



Shot & Channel Scaling Test

NZ 3D Processing

28 October 2020

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

- **Objective:**

To solve amplitude variation caused by different sensitivity among shots and receivers.

- **Procedure:**

- Amplitude is corrected by applying the scaler which is estimated from RMS amplitude variation across shot and channel.
- RMS amplitude is calculated from defined time window (shown in slide 5).

Shot Scalar Estimation Window			Channel Scalar Estimation Window		
Test 1	Test 2	Test 3	Test 1	Test 2	Test 3
5 traces	11 traces	21 traces	21 traces	36 traces	51 traces
Test 2 is recommended			Test 2 is recommended		

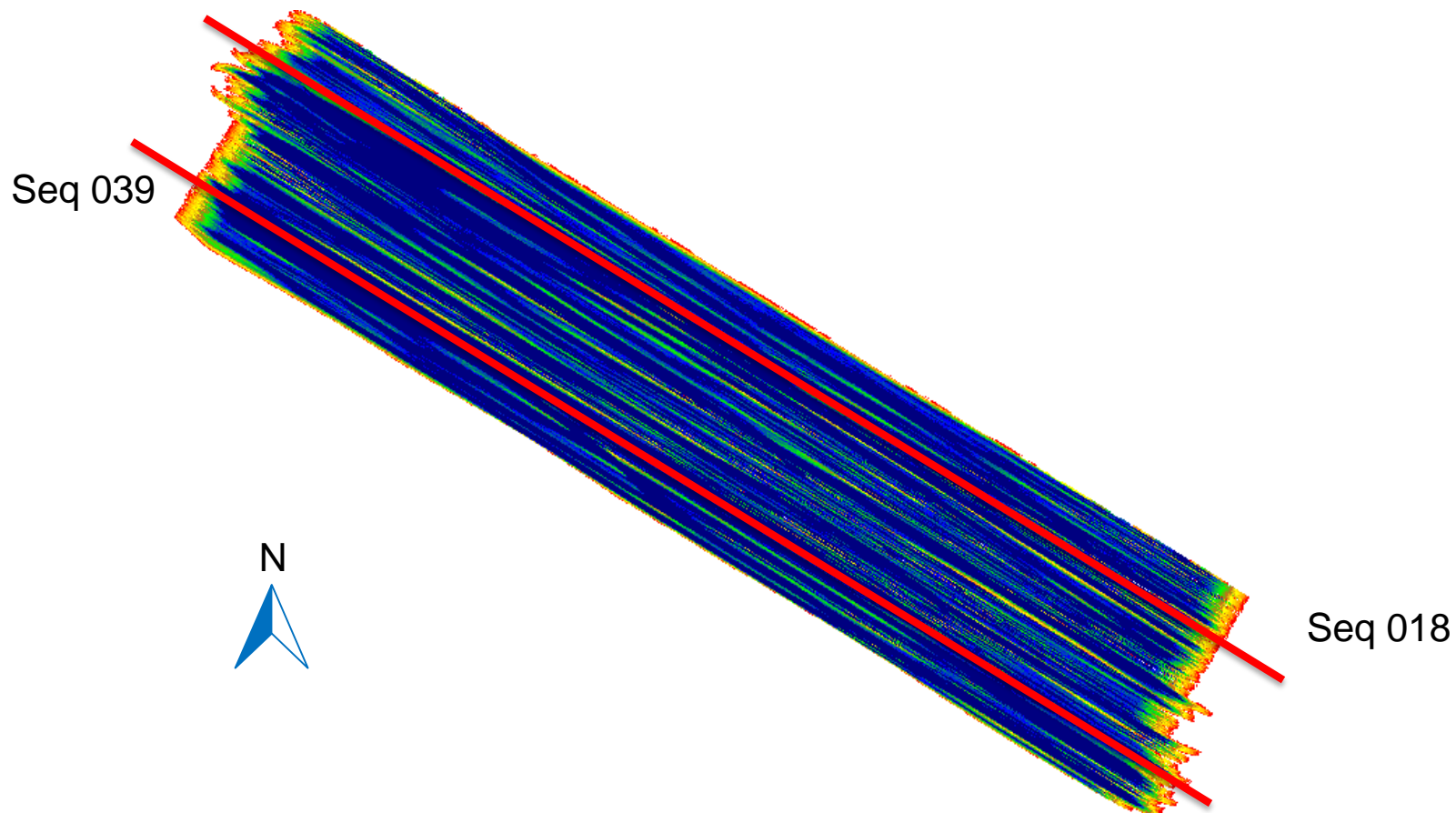
- **Display:**

Sail line amplitude map, scalar map, selected shot gathers and stack.

- **Observation and Recommendation:**

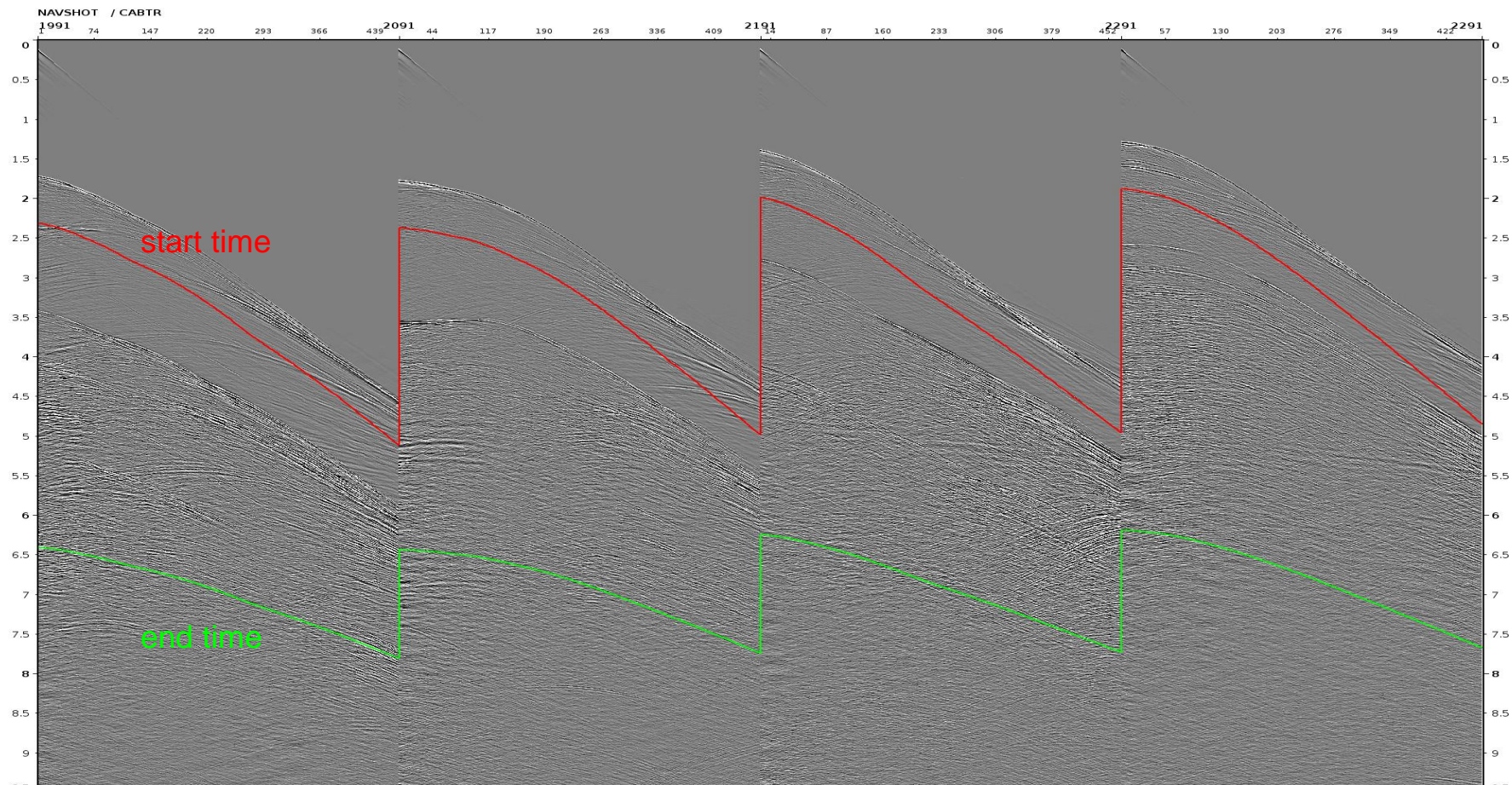
Shot and channel scaling solves the amplitude variation caused by different shot & channel sensitivity and enhances the consistency of the amplitude, while keeping the major amplitude trend.

Hence, it is recommended for production.



