Surface Related Multiple Elimination (3D SRME)

NZ 3D Processing

20 January 2021

INSTITUTE FOR GEOPHYSICS

cgg.com

Passion for Geoscience

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)

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Outline

- **Objective:**

  To generate free surface related multiple model by 3D SEME technique.

- **Procedure:**

  Free surface related multiple is modeled by convolving seismic with itself (Details shown in slides 4).
  Demultiple is processed by subtracting multiple model from input seismic.

- **Display:**

  Sailline 018, 039
  Display: Stack, common channel and shot gathers.

- **Observation and Recommendation:**

  Free surface related multiples are well modeled. The current demultiple result is under preliminary subtraction with SRME only, for final production, a simultaneous subtraction with both MWD and SRME model will be tested.

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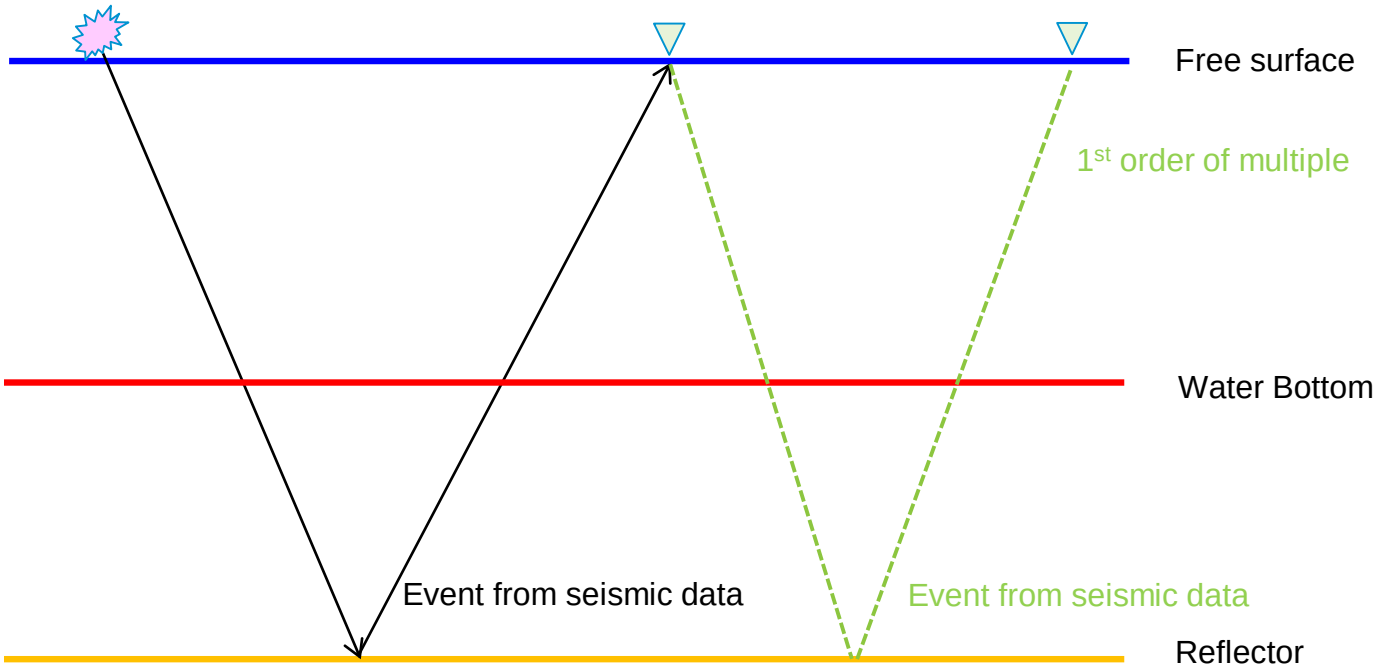
Brief Introduction on SRME



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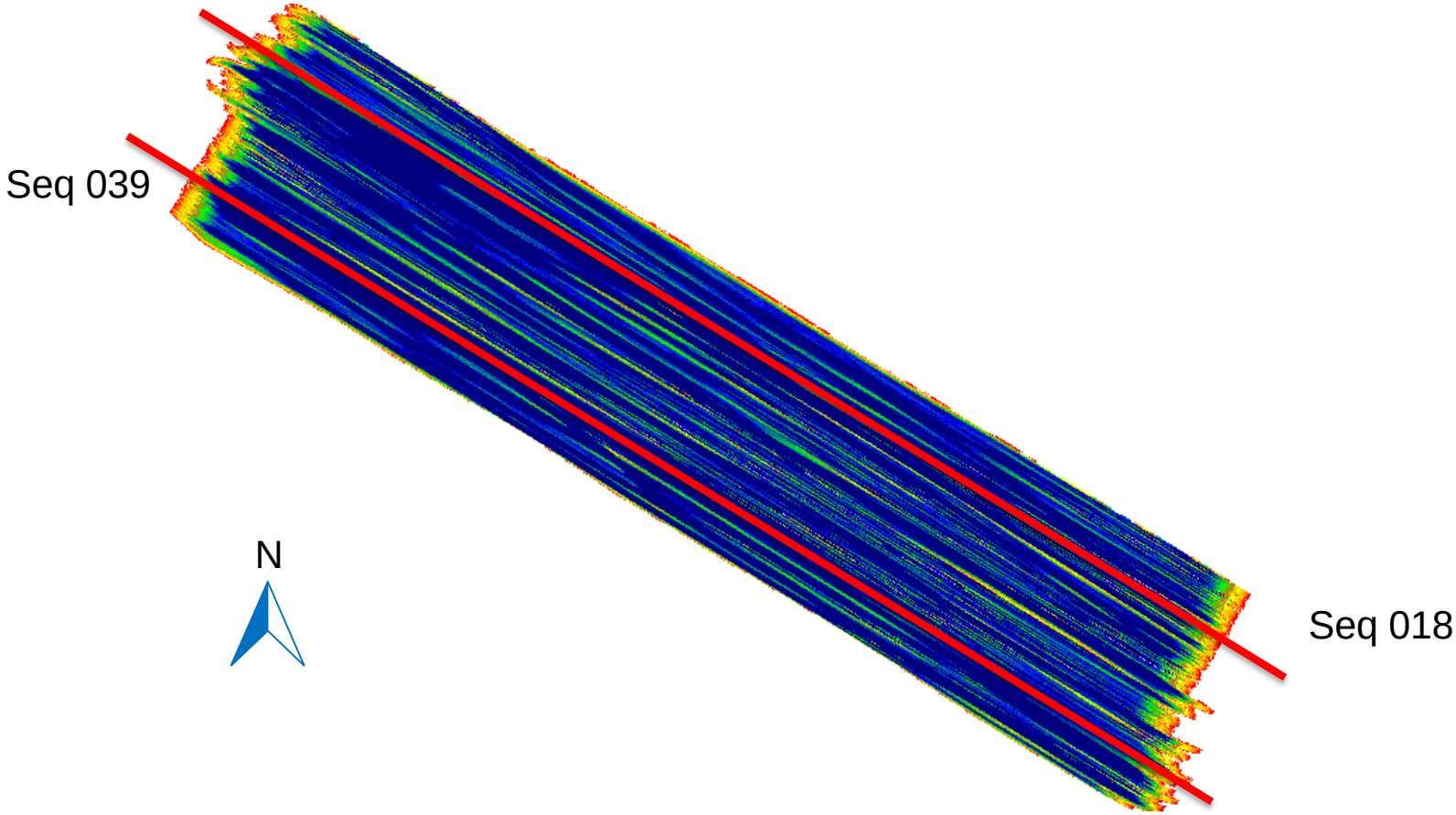
Test Line Location



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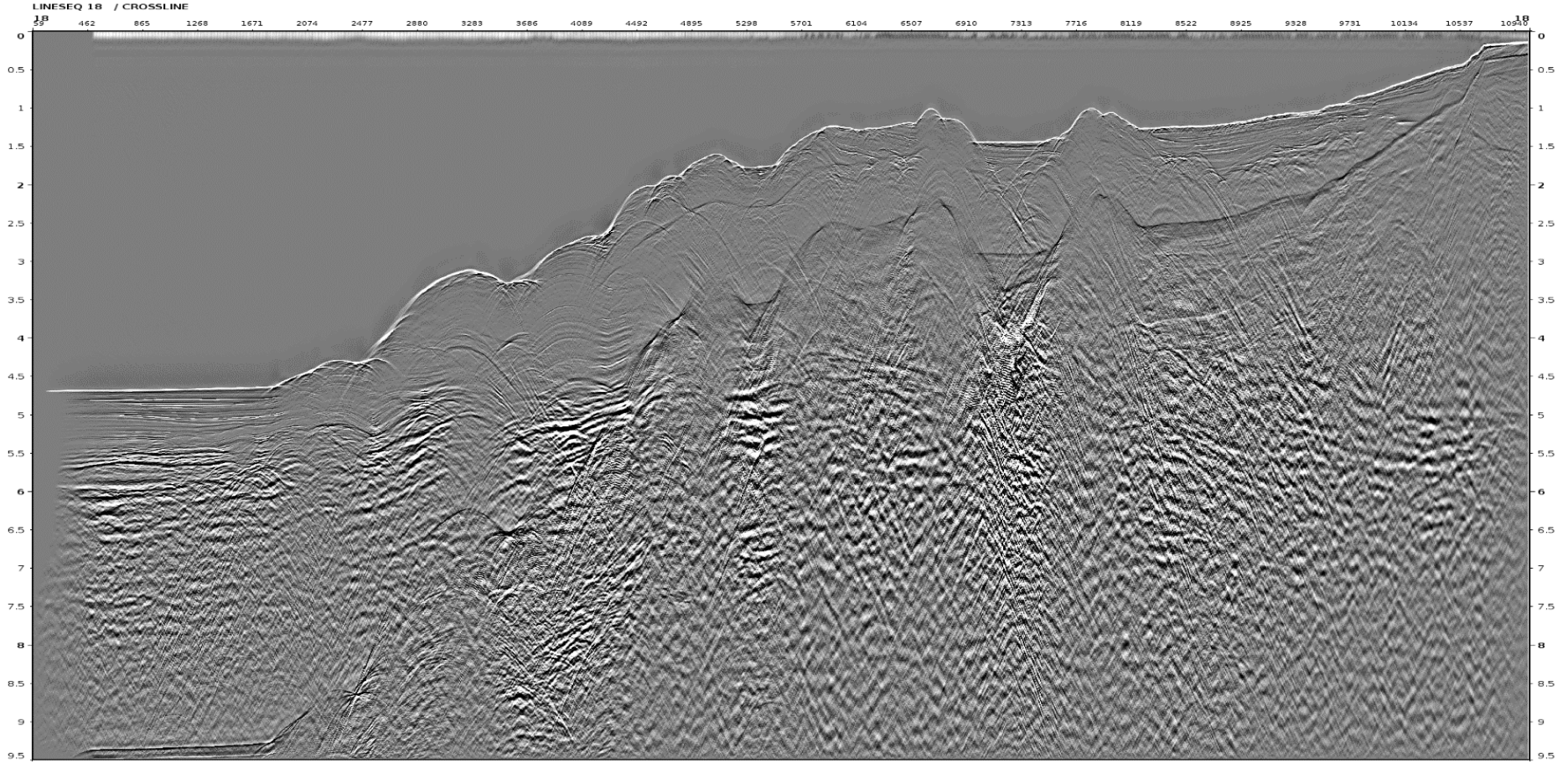
Seq 018

Stack

Common Channel

Shot Gathers

Stack before SRME



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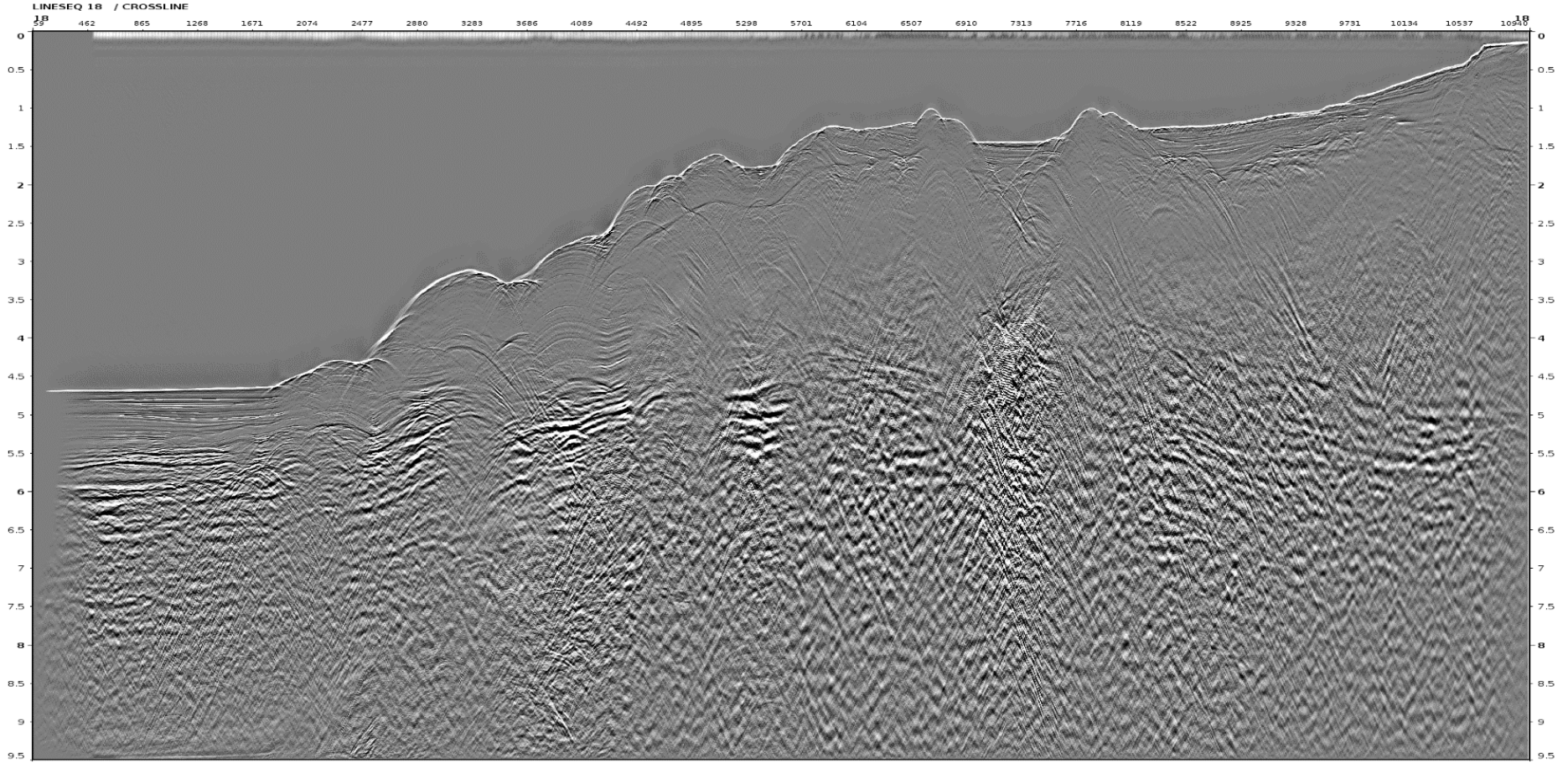
Stack after SRME



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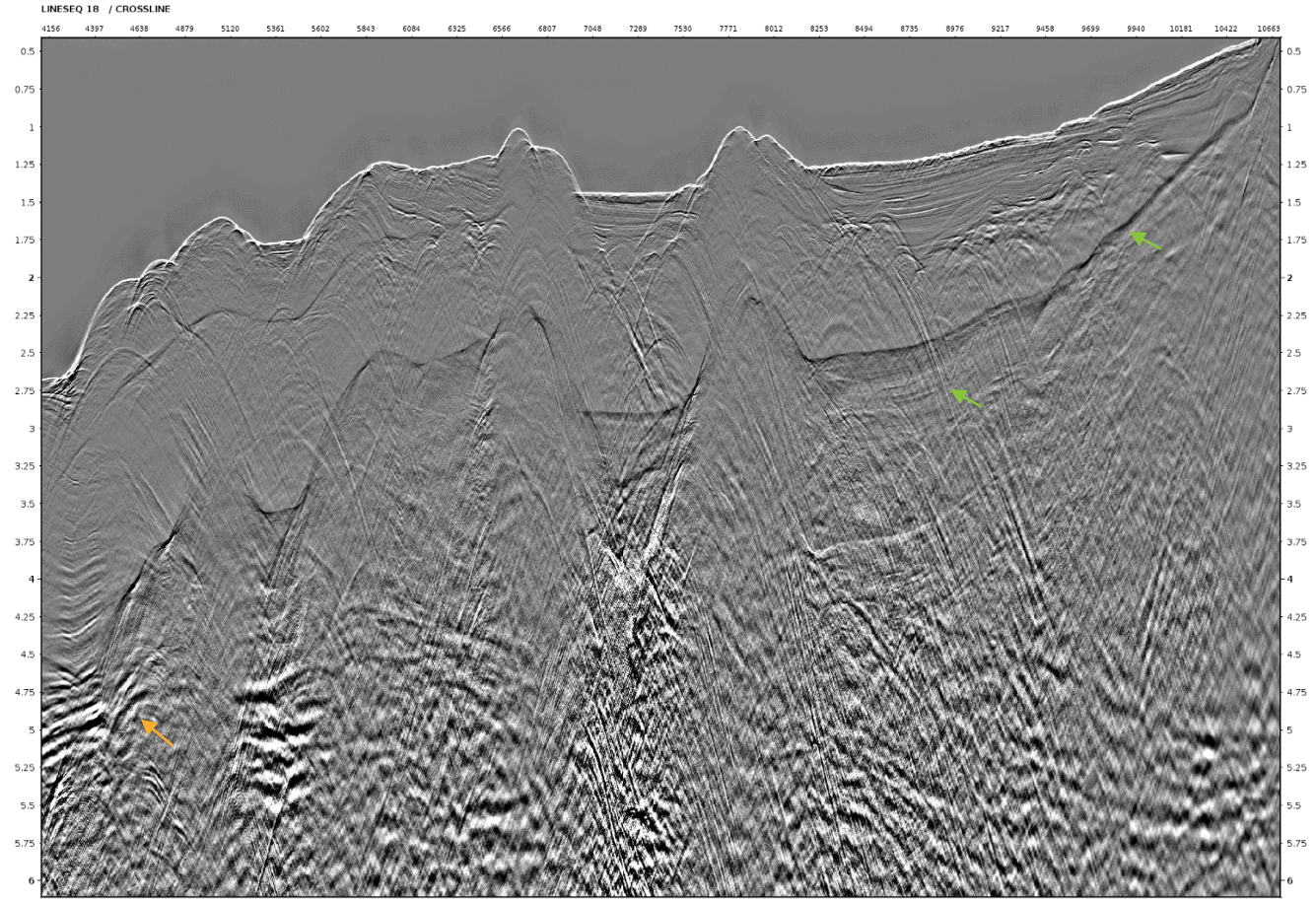
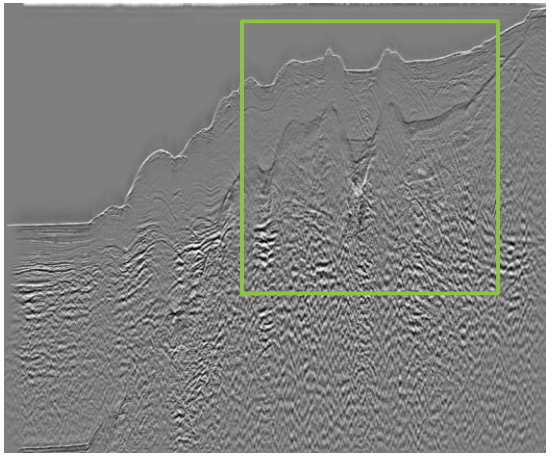
Zoom in Stack before SRME





- Free Surface related multiples are well modeled and attenuated after subtraction.

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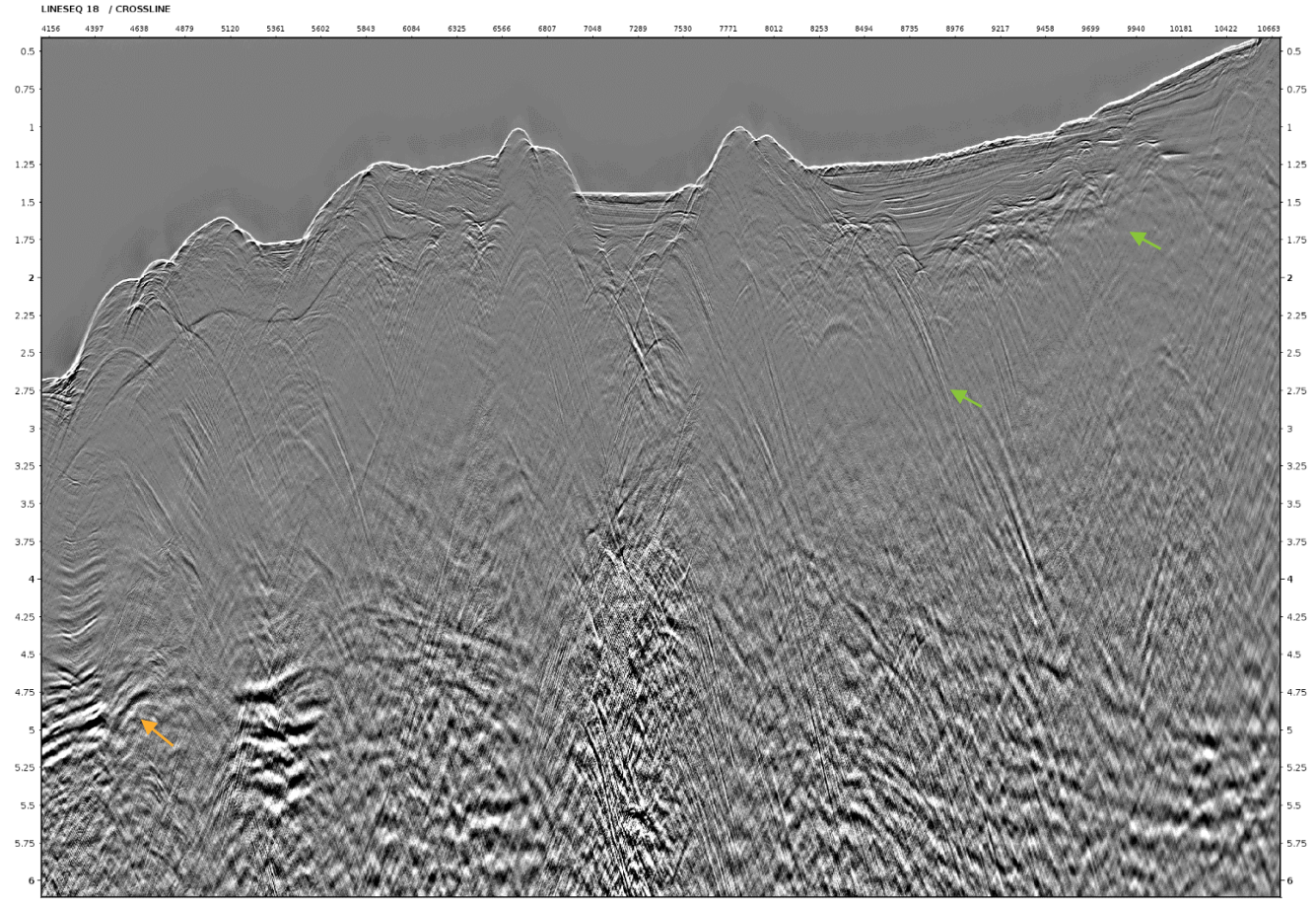
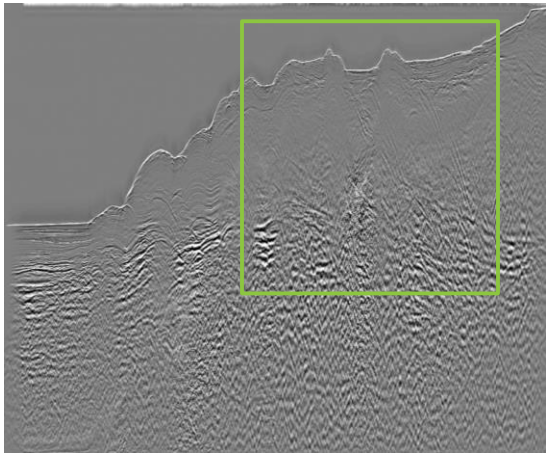
Zoom in Stack after SRME





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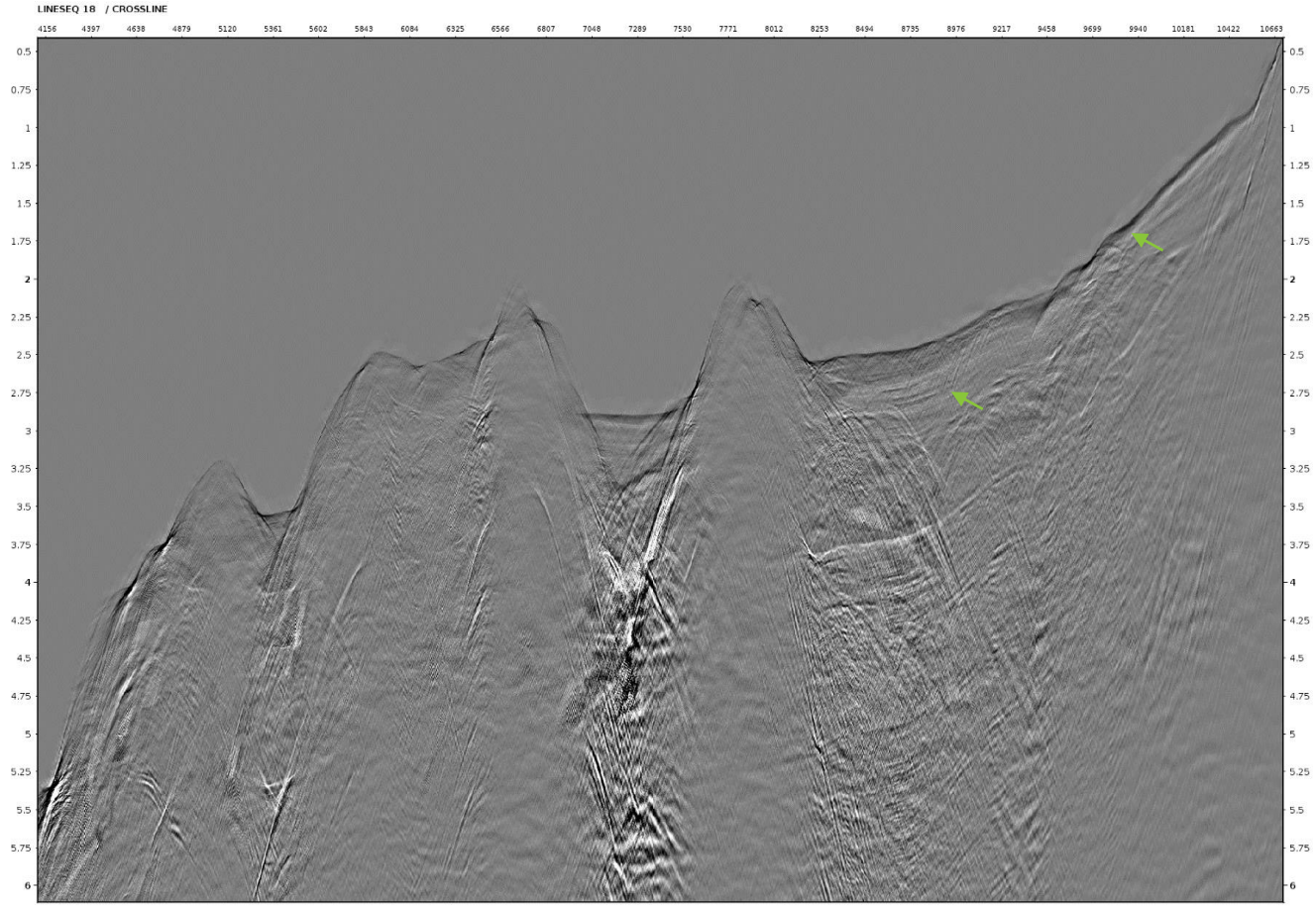
Difference before – after SRME



