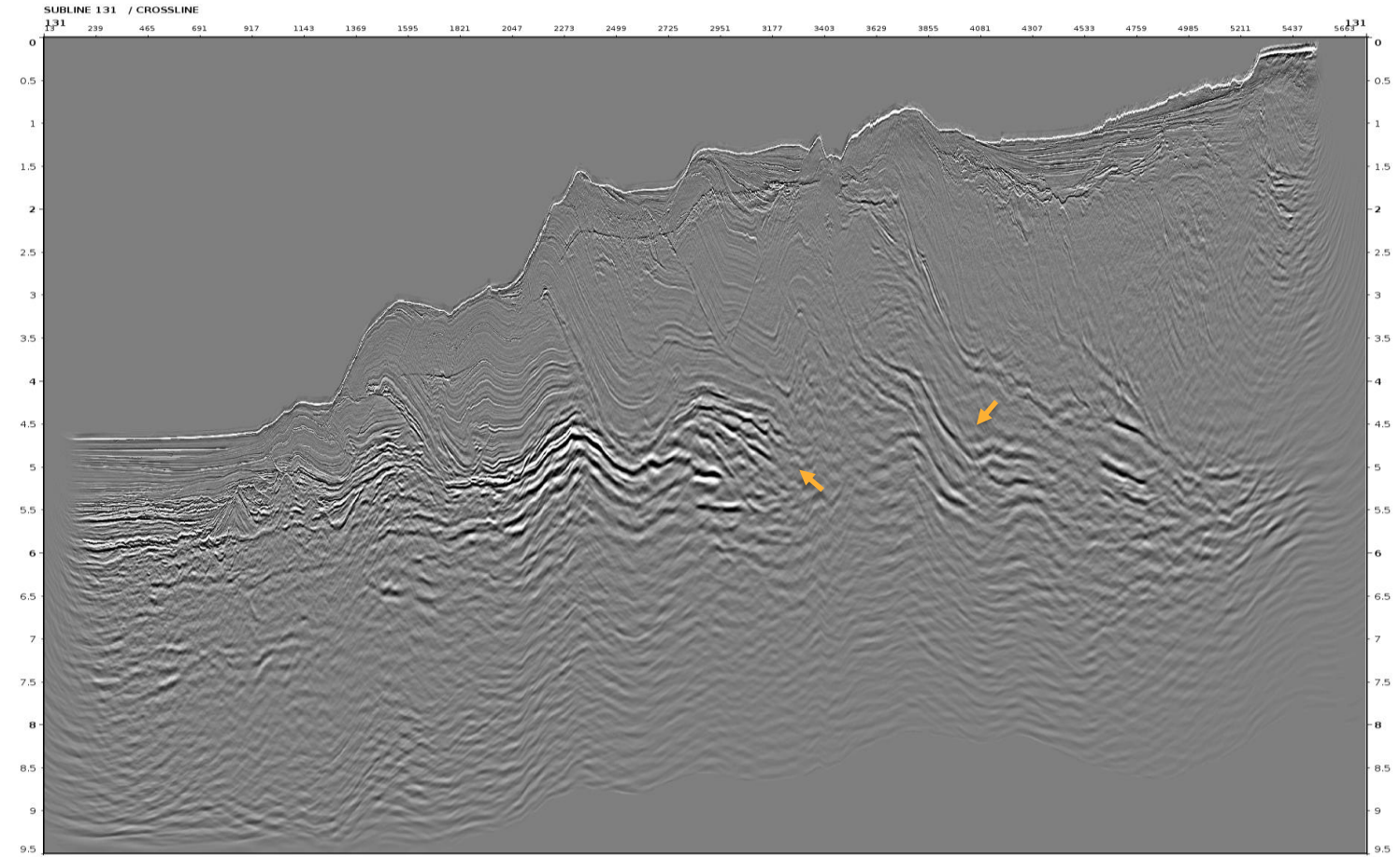
Time Stack before Q Amplitude Compensation



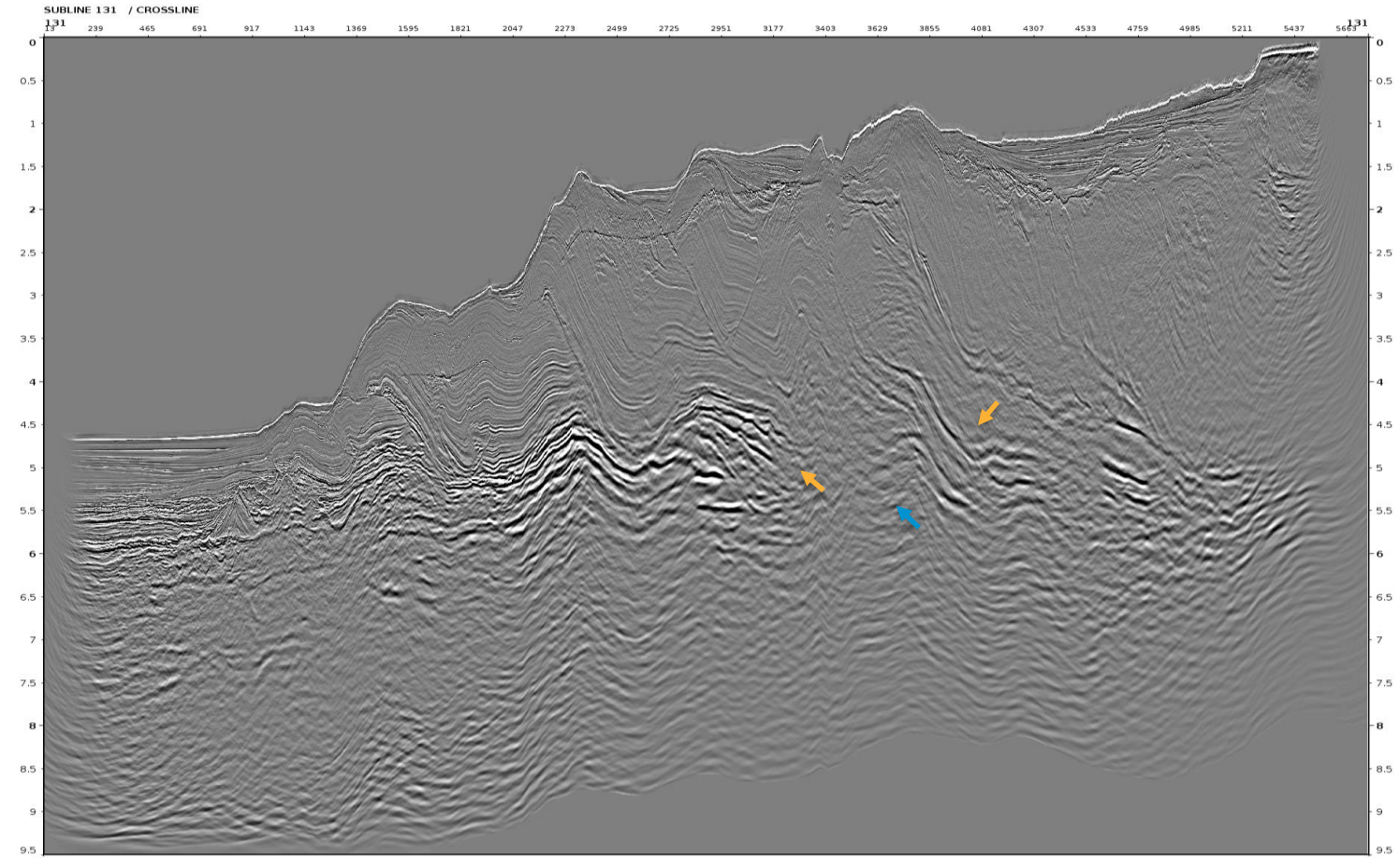
- Primaries amplitude at high frequency get compensated.