RMS Amplitude Calculation Window

5



Shot Scaler Test

Test 1 : scalar estimation window defined by 5 traces

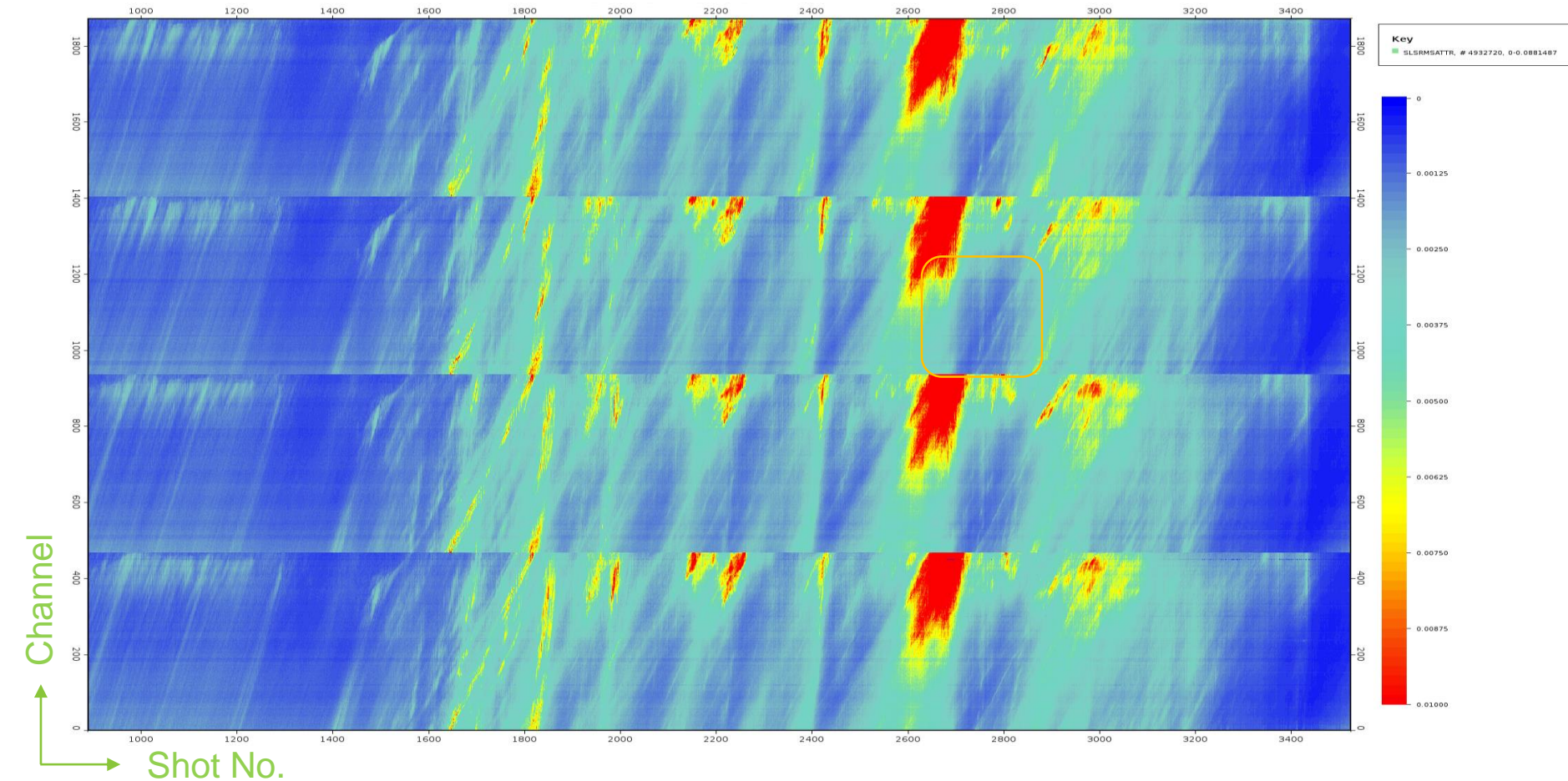
Test 2 : scalar estimation window defined by 11 traces (**recommended**)

Test 3 : scalar estimation window defined by 21 traces



Seq 018 Amplitude Map before Shot Scaling

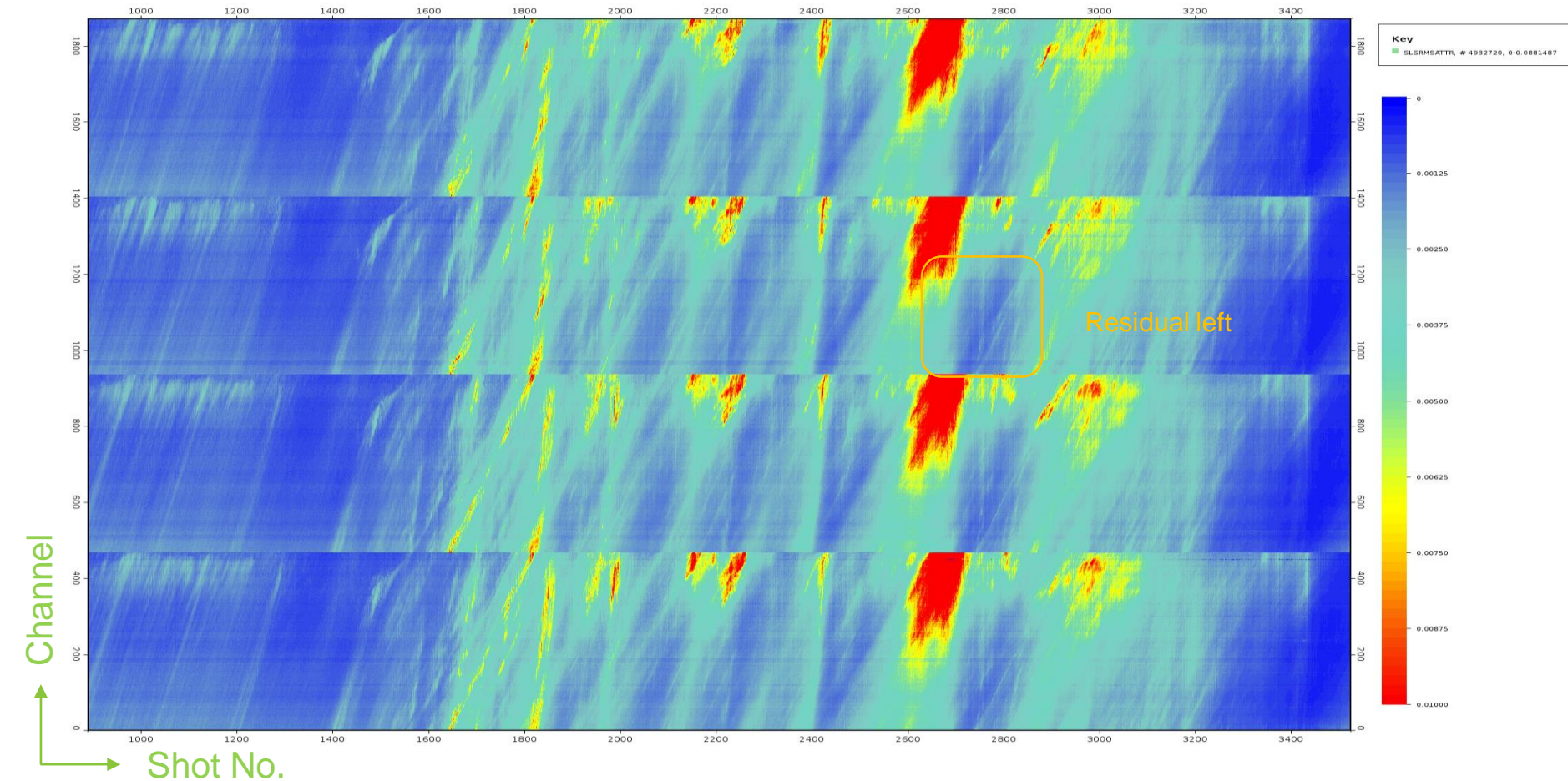
7





Seq 018 Amplitude Map **after** Shot Scaling (5)