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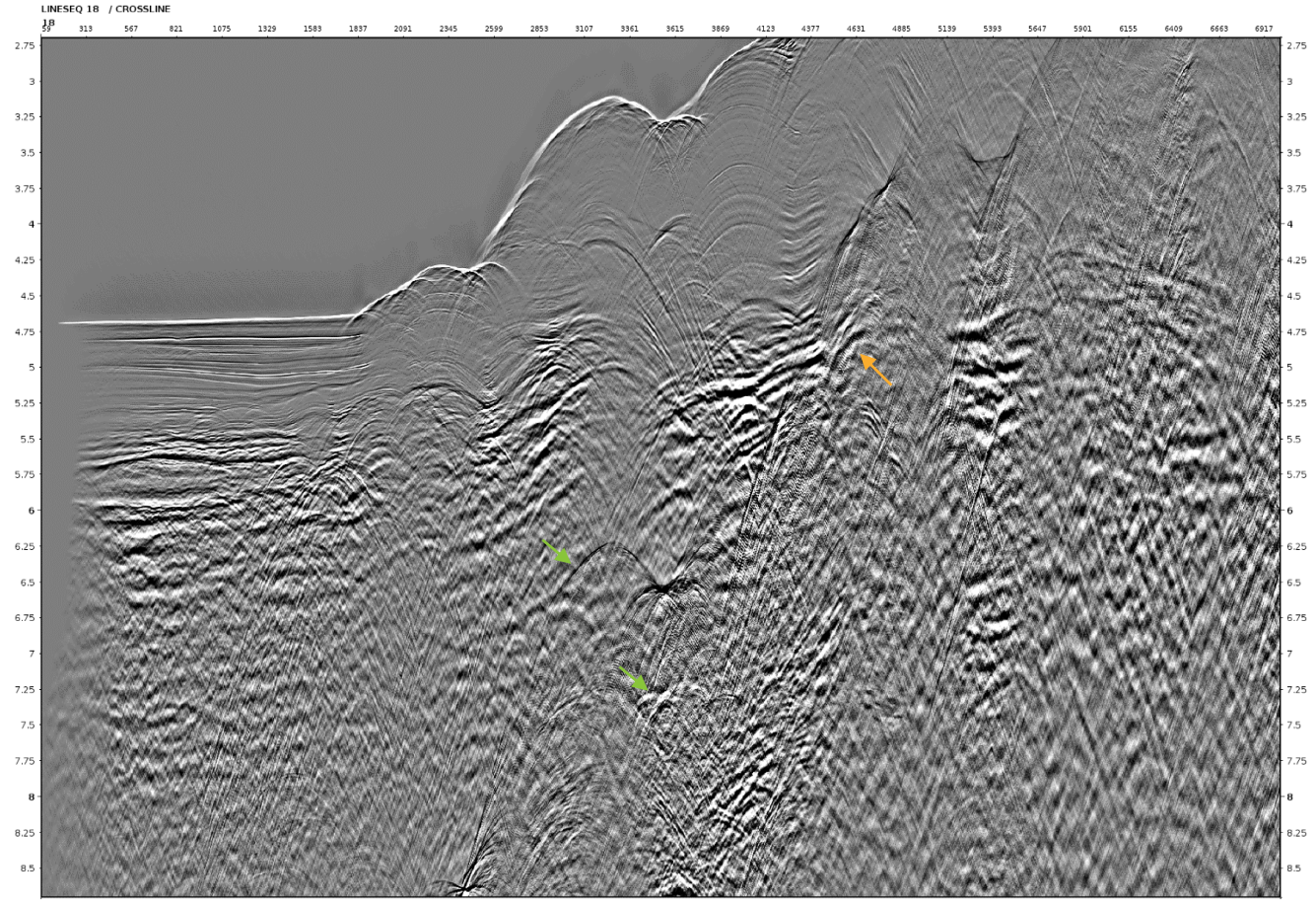
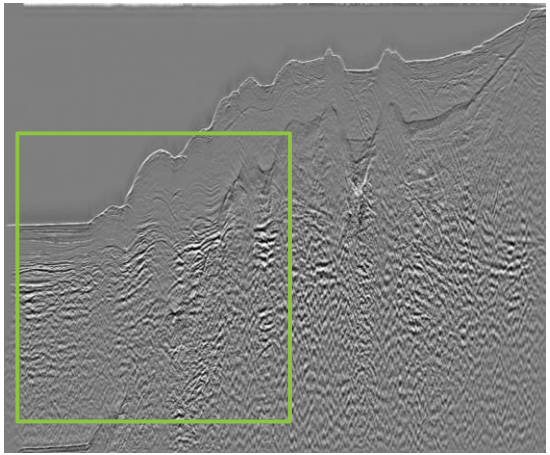
Zoom in Stack before SRME





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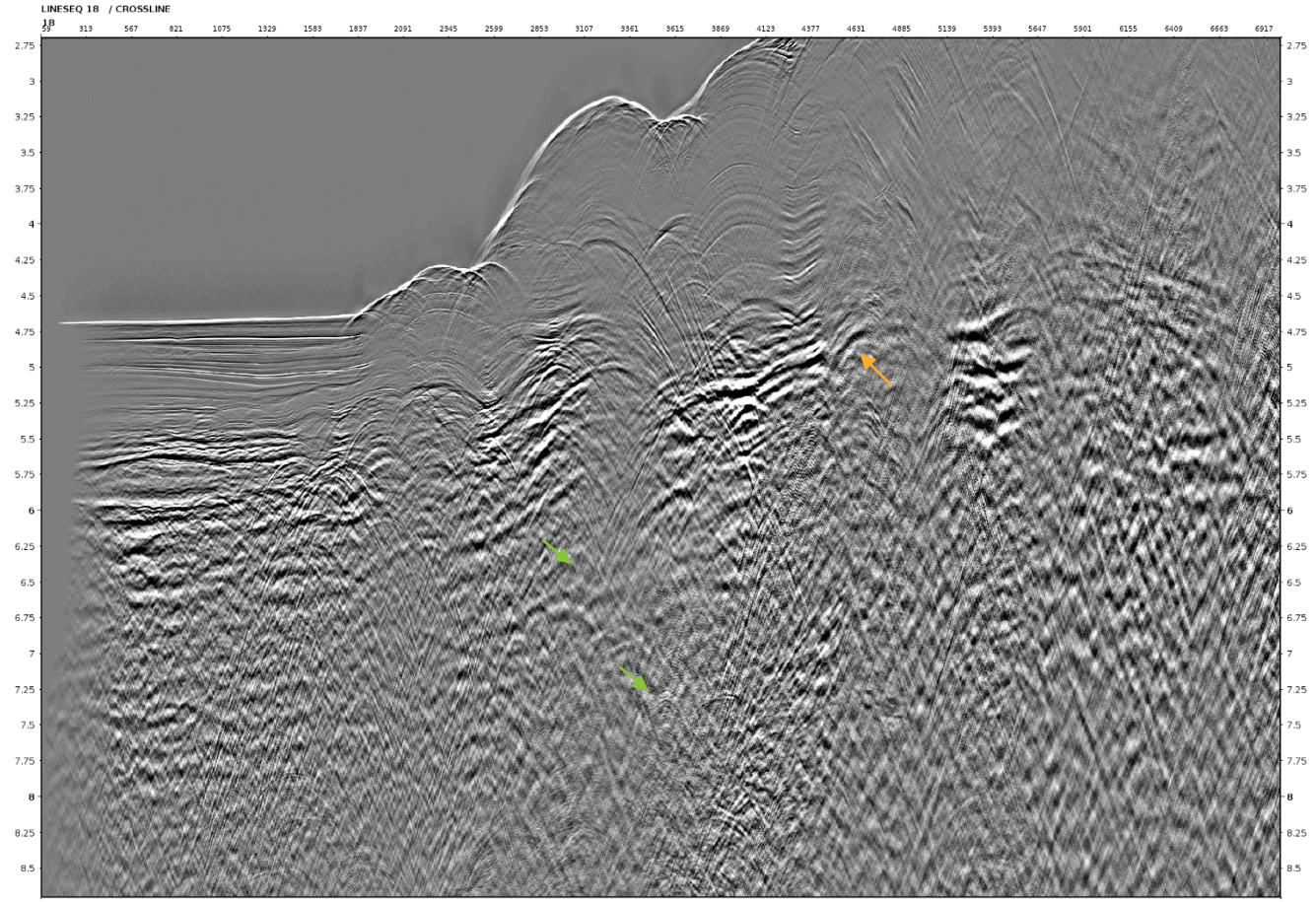
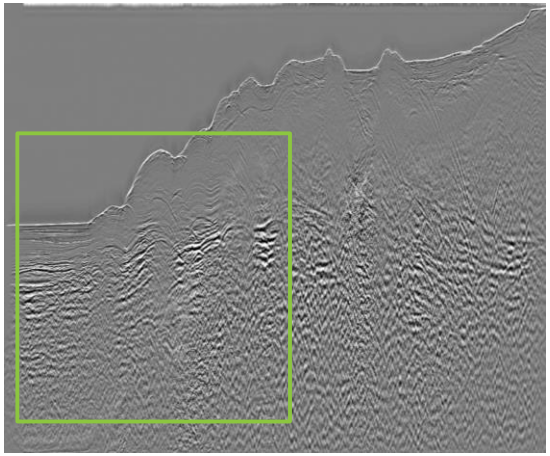
Zoom in Stack after SRME





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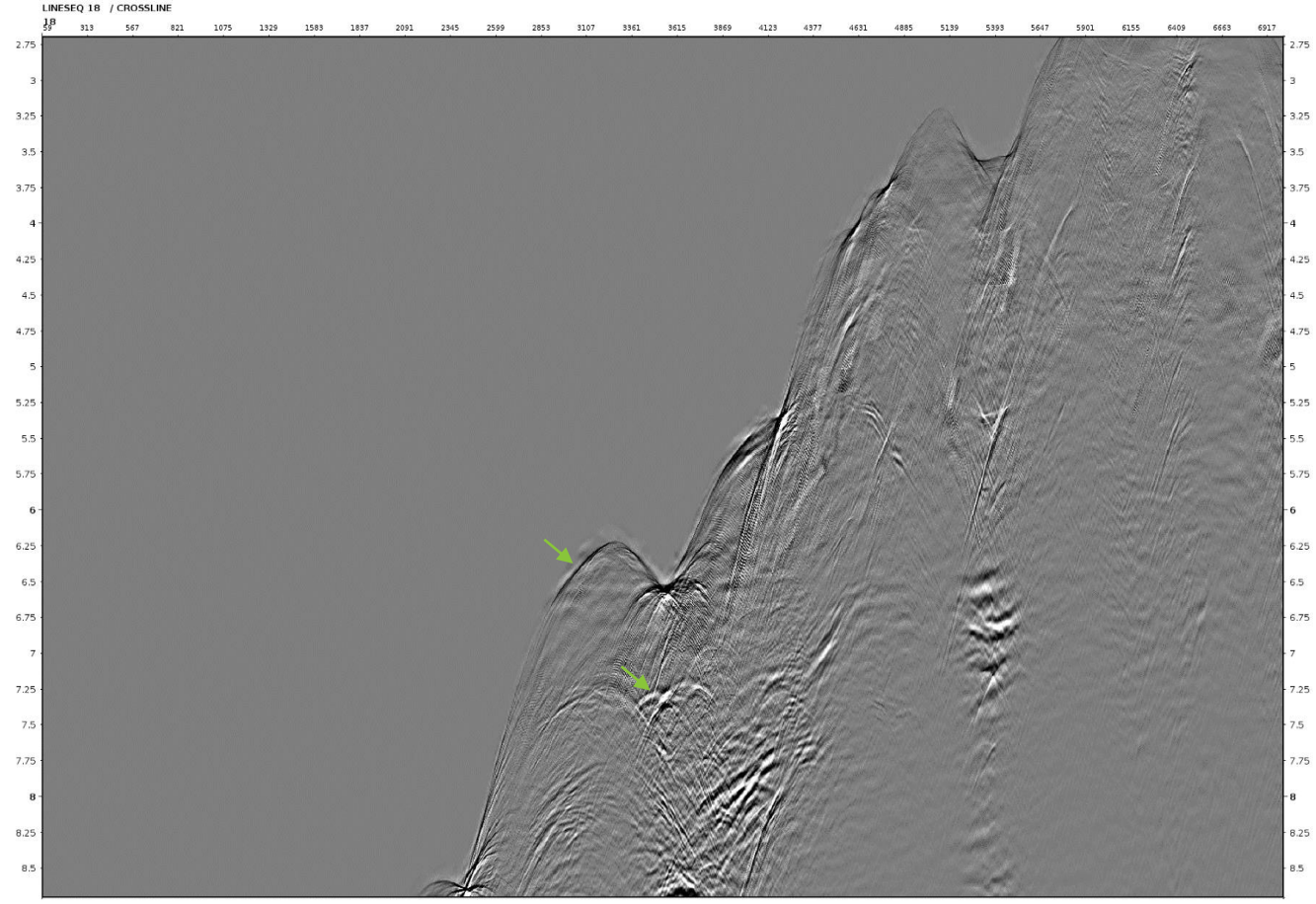
Difference before – after SRME



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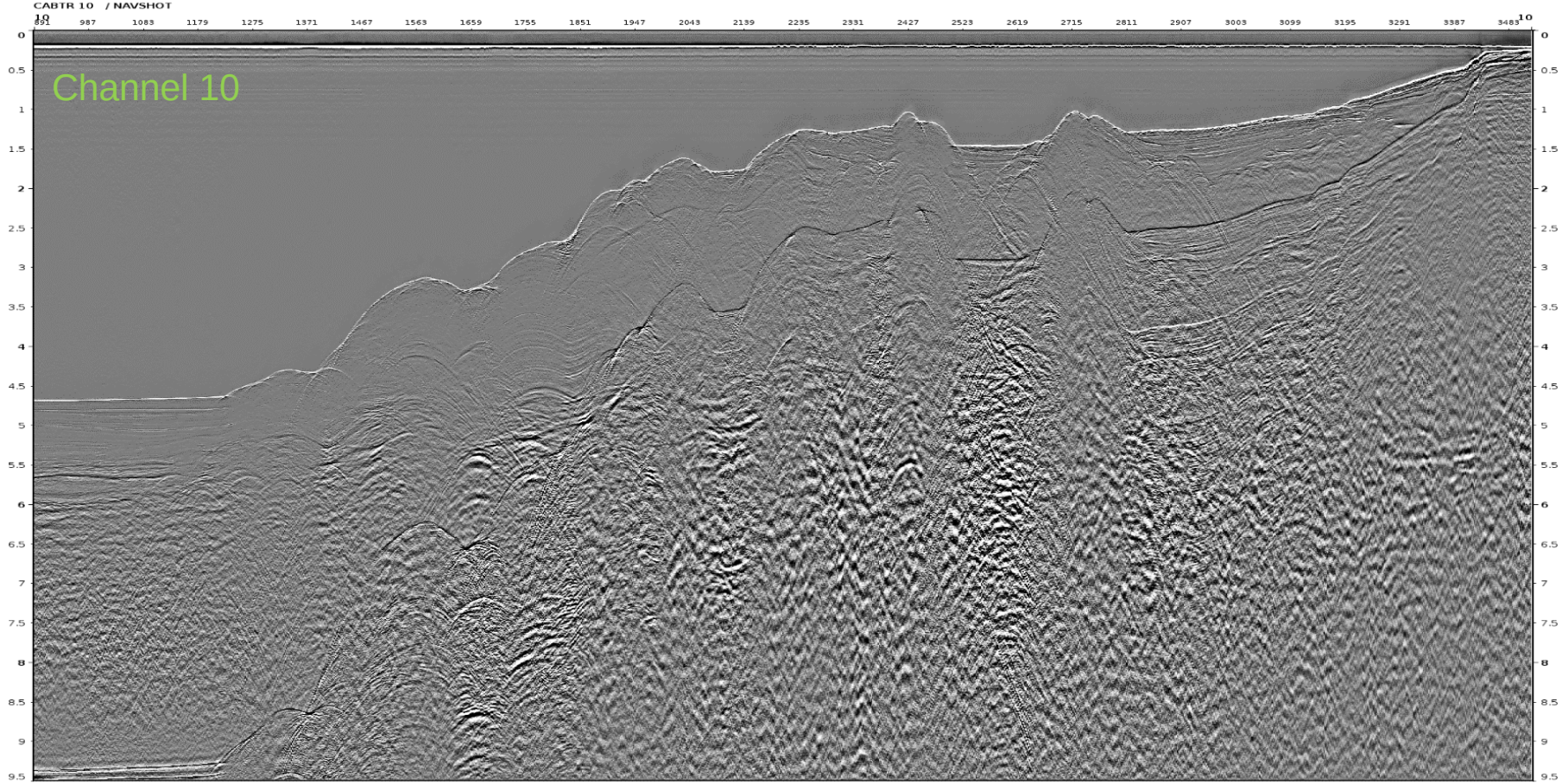
Common Channel before SRME



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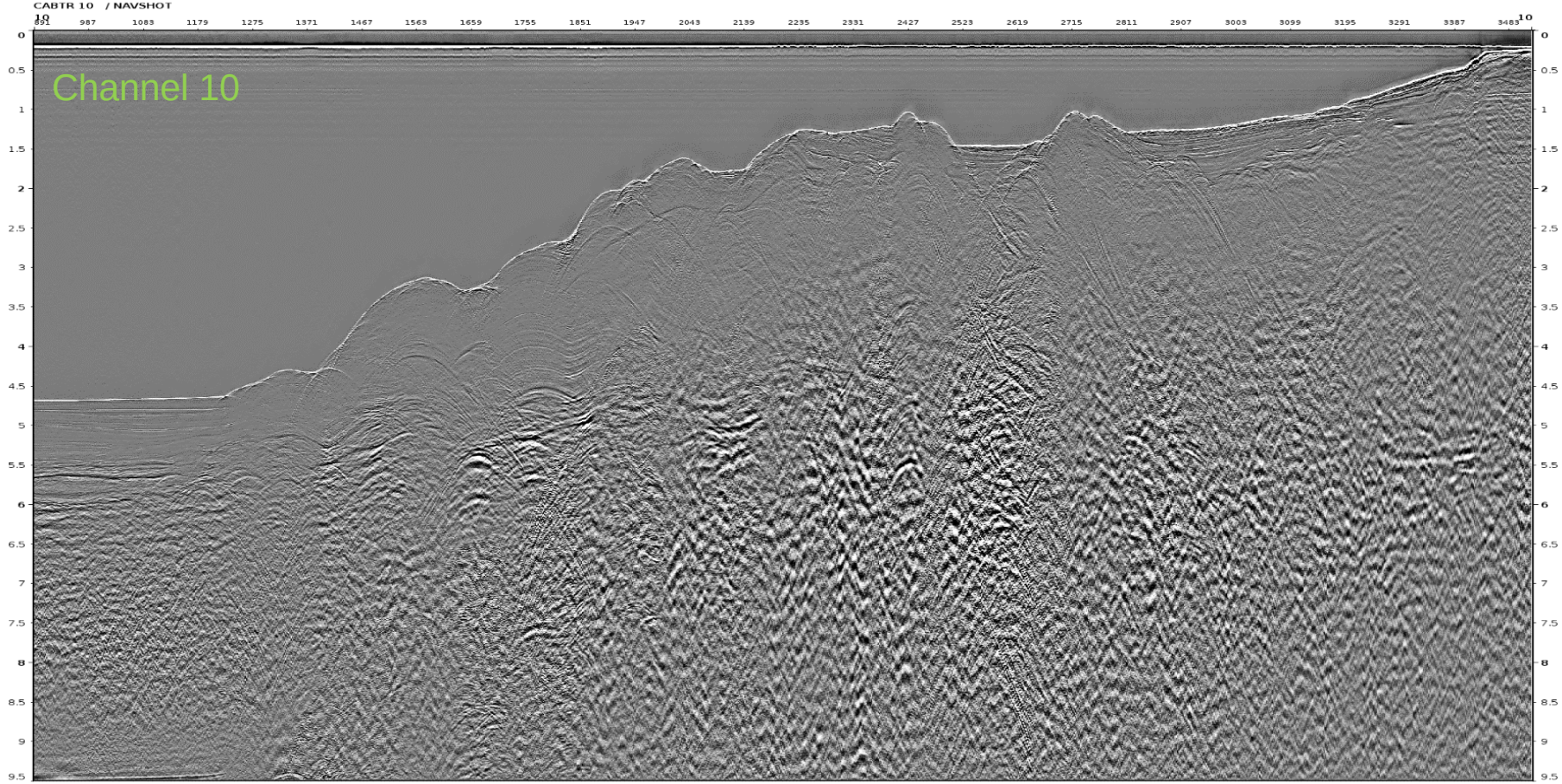
Common Channel after SRME



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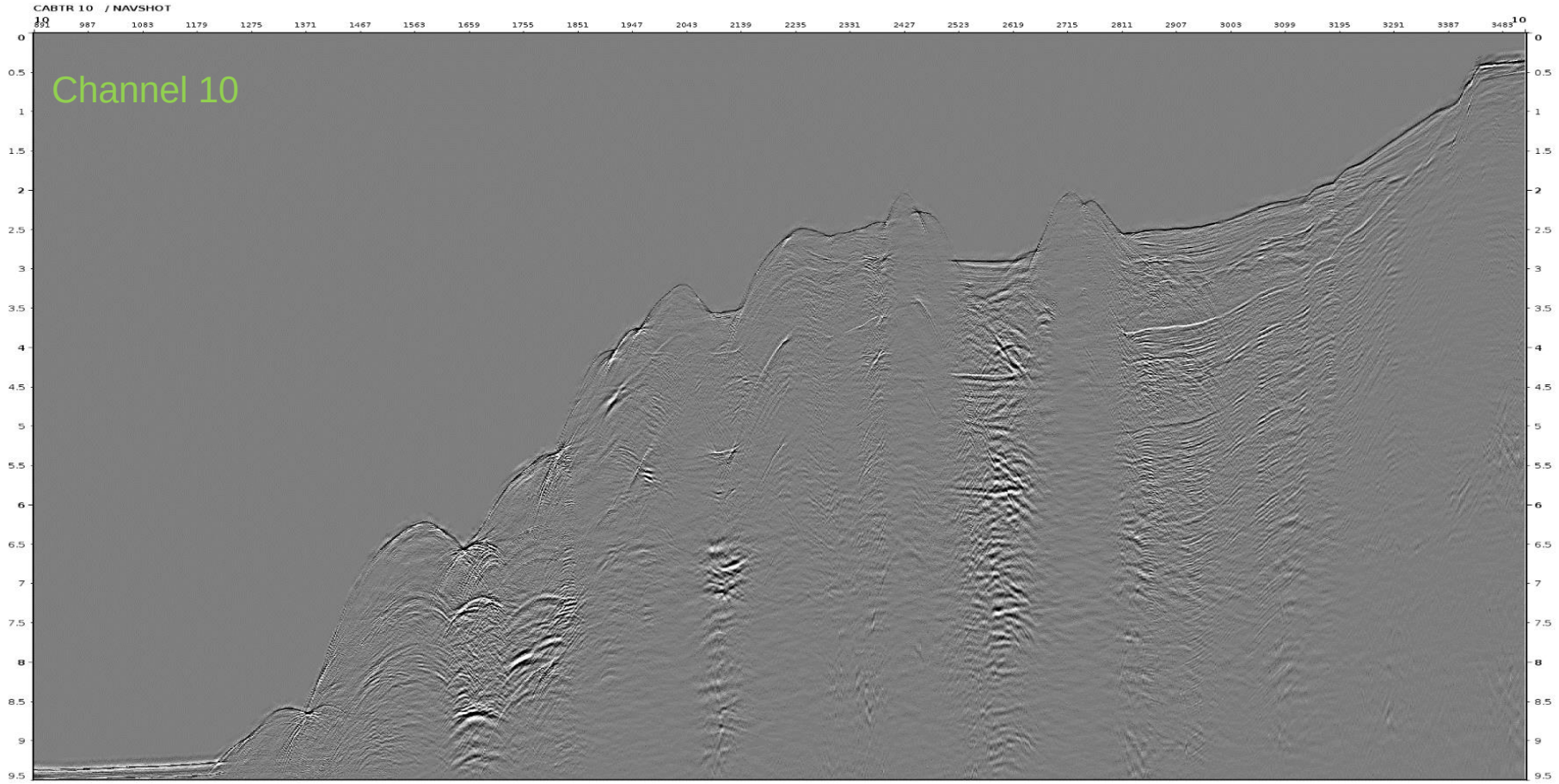
Difference before – after SRME



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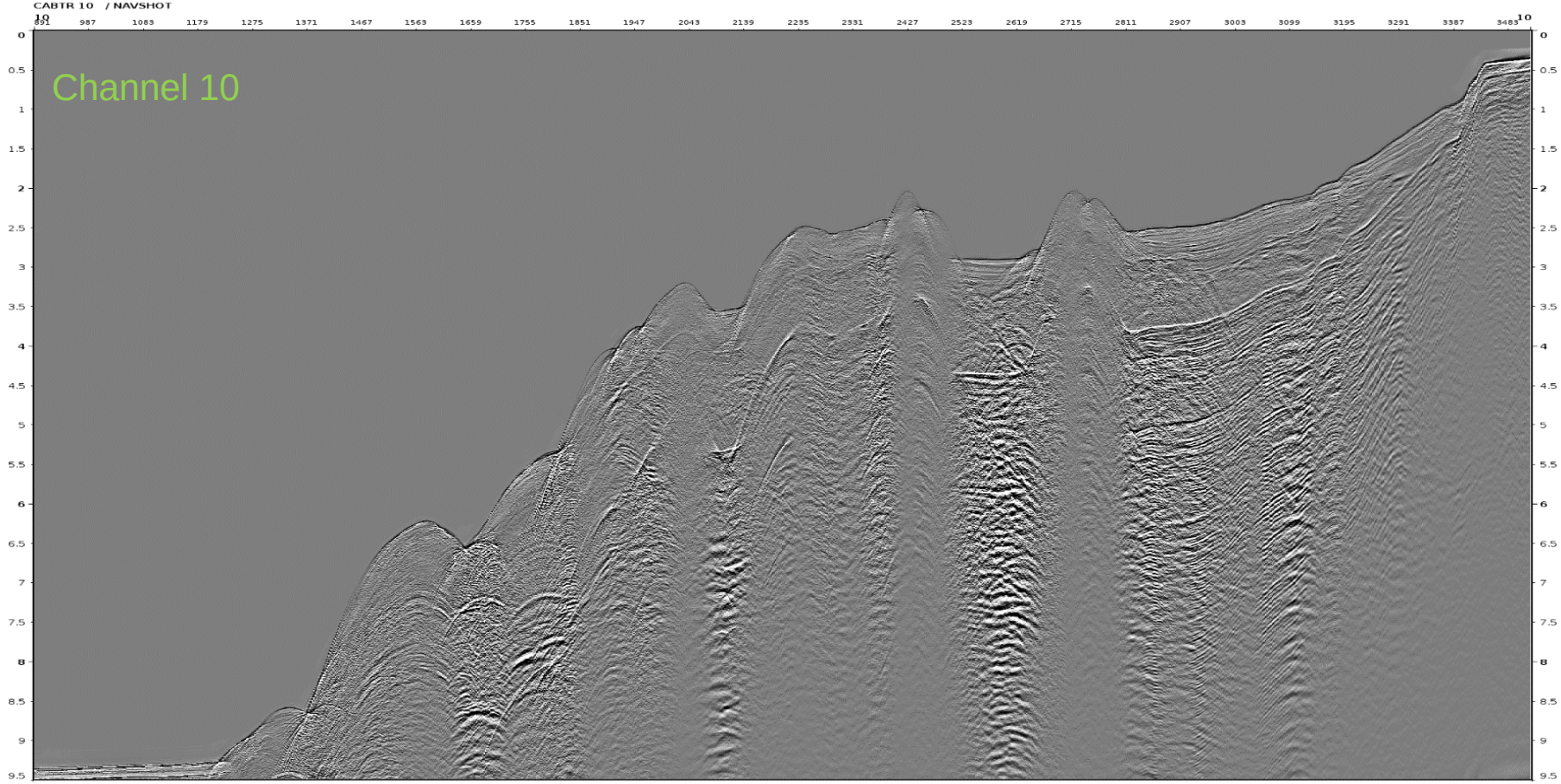
SRME Multiple Model