Time Stack: after Q Amp Compensation Limited at 5dB



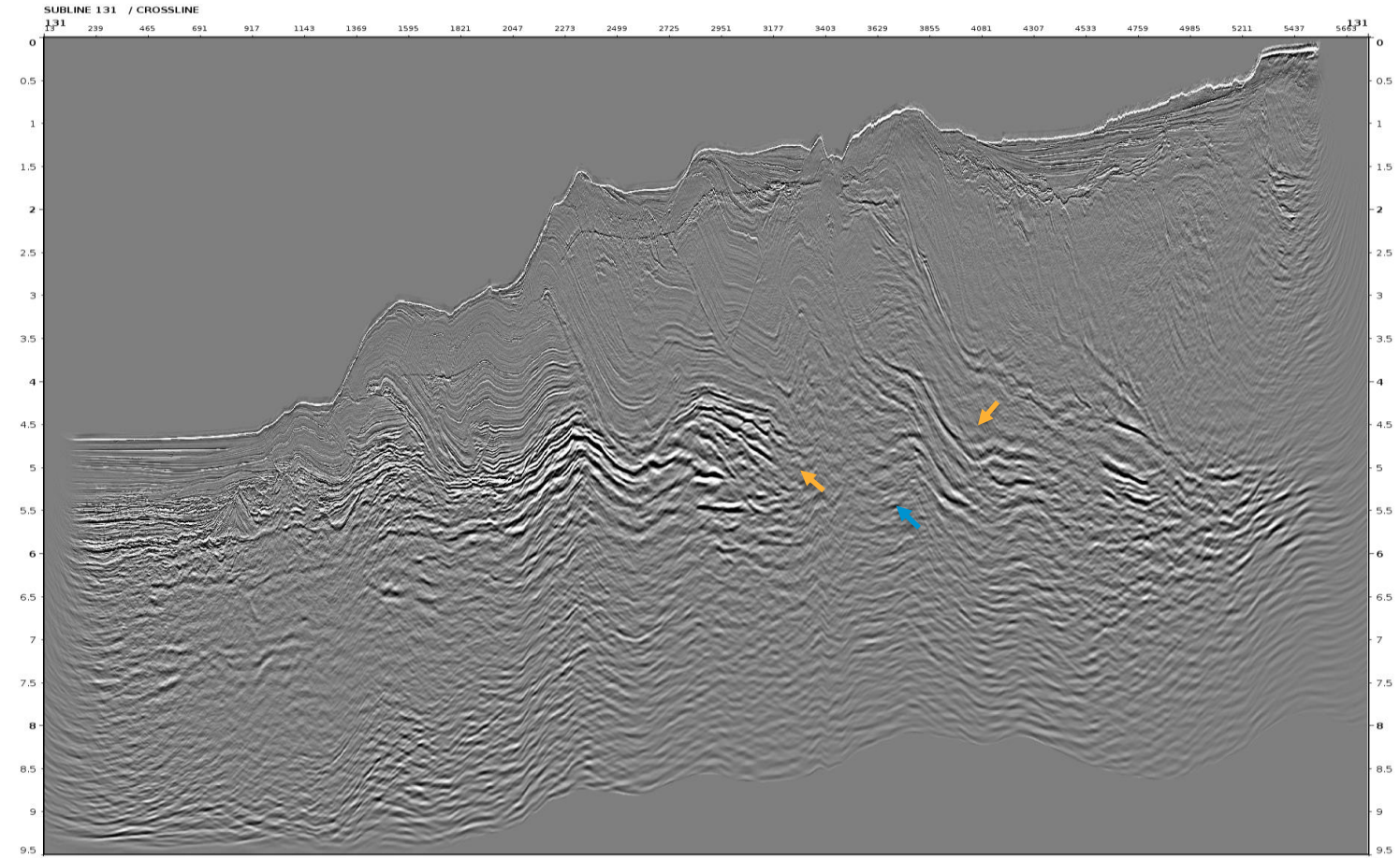
- Primaries amplitude at high frequency get compensated.

Time Stack: after Q Amp Compensation Limited at 10dB



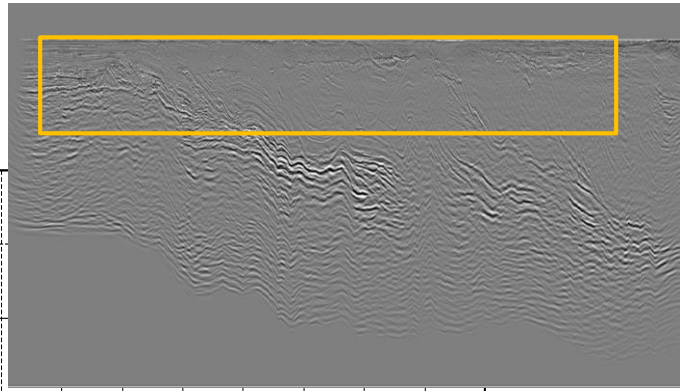
- Primaries amplitude at high frequency get compensated, more details can be recognized.
- Noise energy boost a little bit.