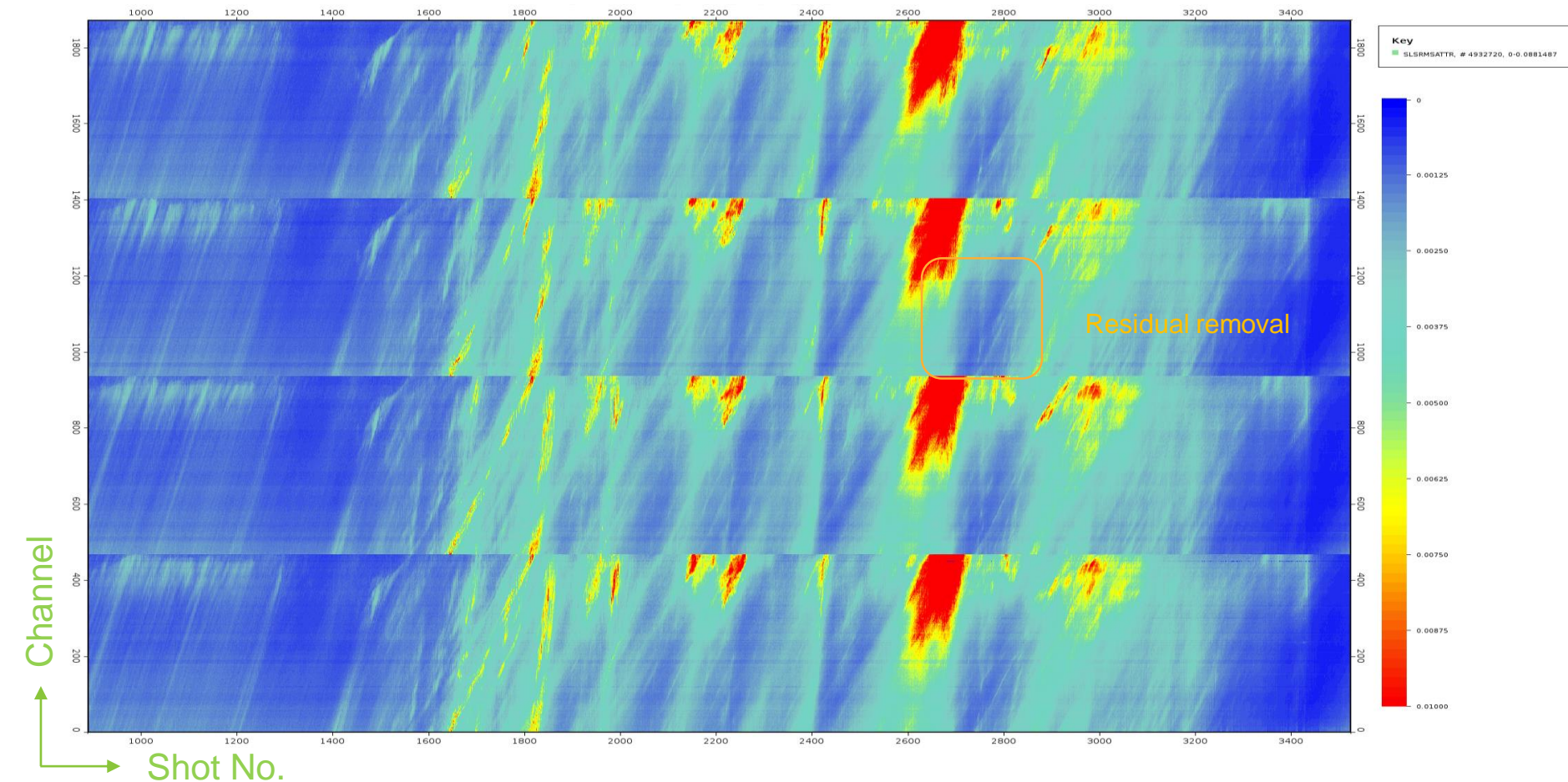
8





Seq 018 Amplitude Map after Shot Scaling (11) recommended

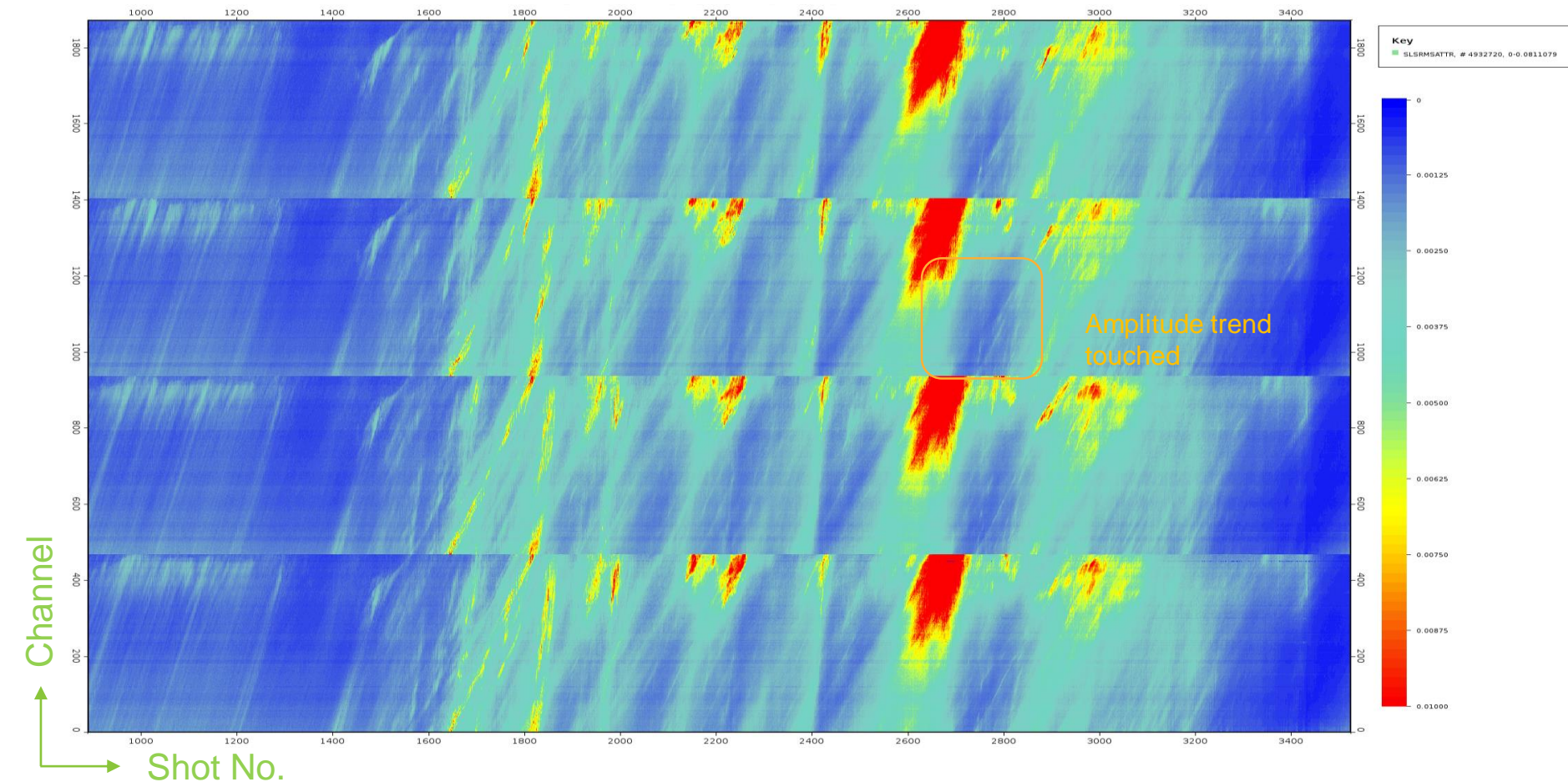
9





Seq 018 Amplitude Map **after** Shot Scaling (31)