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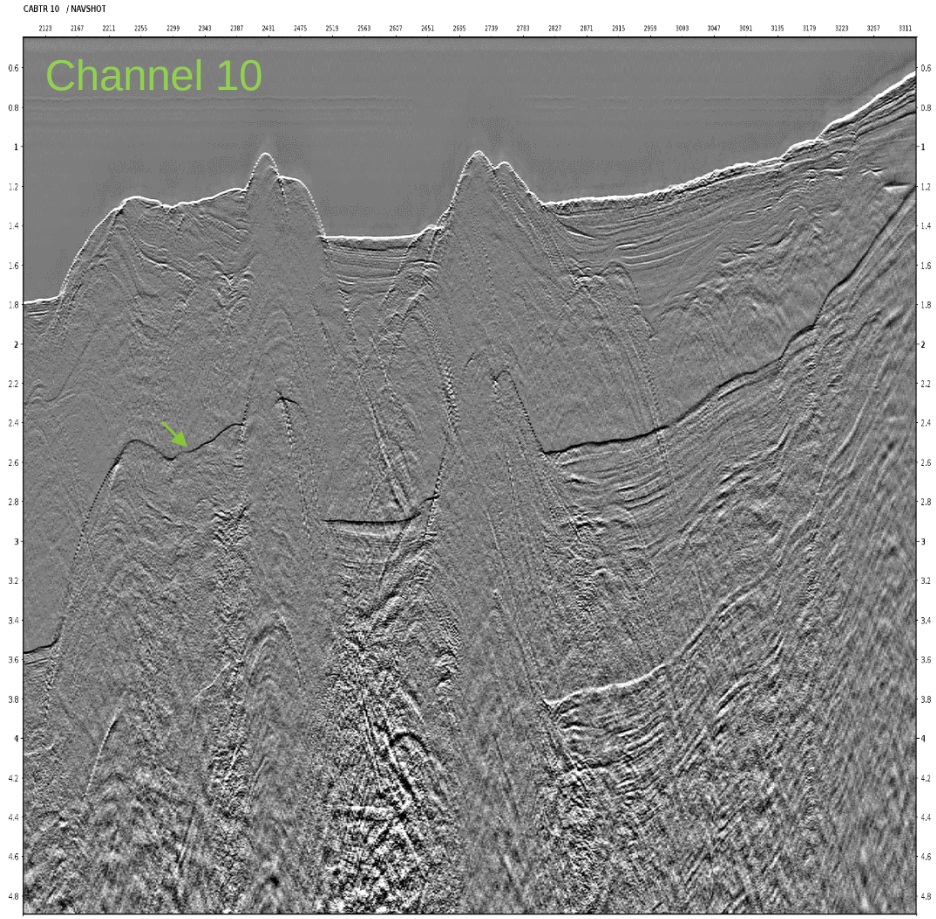
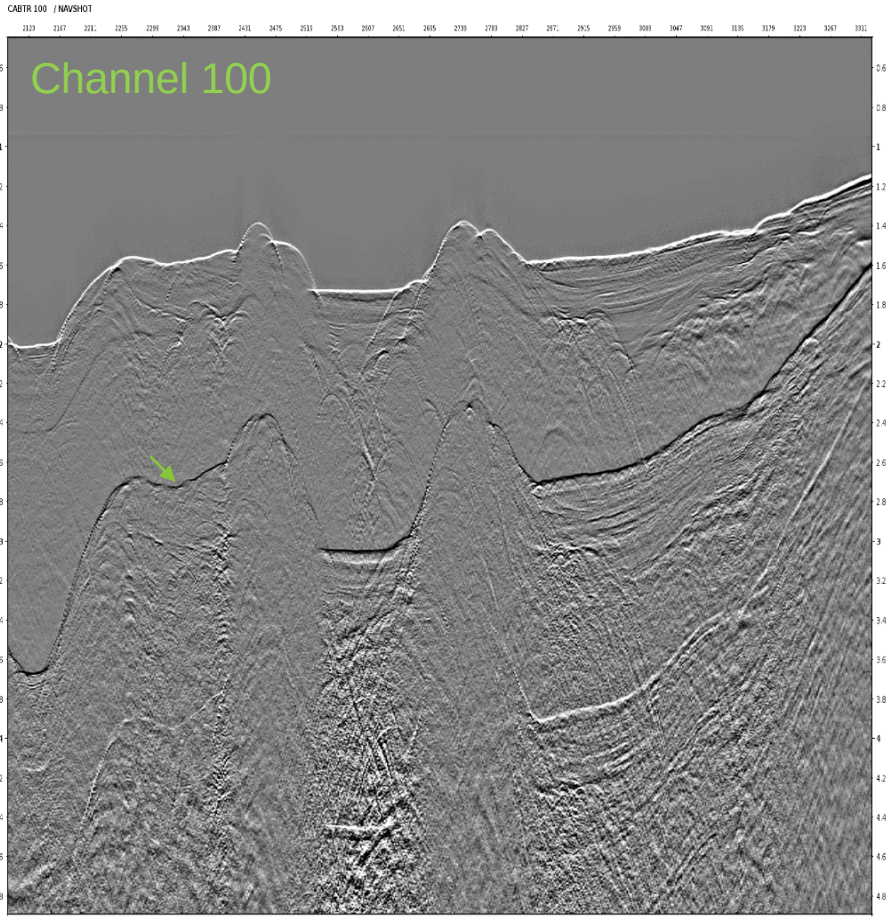
Zoom in Common Channel before SRME





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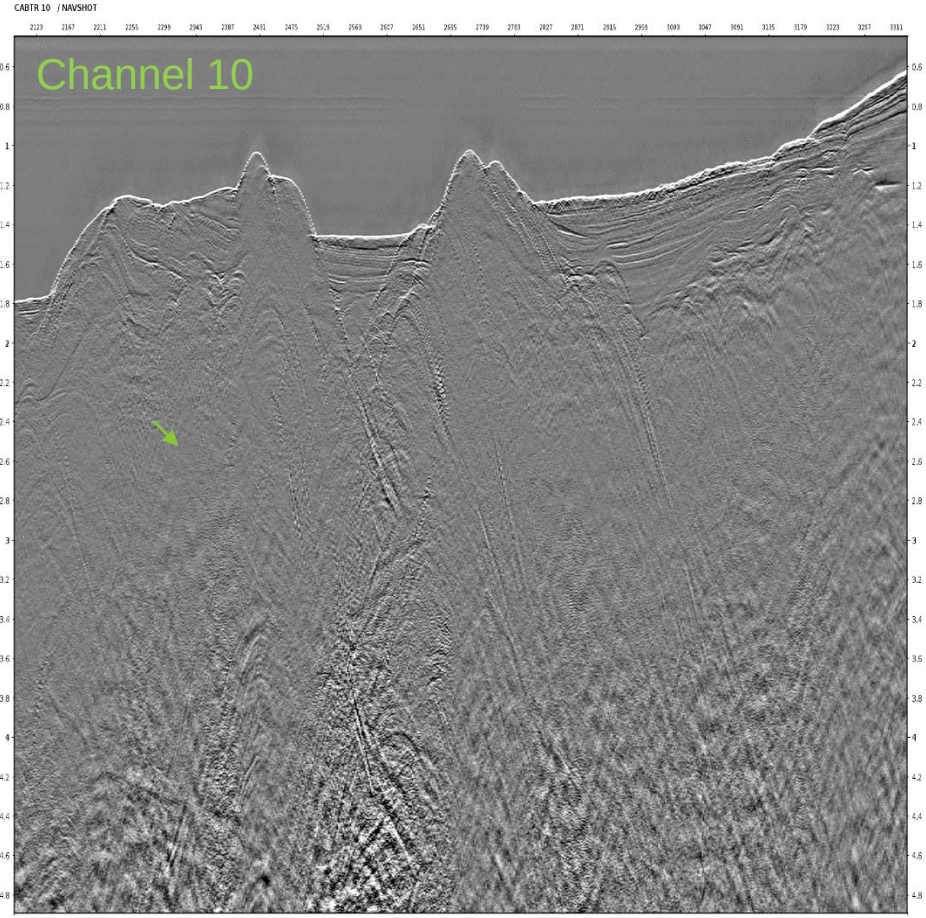
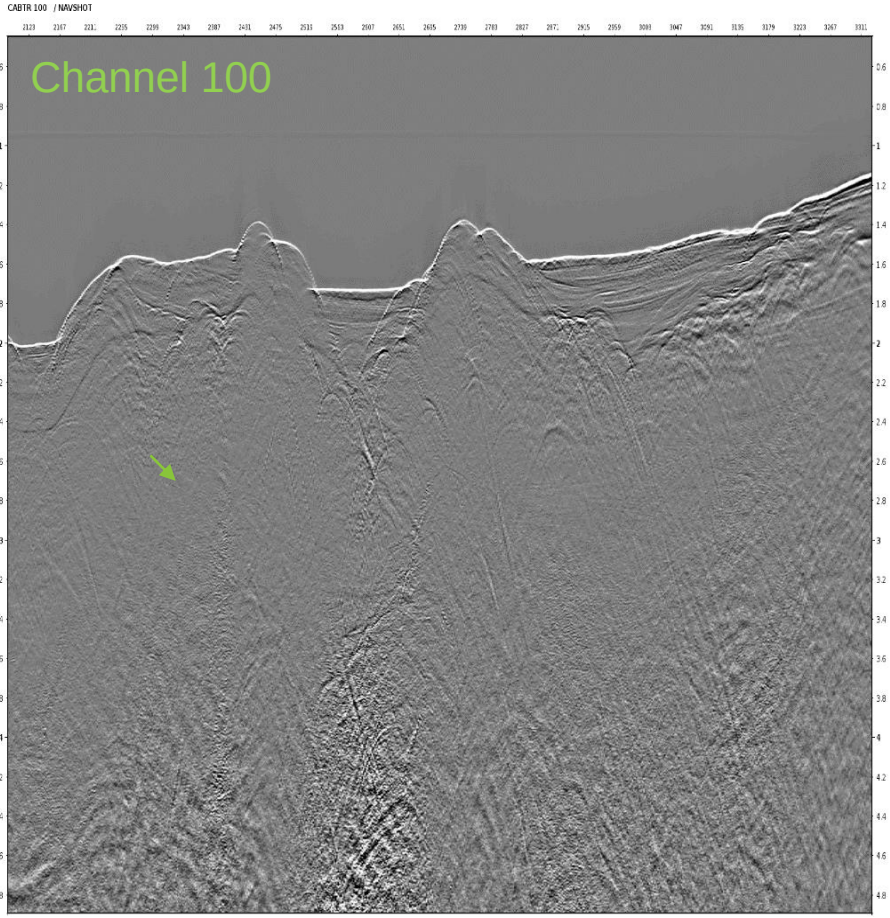
Zoom in Common Channel after SRME





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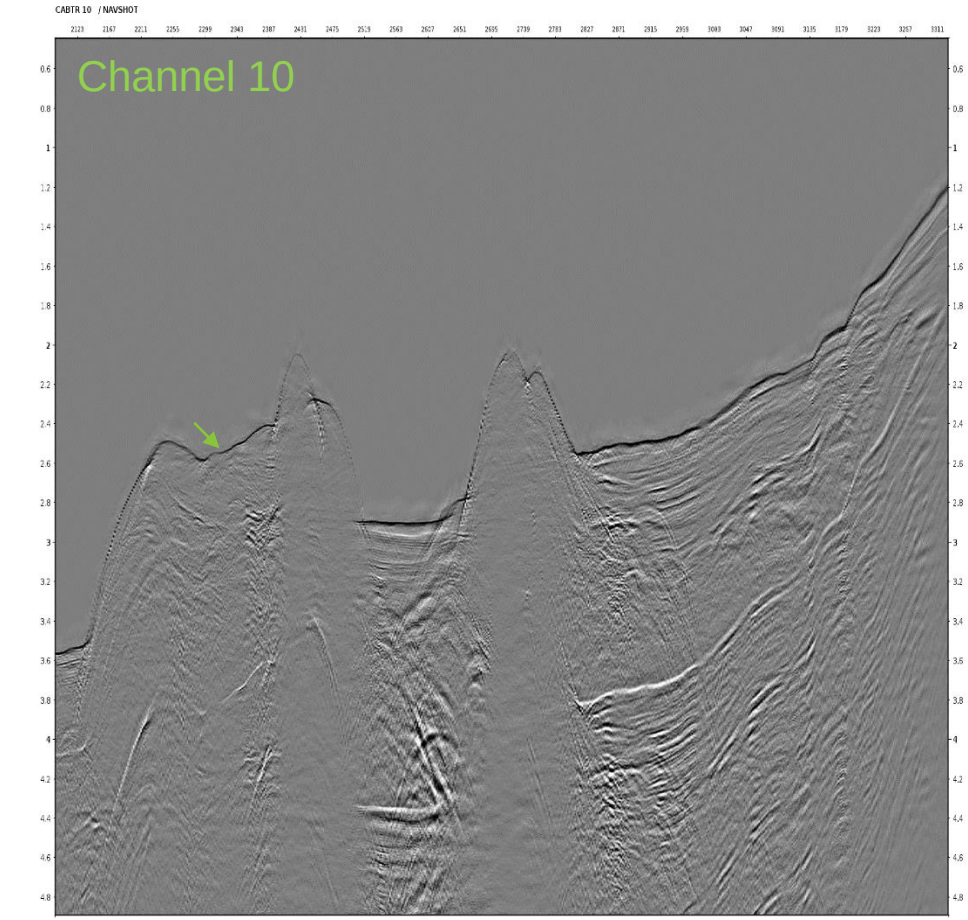
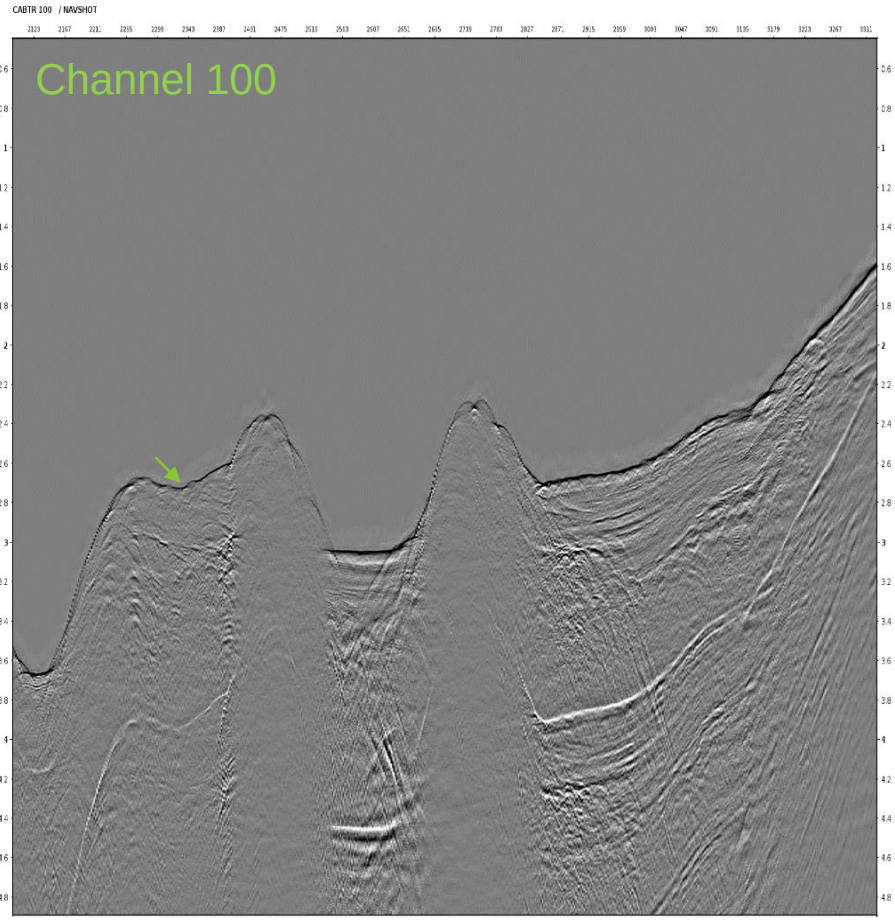
Difference before – after SRME





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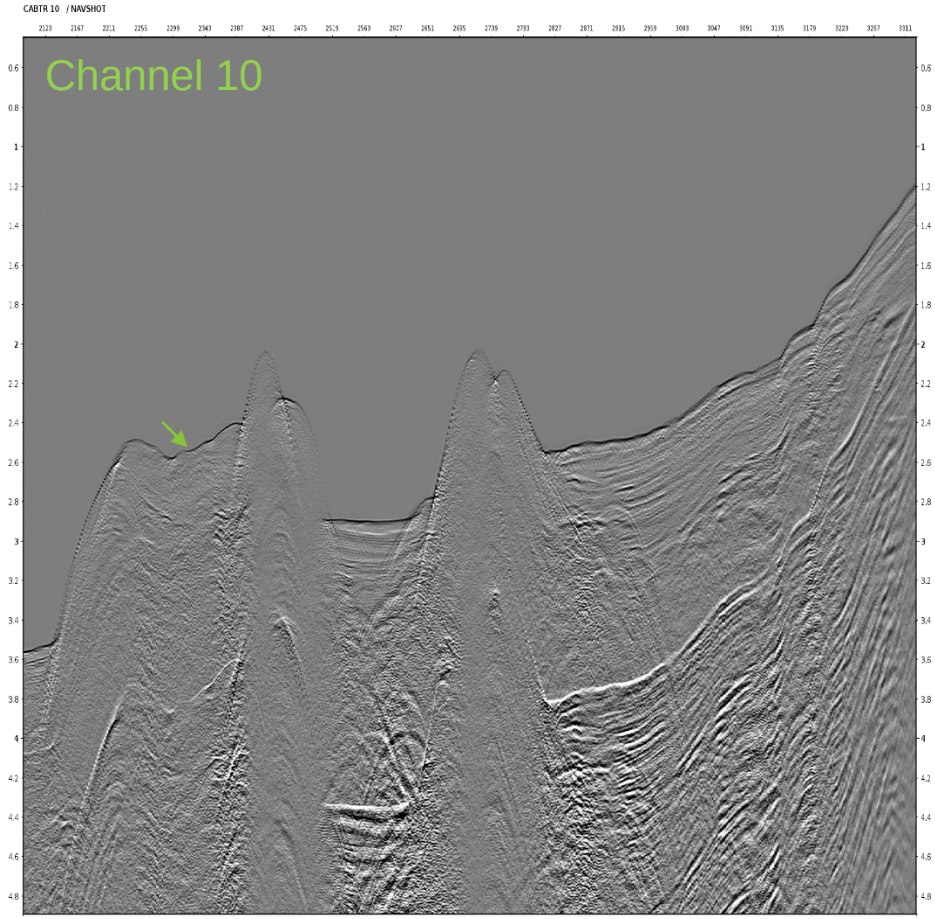
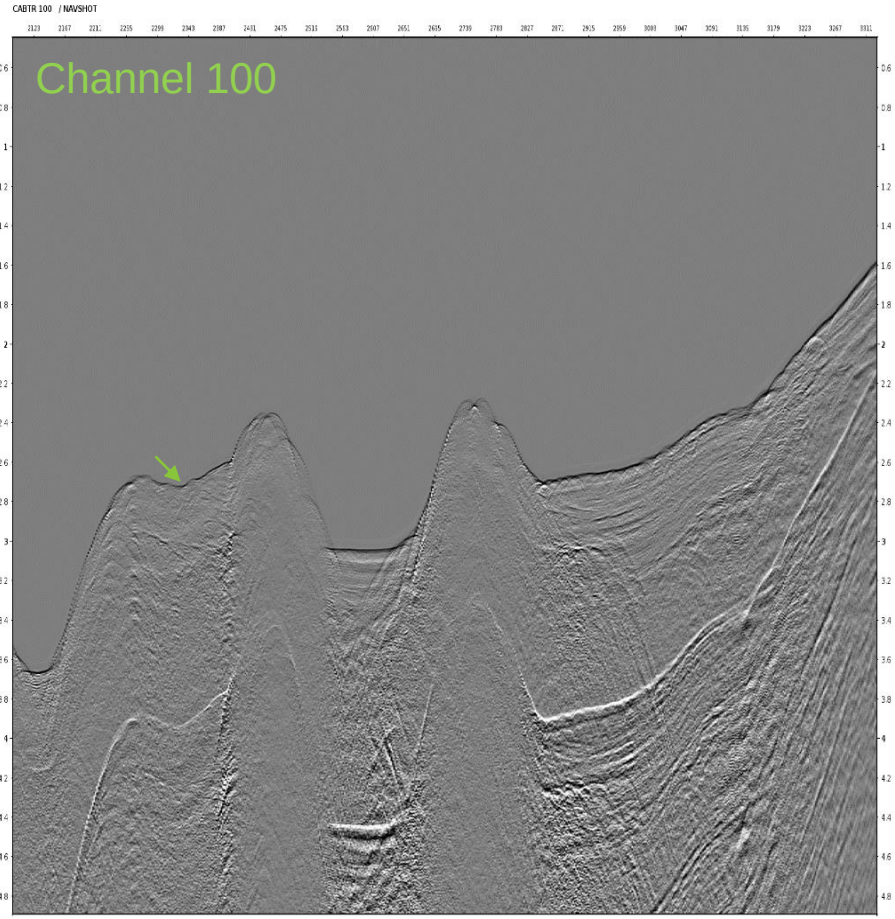
SRME Multiple Model





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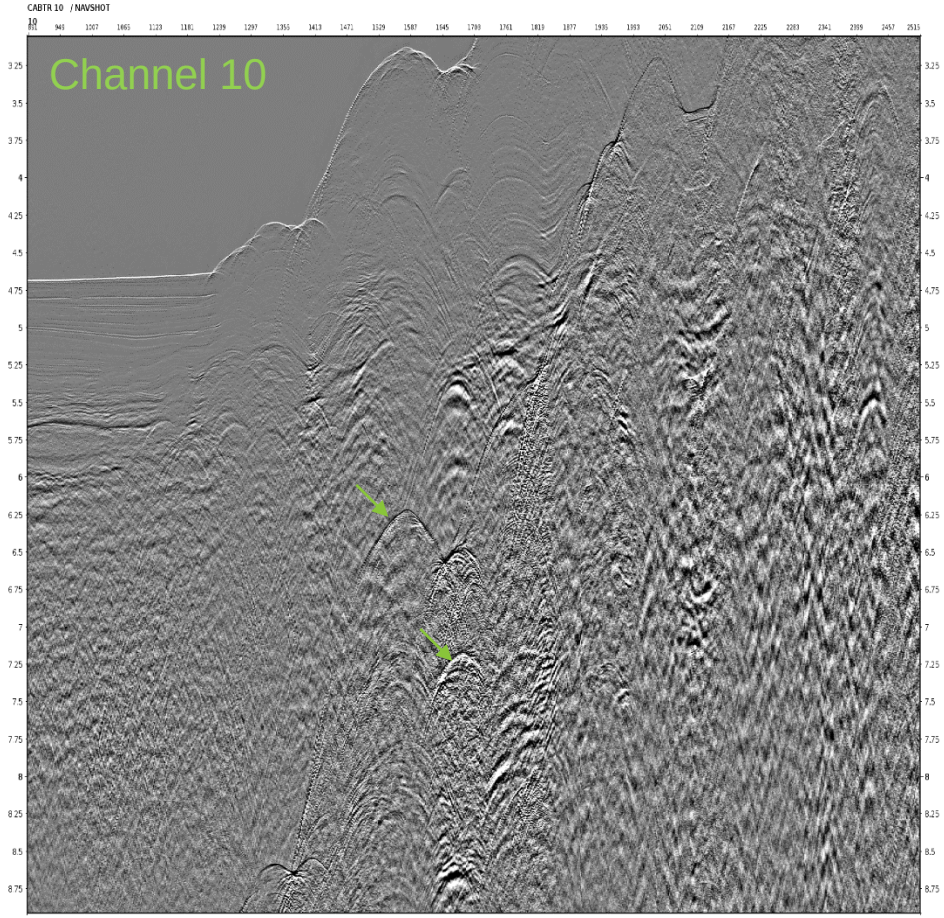
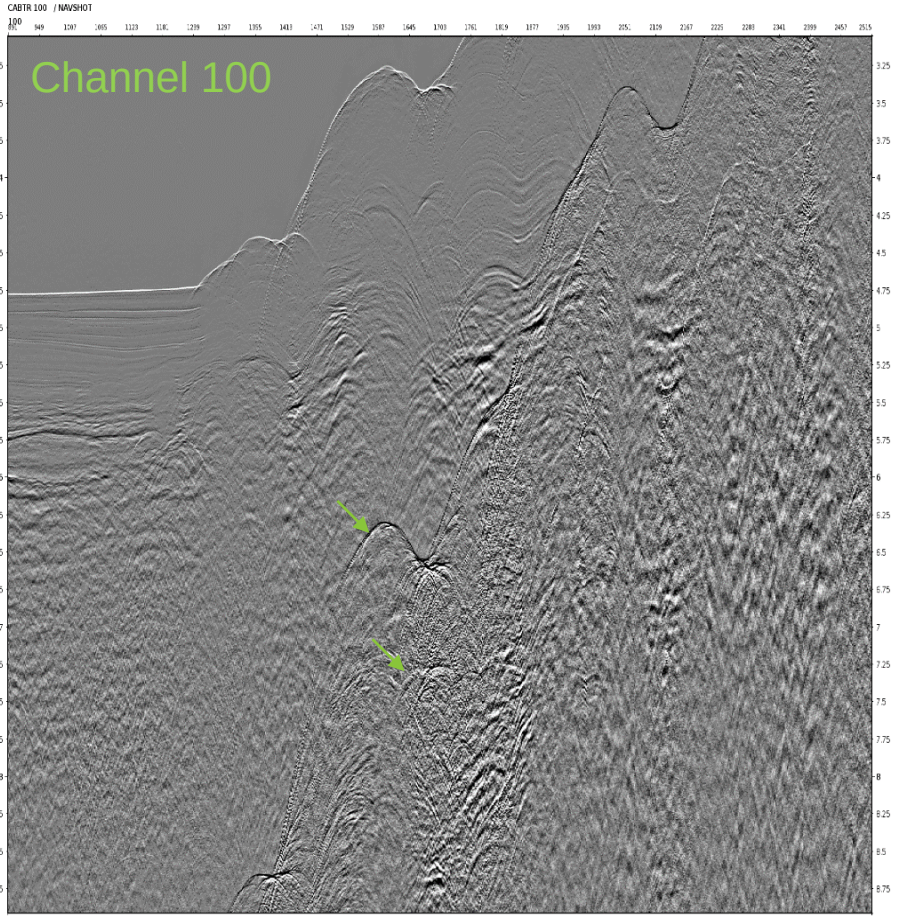
Zoom in Common Channel before SRME





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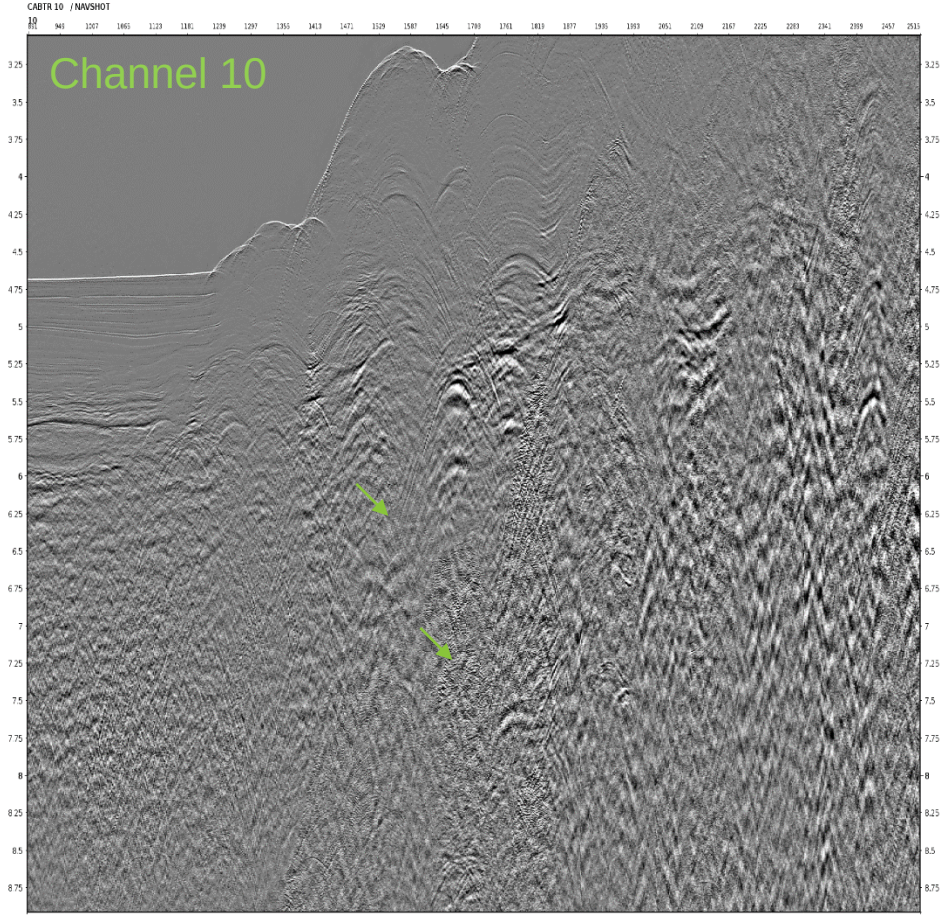
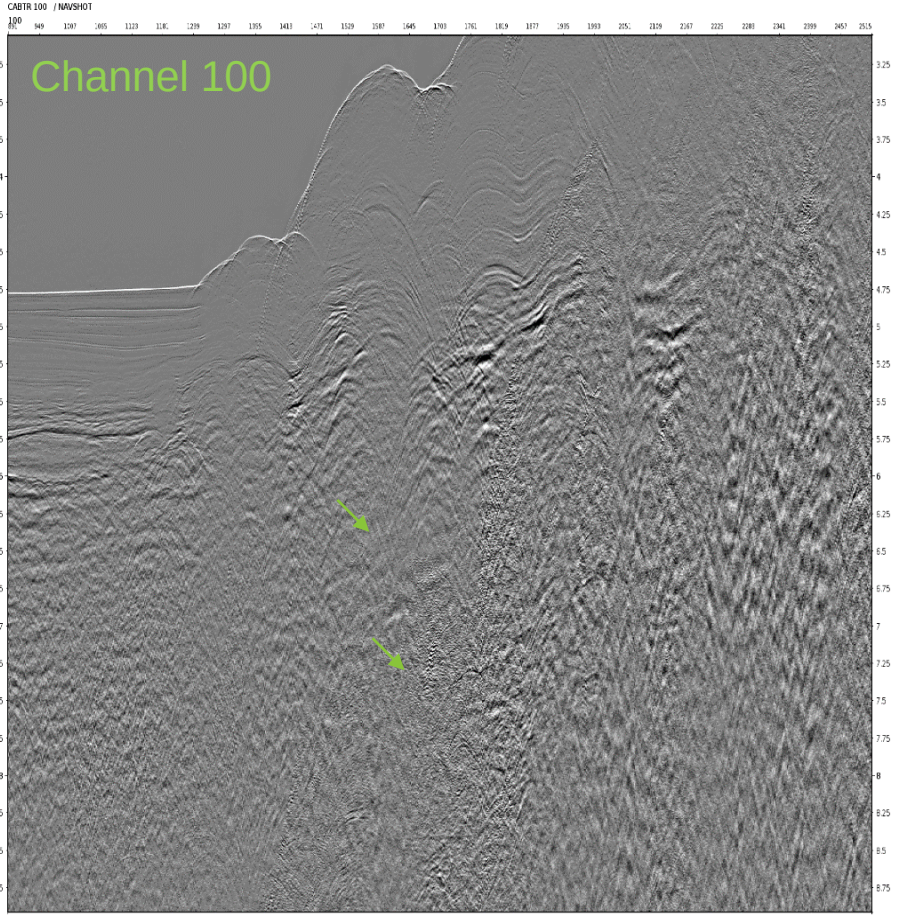
Zoom in Common Channel after SRME





