Shallow Water Demultiple

NZ 3D Processing

06 January 2021

INSTITUTE FOR GEOPHYSICS

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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

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Outline

- **Objective:**

  To generate water bottom related multiple model for shallow water area by Model-based Water-layer Demultiple Technique (MWD).

- **Procedure:**

  Water bottom related multiple is considered as an additional bounce reflected at water bottom.
  The multiples are modelled by a given water bottom horizon and wave extrapolation function.
  (Details shown in slides 4)
  Demultiple is processed by subtracting multiple model from input seismic.

- **Display:**

  Sailline 039
  Display: Stack, autocorrelation, amplitude spectra and common channel.

- **Observation and Recommendation:**

  The water bottom related multiples at shallow water area are well modeled, residuals from other reflection horizon will be further modeled by SRME. The current demultiple result is under preliminary subtraction, for final production, a simultaneous subtraction with both MWD and SRME model will be applied.

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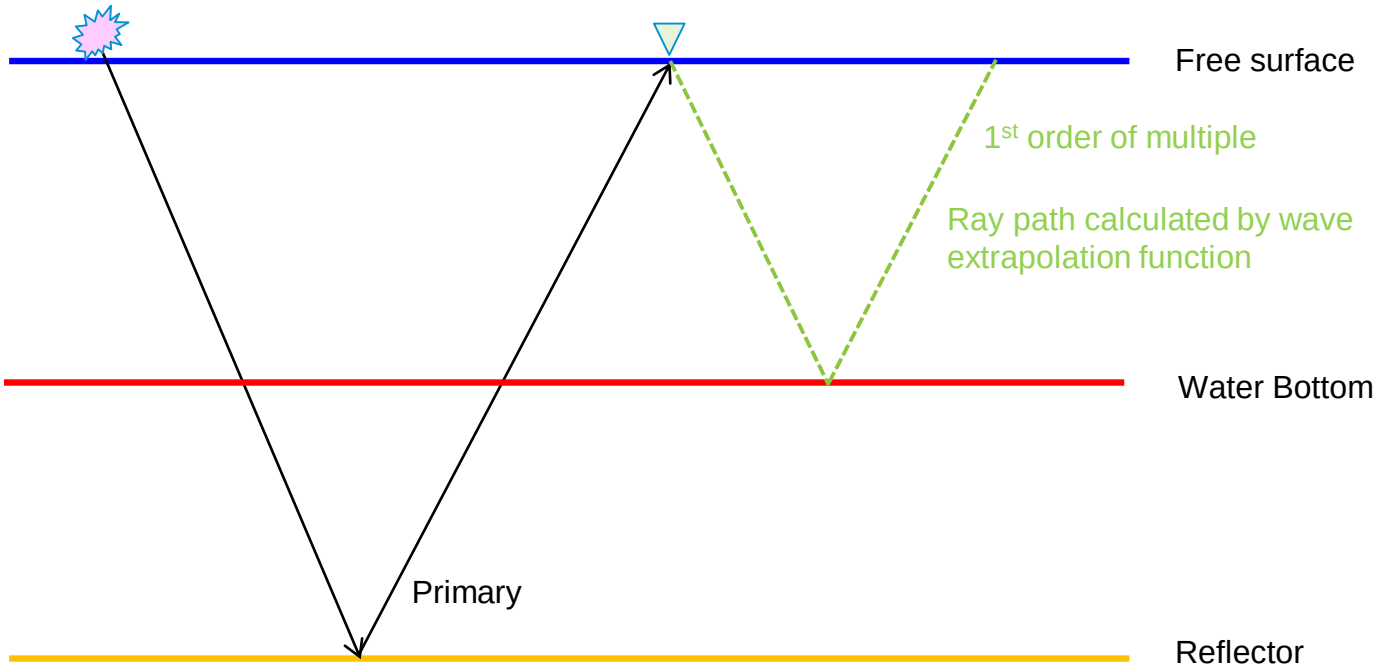
Brief Introduction on MWD



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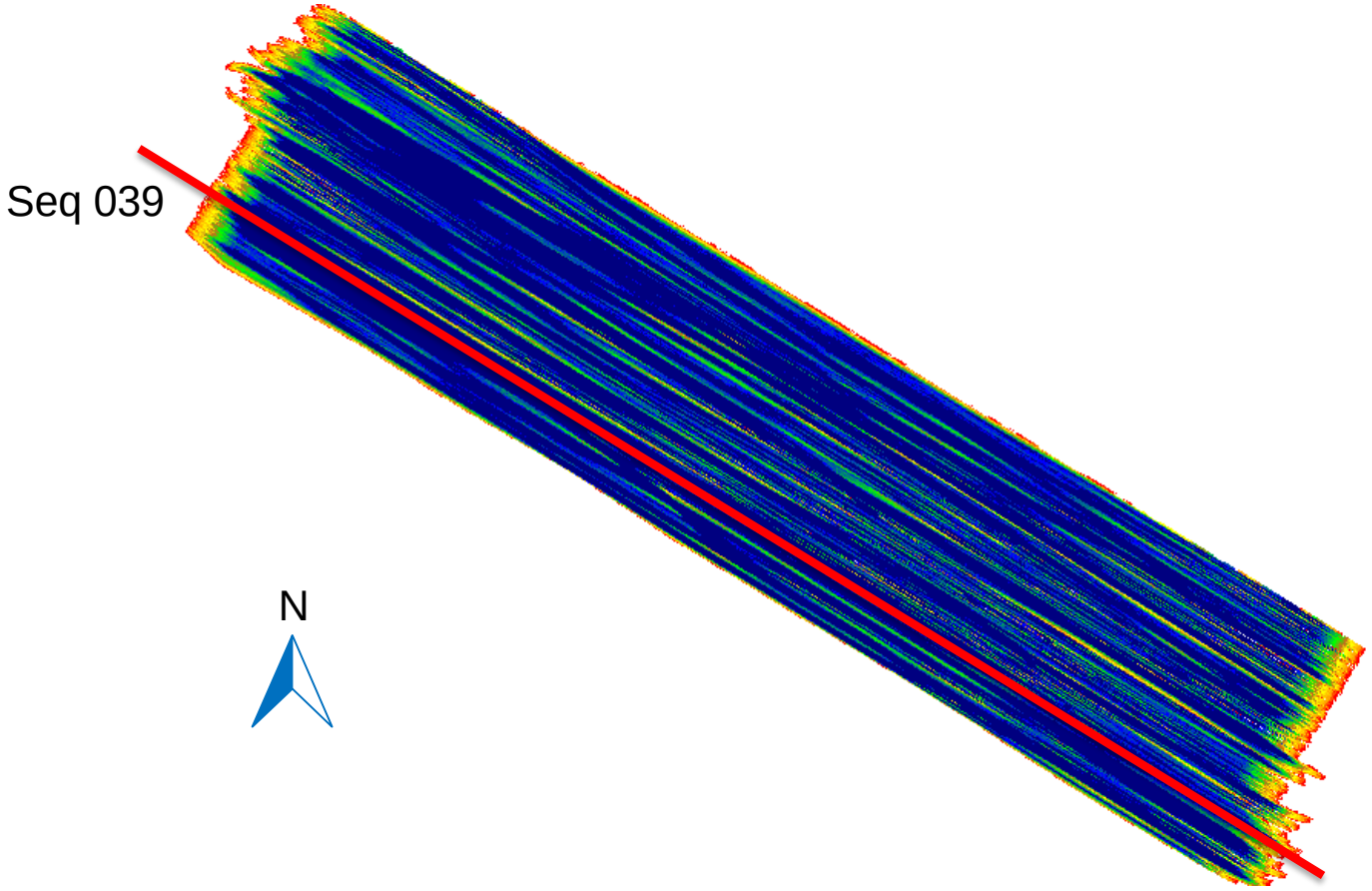
Test Line Location