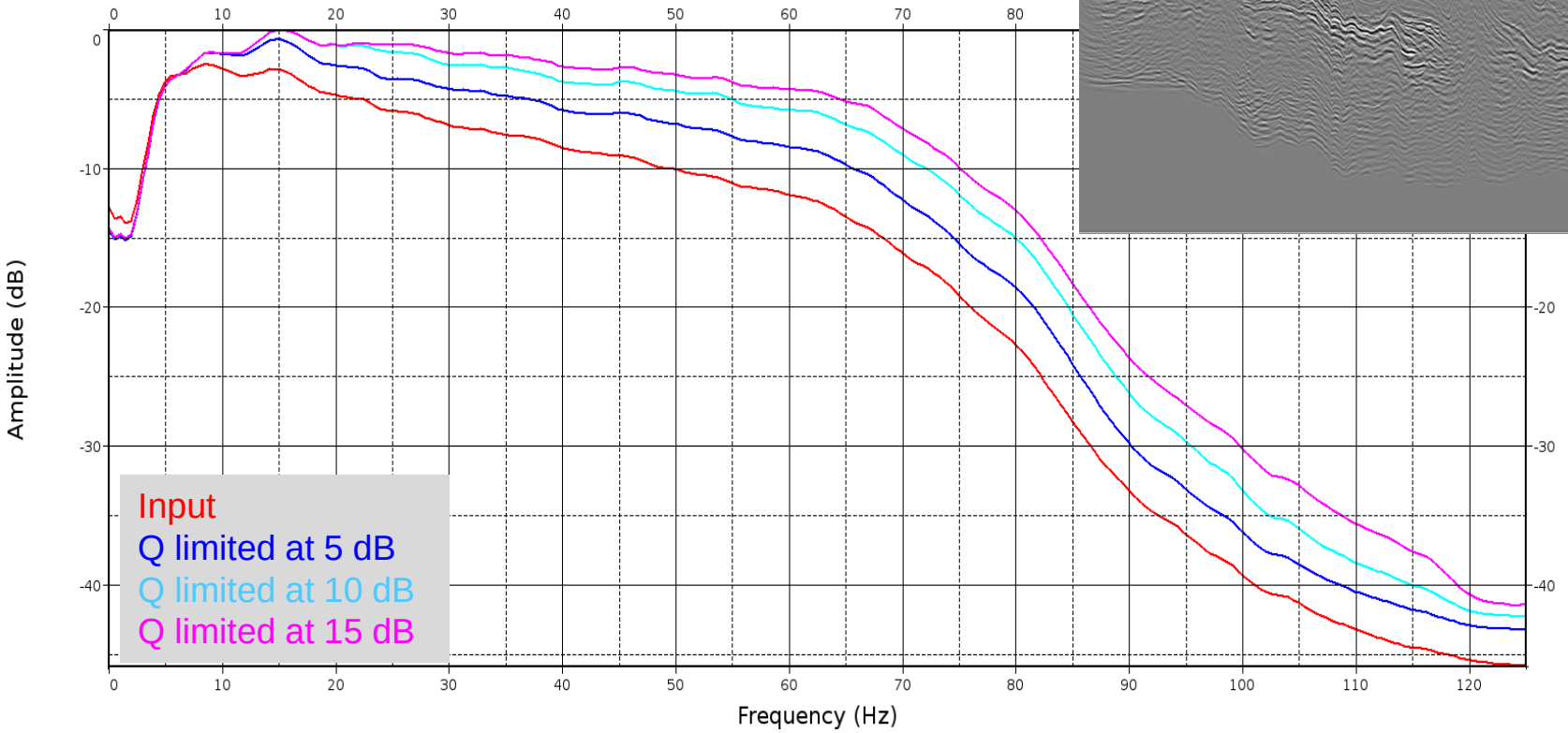
Time Stack: after Q Amp Compensation Limited at 15dB



- Primaries amplitude at high frequency get compensated.
- Noise energy boost obviously.

Amplitude Spectra





IL 441

- Time stack without Q compensation
- Time stack with Q limited at 5 dB
- Time stack with Q limited at 10 dB
- Time stack with Q limited at 15 dB

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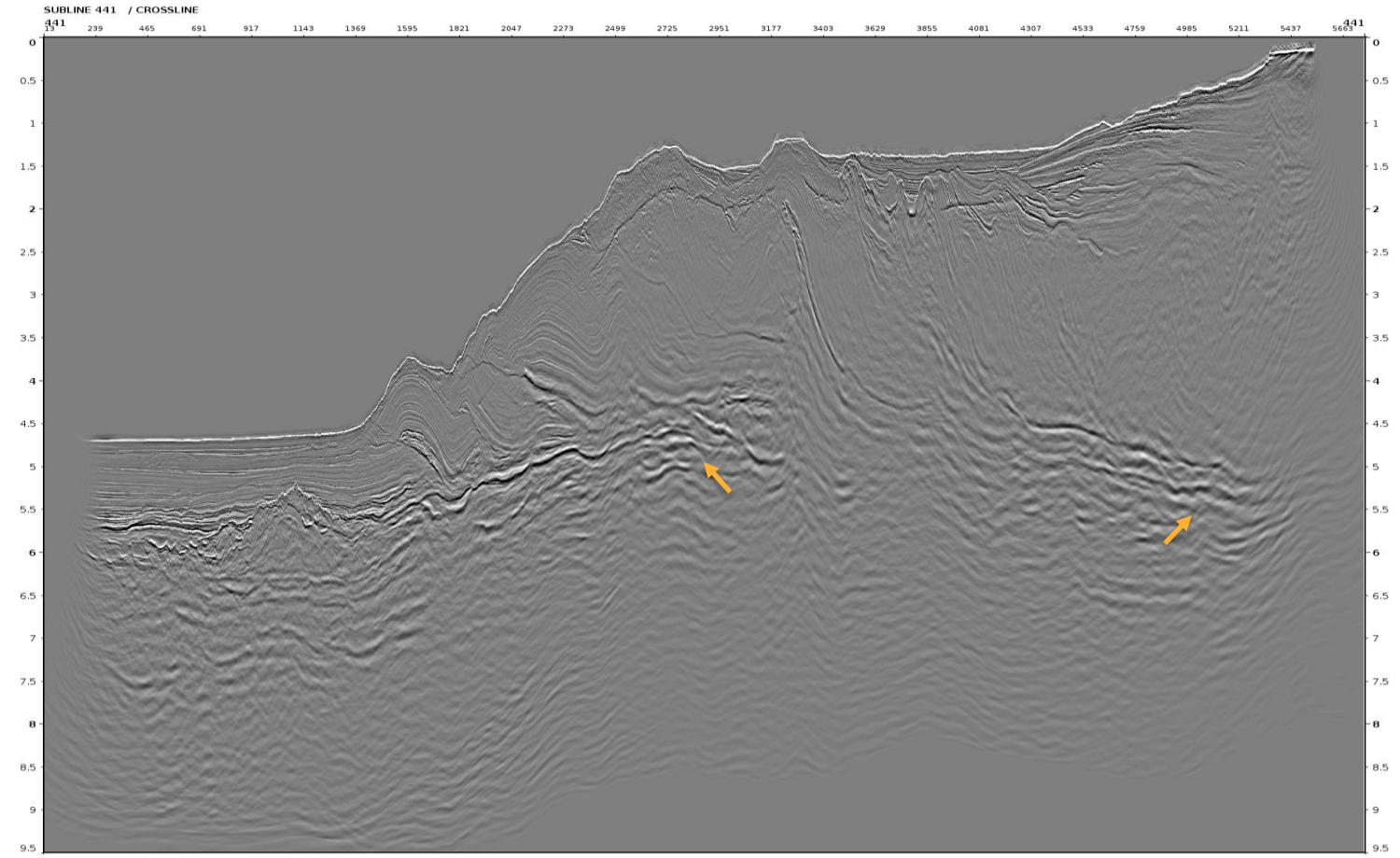
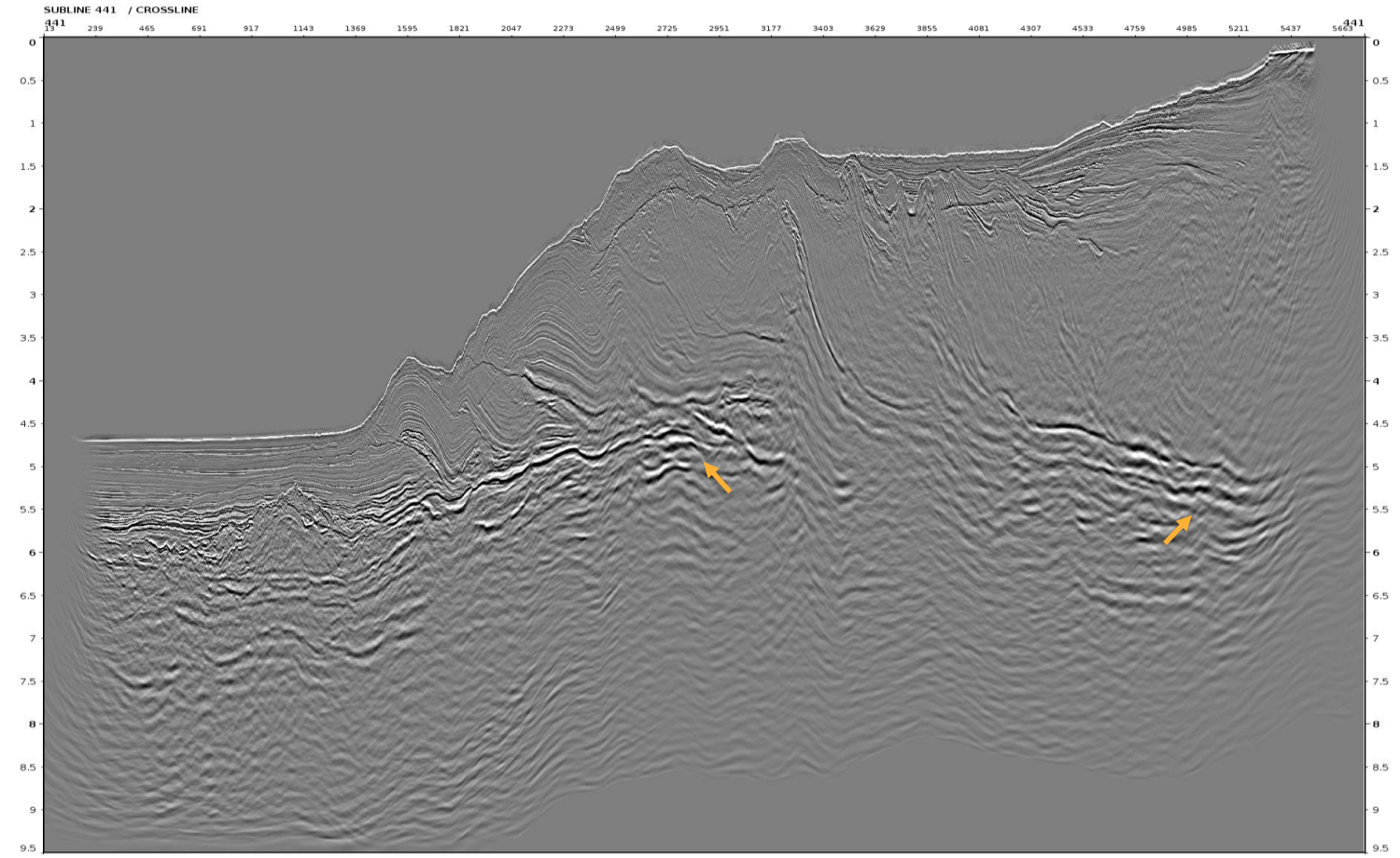
Time Stack before Q Amplitude Compensation