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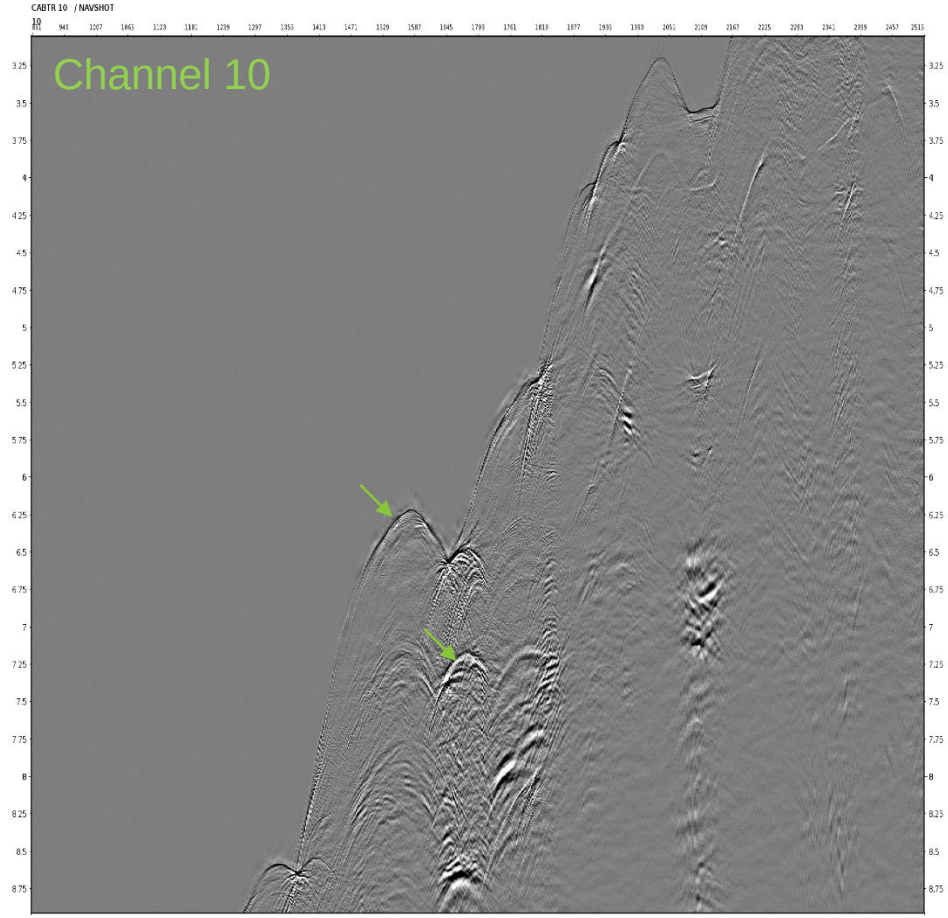
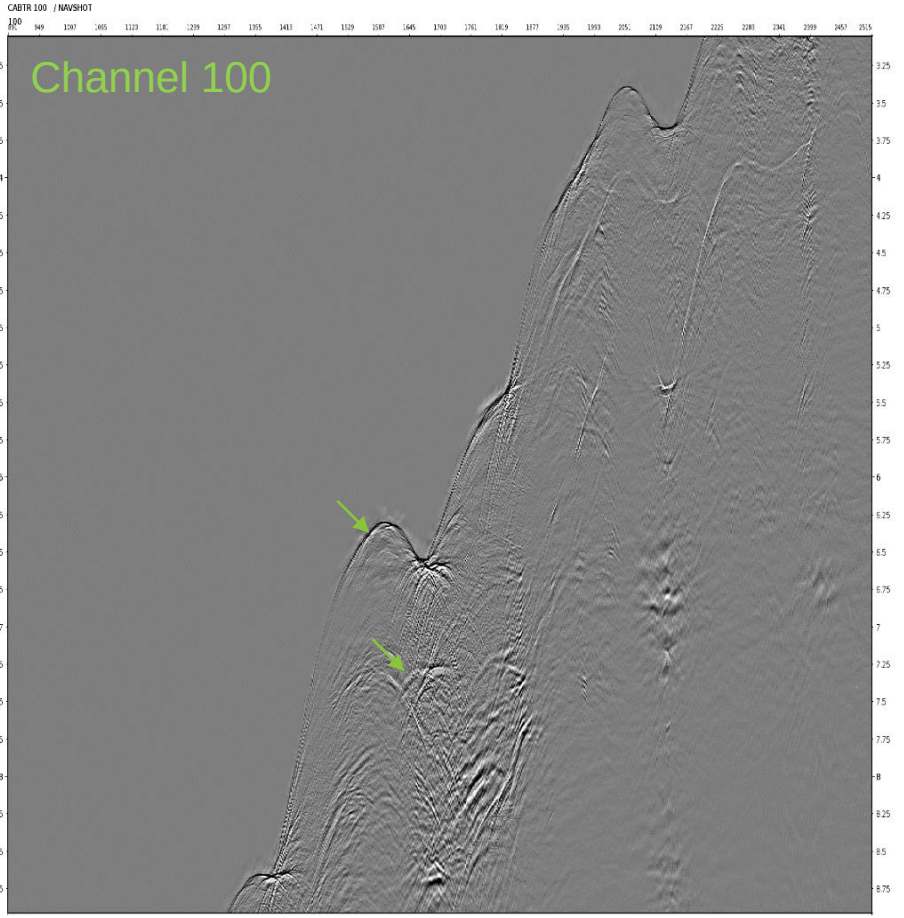
Difference before – after SRME





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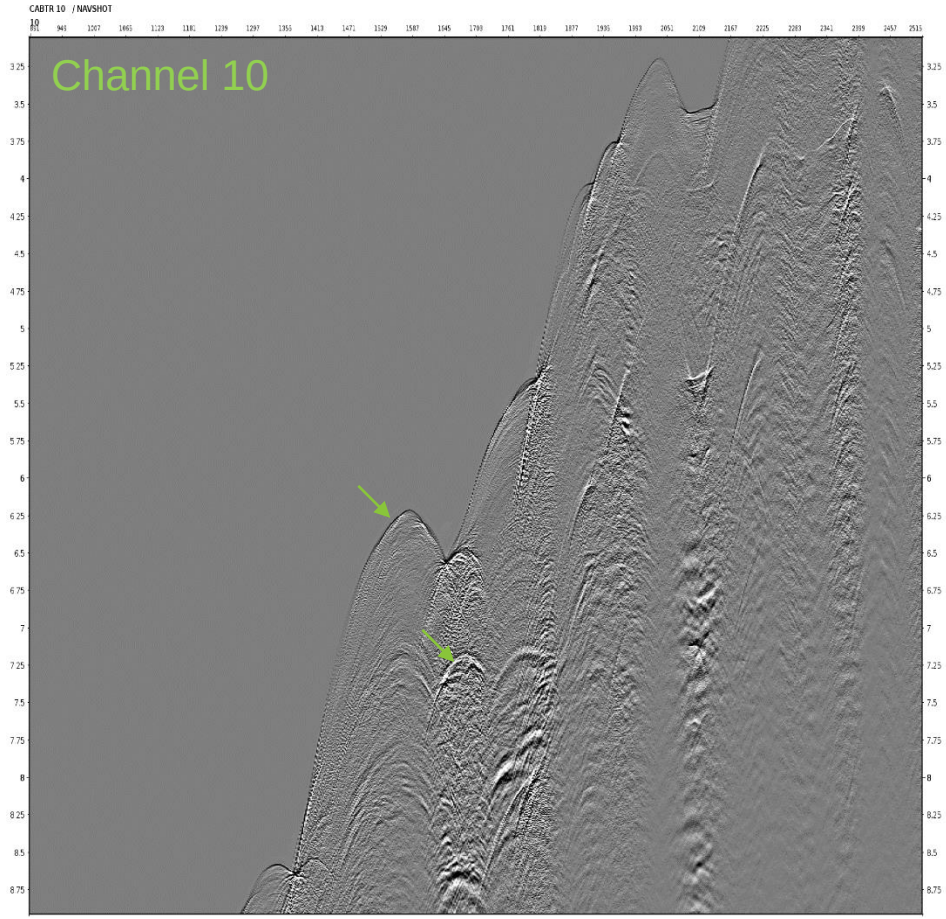
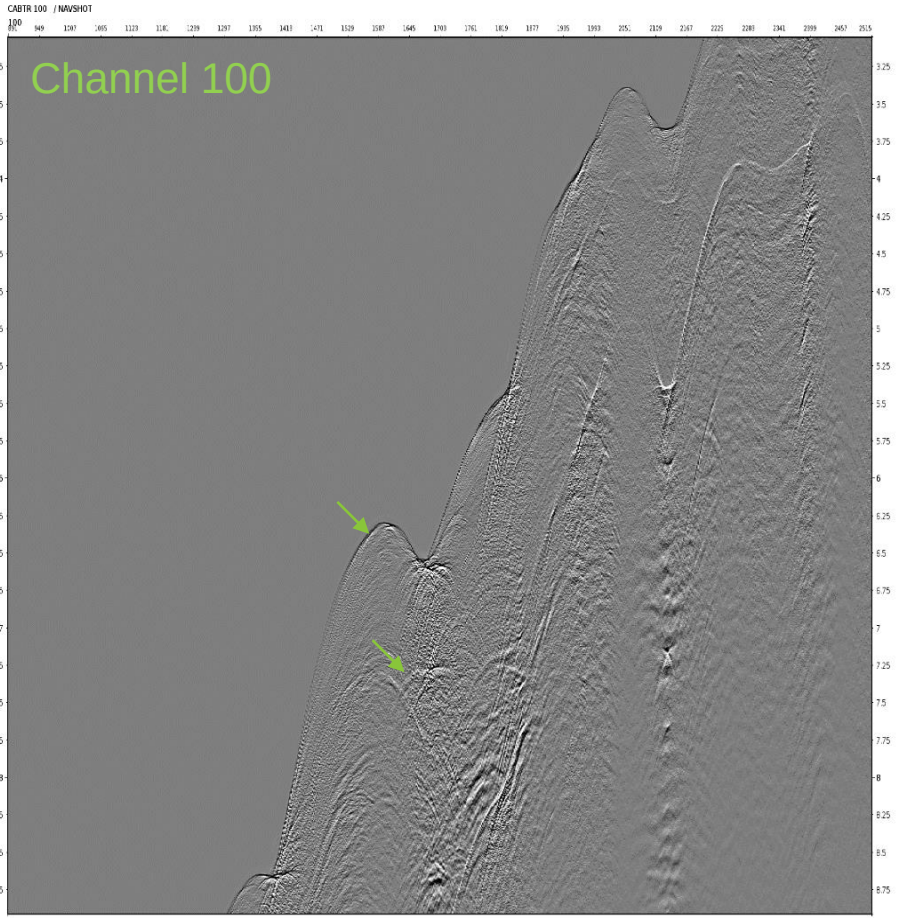
SRME Multiple Model





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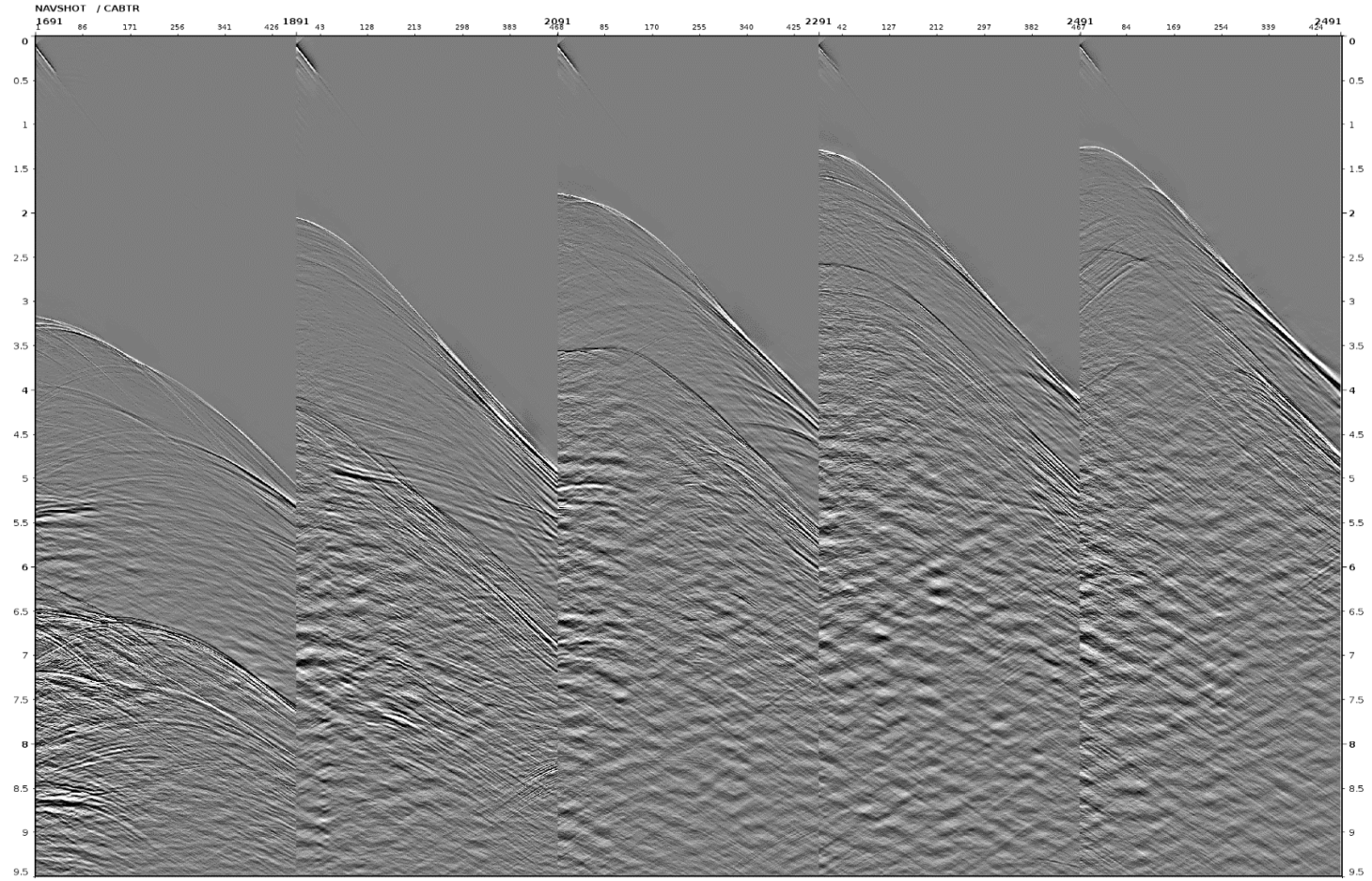
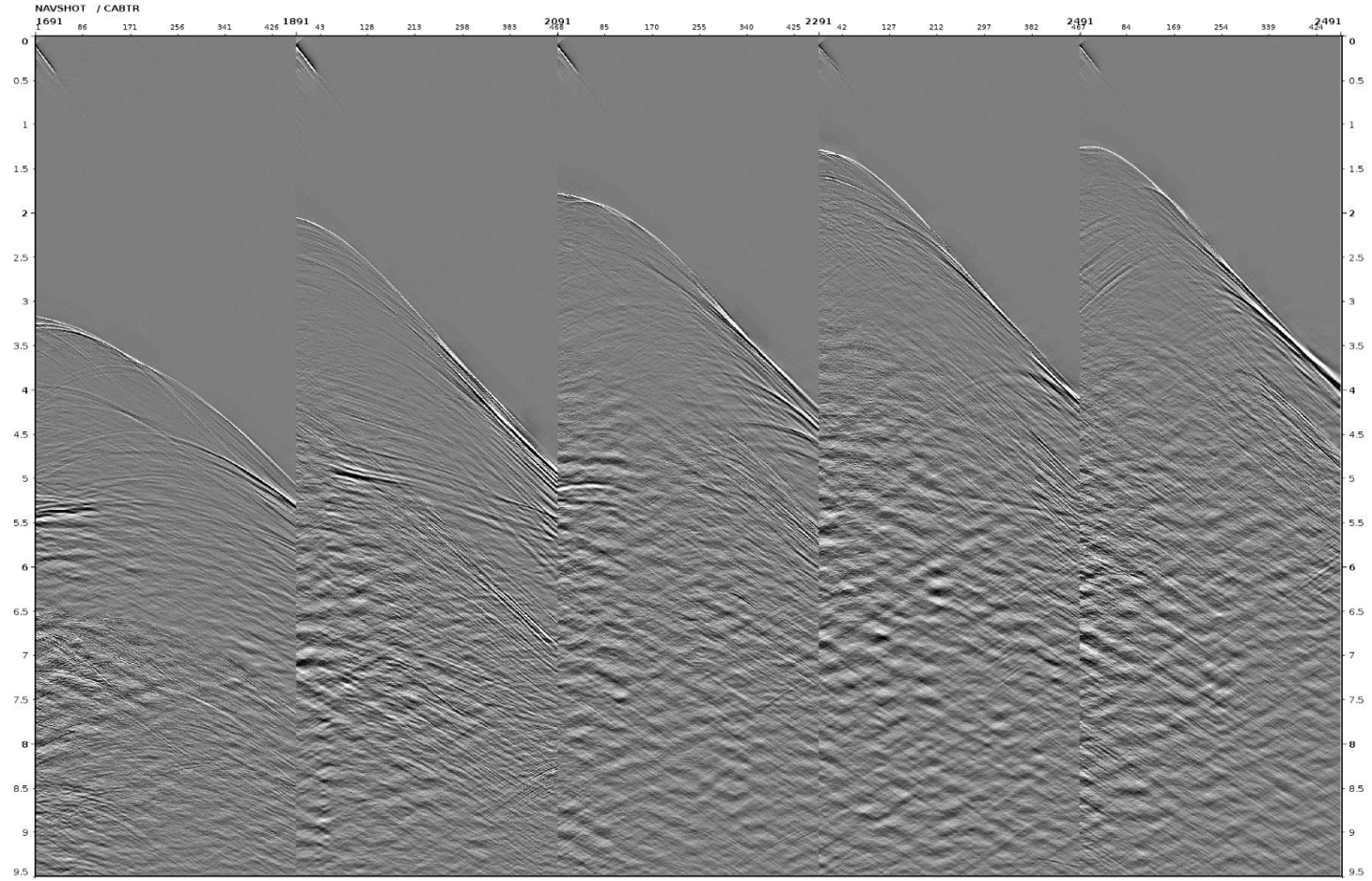
Selected Shot Gathers before SRME



- Free Surface related multiples are well modeled and attenuated after subtraction.
- Simultaneous subtraction flow with MWD & SRME will be tested later to handle subtraction residuals.

© 2020 CGG

Selected Shot Gathers after SRME



- Free Surface related multiples are well modeled and attenuated after subtraction.
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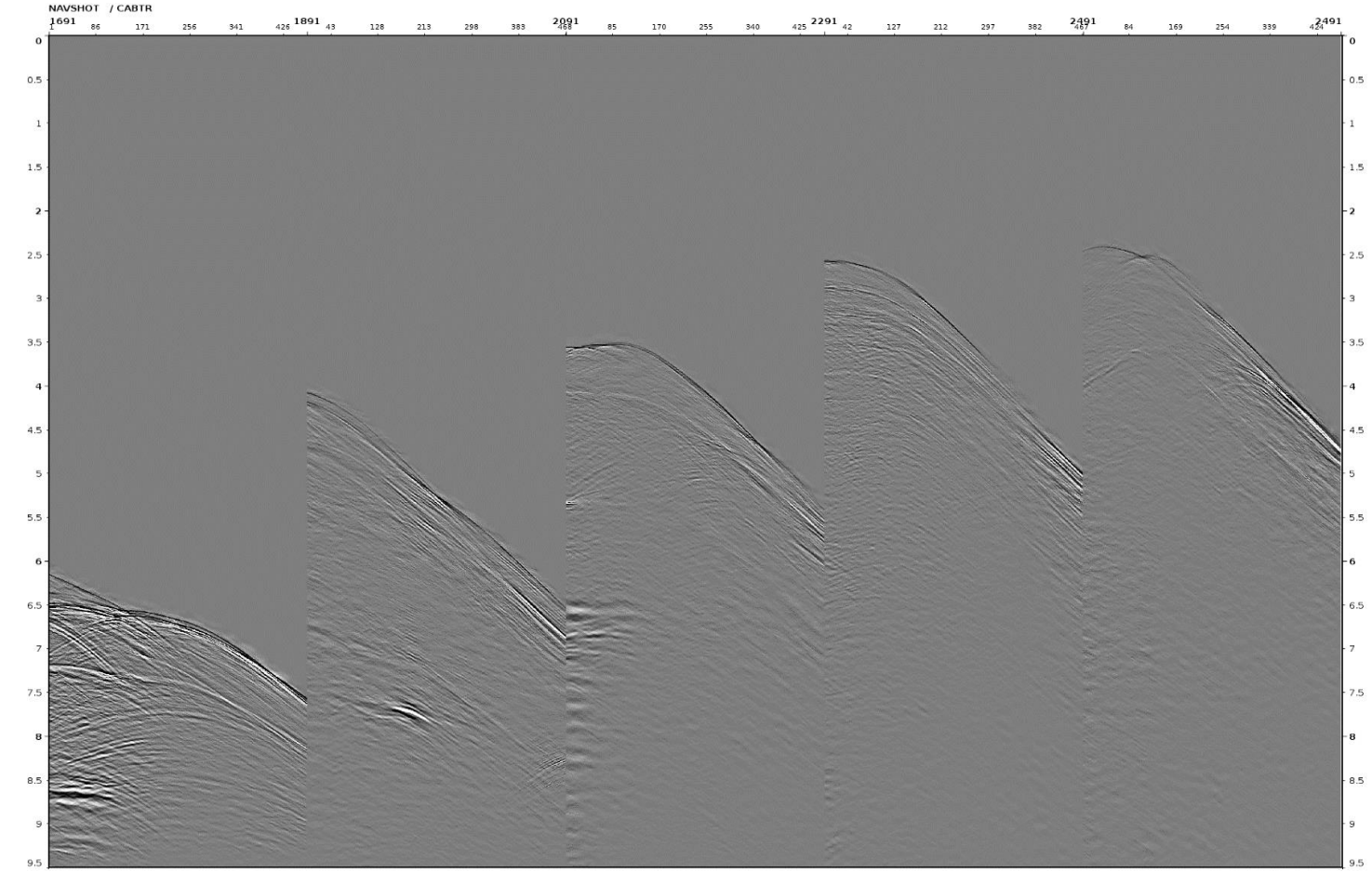
Difference before – after SRME



- Free Surface related multiples are well modeled and attenuated after subtraction.
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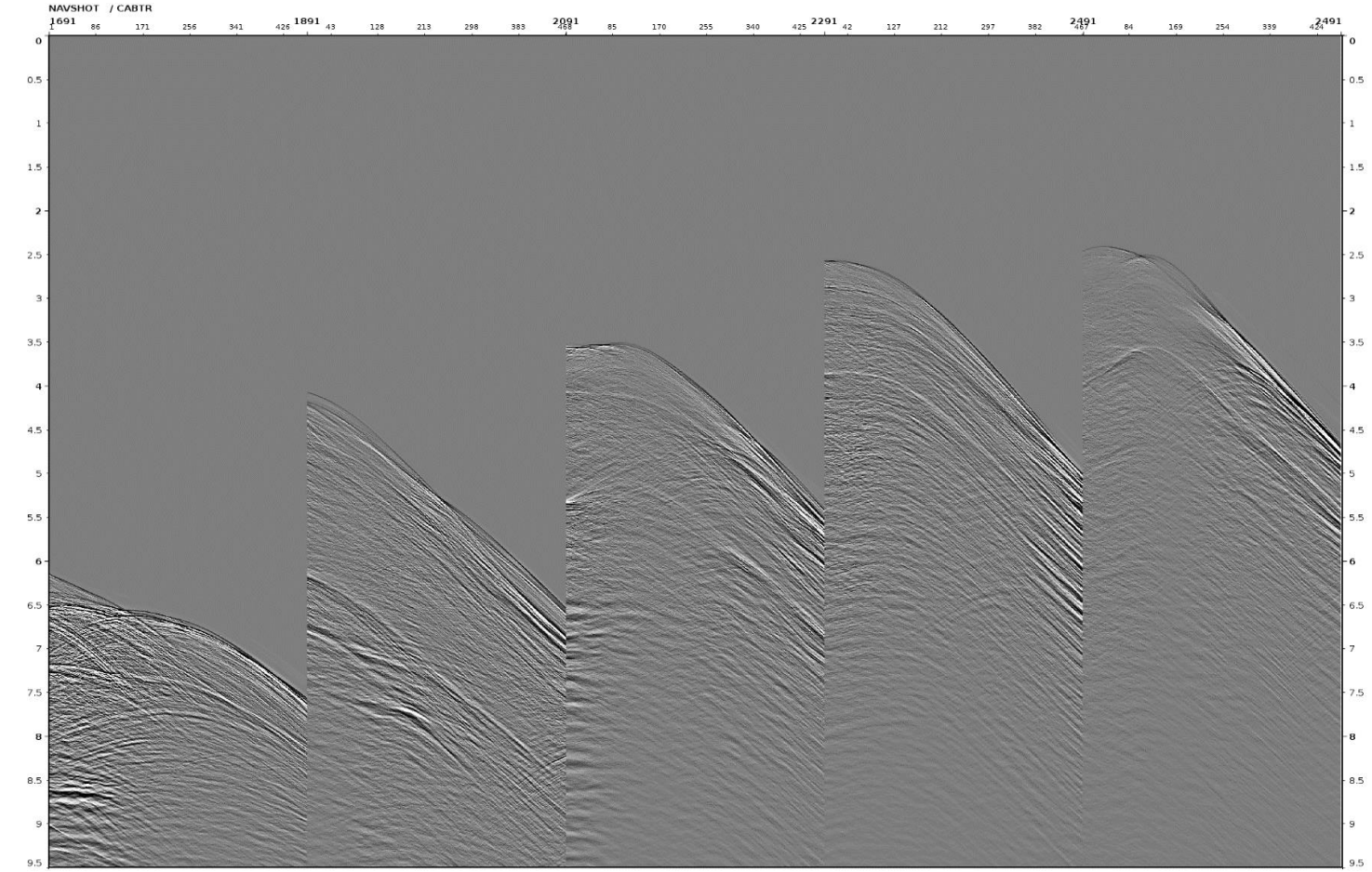
SRME Model



- Free Surface related multiples are well modeled and attenuated after subtraction.
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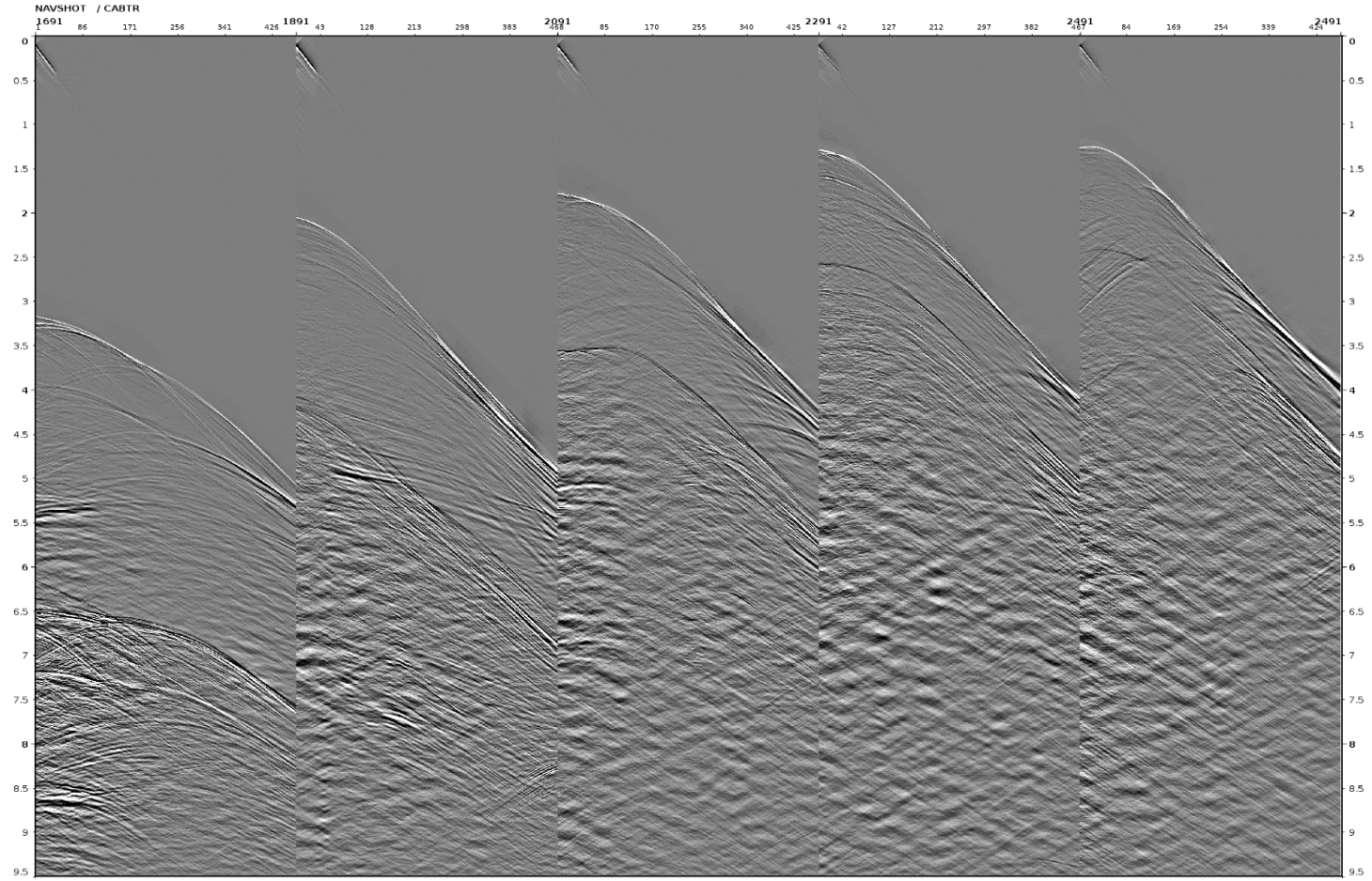
Selected Shot Gathers before SRME (copy)



- Free Surface related multiples are well modeled and attenuated after subtraction.
- Simultaneous subtraction flow with MWD & SRME will be tested later to handle subtraction residuals.