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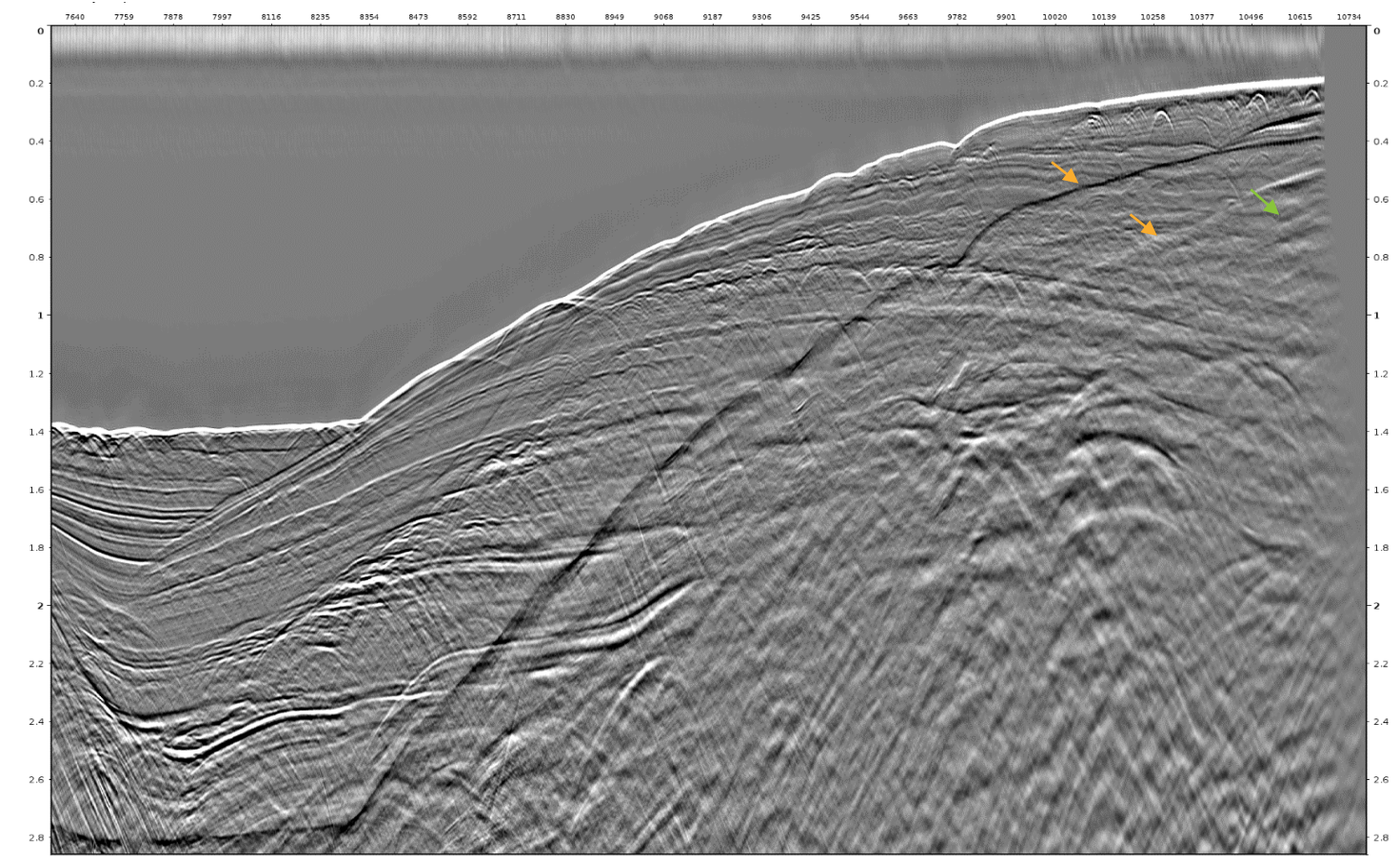
Seq 039

Stack, auto-correlation, amplitude spectra

Common Channel

Stack before Demultiple (zoom in shallow area)



- Water bottom related multiples are well modeled and attenuated after subtraction.
- Residual multiples from other reflectors are left to be modeled by SRME.