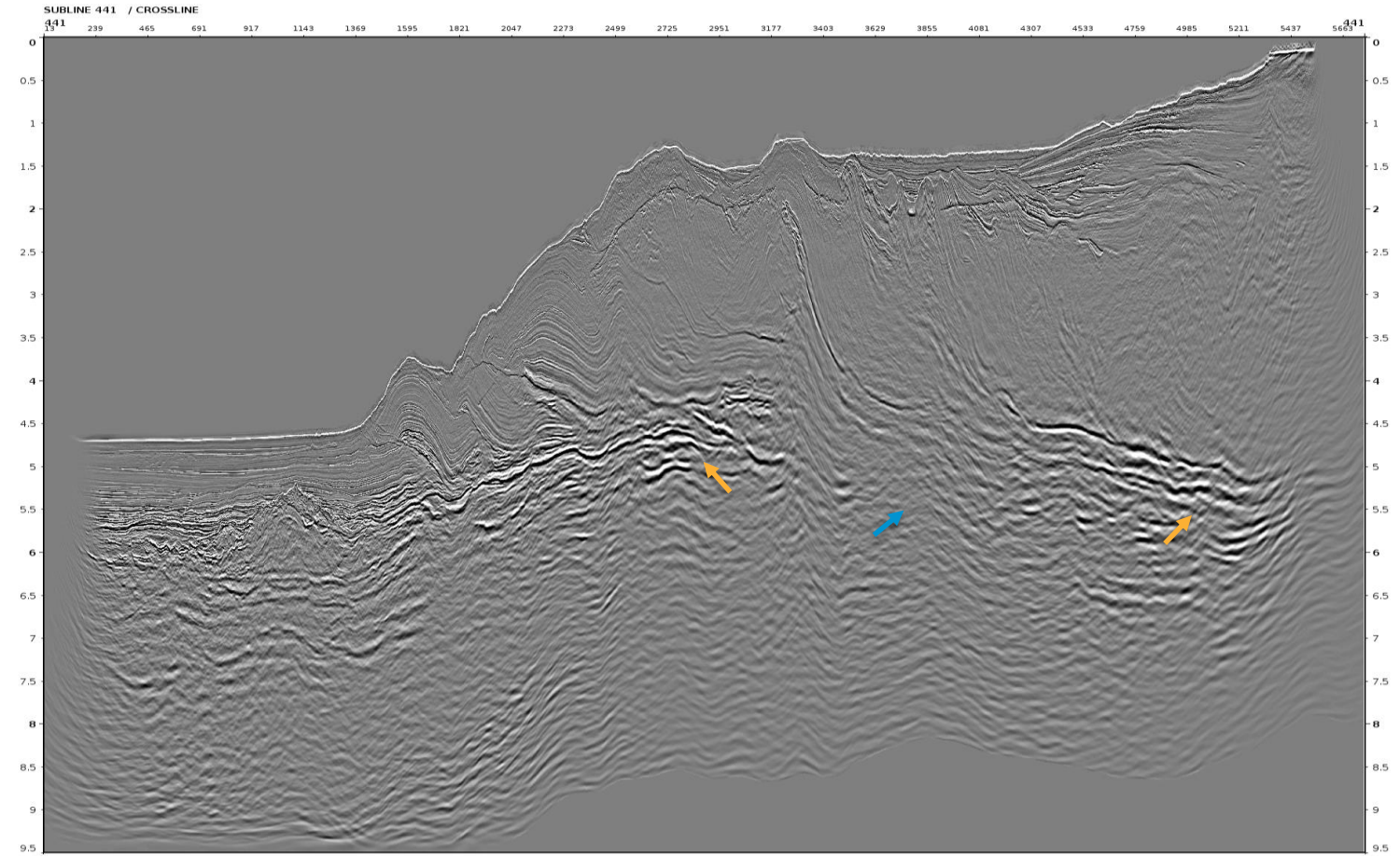
- Primaries amplitude at high frequency get compensated.