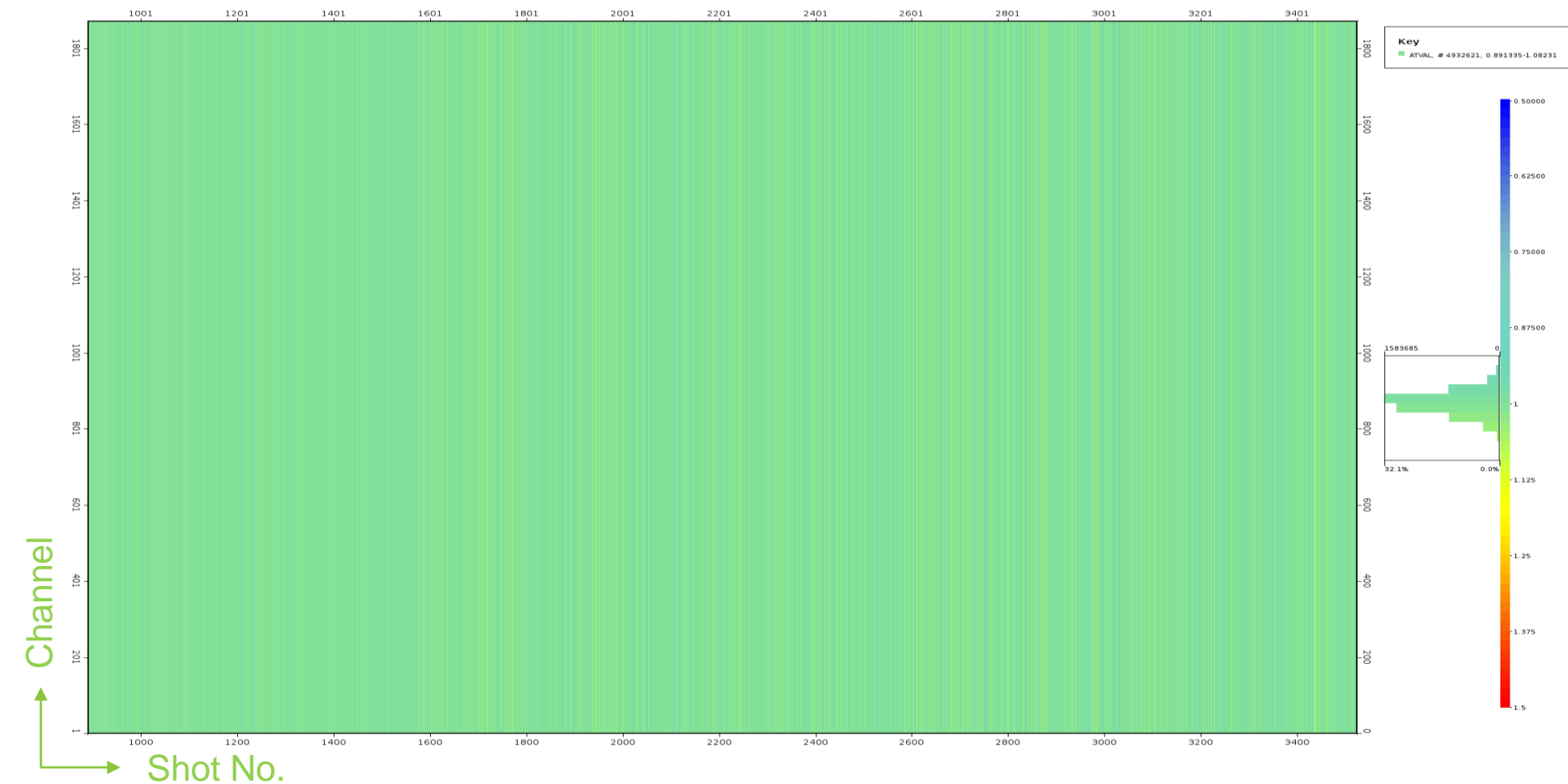
10





Scalar Map for Shot Scaling (5)

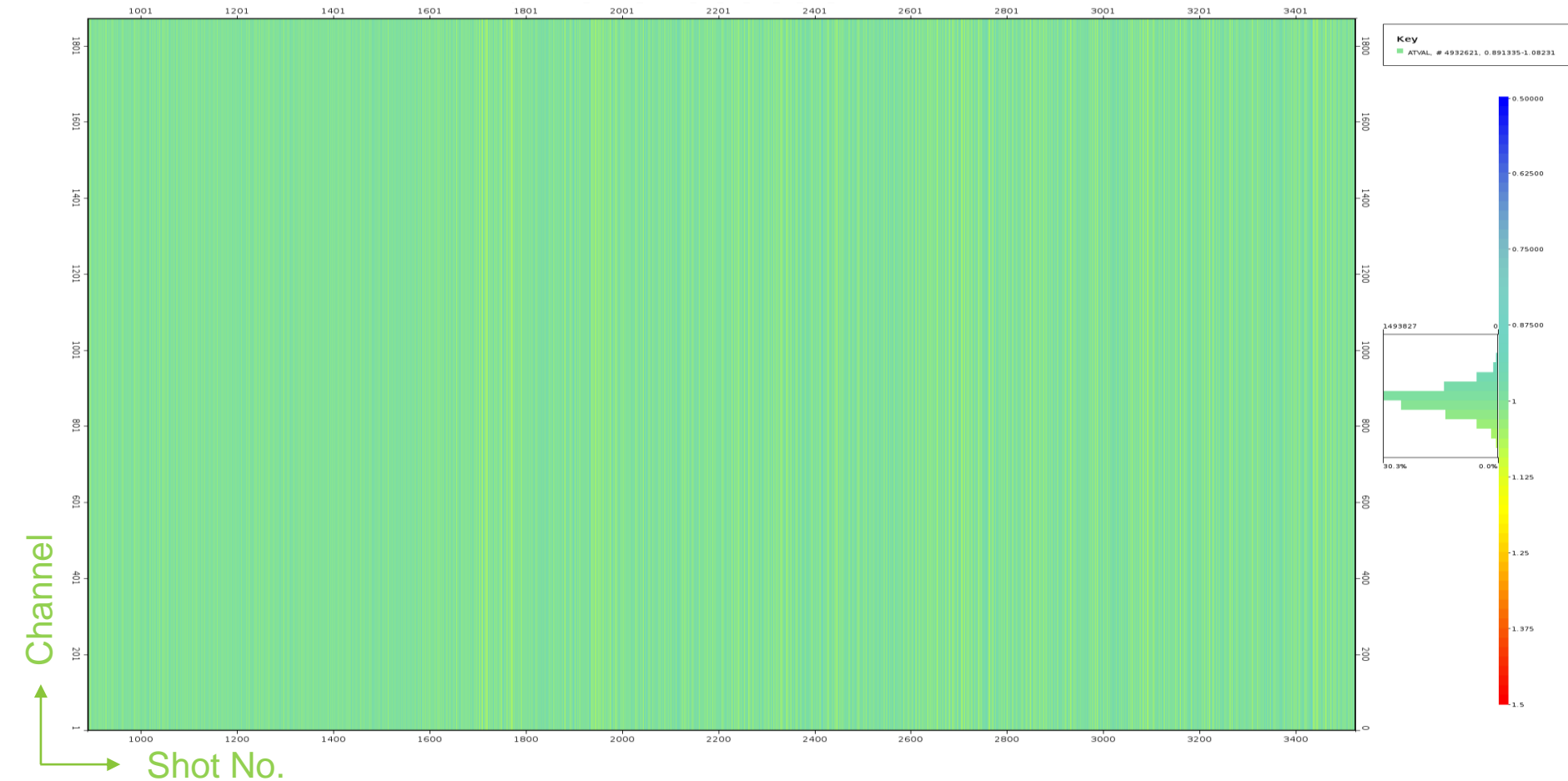
11





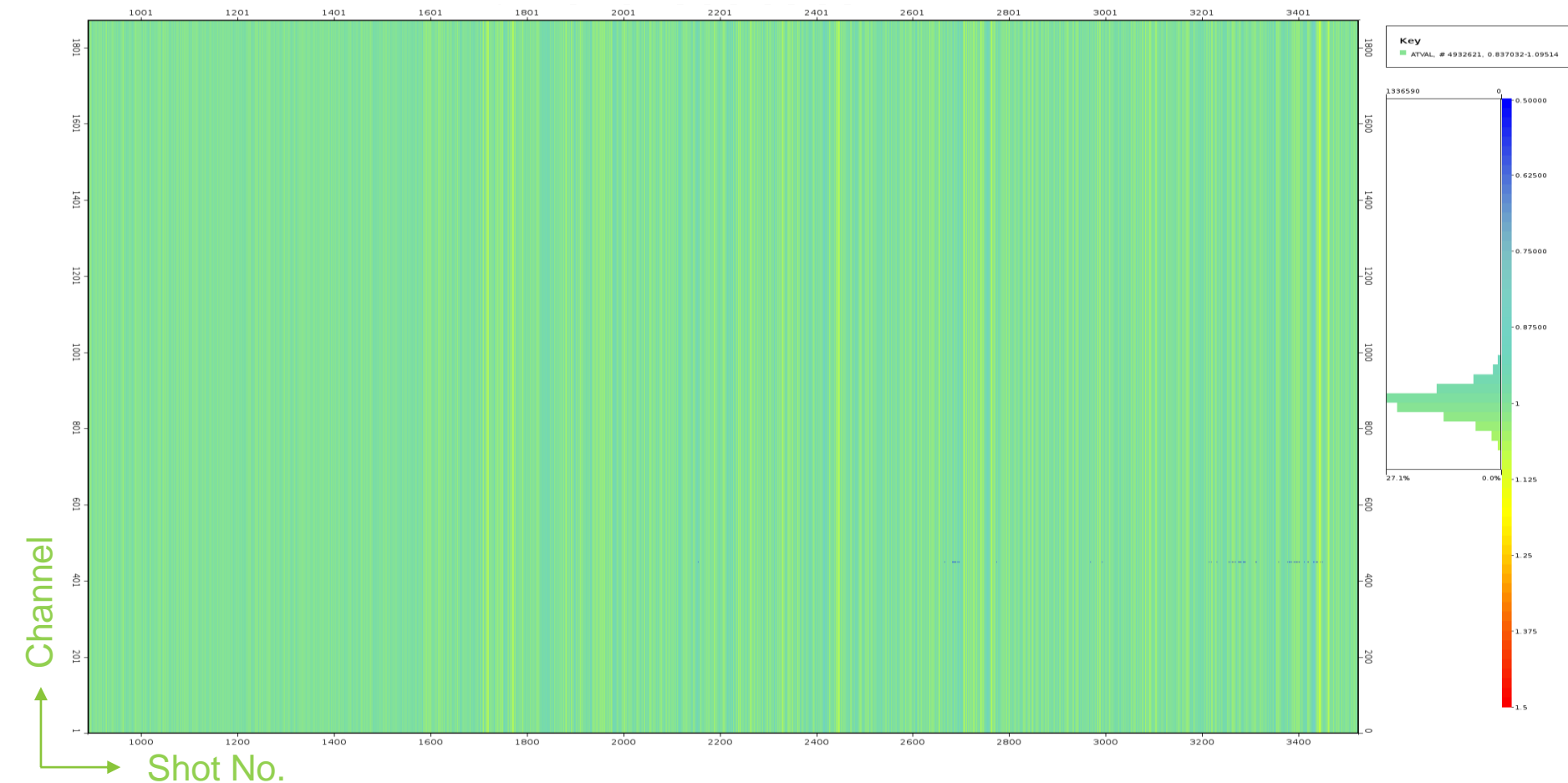
Scalar Map for Shot Scaling (11) recommended