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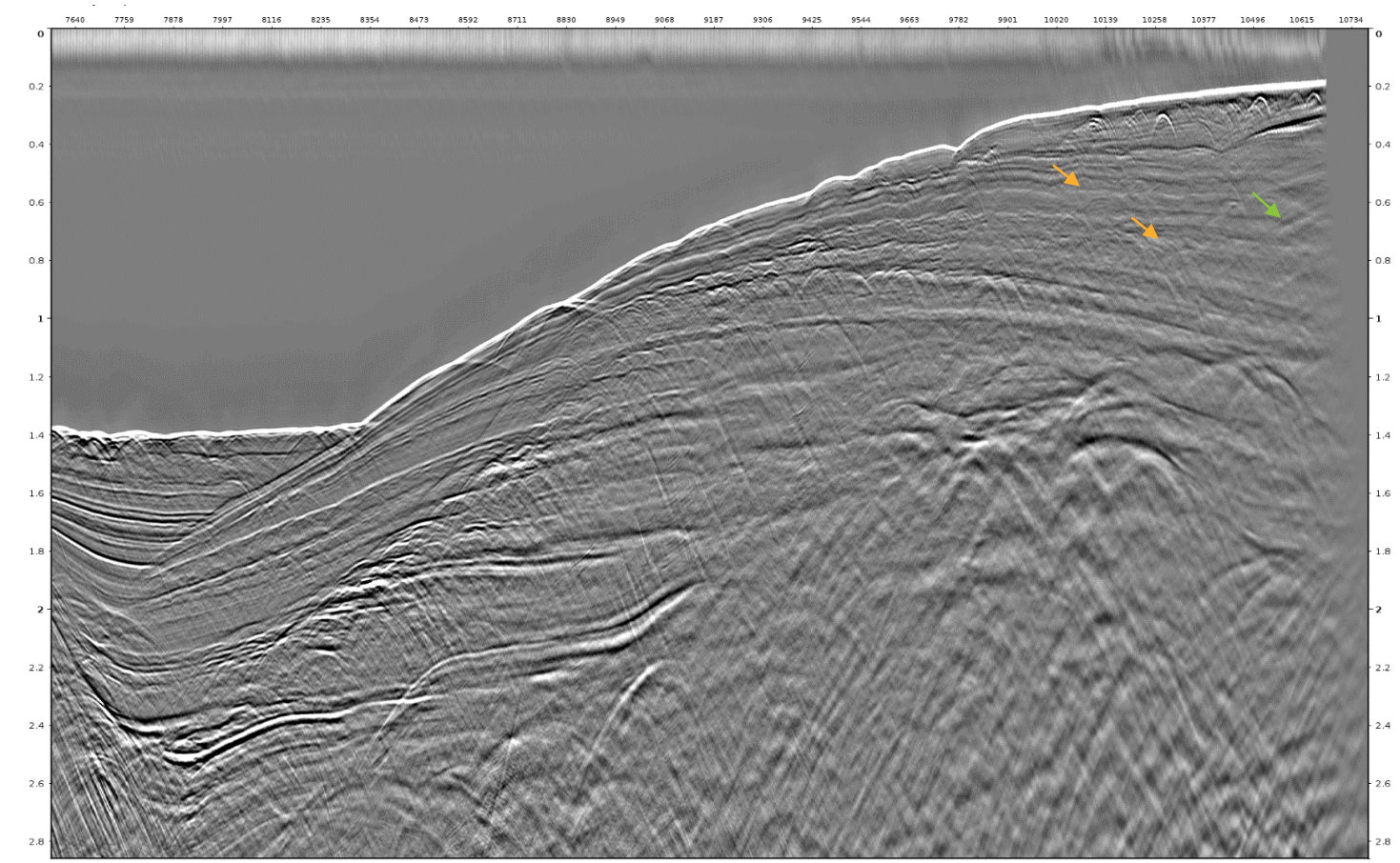
Stack after Demultiple (zoom in shallow area)



- Water bottom related multiples are well modeled and attenuated after subtraction.
- Residual multiples from other reflectors are left to be modeled by SRME.

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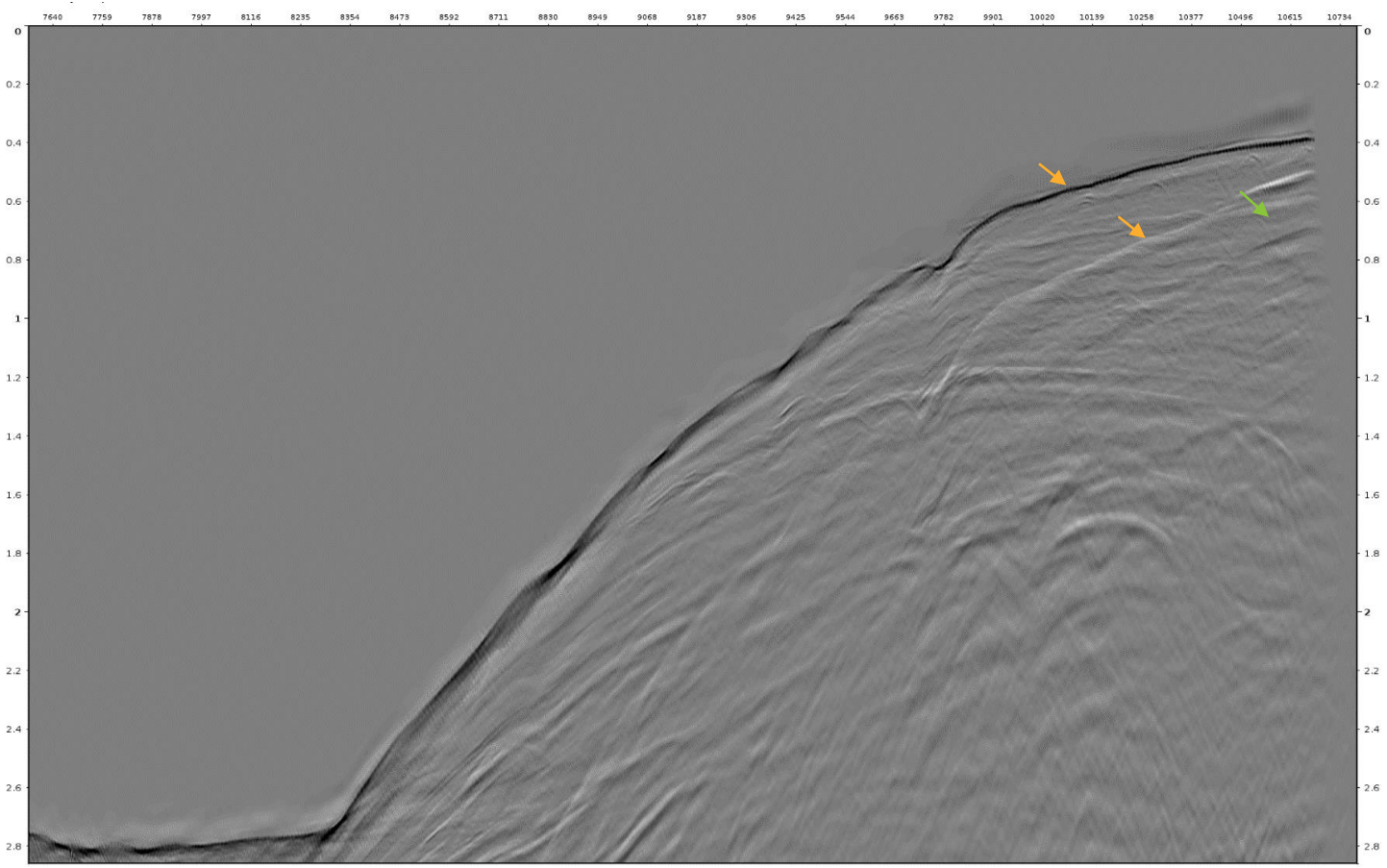
Difference before – after Demultiple