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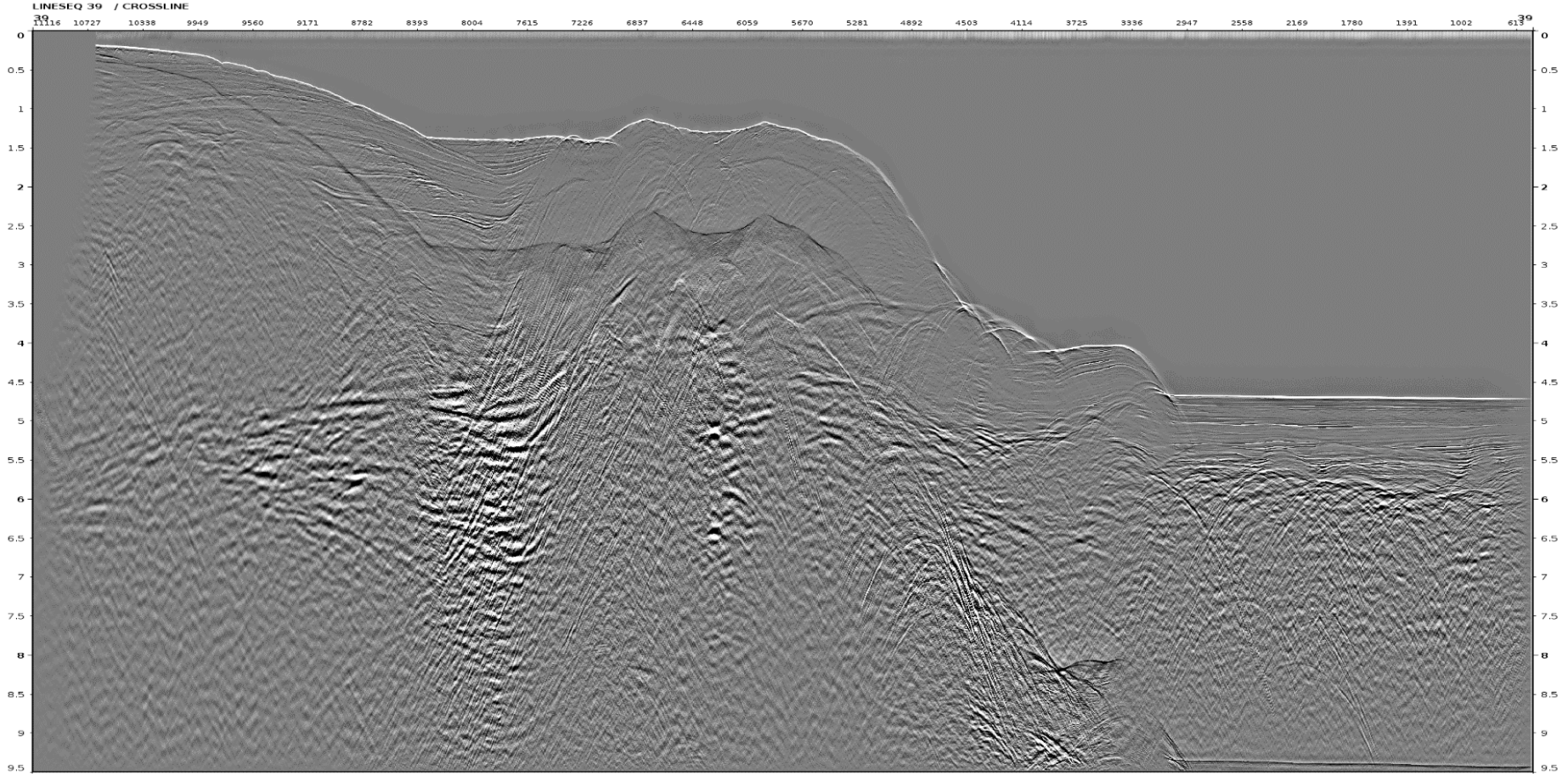
Seq 039

Stack

Common Channel

Shot Gathers

Stack before SRME



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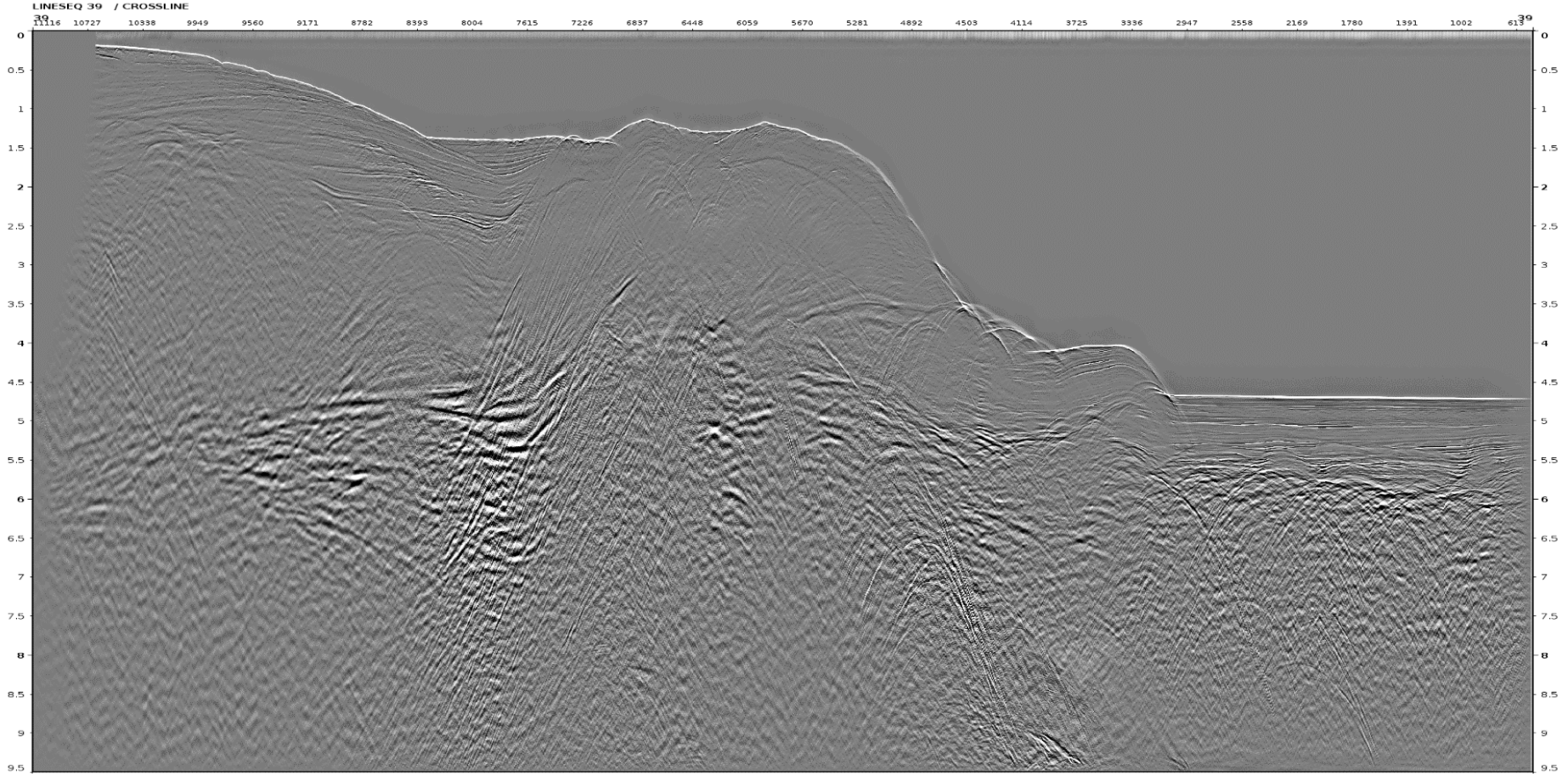
Stack after SRME



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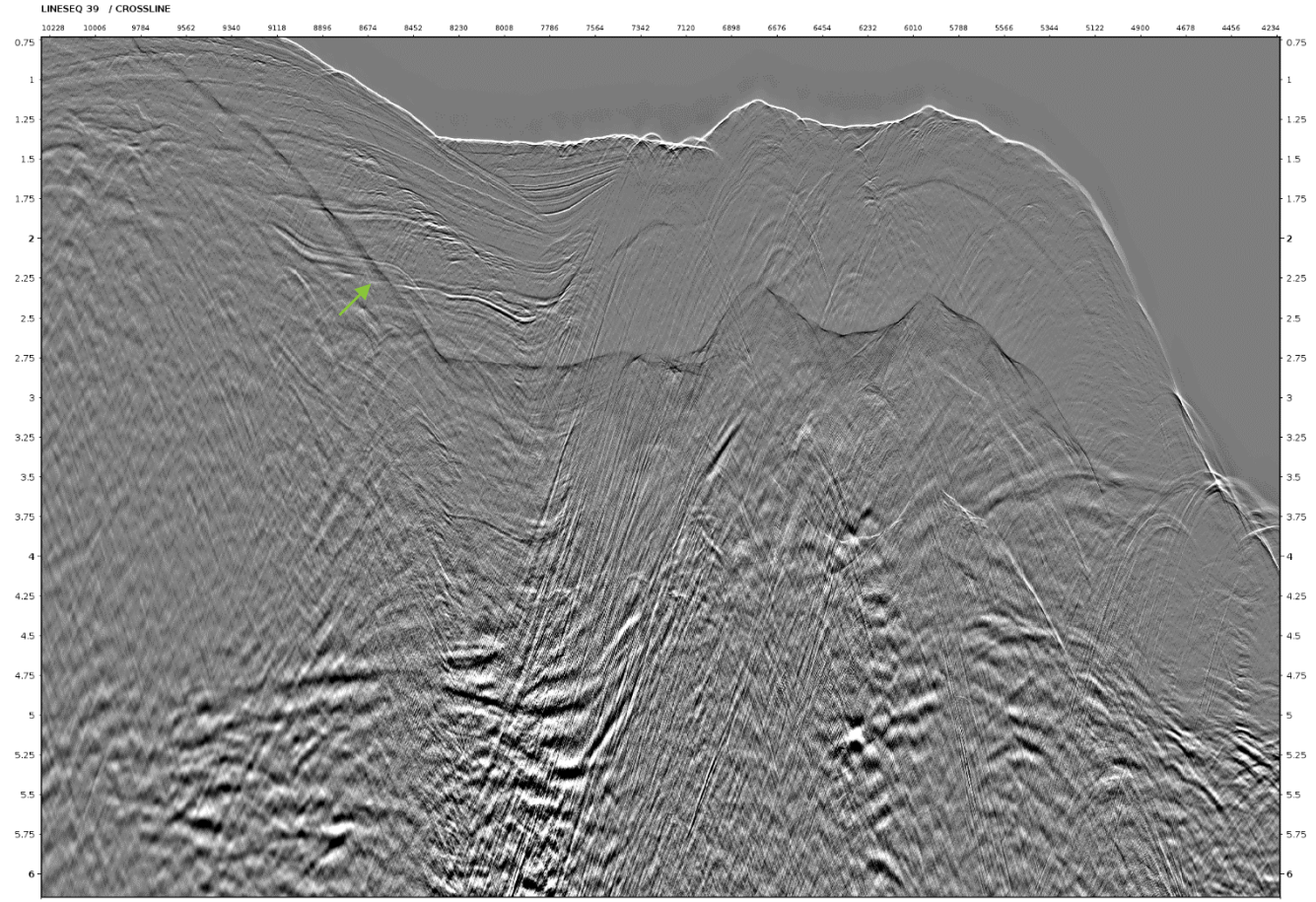
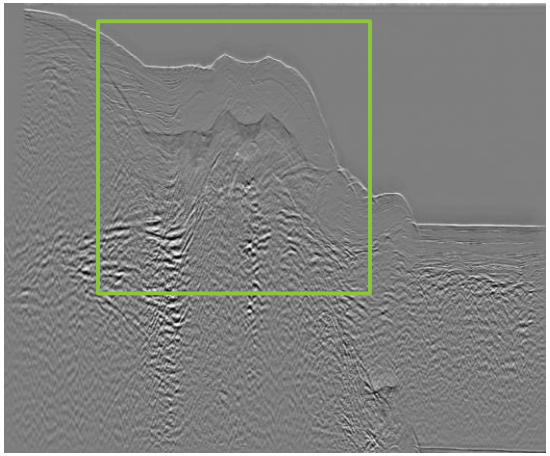
Zoom in Stack before SRME





- Free Surface related multiples are well modeled and attenuated after subtraction.

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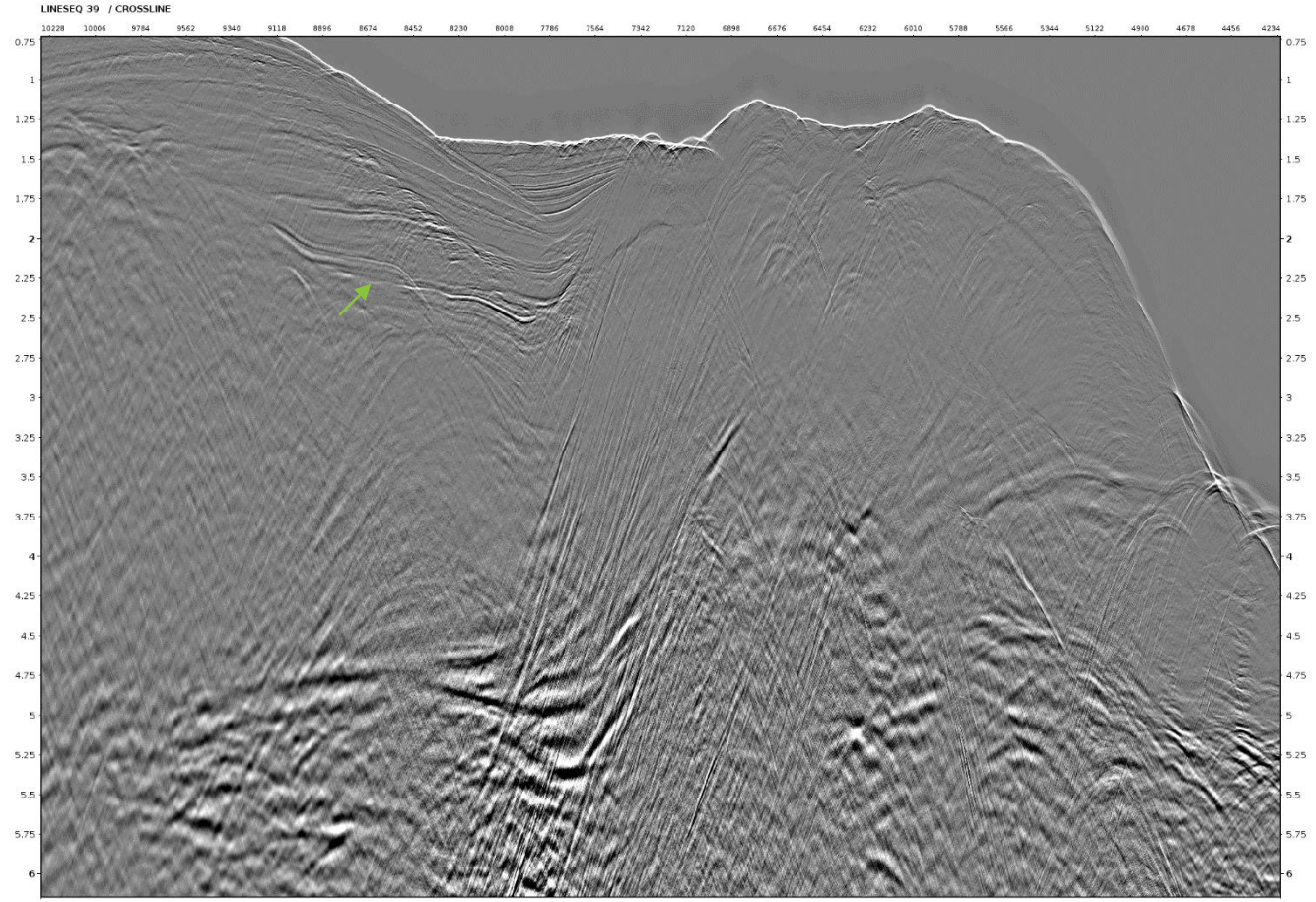
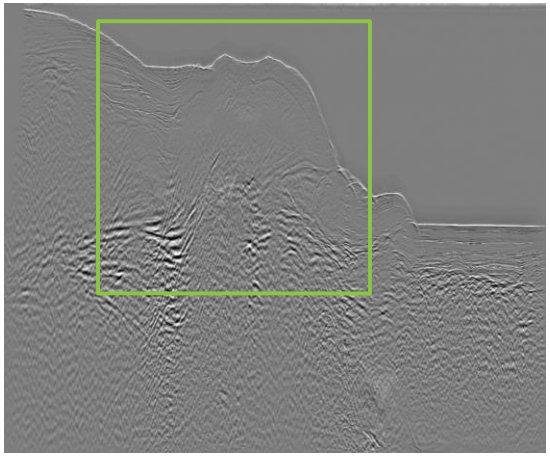
Zoom in Stack after SRME





- Free Surface related multiples are well modeled and attenuated after subtraction.

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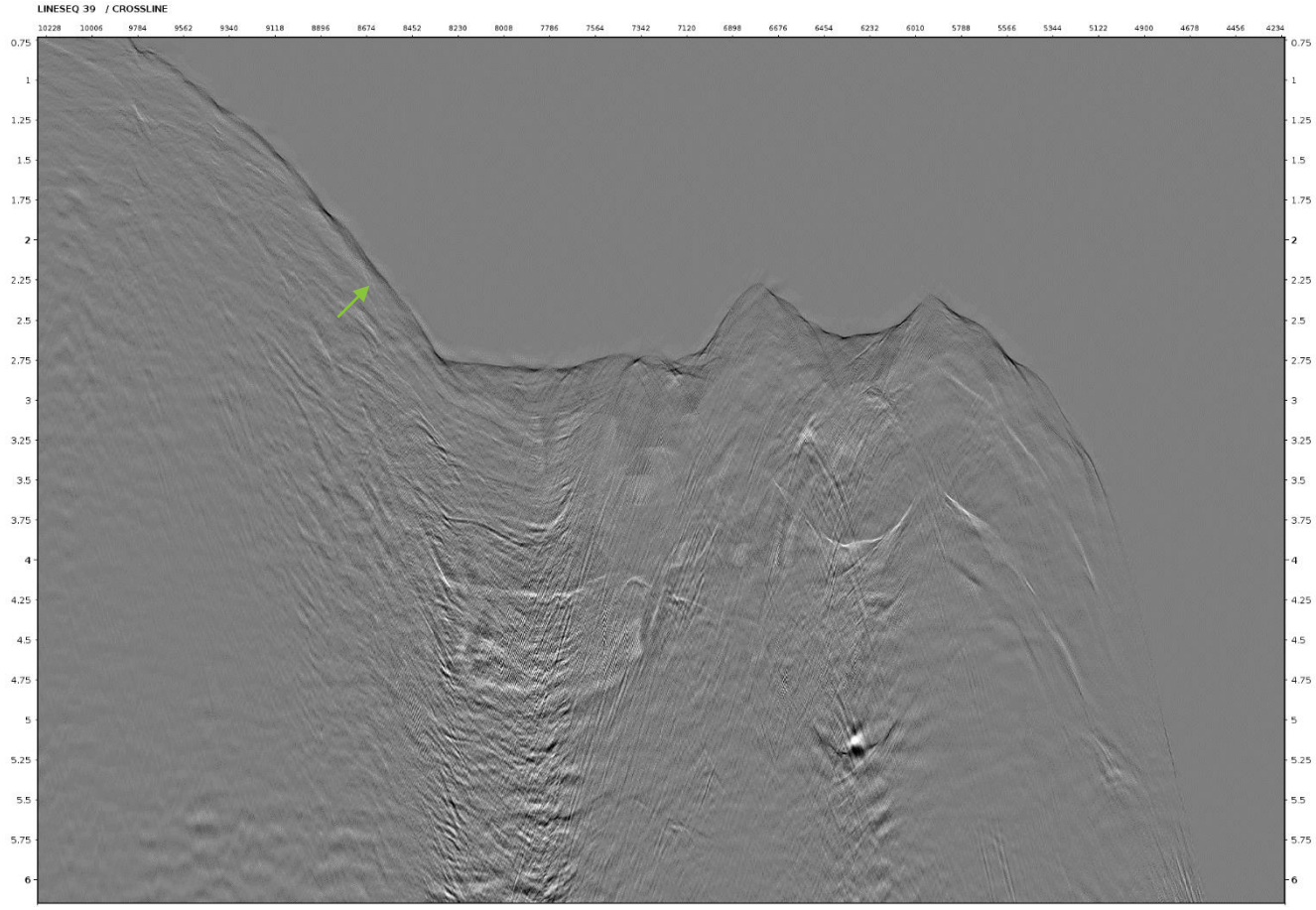
Difference before – after SRME



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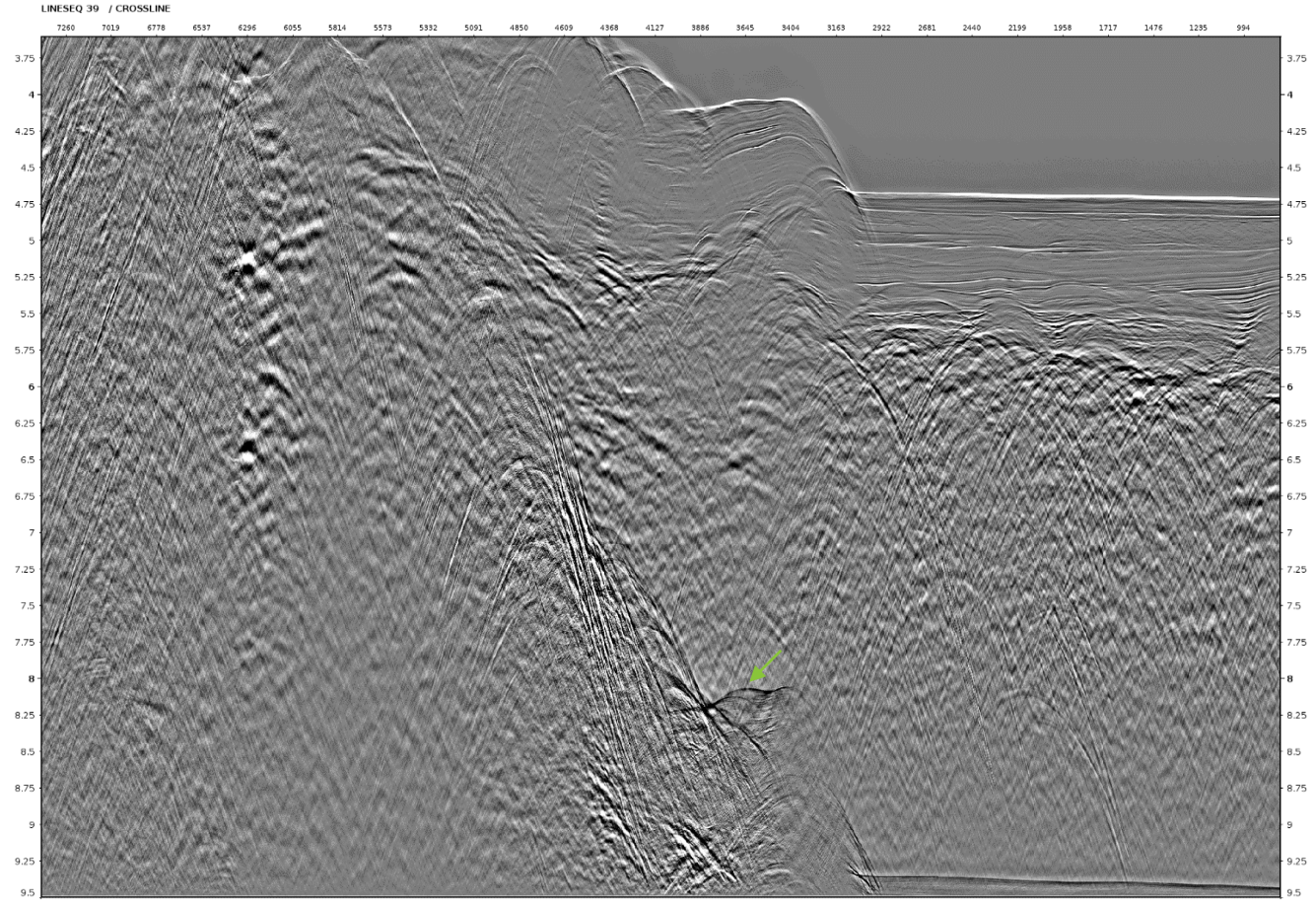
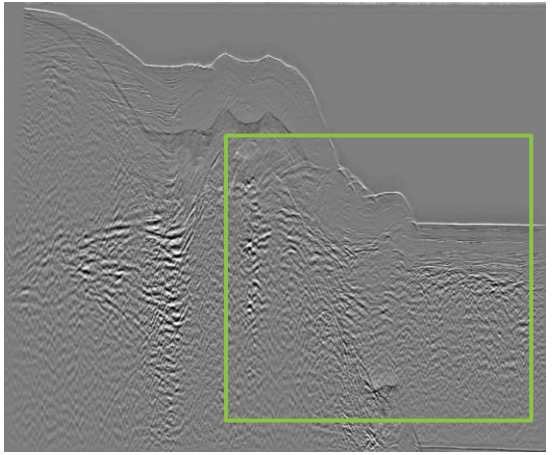
Zoom in Stack before SRME





- High frequency diffraction tails and dipping residuals are left to be removed in following processing.

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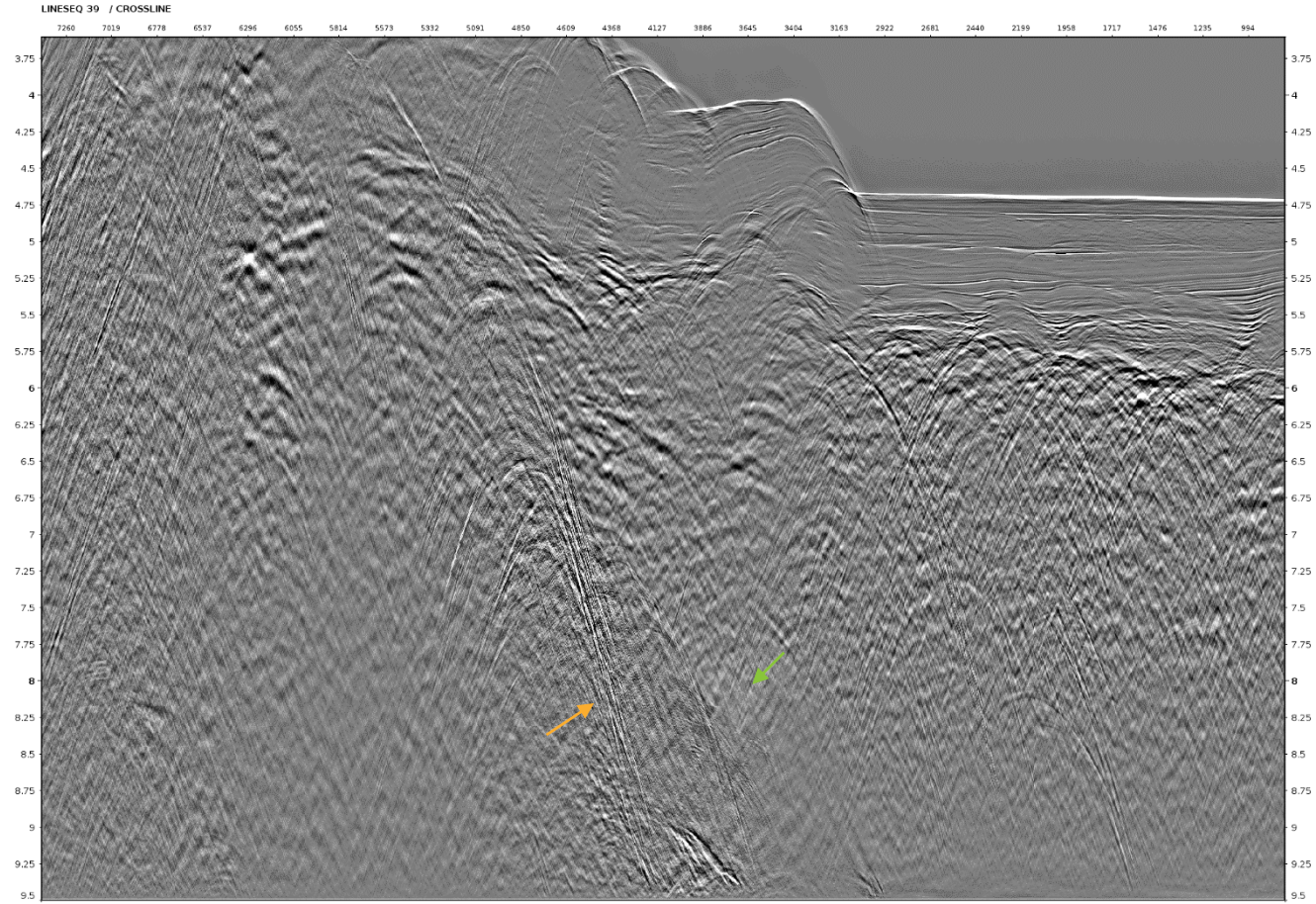
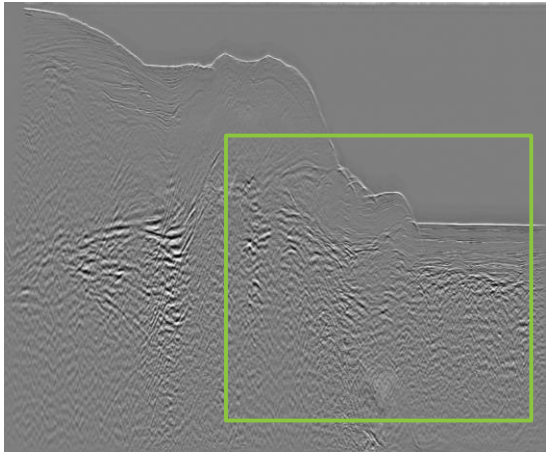
Zoom in Stack after SRME





- High frequency diffraction tails and dipping residuals are left to be removed in following processing.