12



Scalar Map for Shot Scaling (21)

13



Channel scaler test

Test 1 : scalar estimation window defined by 21 traces

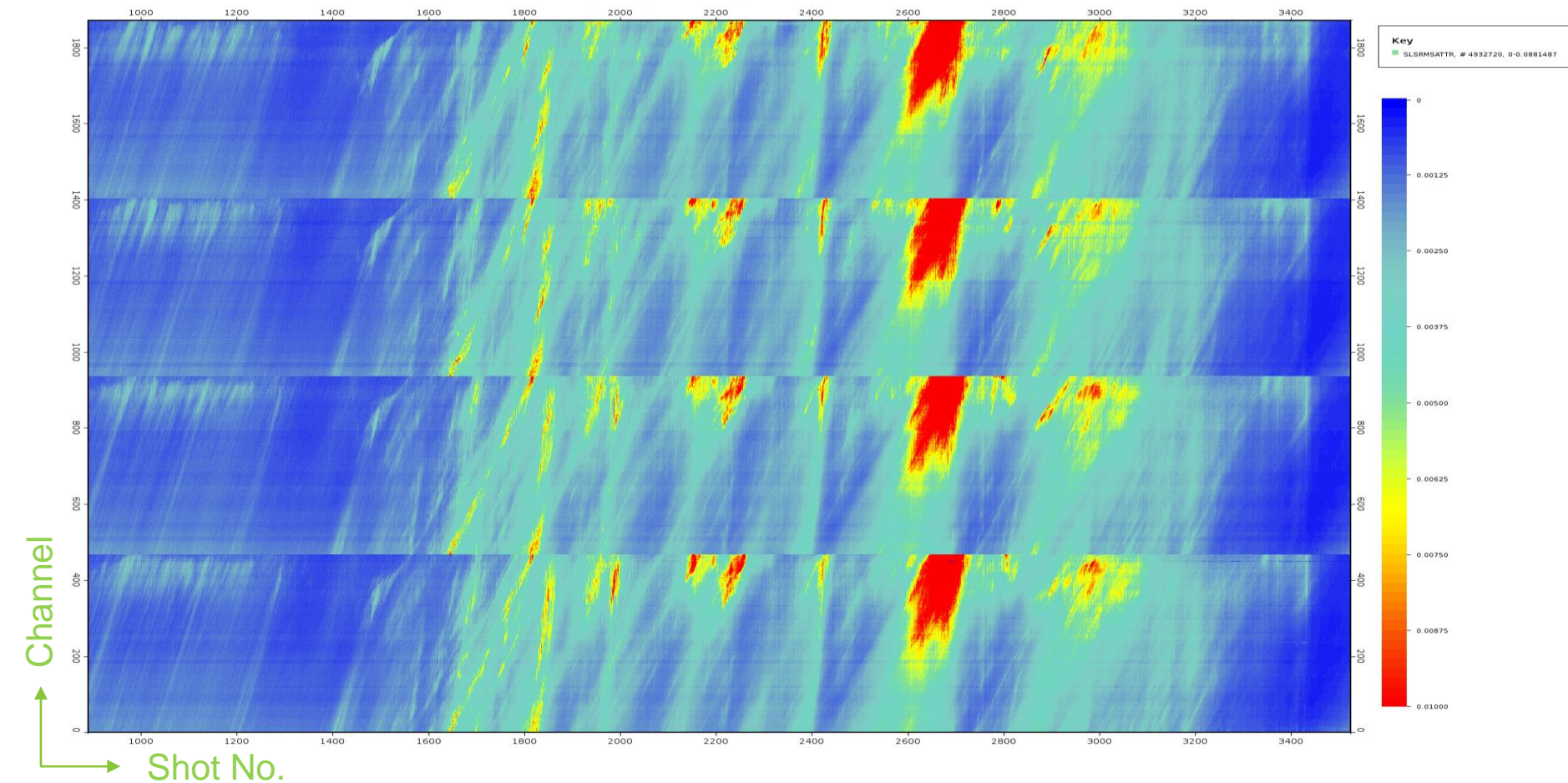
Test 2 : scalar estimation window defined by 36 traces (**recommended**)