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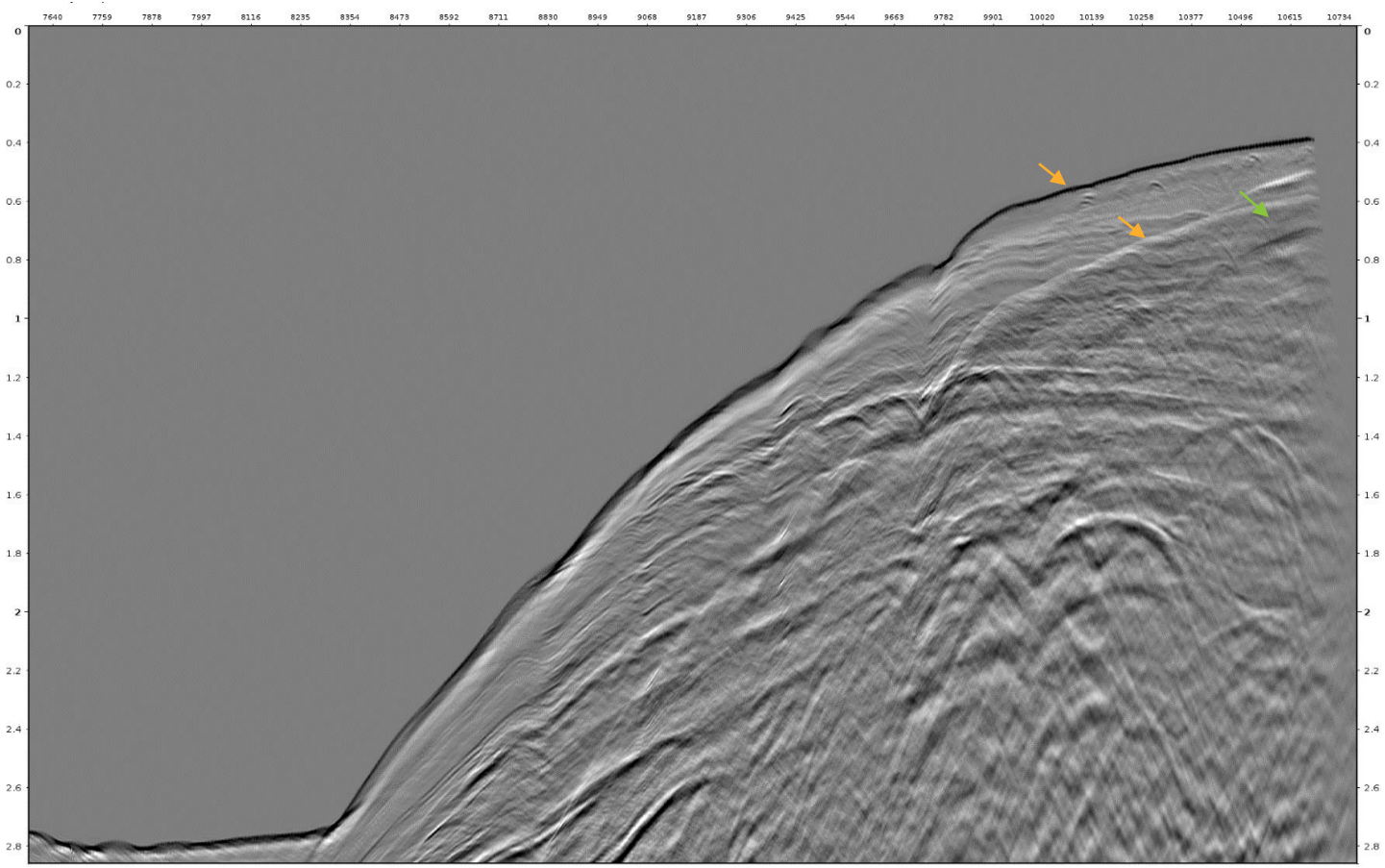
Stack – Multiple Model (zoom in shallow)



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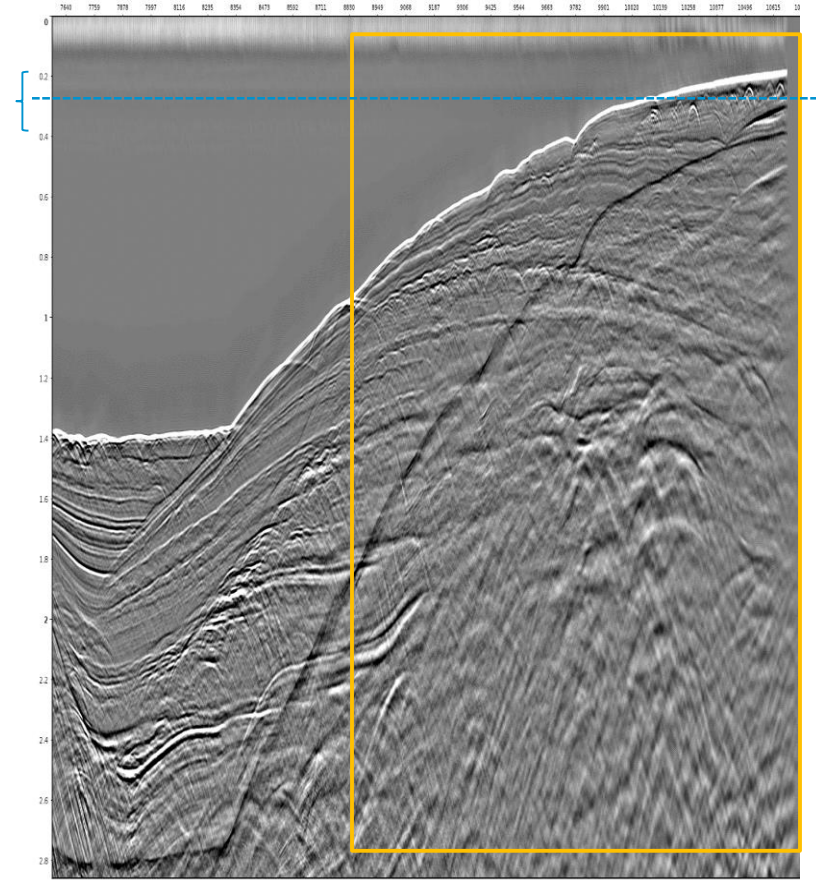
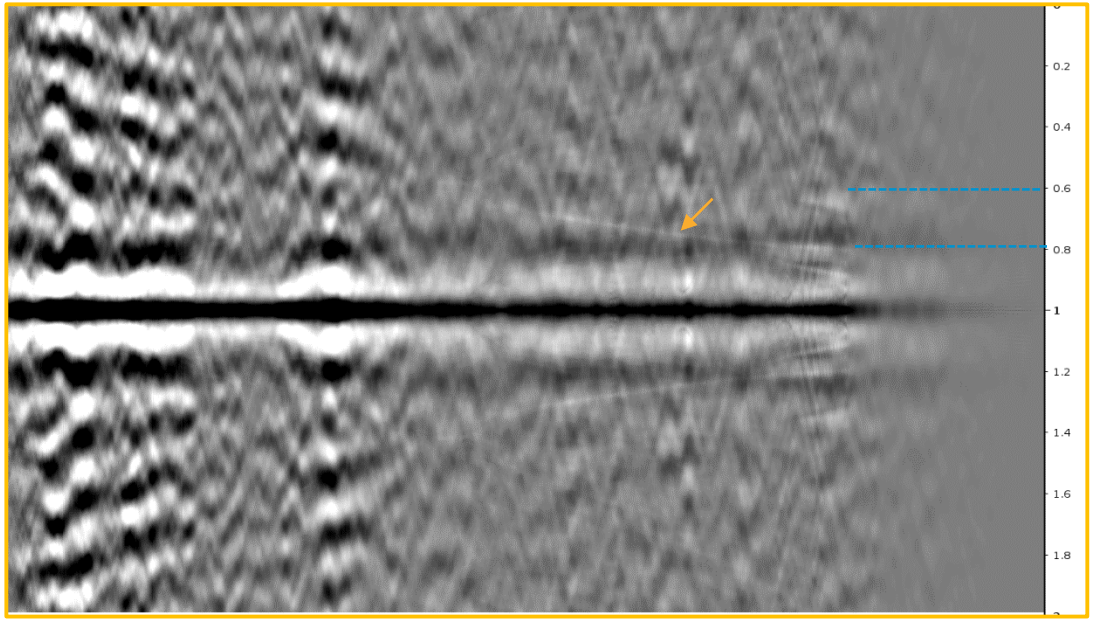
Auto-correlation before Demultiple