Time Stack: after Q Amp Compensation Limited at 5dB



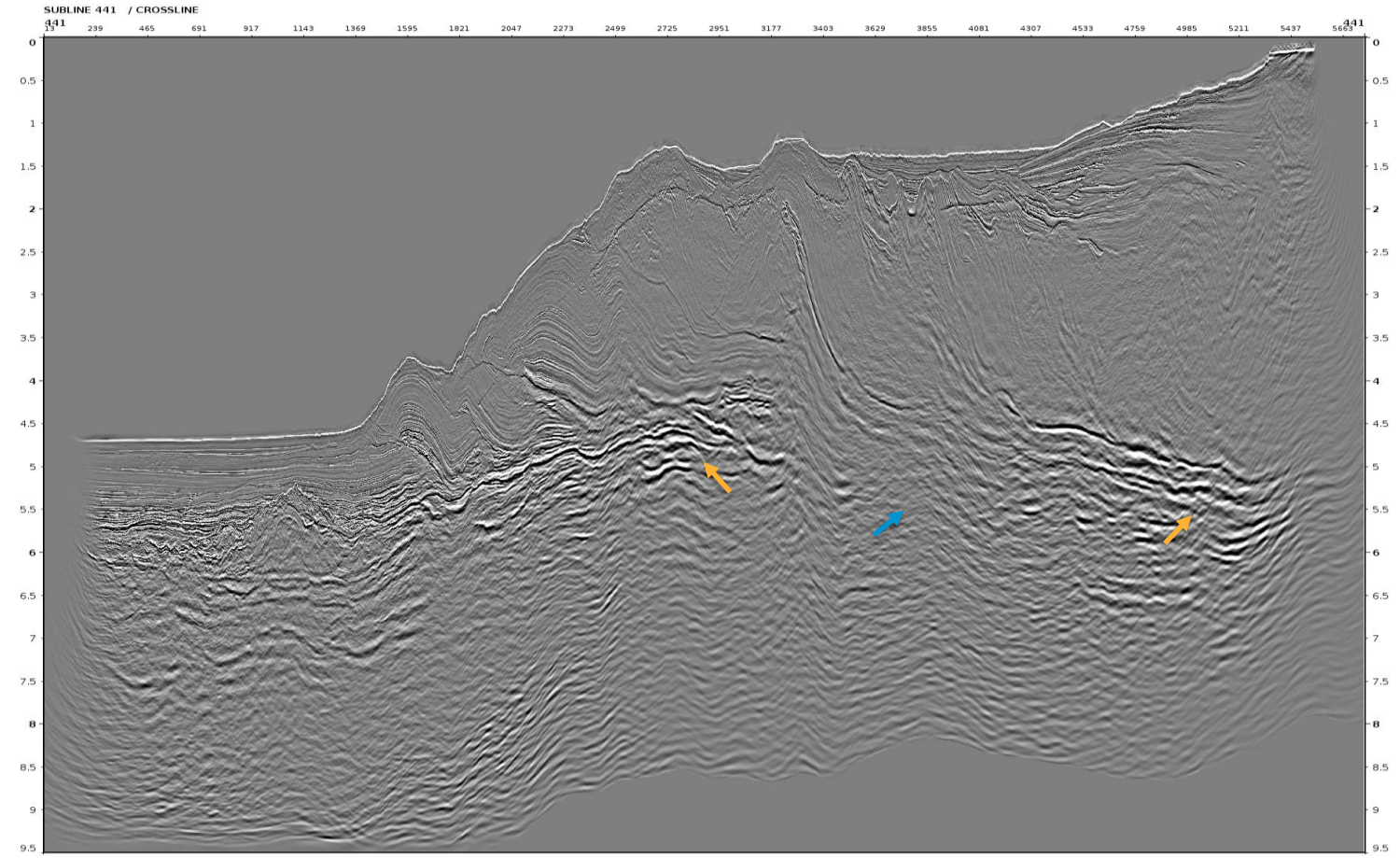
- Primaries amplitude at high frequency get compensated.

Time Stack: after Q Amp Compensation Limited at 10dB



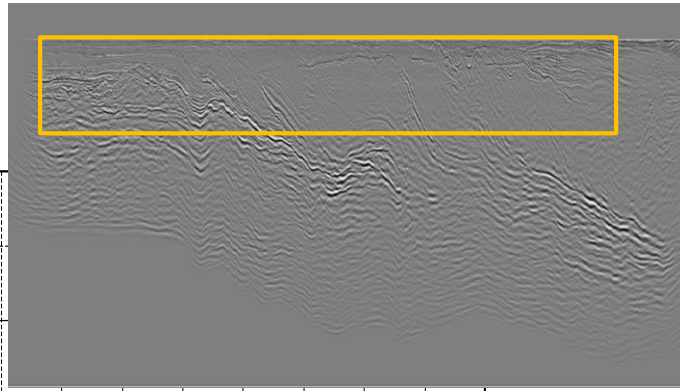
- Primaries amplitude at high frequency get compensated.
- Noise energy boost obviously.

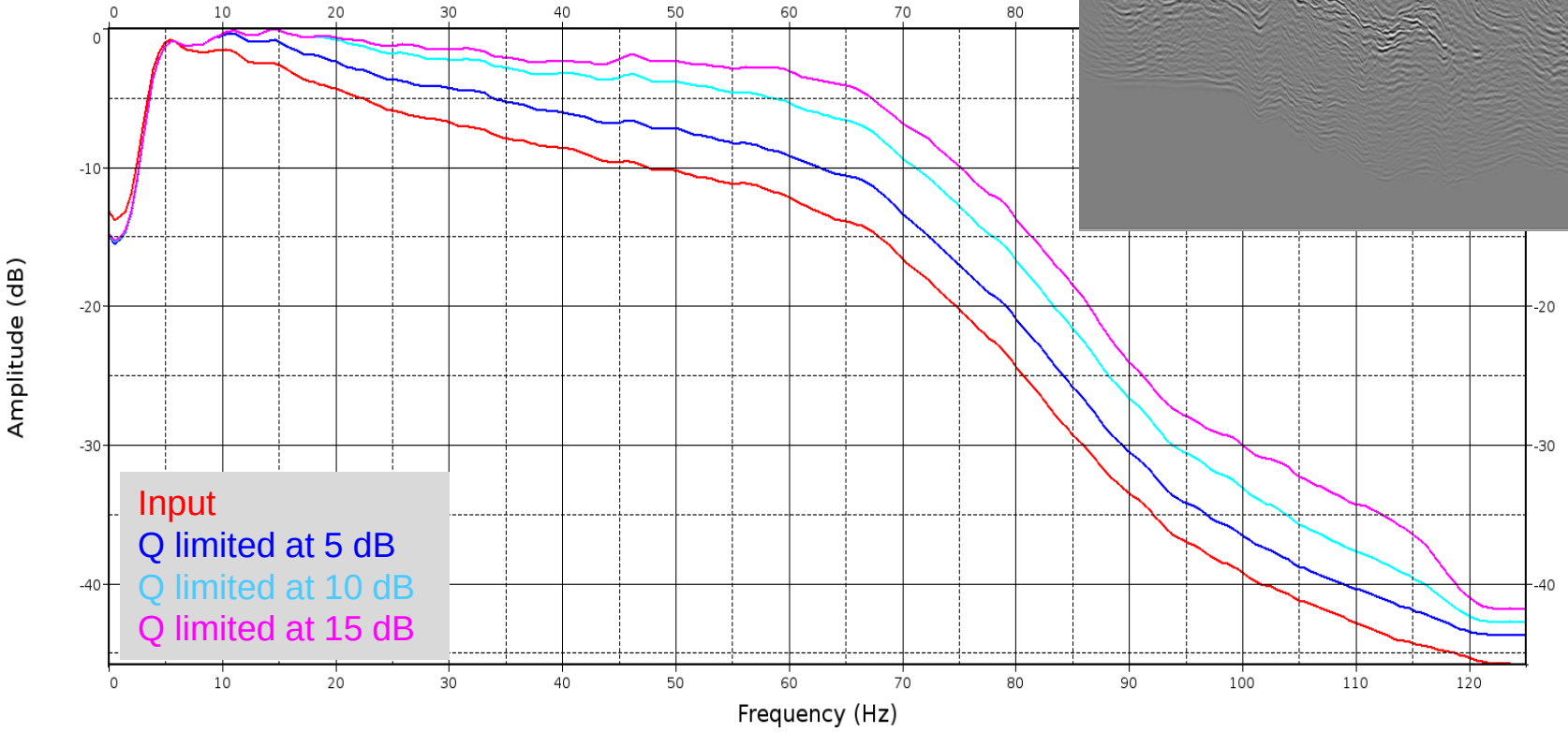
Time Stack: after Q Amp Compensation Limited at 15dB



- Primaries amplitude at high frequency get compensated.
- Noise energy boost obviously.