Test 3 : scalar estimation window defined by 51 traces



Seq 018 Amplitude Map before Channel Scaling

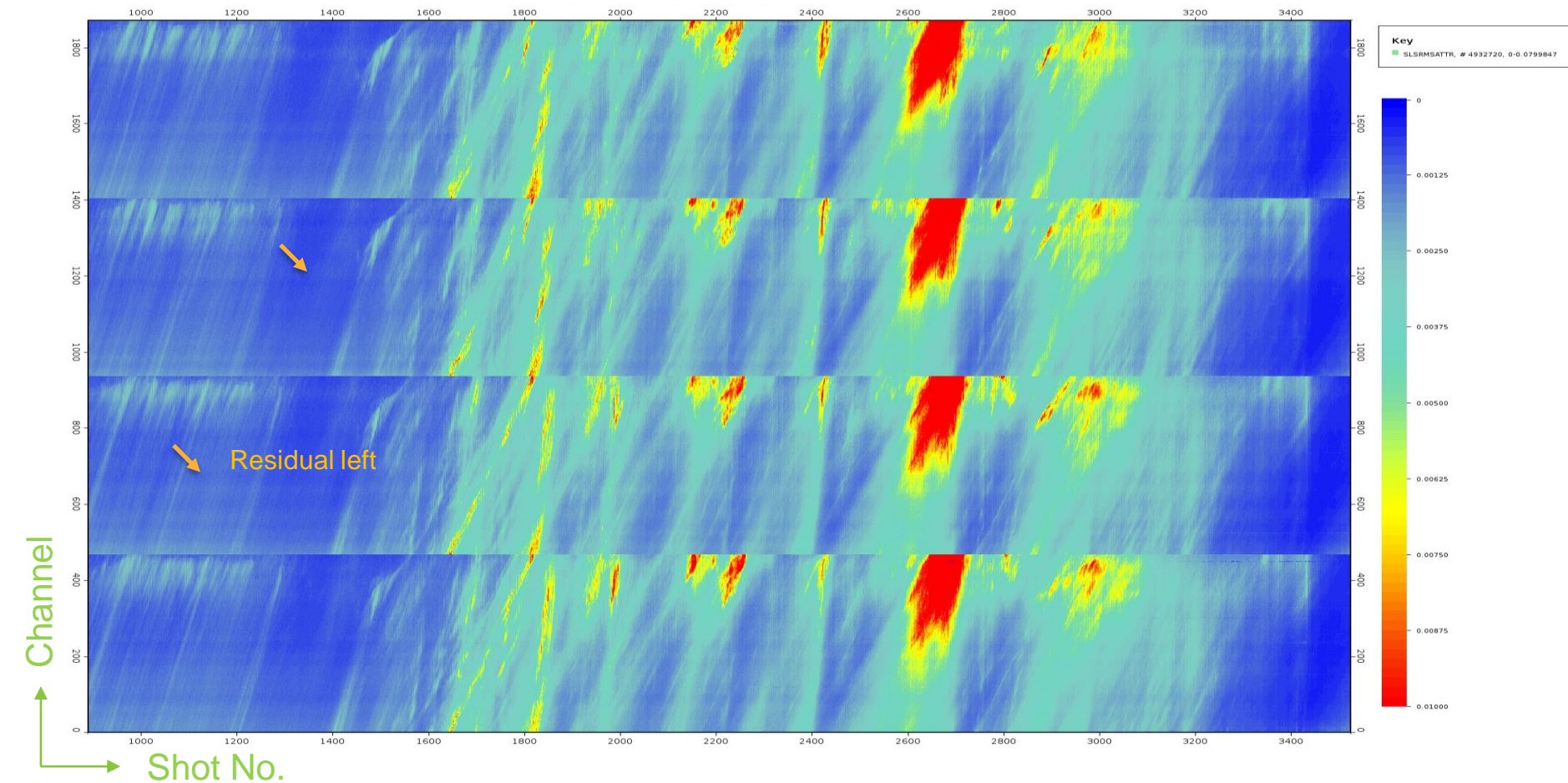
15





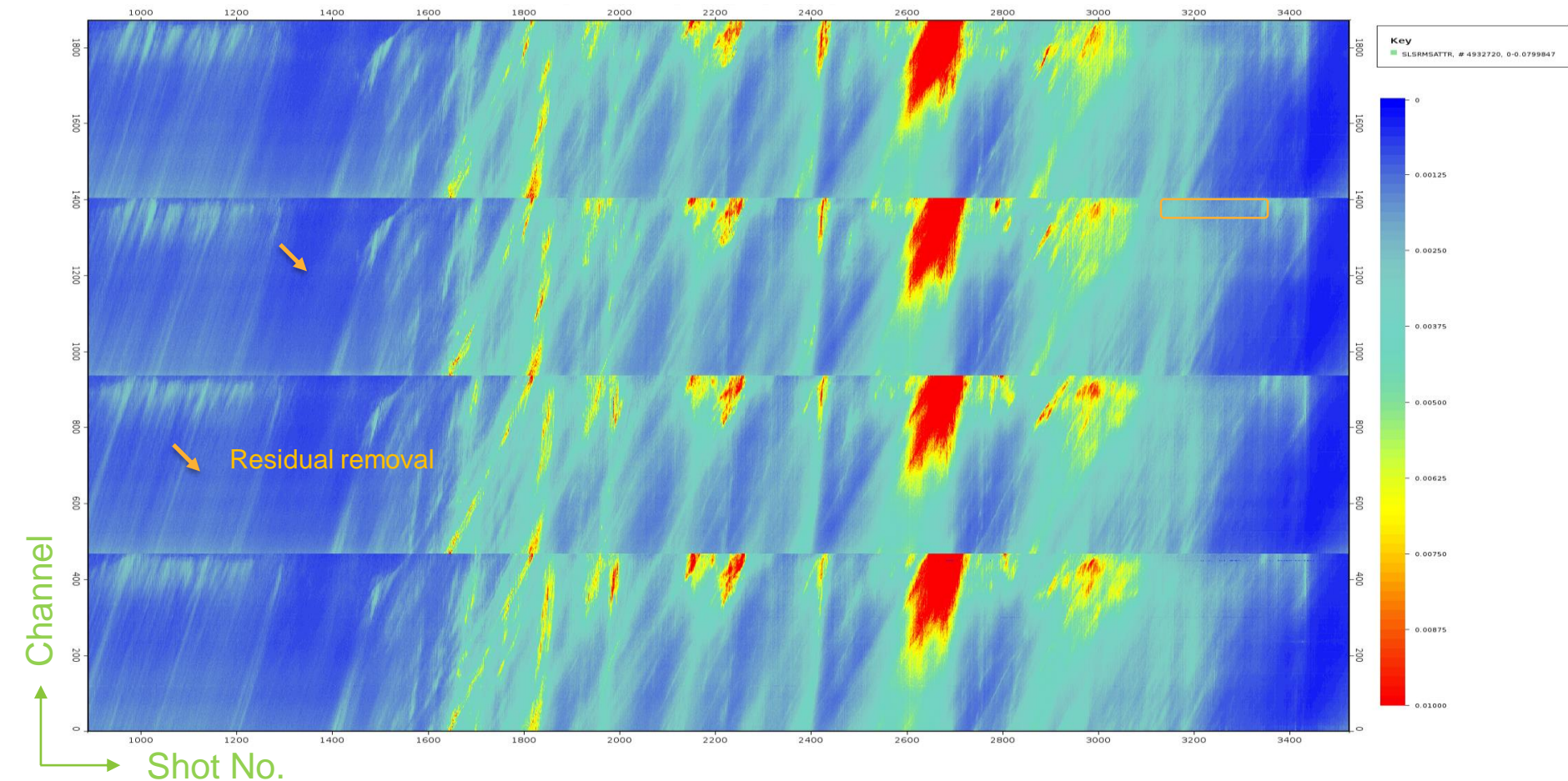
Seq 018 Amplitude Map **after** Channel Scaling (21)

16





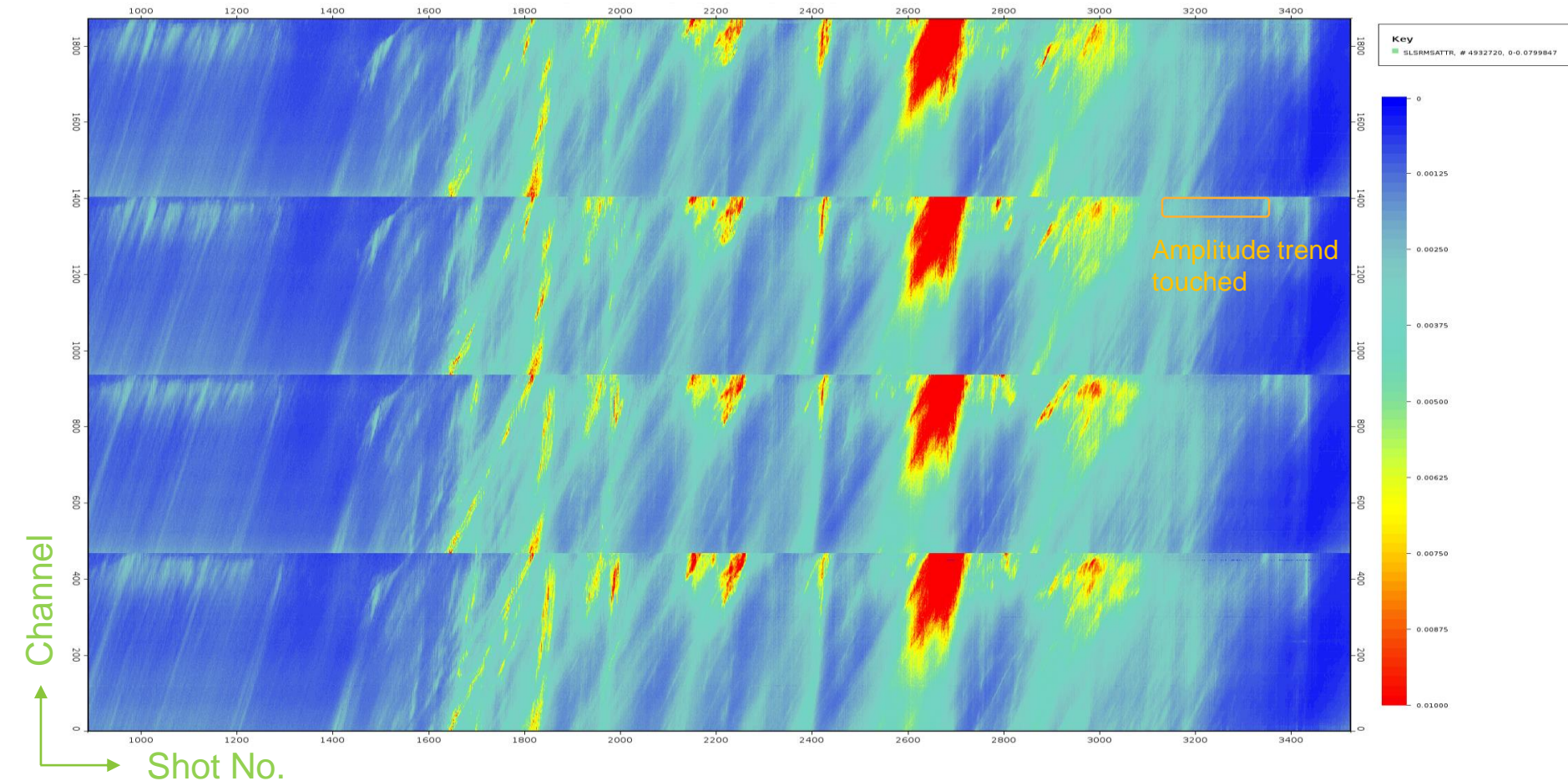
Seq 018 Amplitude Map **after** Channel Scaling (36) recommended 17