The period of water bottom related multiple at shallow area, is recognized on autocorrelation generated with lead-lag 1000ms.

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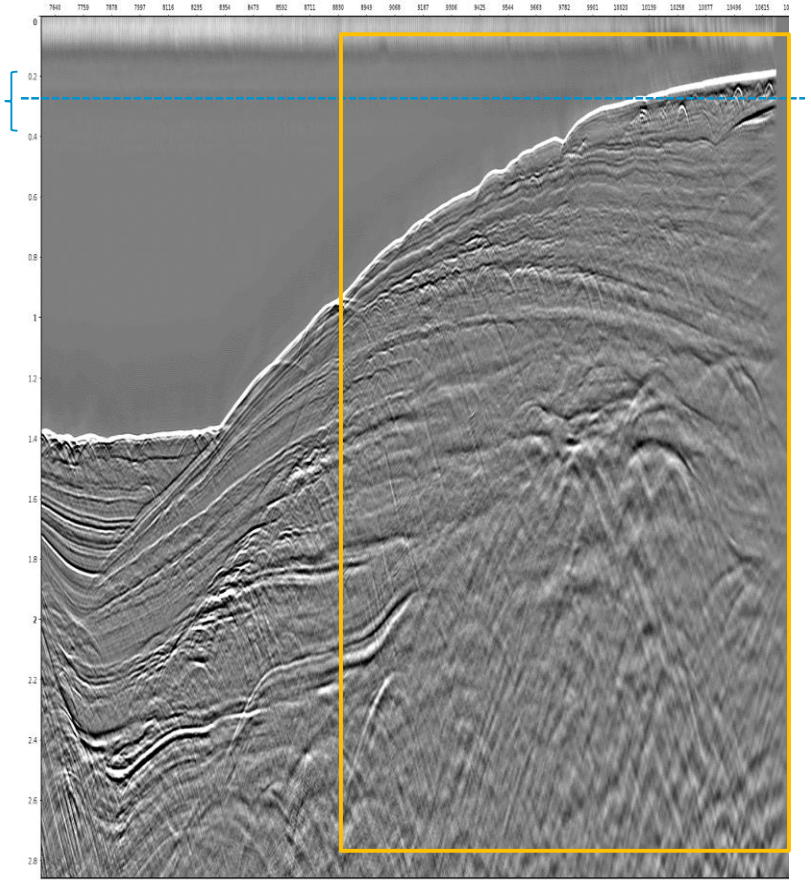
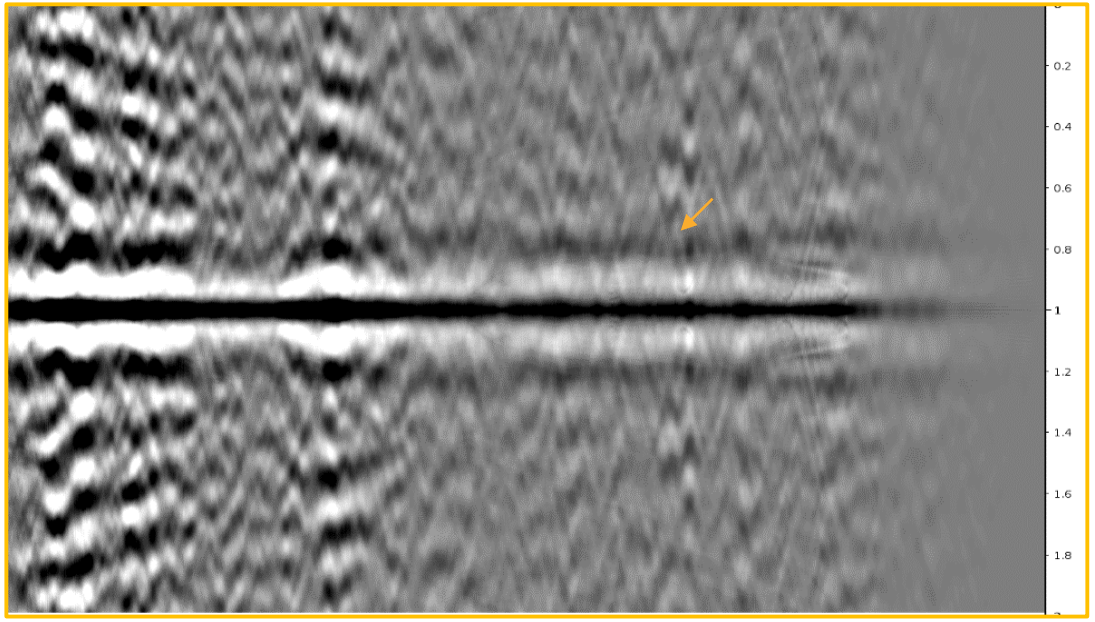
Auto-correlation after Demultiple





Water bottom related multiple energy at shallow area, is attenuated on autocorrelation after demultiple.