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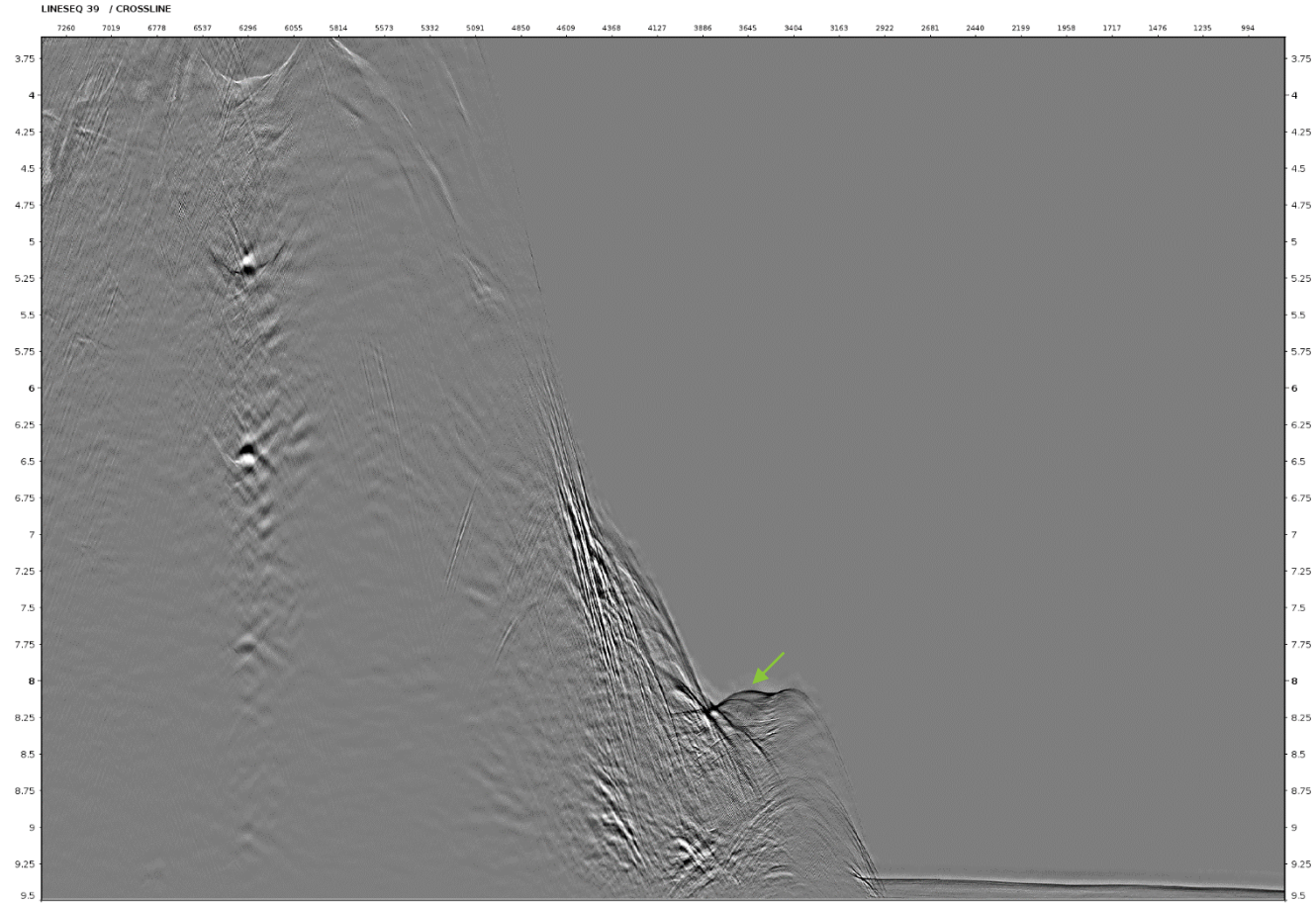
Difference before – after SRME



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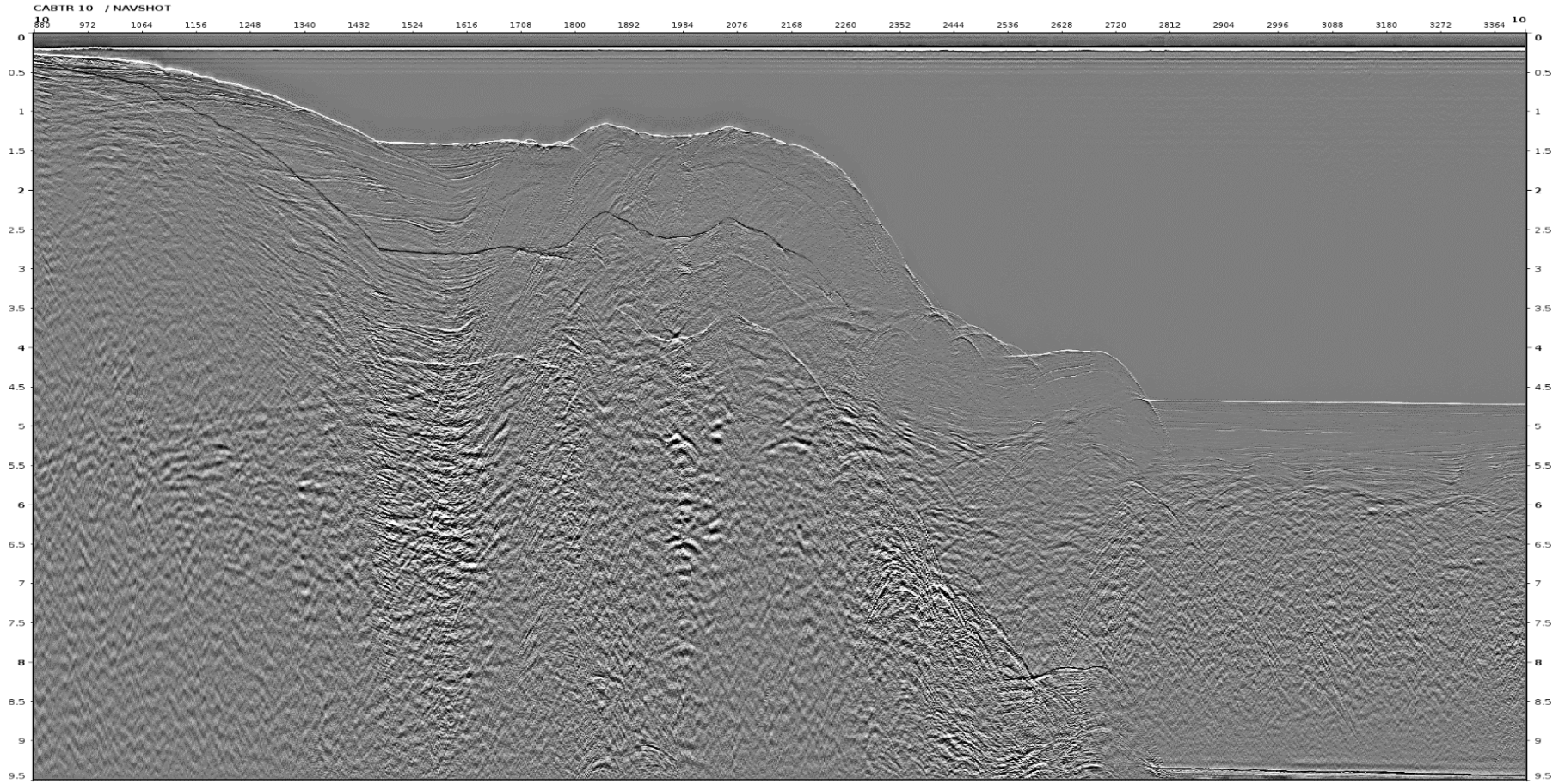
Common Channel before SRME



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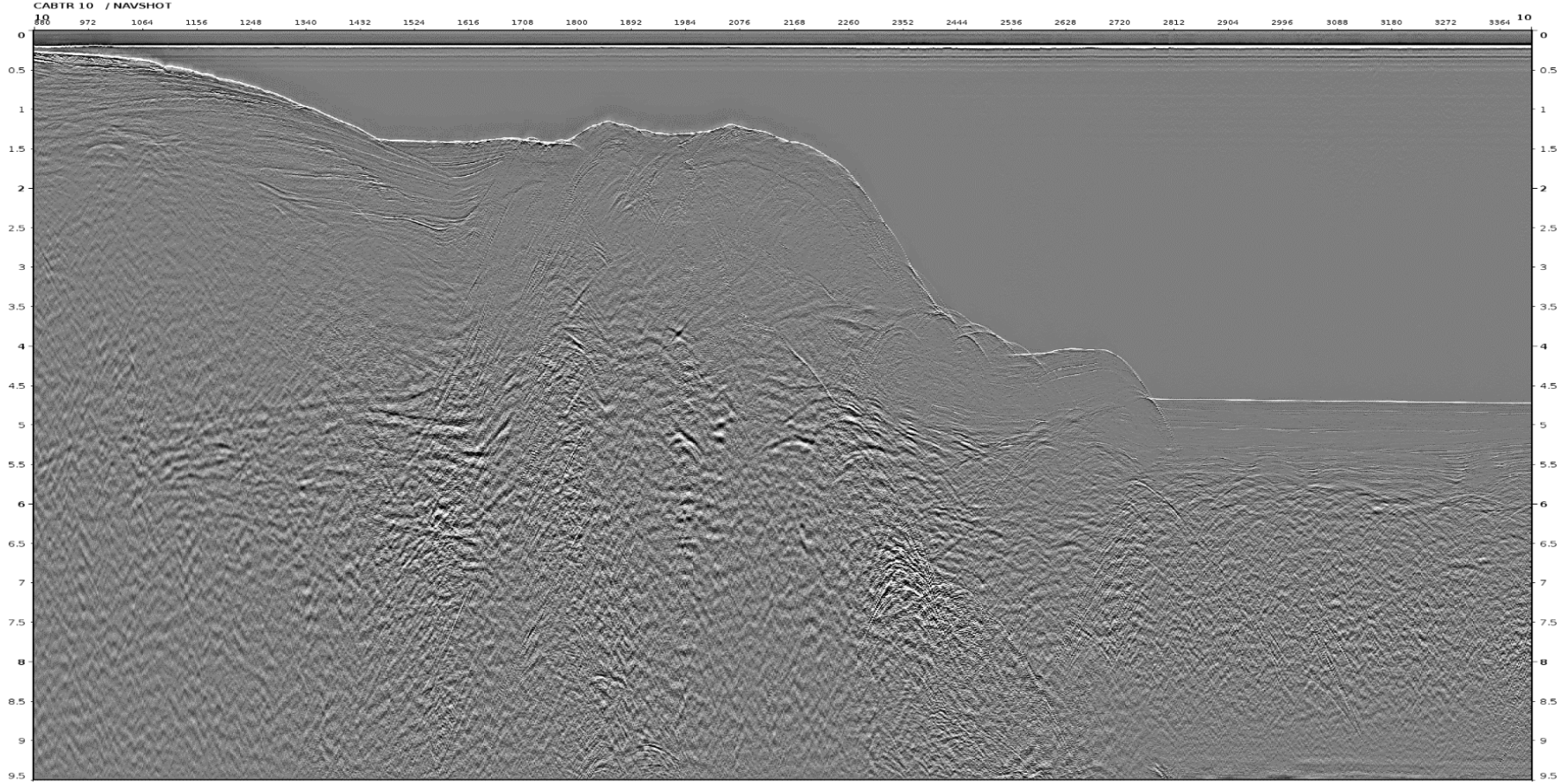
Common Channel after SRME



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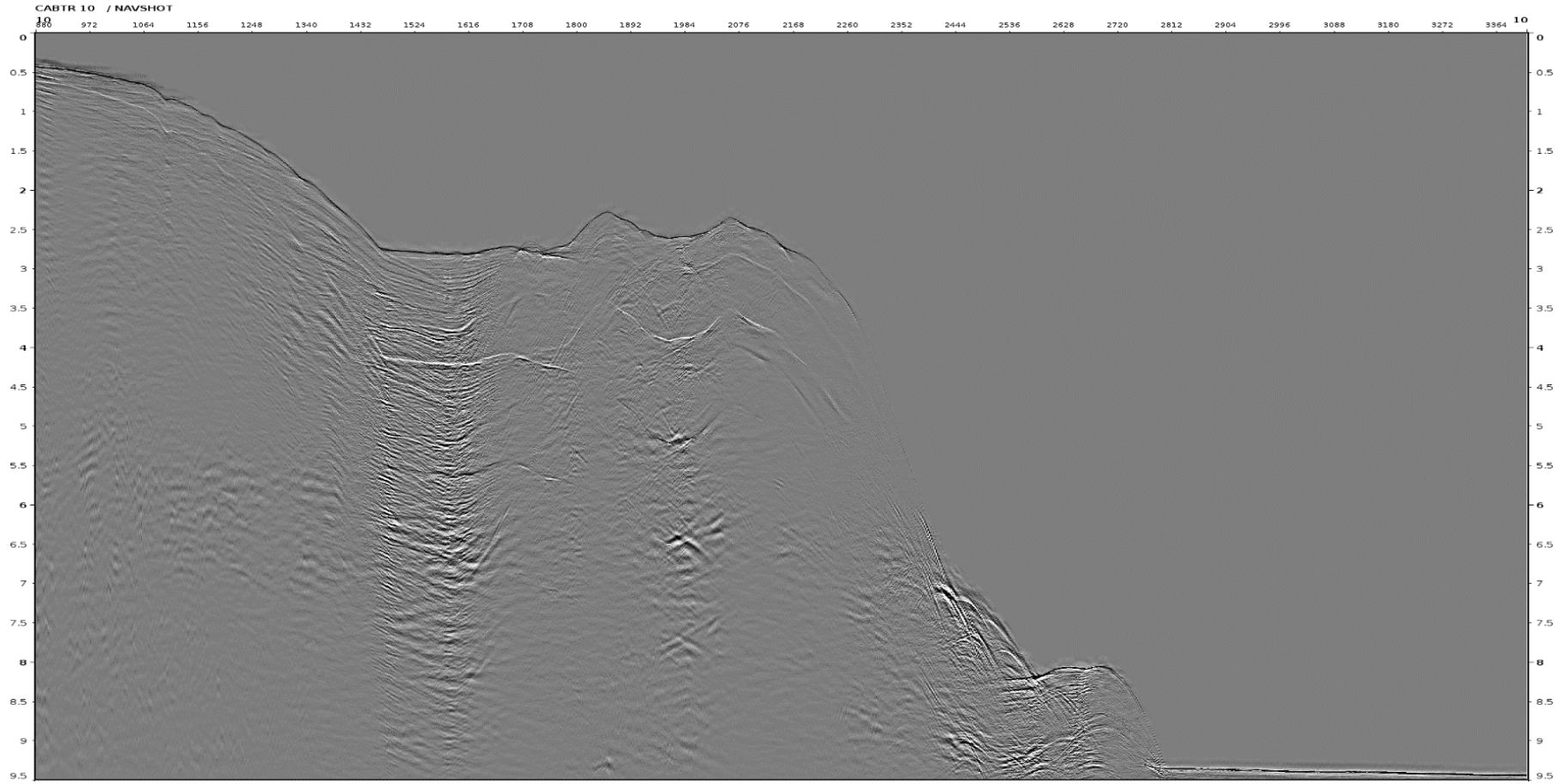
Difference before – after SRME



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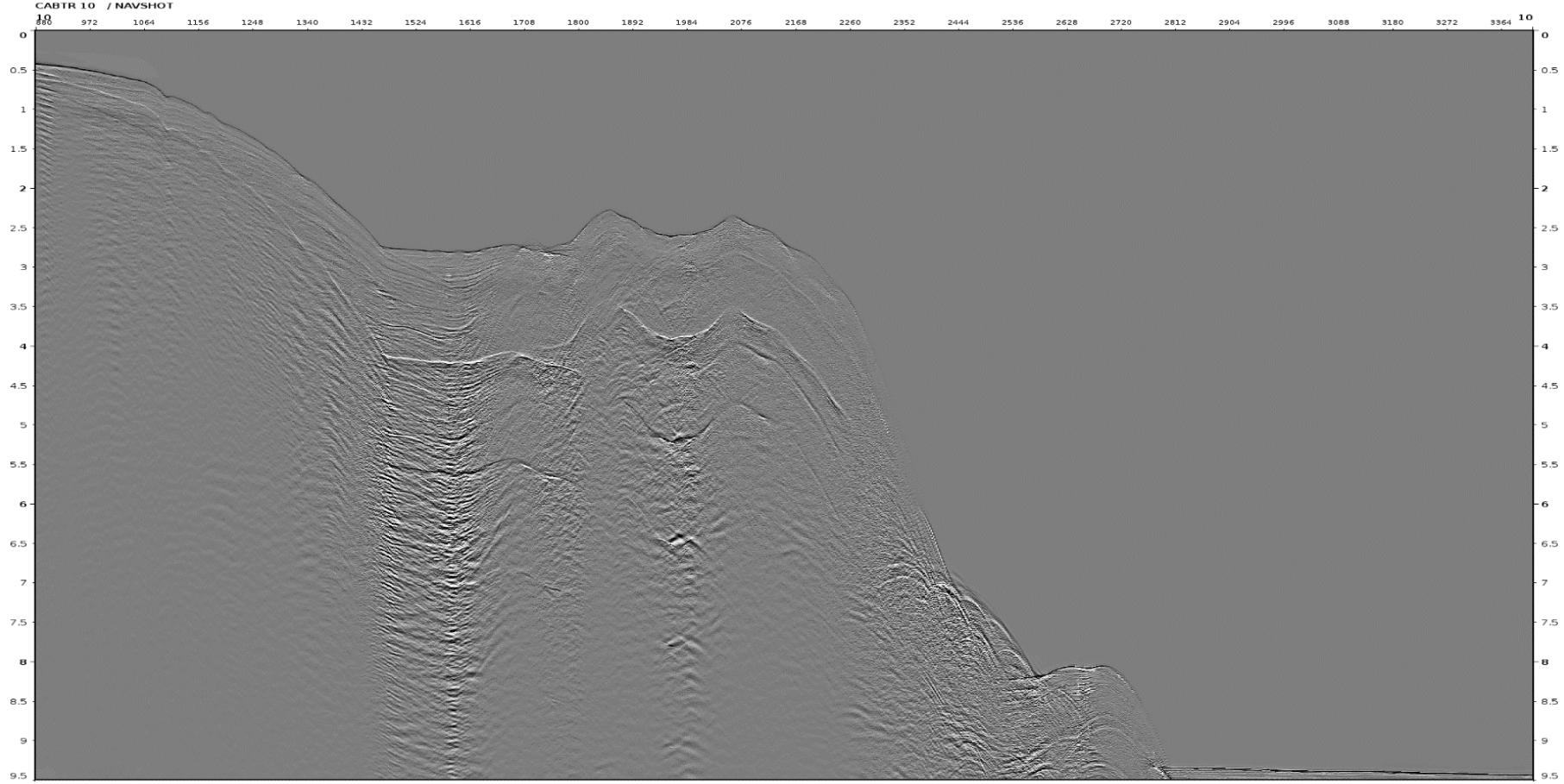
SRME Multiple Model



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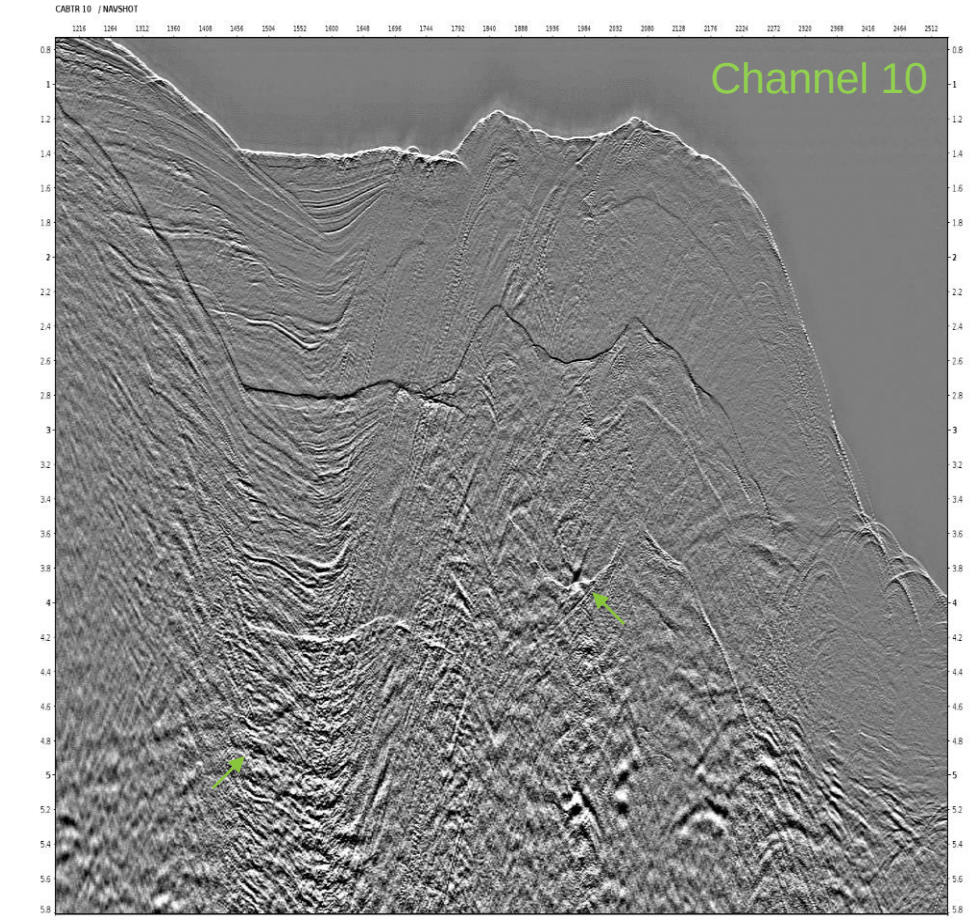
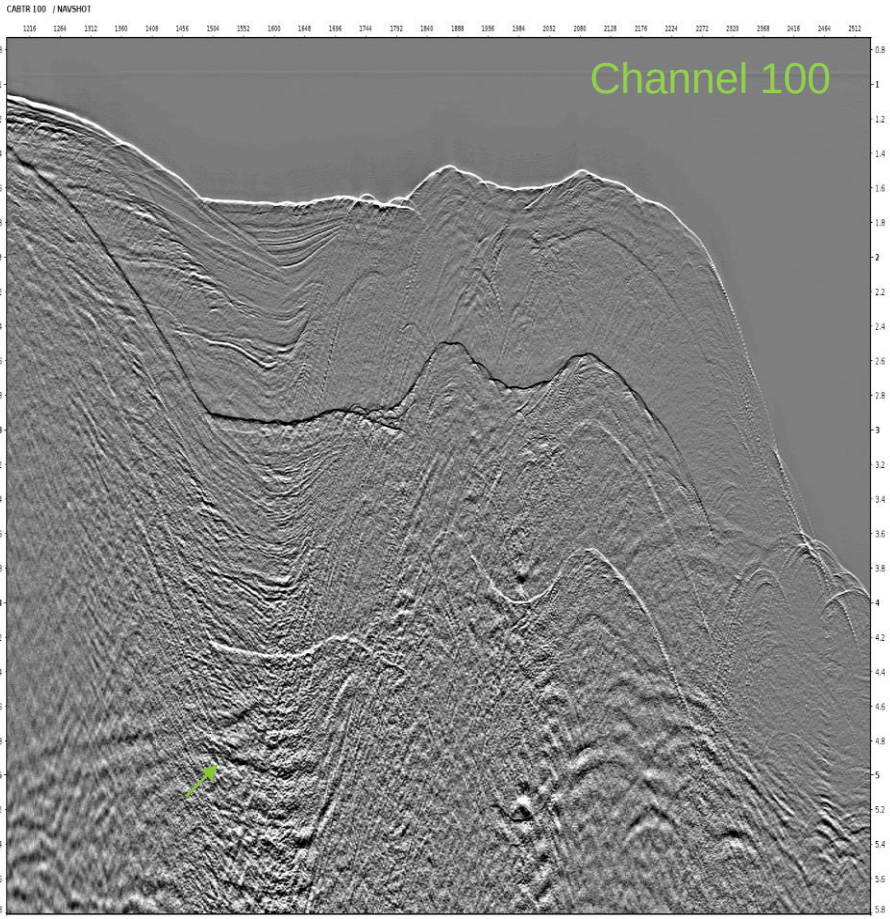
Zoom in Common Channel before SRME





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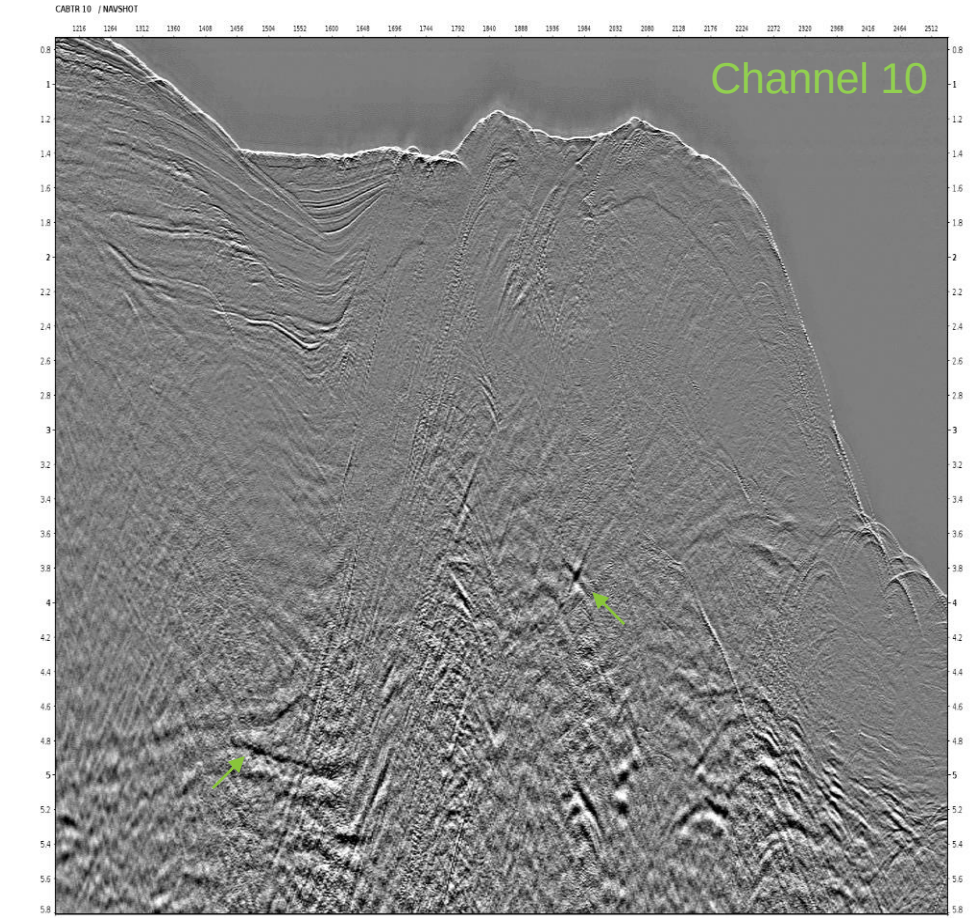
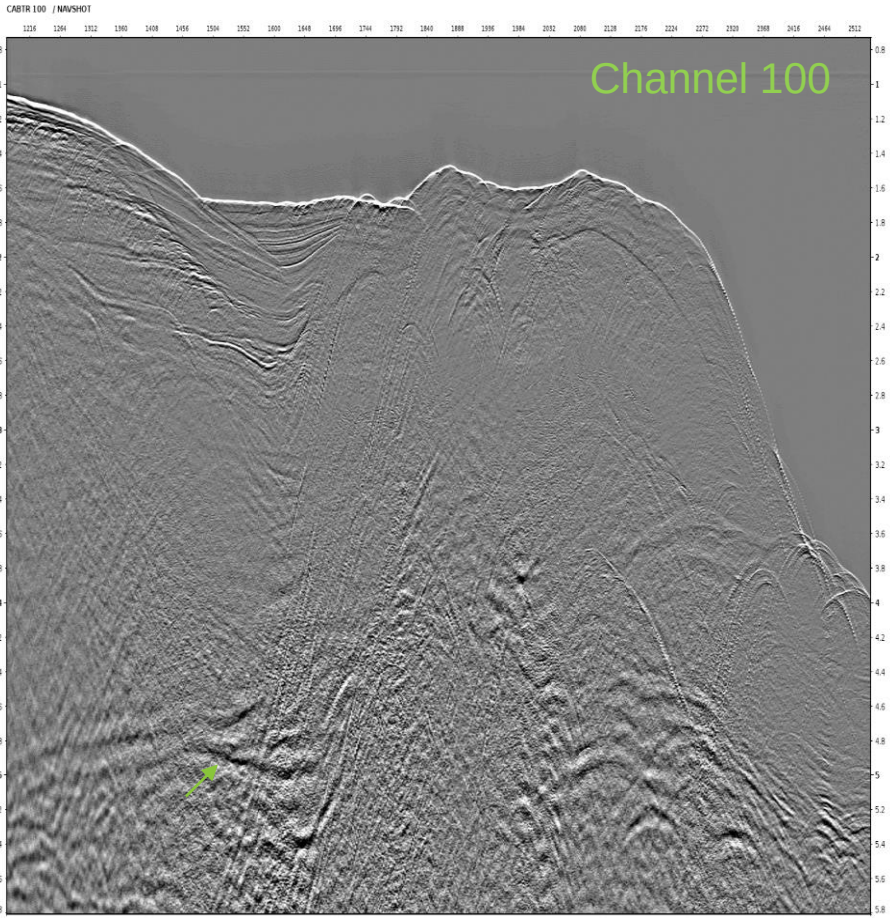
Zoom in Common Channel after SRME