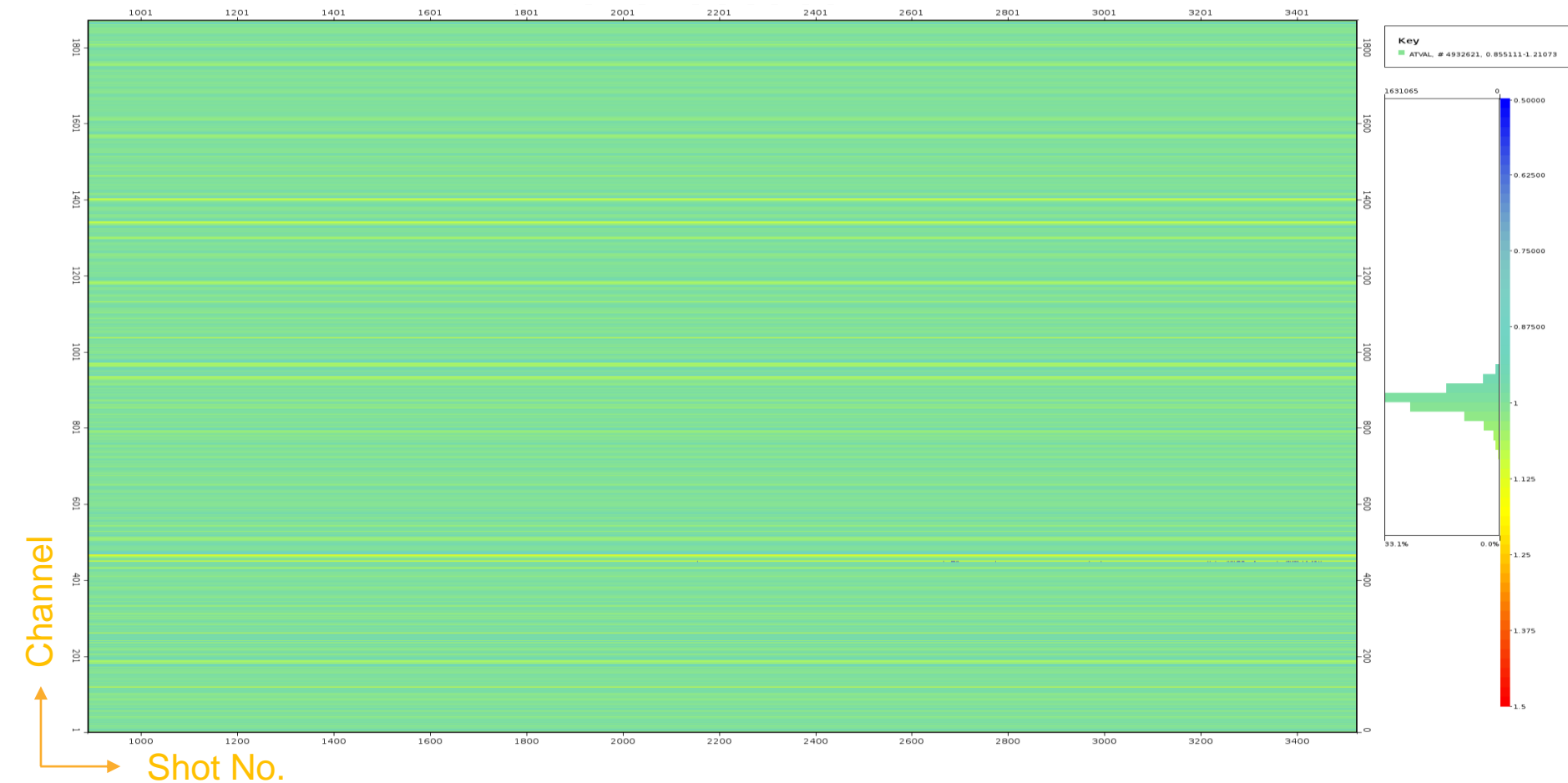
Seq 018 Amplitude Map **after** Channel Scaling (51)

18



Scalar Map for Channel Scaling (21)

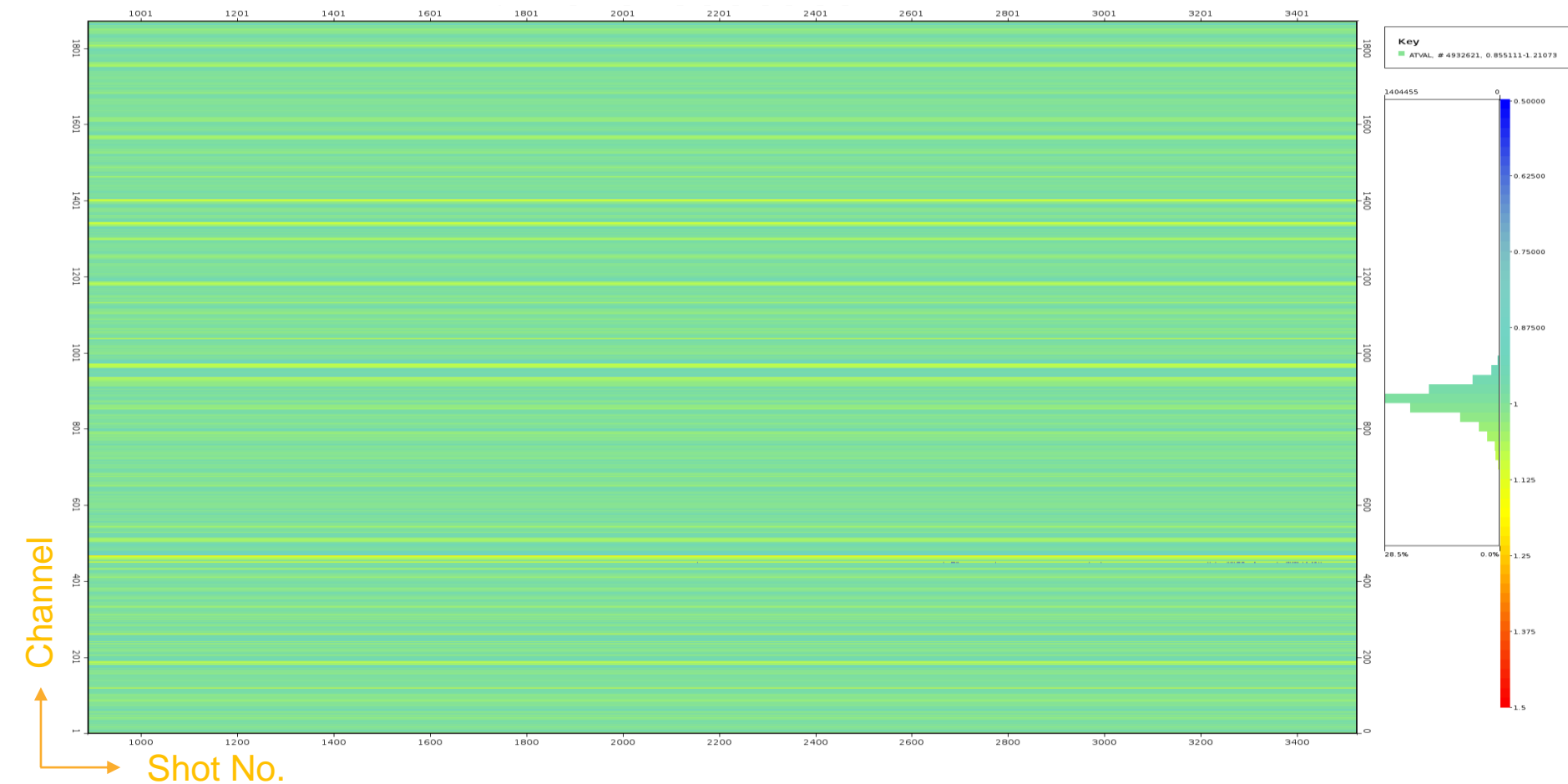
19





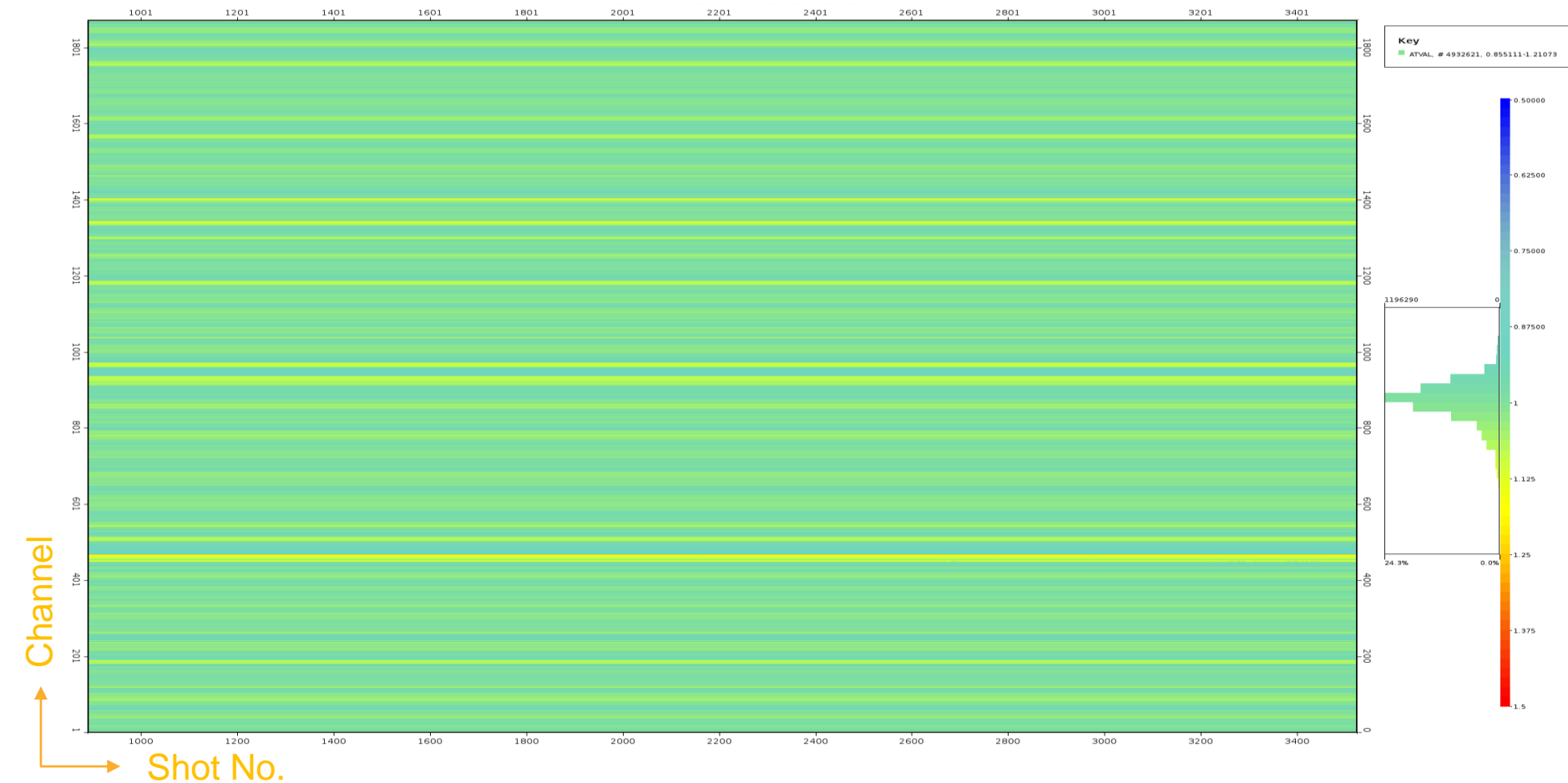
Scalar Map for Channel Scaling (36) recommended