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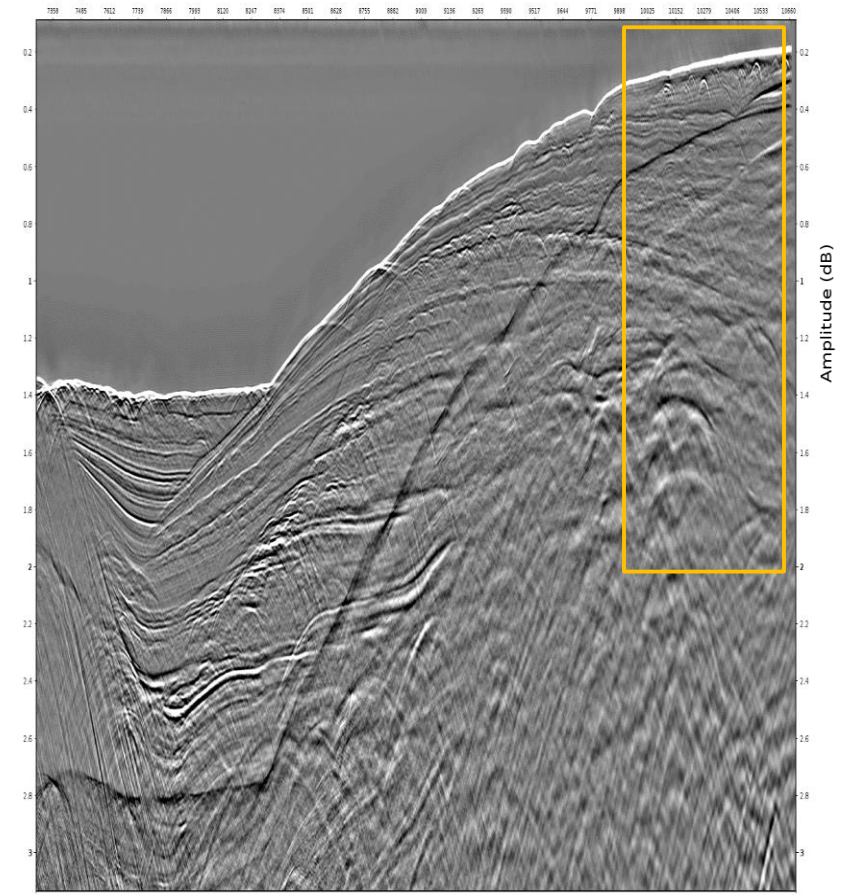
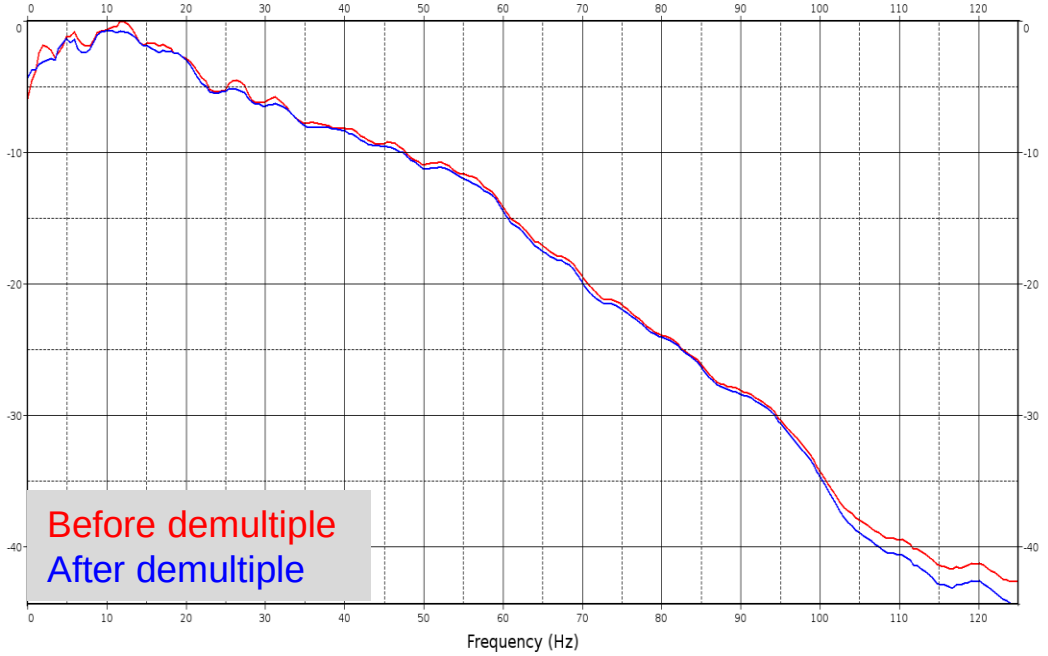
Amplitude Spectra





After demultiple, notches caused by multiple are attenuated, the residual will be further attenuated by SRME.