Amplitude Spectra





IL 711

- Time stack without Q compensation
- Time stack with Q limited at 5 dB
- Time stack with Q limited at 10 dB
- Time stack with Q limited at 15 dB

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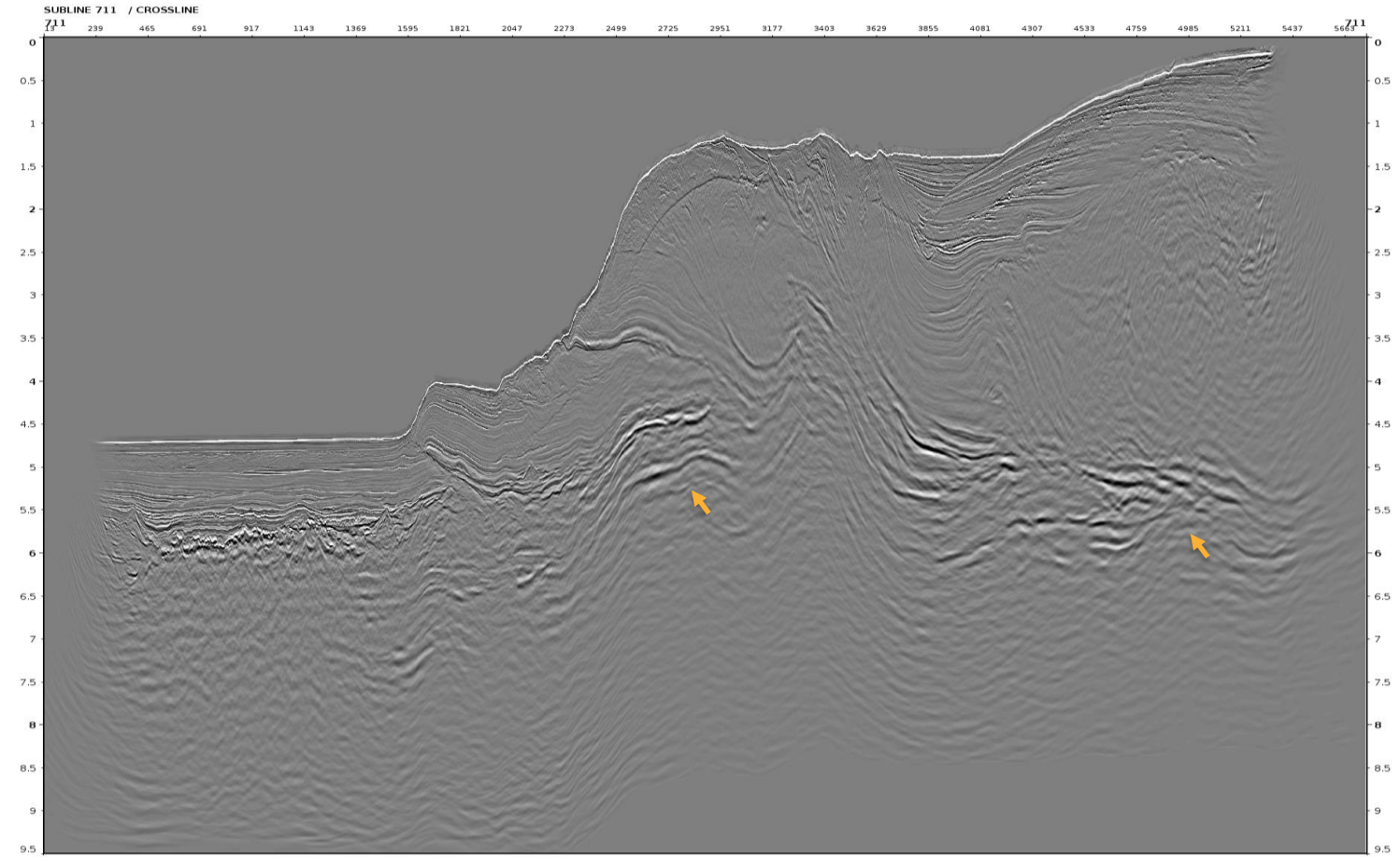
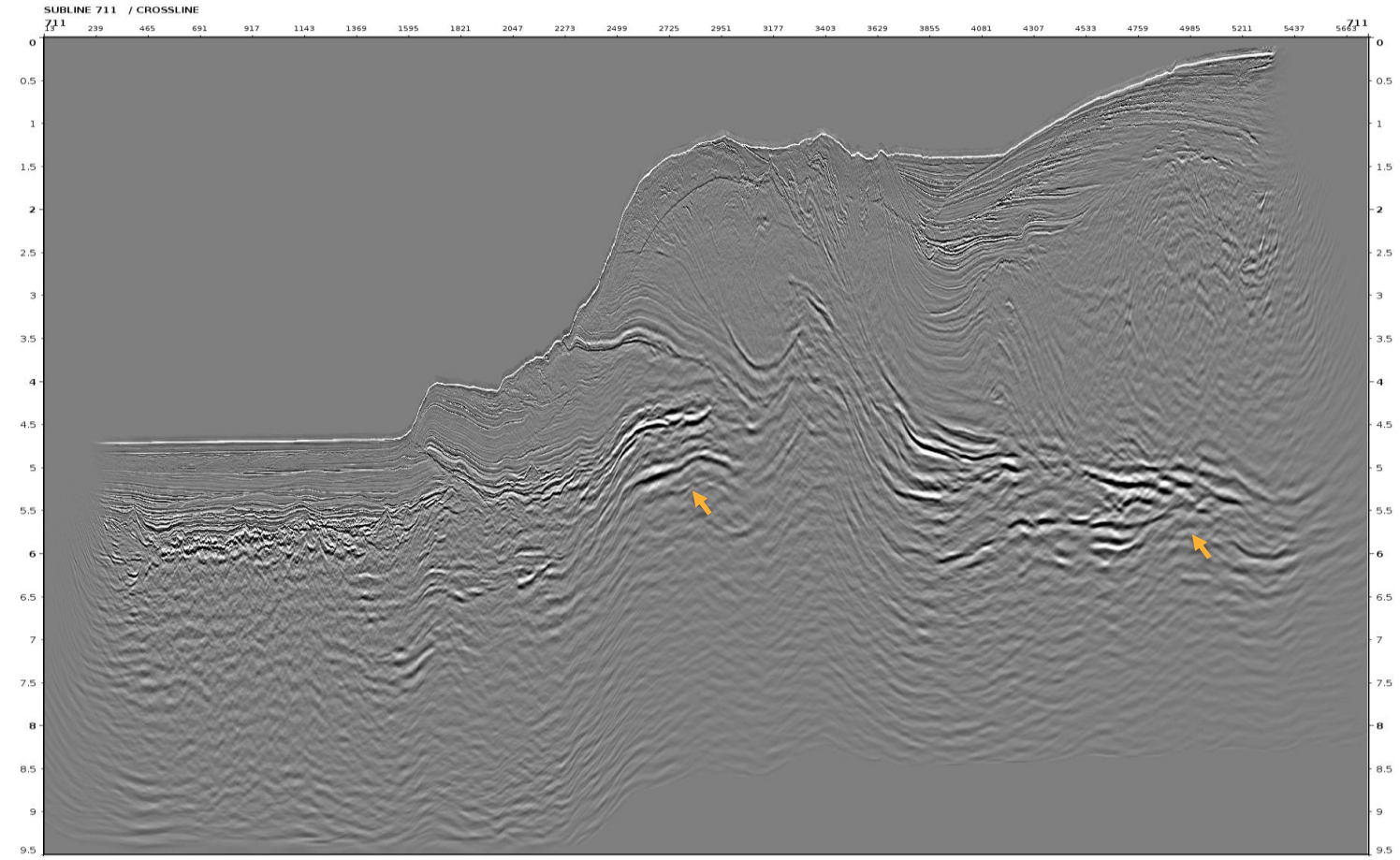
Time Stack before Q Amplitude Compensation