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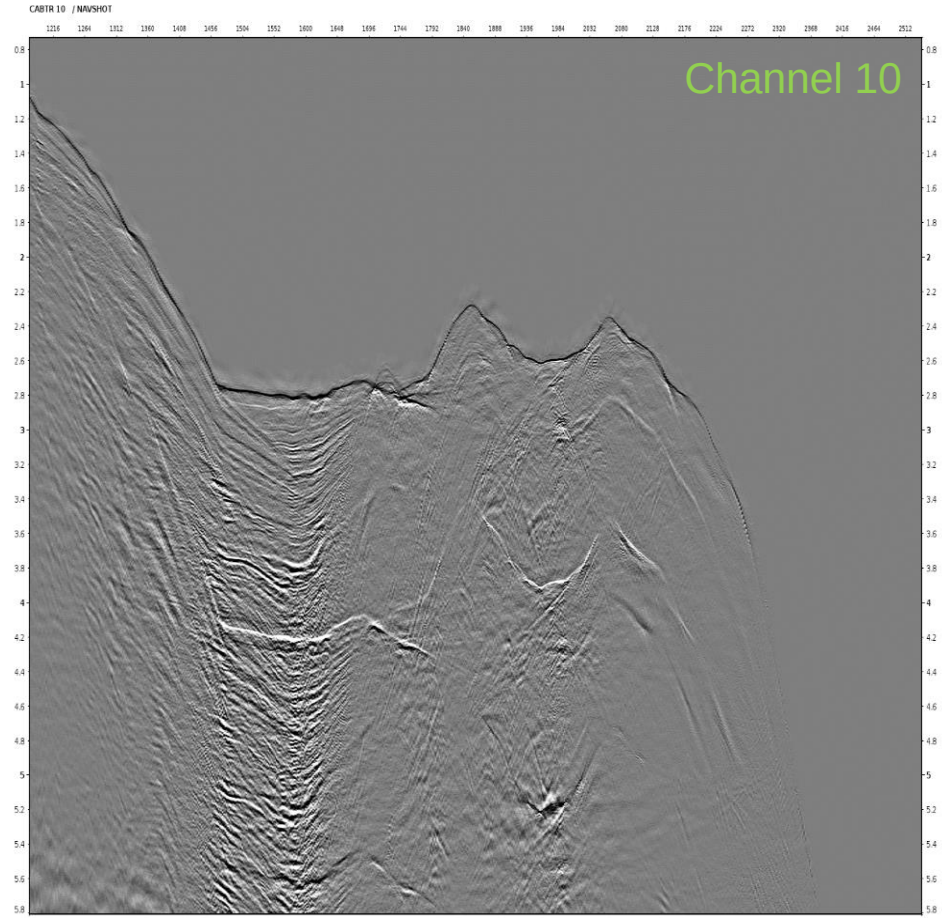
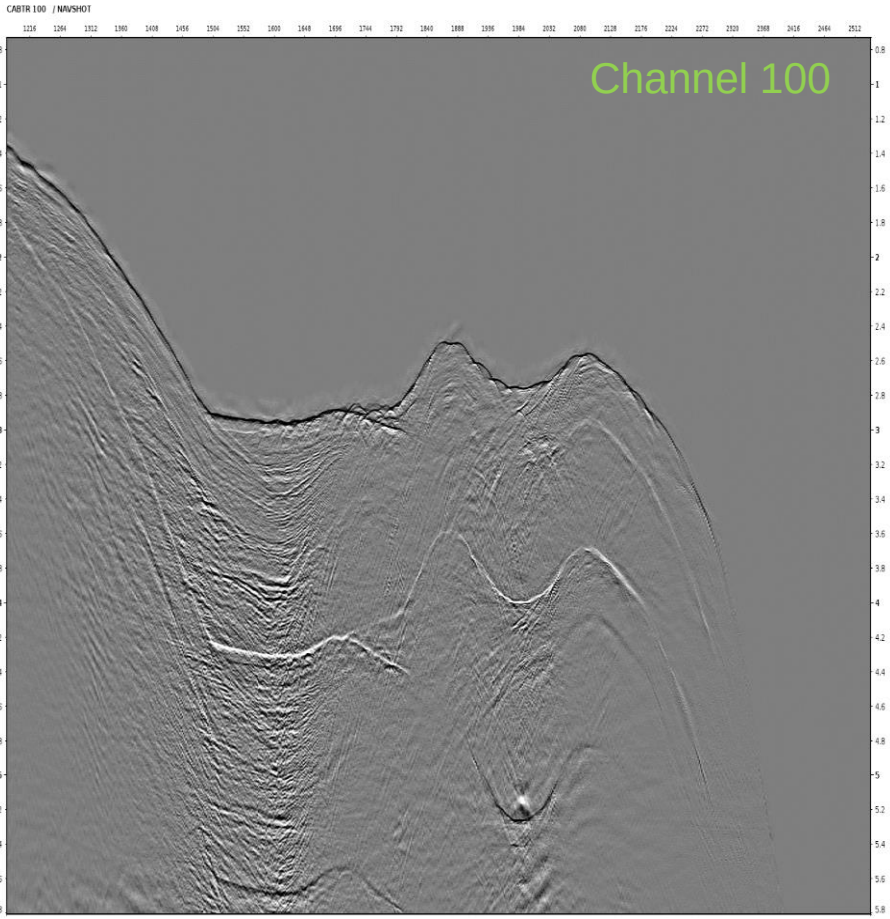
Difference before – after SRME





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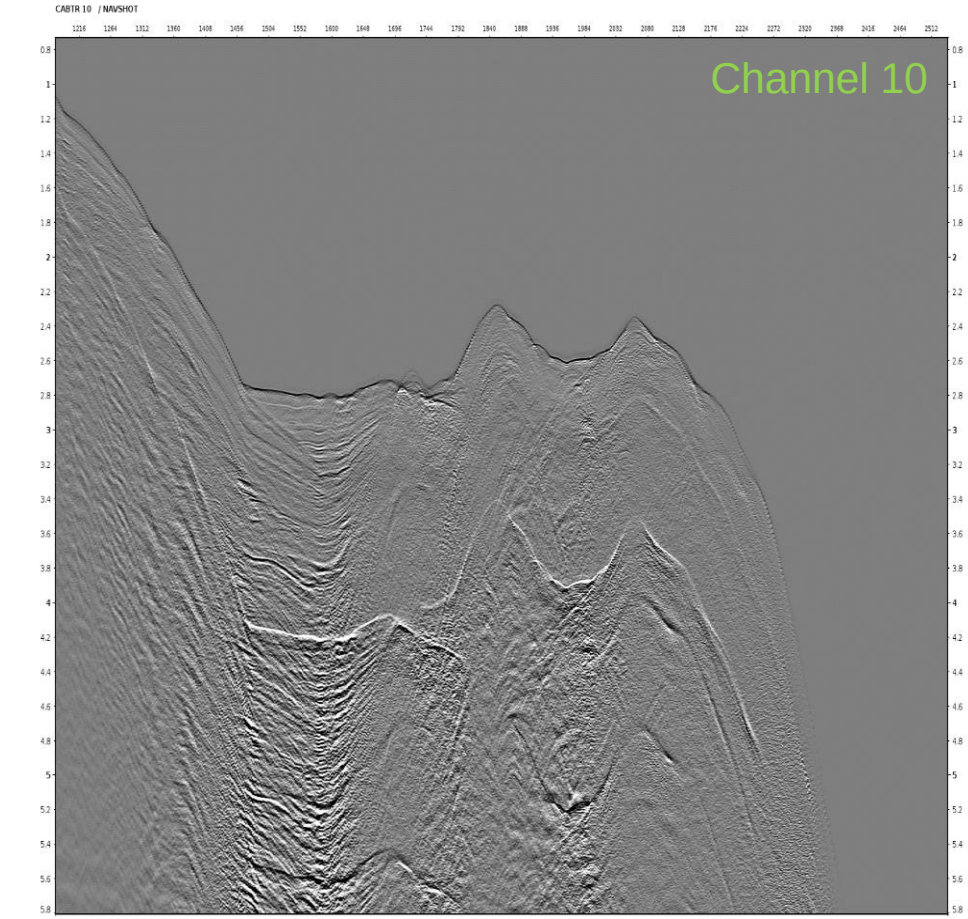
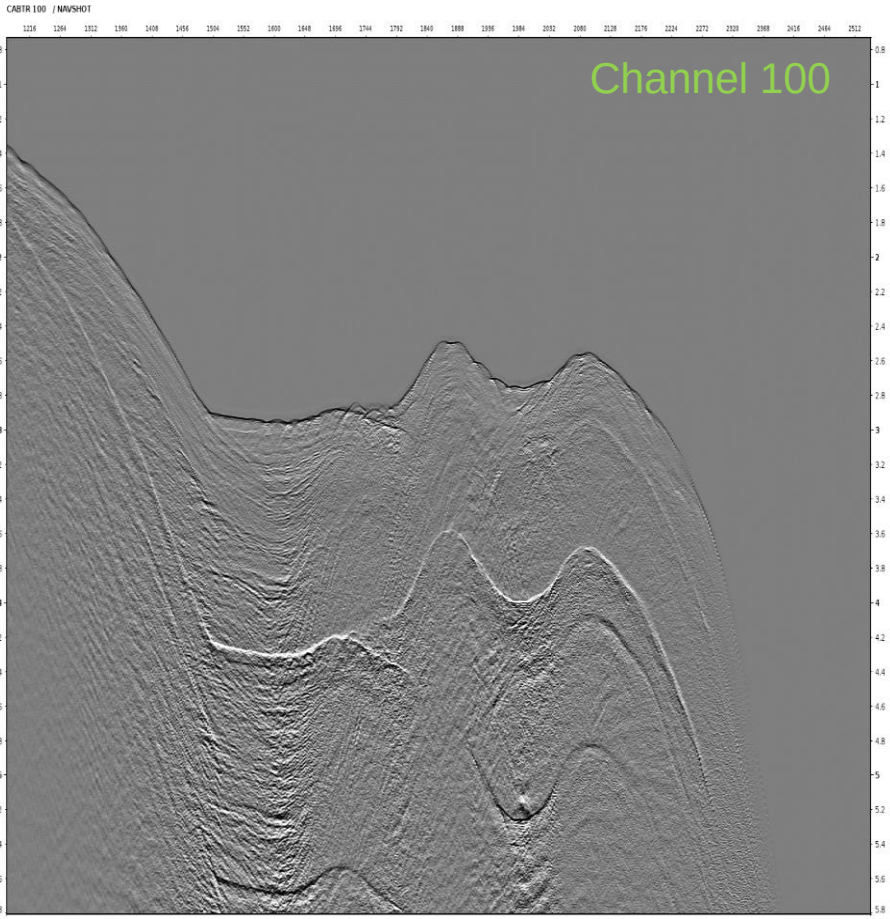
SRME Multiple Model





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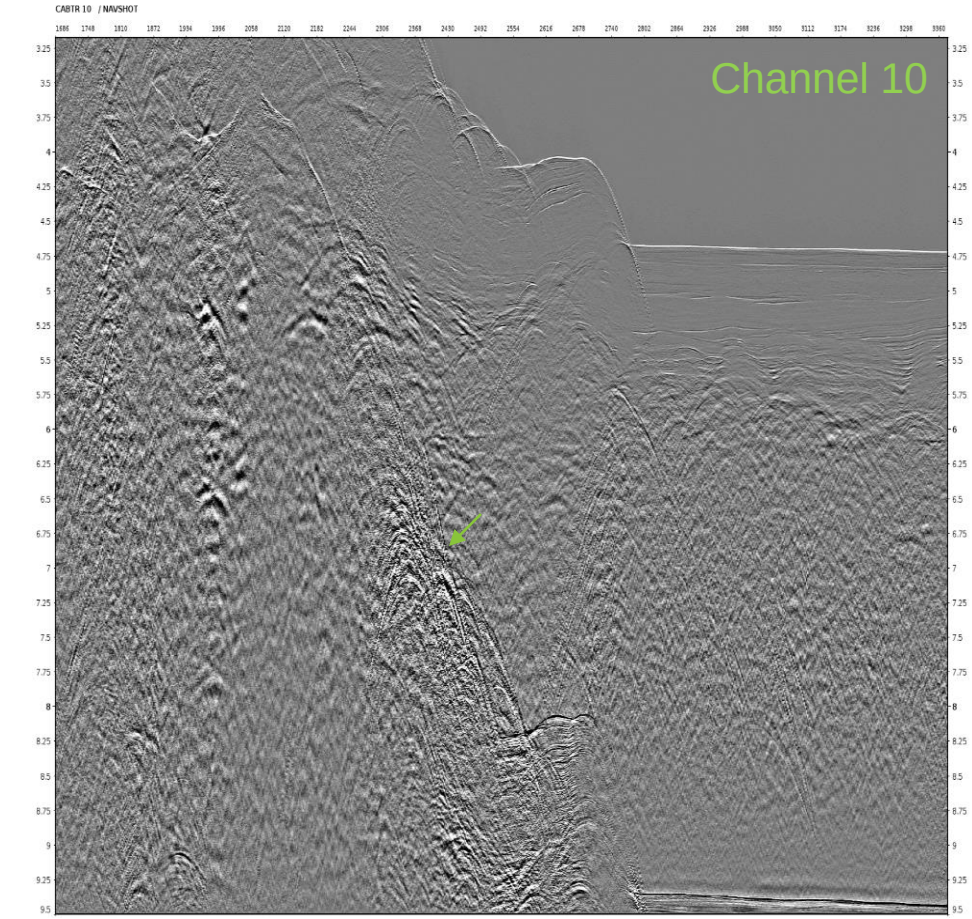
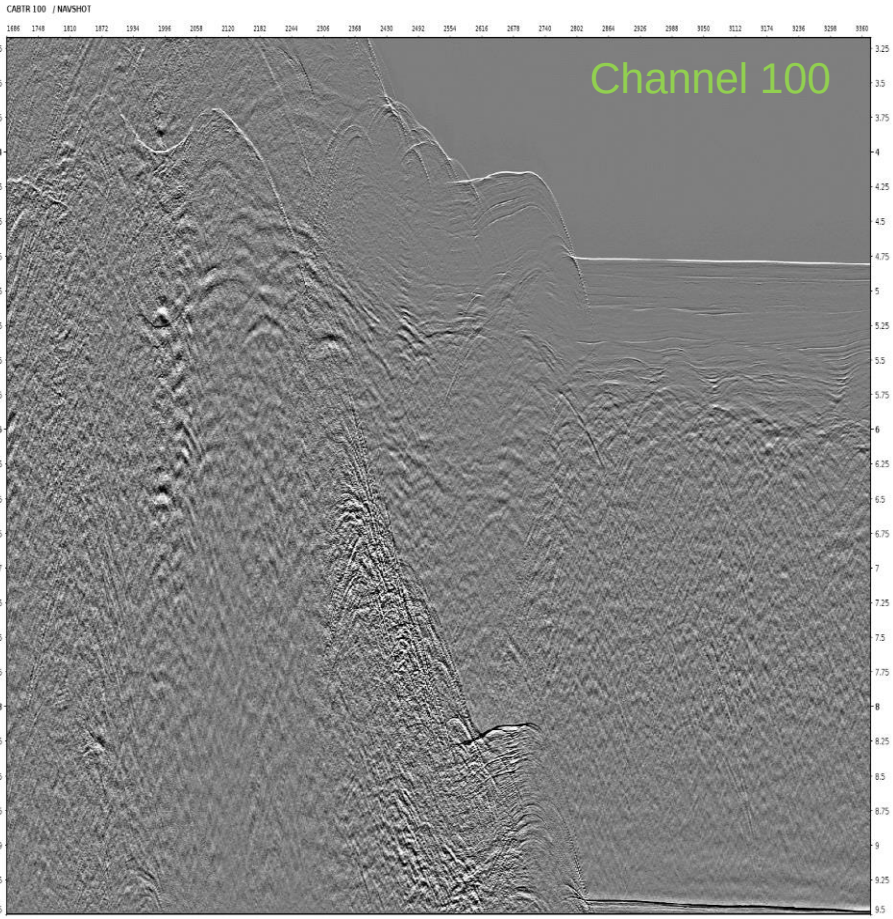
Zoom in Common Channel before SRME





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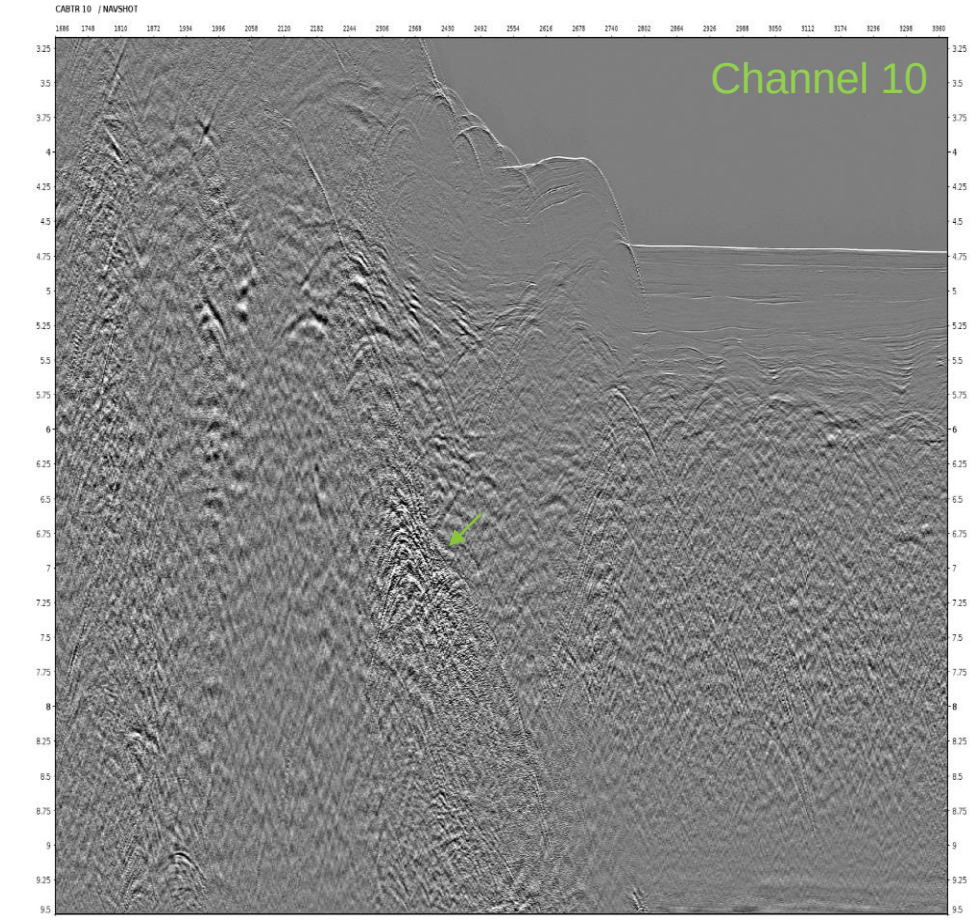
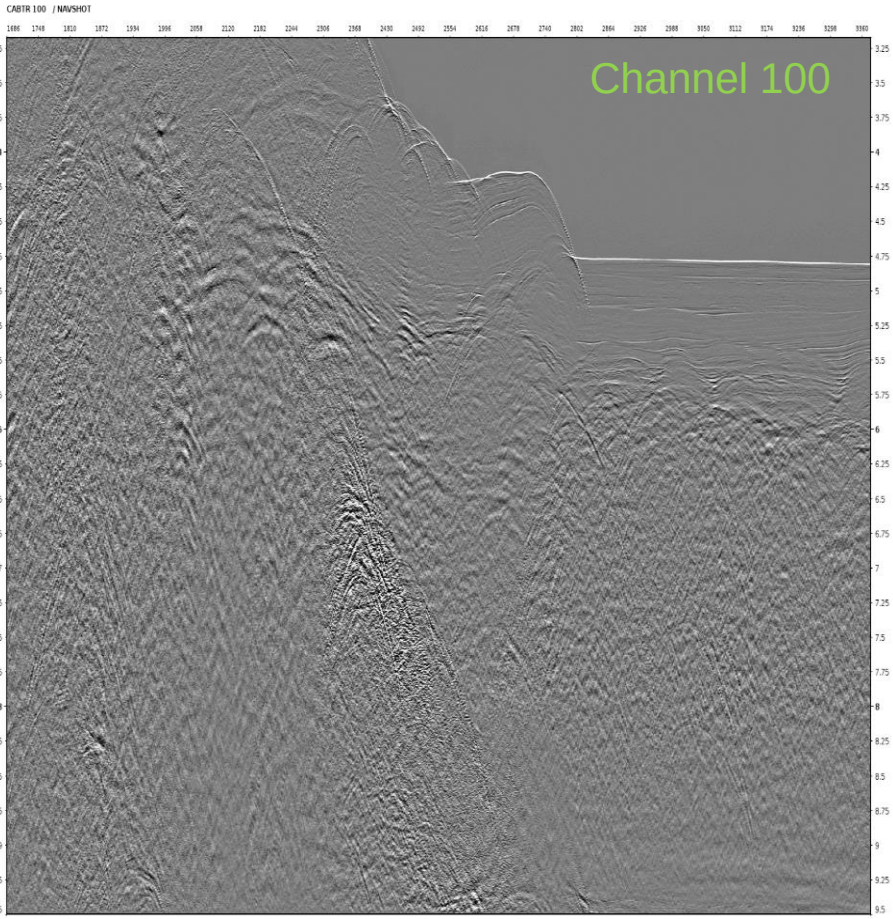
Zoom in Common Channel after SRME





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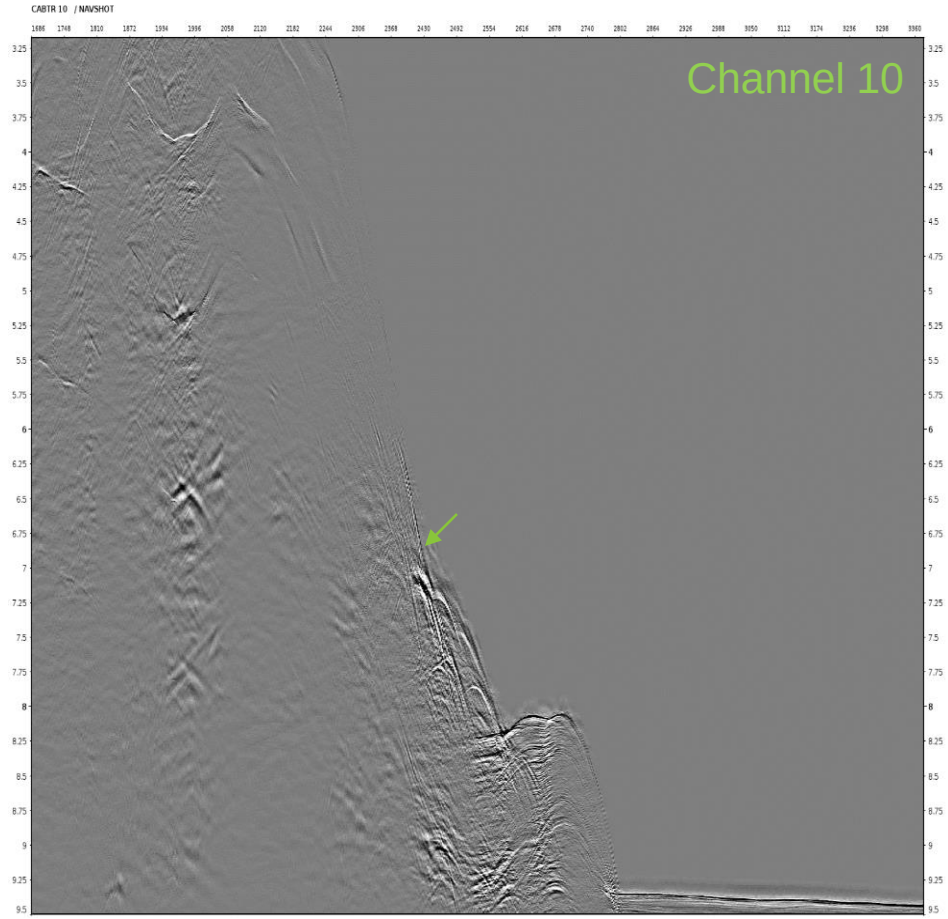
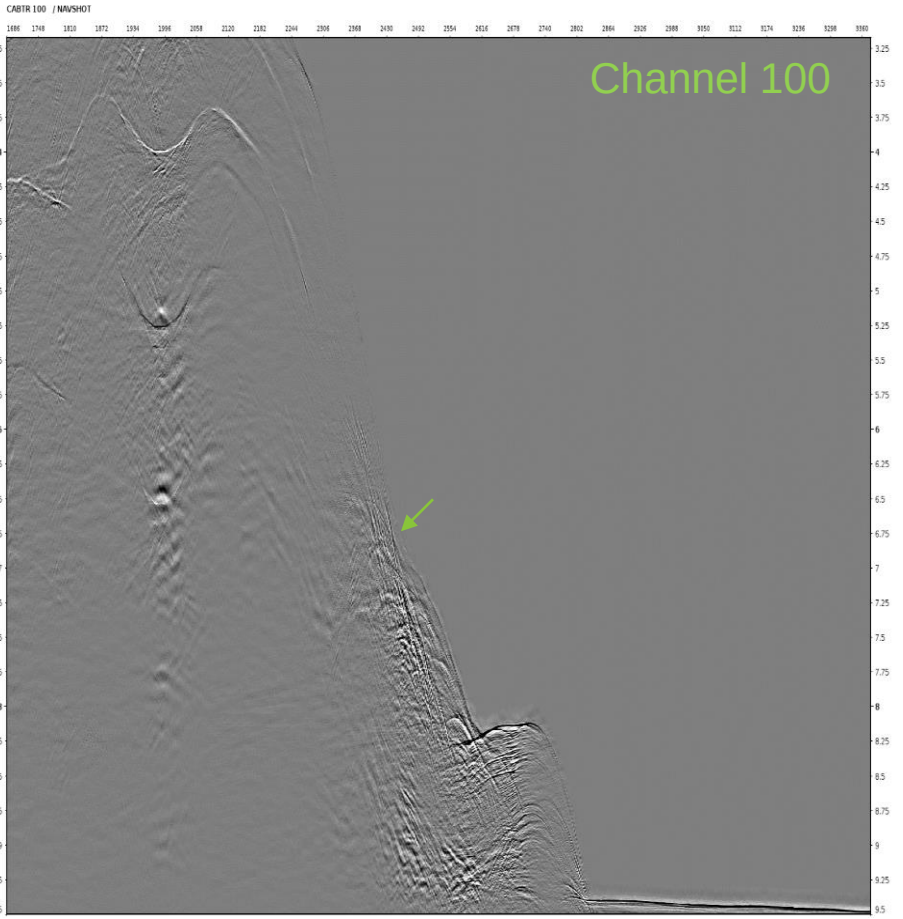
Difference before – after SRME