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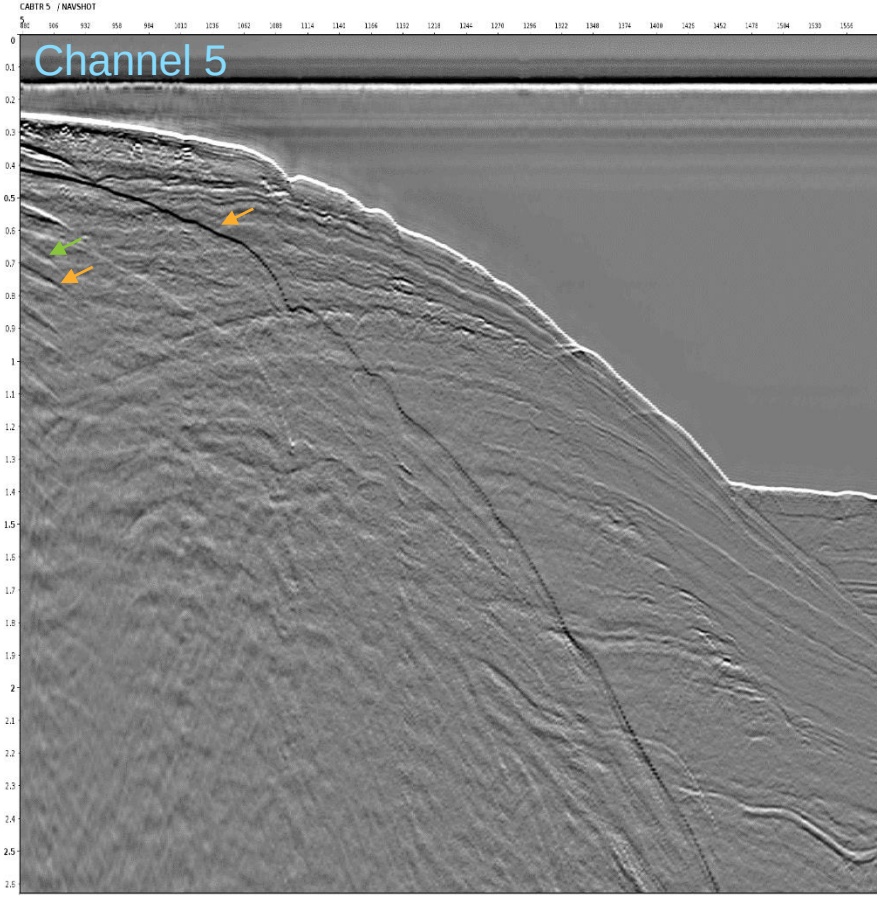
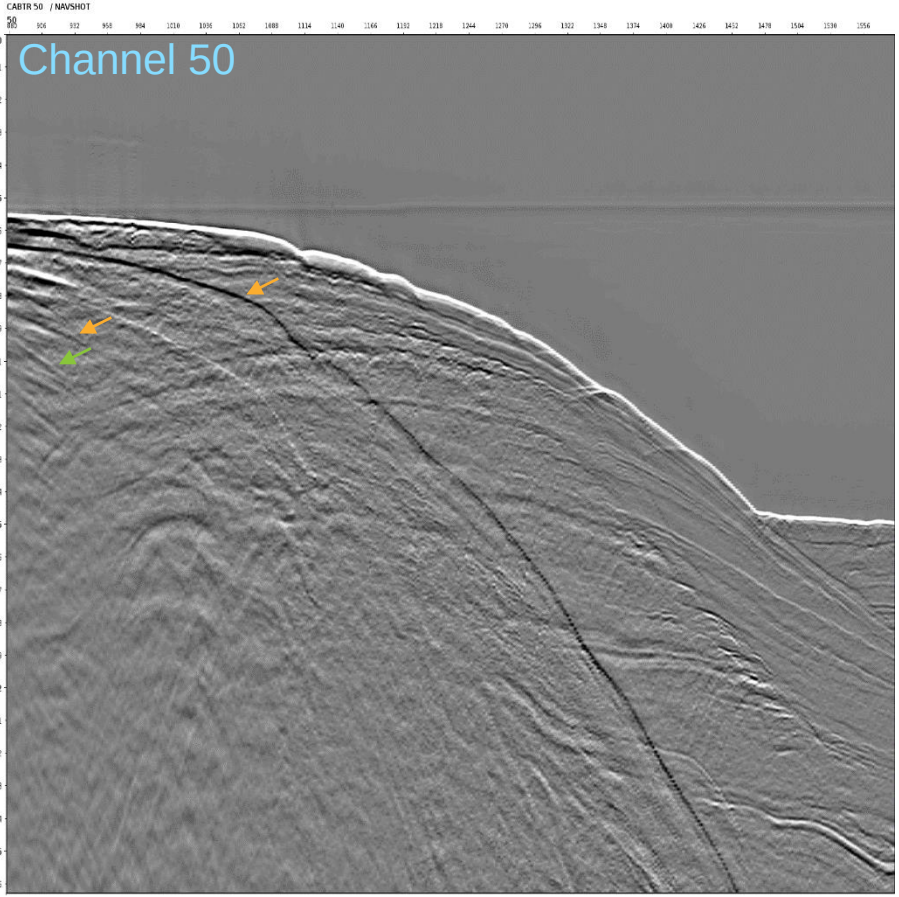
Common Channel before Demultiple





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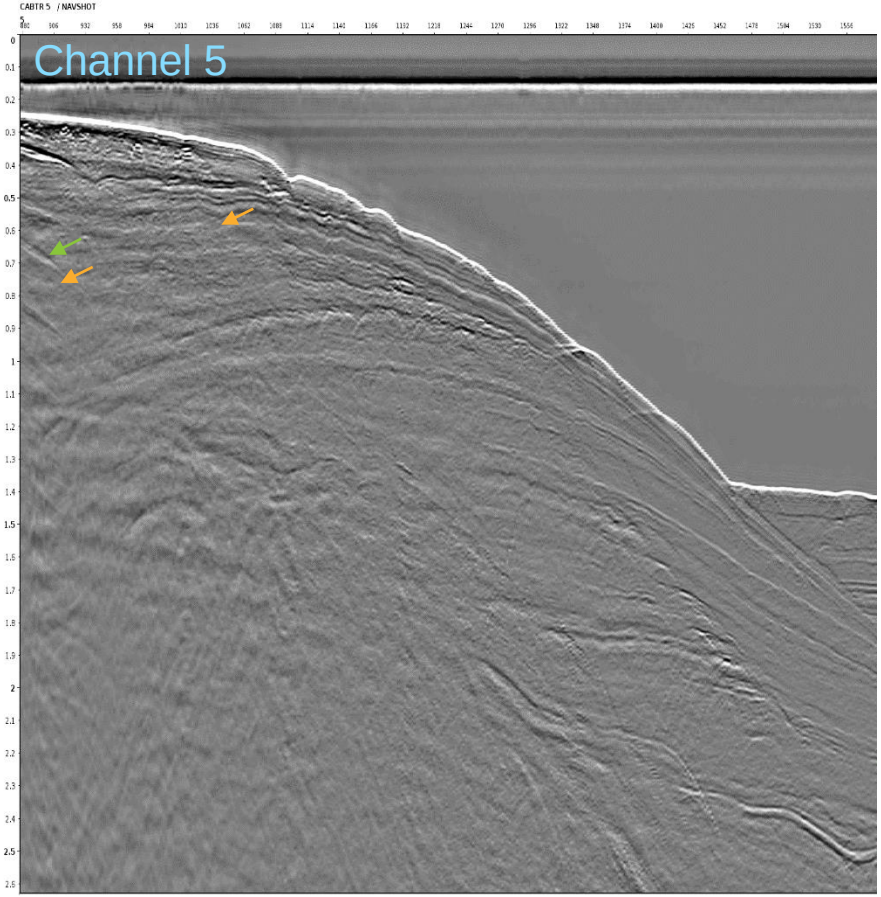
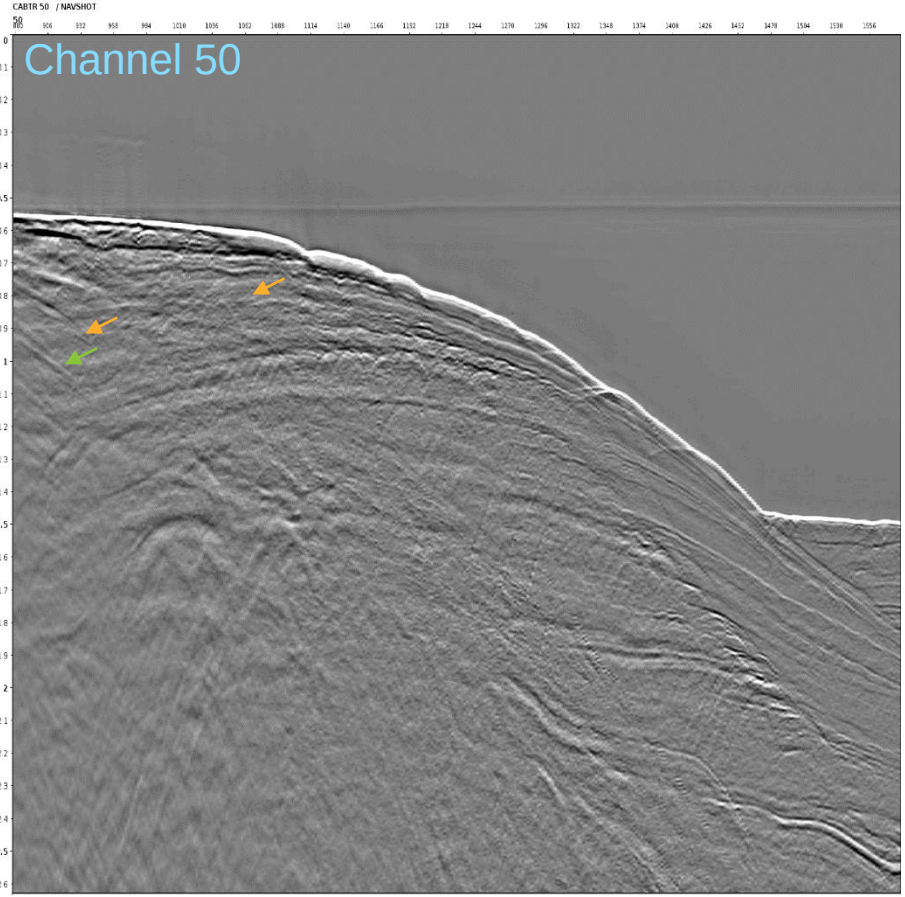
Common Channel after Demultiple