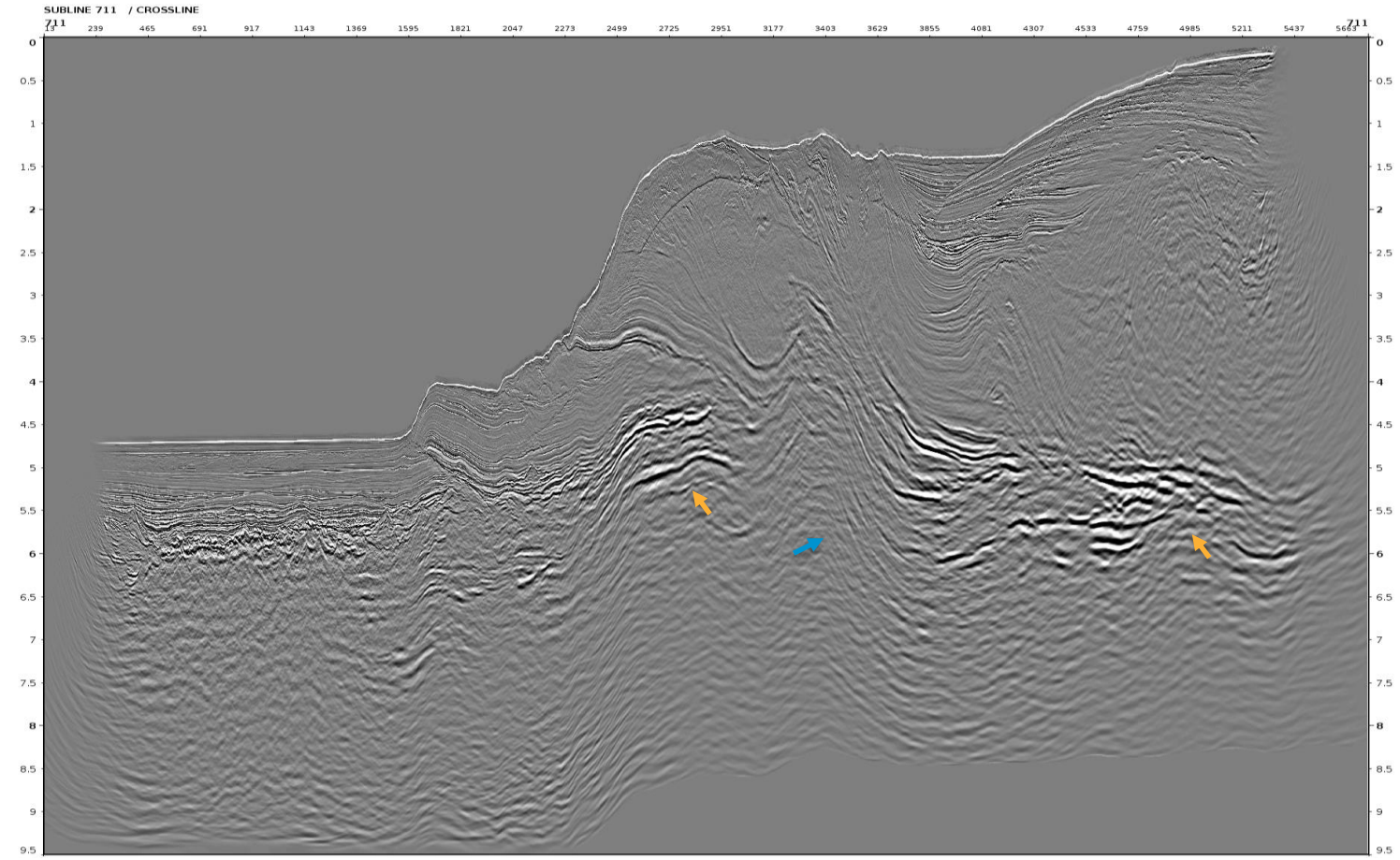
- Primaries amplitude at high frequency get compensated.