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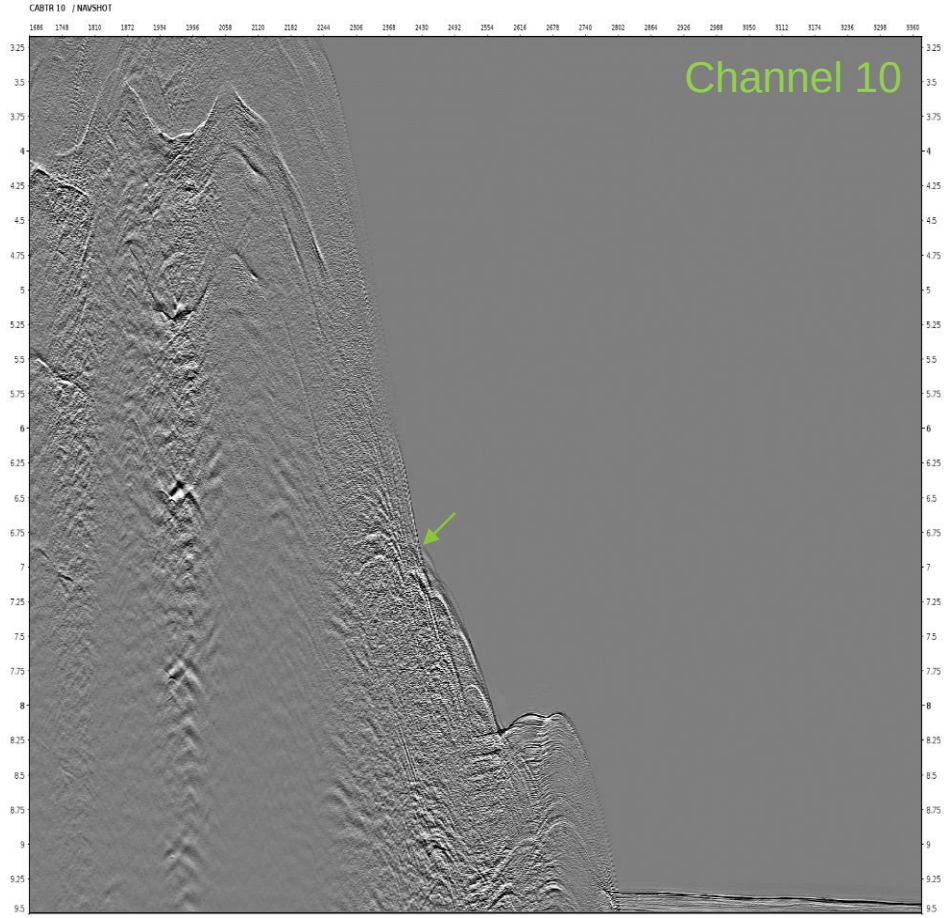
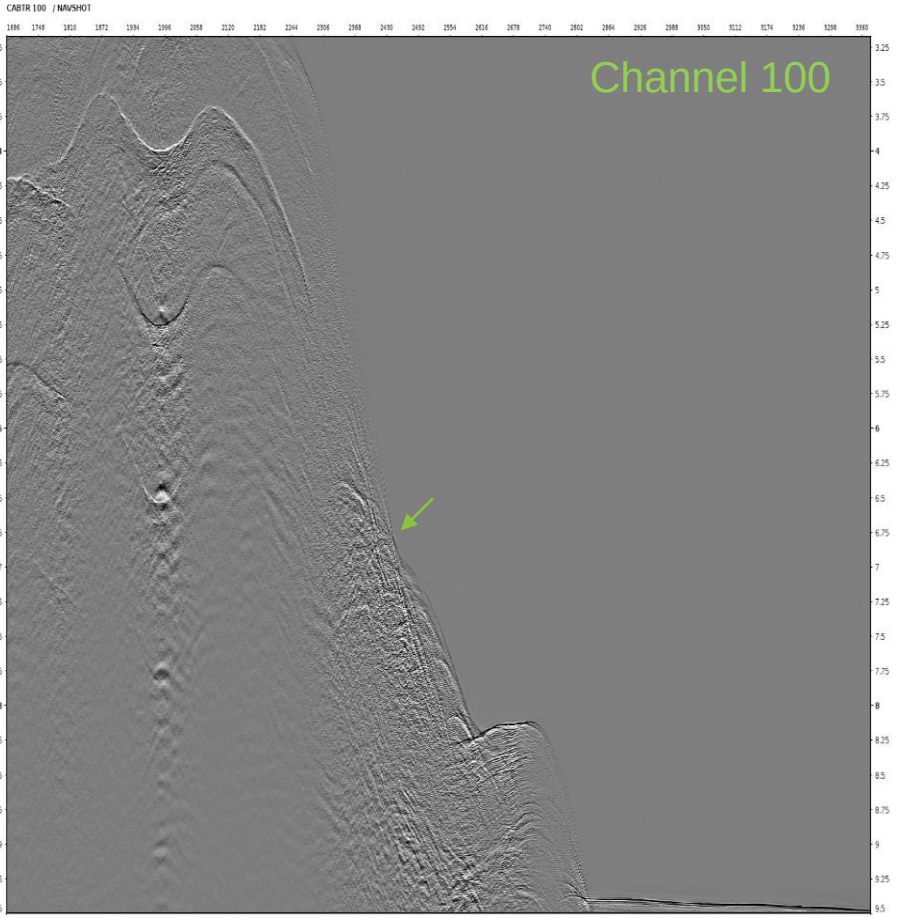
SRME Multiple Model





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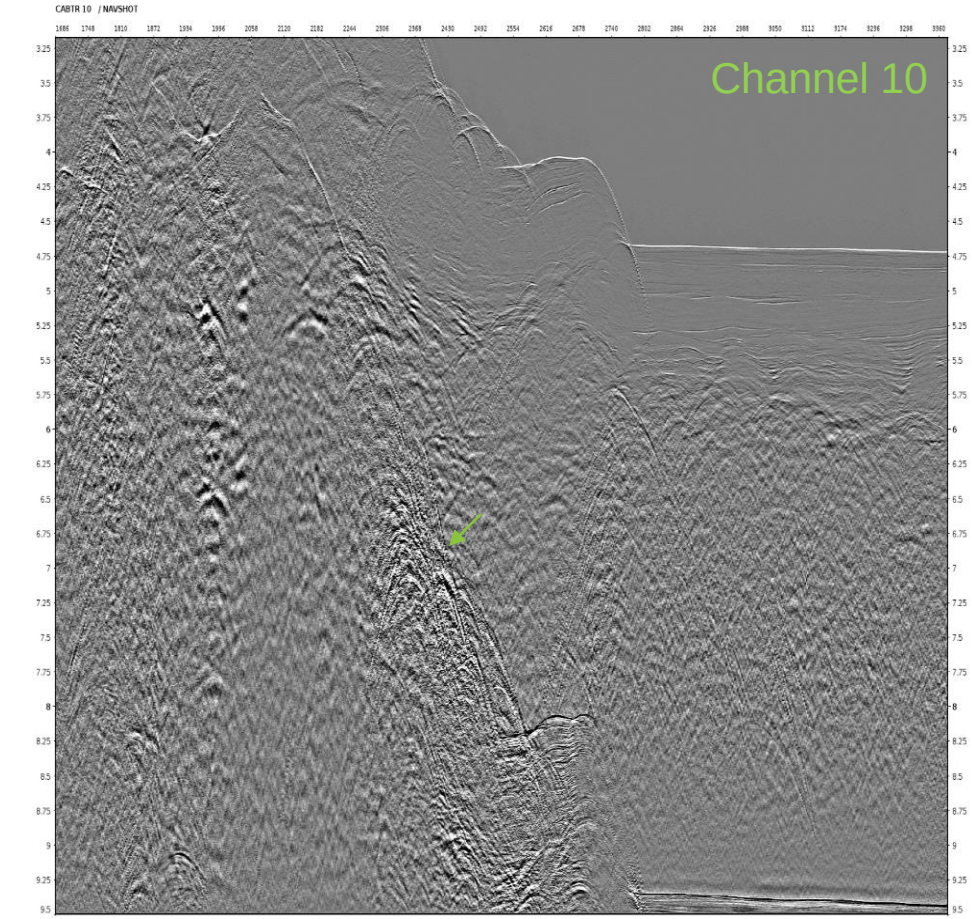
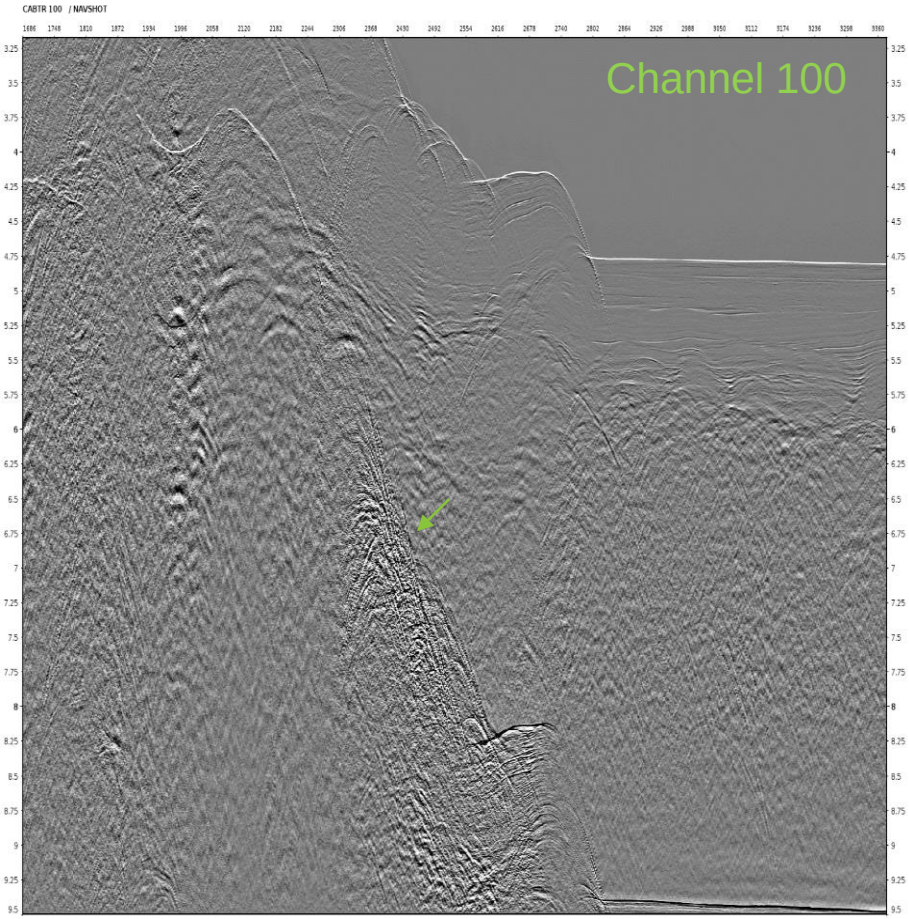
Zoom in Common Channel before SRME (copy)





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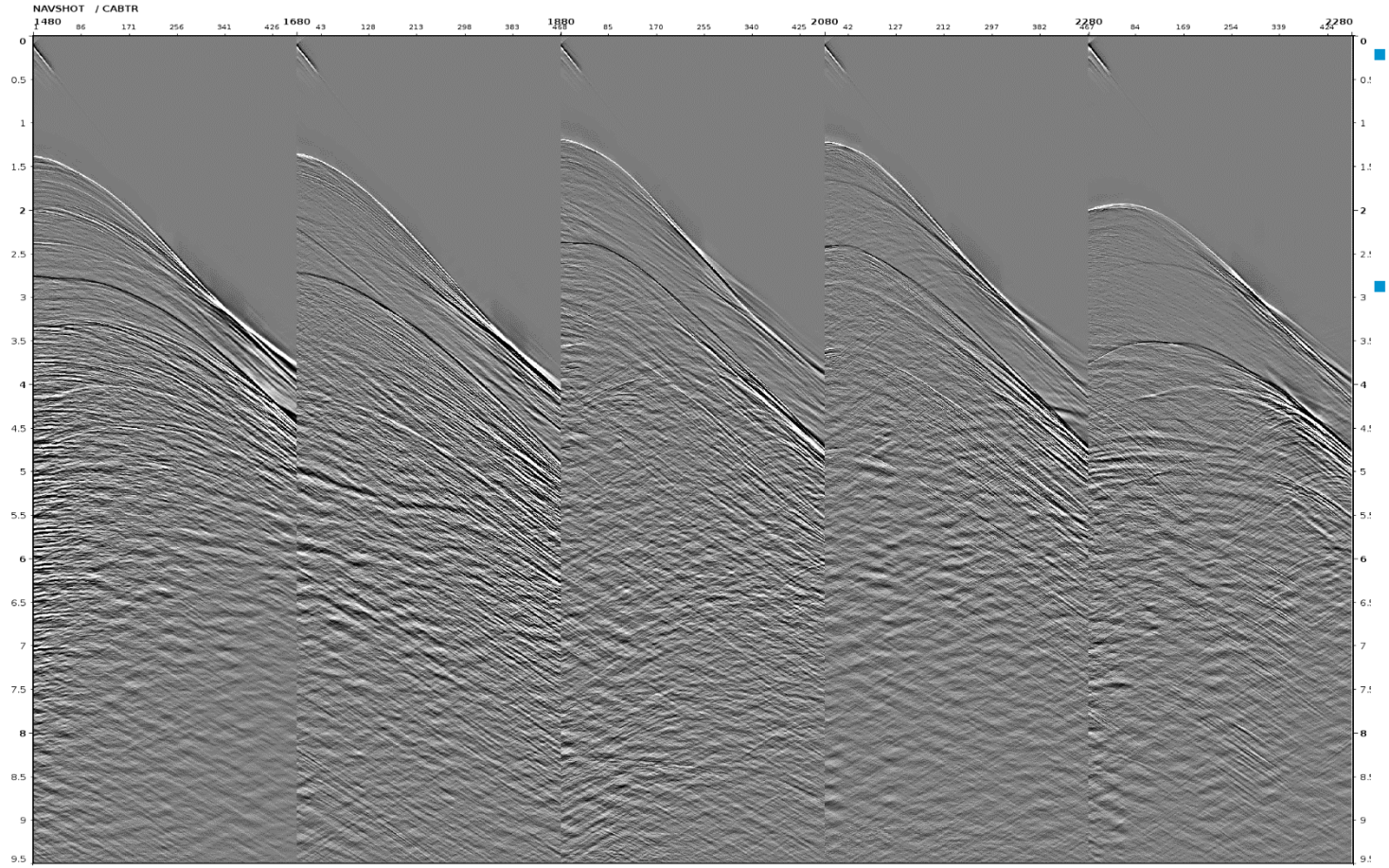
Selected Shot Gathers before SRME



- Free Surface related multiples are well modeled and attenuated after subtraction.
- Simultaneous subtraction flow with MWD & SRME will be tested later to handle subtraction residuals.

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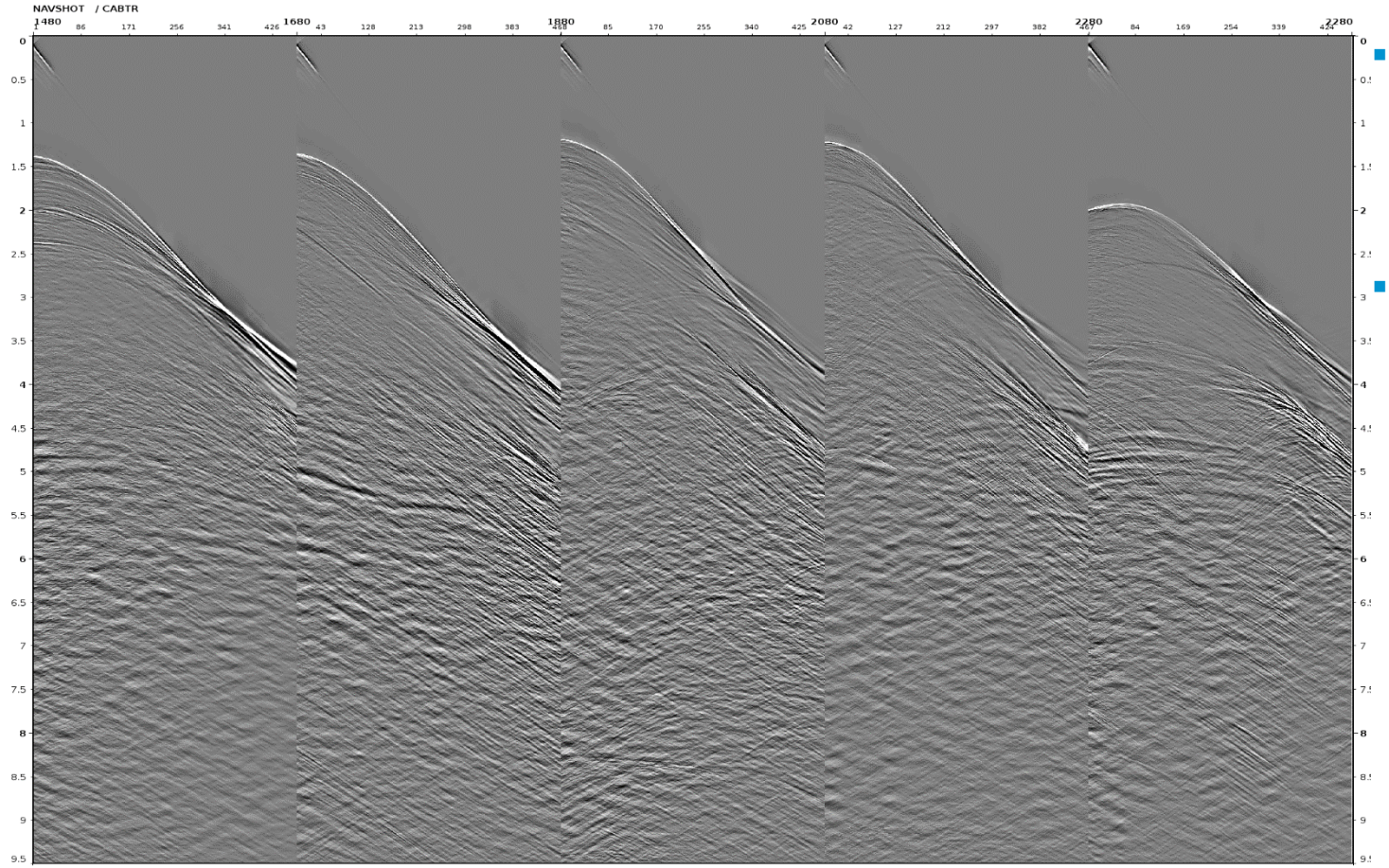
Selected Shot Gathers after SRME



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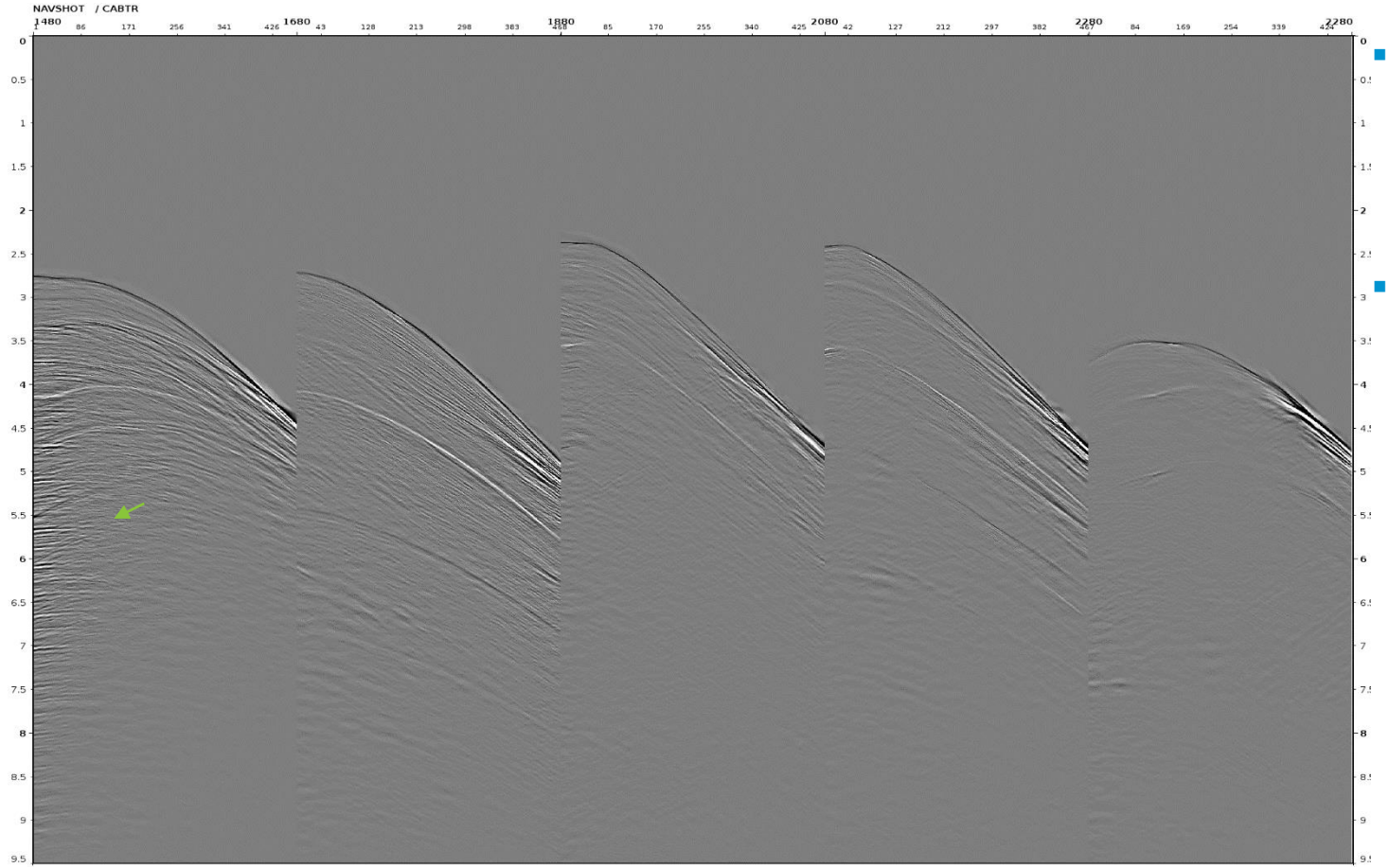
Difference before – after SRME



- Free Surface related multiples are well modeled and attenuated after subtraction.
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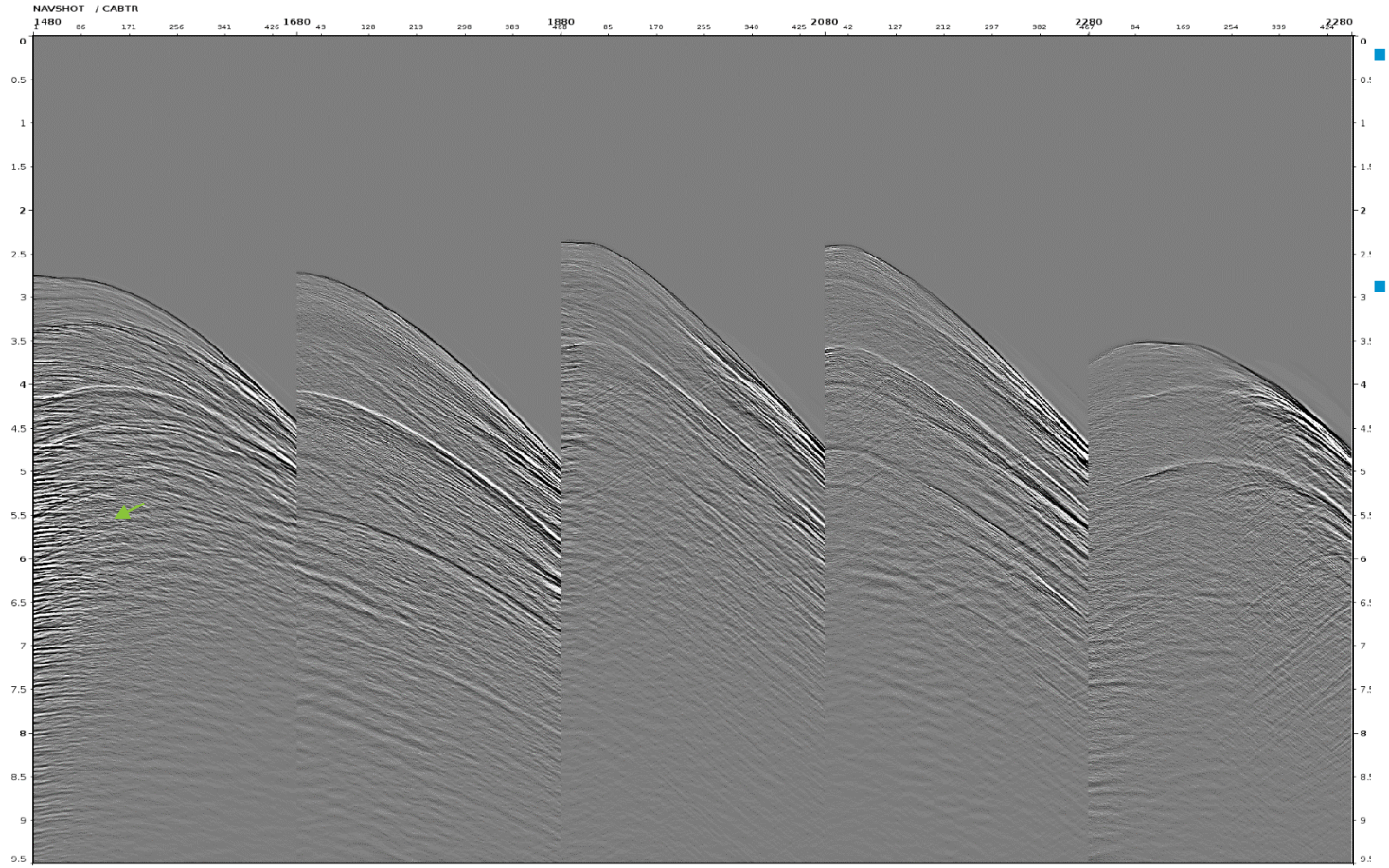
SRME Model



- Free Surface related multiples are well modeled and attenuated after subtraction.
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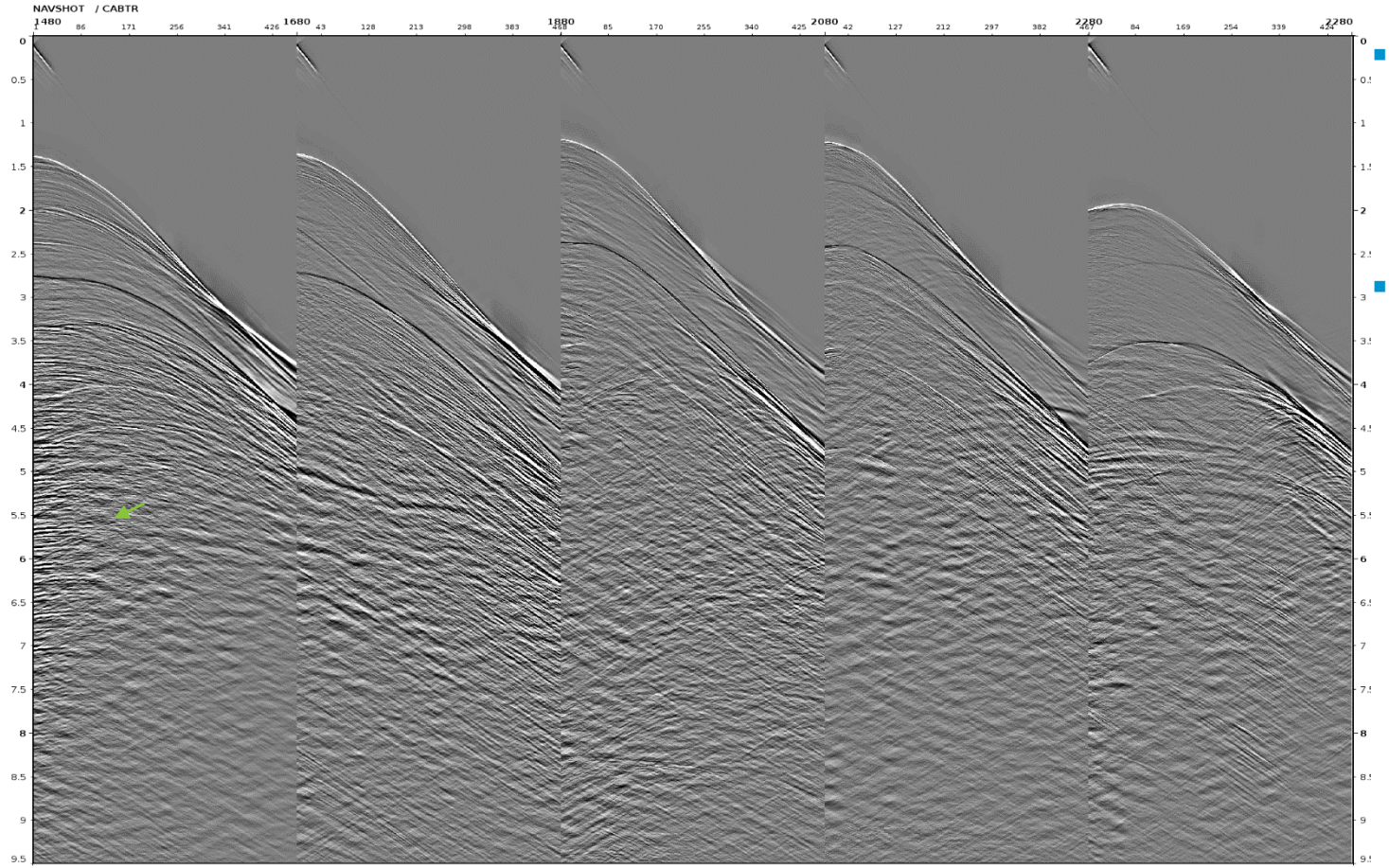
Selected Shot Gathers before SRME (copy)



- Free Surface related multiples are well modeled and attenuated after subtraction.
- Simultaneous subtraction flow with MWD & SRME will be tested later to handle subtraction residuals.

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Summery

- From preliminary demultiple results, the free surface related multiples are well modeled.
- High frequency residual diffraction tails will be attenuated by following processing.
- For final production, a simultaneous subtraction with both MWD and SRME model will be tested to achieve better quality demultiple data.

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