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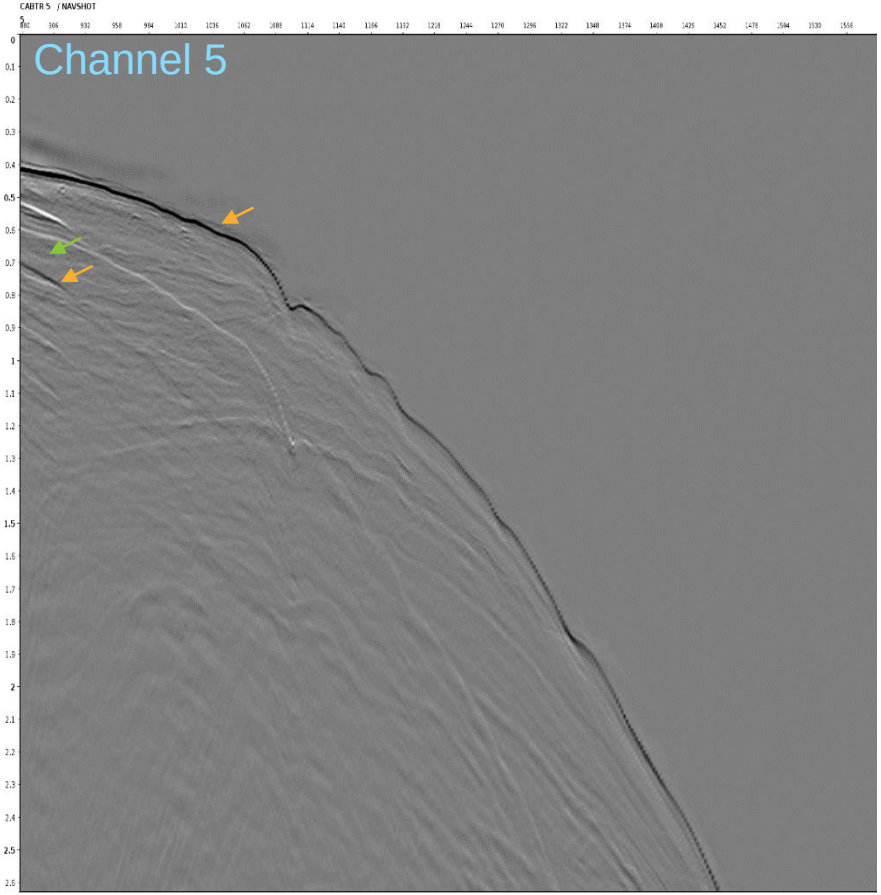
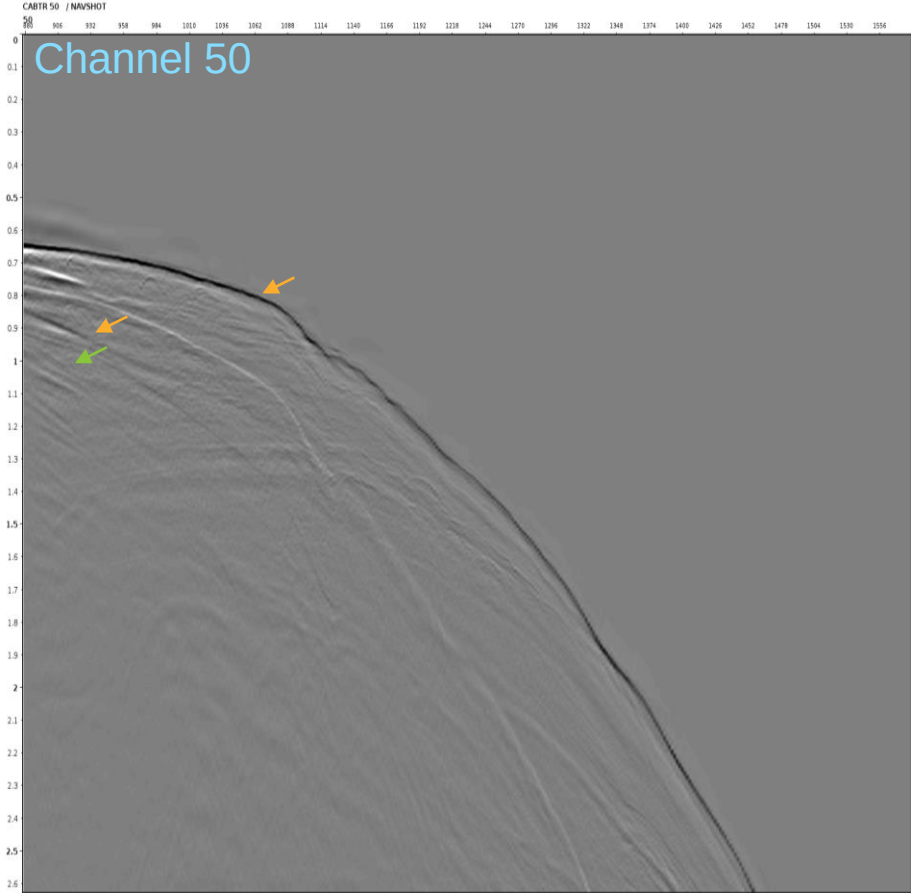
Difference before – after Demultiple





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Summery

- From preliminary demultiple results, the water bottom related multiples at shallow water area are well modeled.

- Residuals from other reflection horizons will be further attenuated by SRME.

- For final production, a simultaneous subtraction with both MWD and SRME model will be applied to further remove multiples energy.

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