Time Stack: after Q Amp Compensation Limited at 5dB



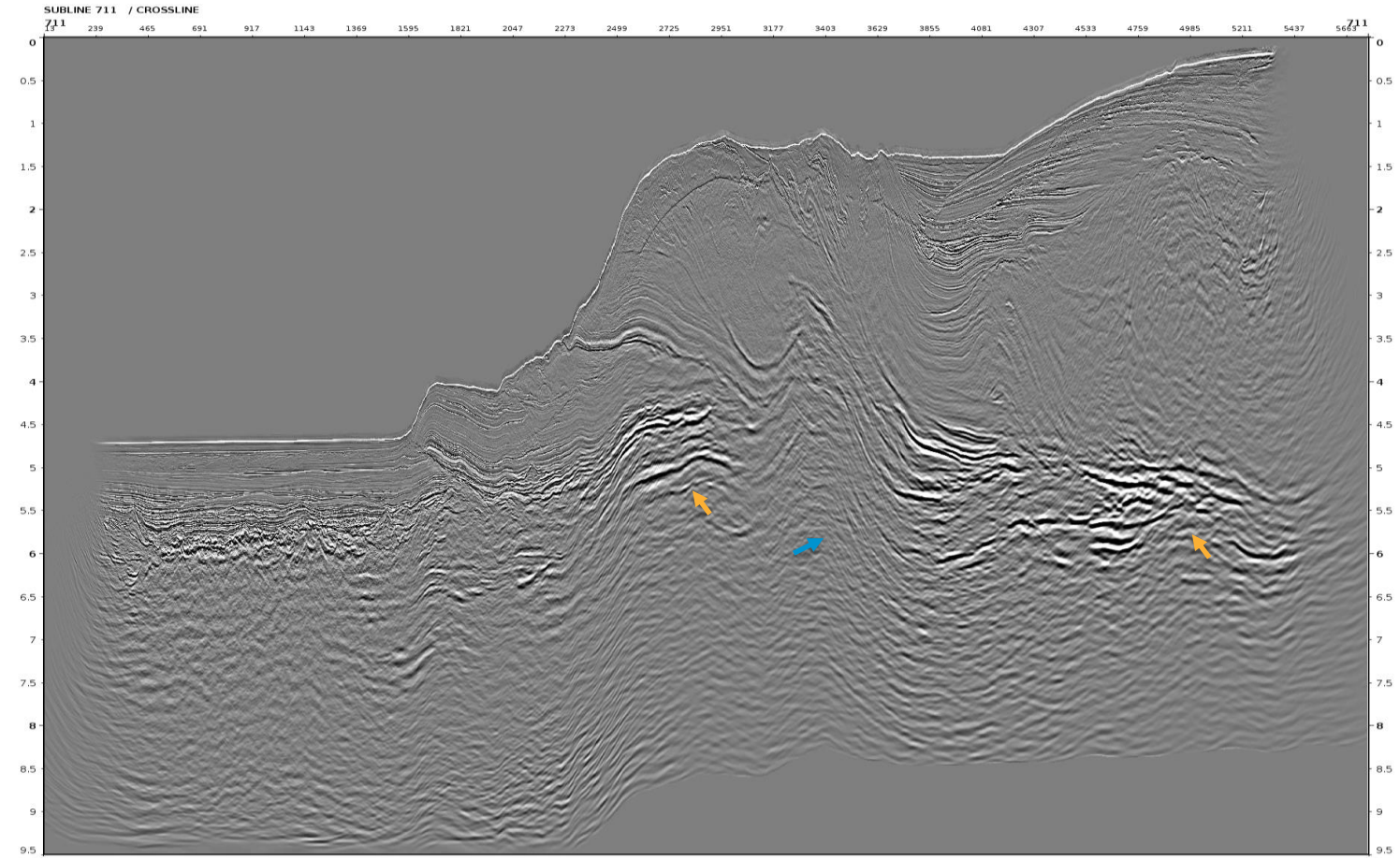
- Primaries amplitude at high frequency get compensated.

Time Stack: after Q Amp Compensation Limited at 10dB



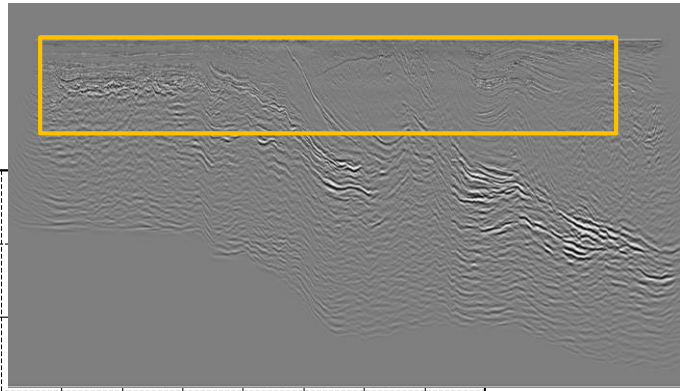
- Primaries amplitude at high frequency get compensated, more details can be recognized.
- Noise energy boost a little bit.

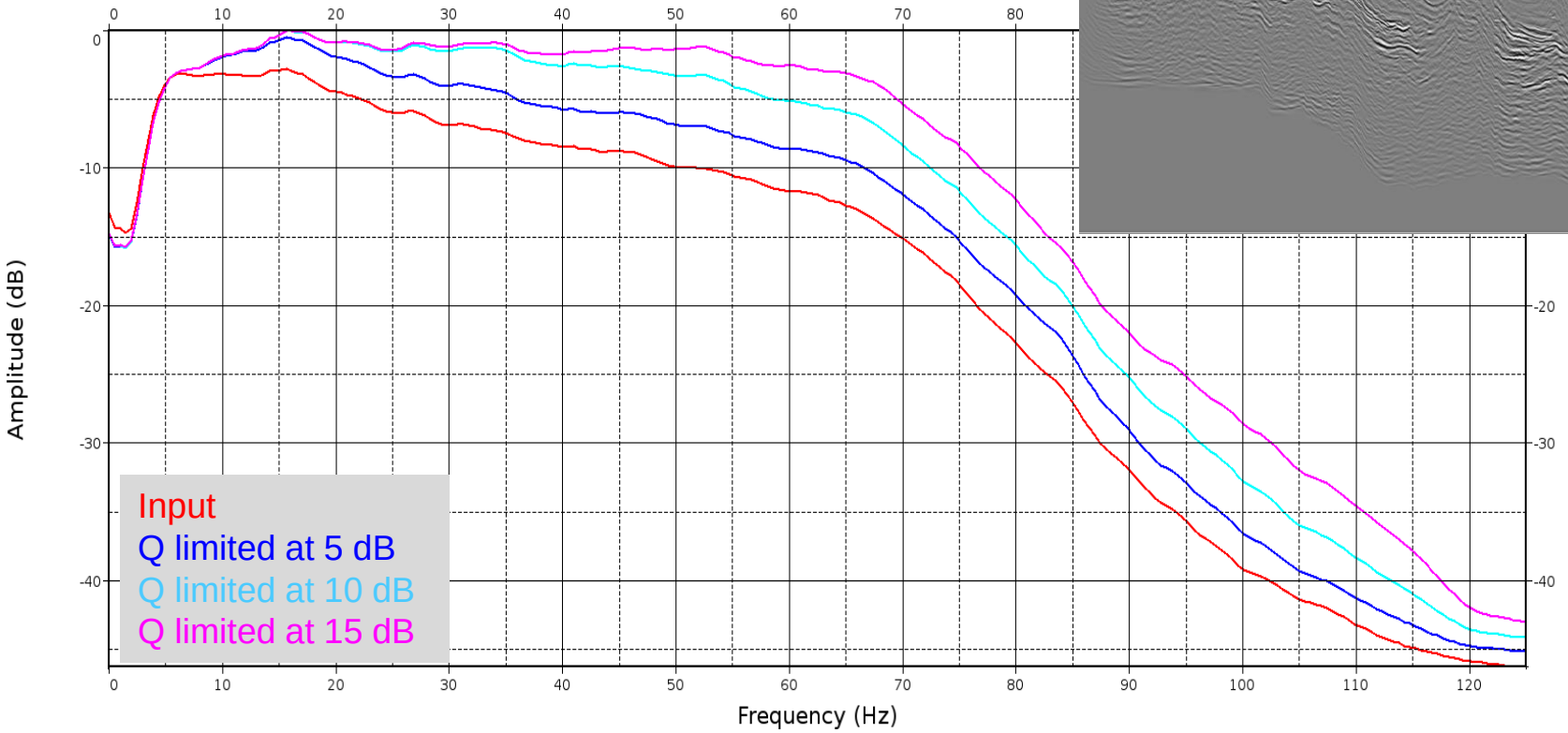
Time Stack: after Q Amp Compensation Limited at 15dB



- Primaries amplitude at high frequency get compensated.
- Noise energy boost obviously.

Amplitude Spectra





Summary

- After apply Q compensation limited at 10 dB, high frequency primary energy amplitude get compensated and noise energy boost remains low. We recommend to apply limited 10 dB Q compensation for production.