20



Scalar Map for Channel Scaling (51)

21



Shot Channel Scaler Apply

Shot Scalar Estimation Window 11 & Channel Scalar Estimation Window 36

- Amplitude Map & Scalar Map
- Selected Shot Gathers
- Stack

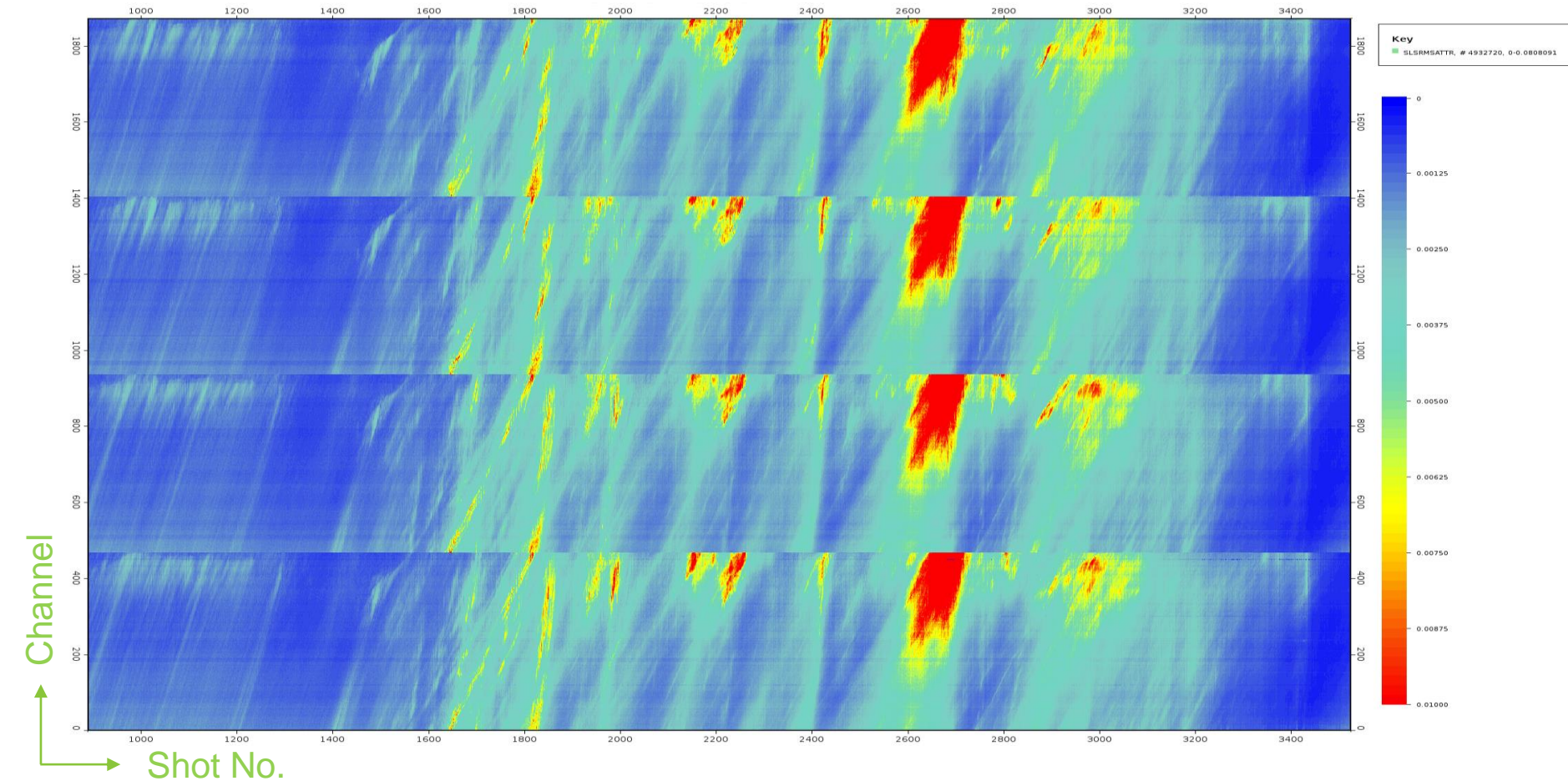


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Seq 018 Amplitude Map **before** Shot Channel Scaling

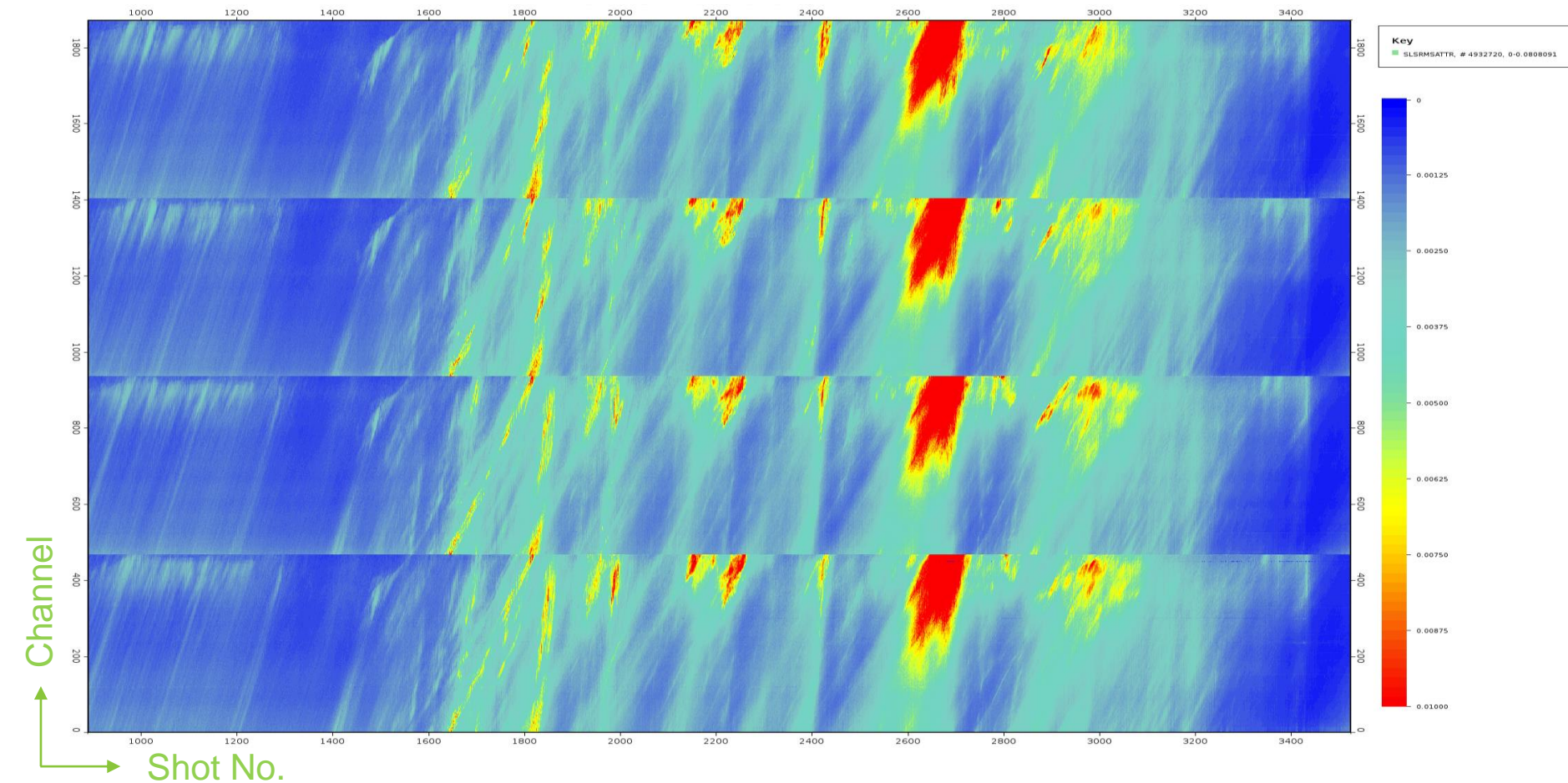
23





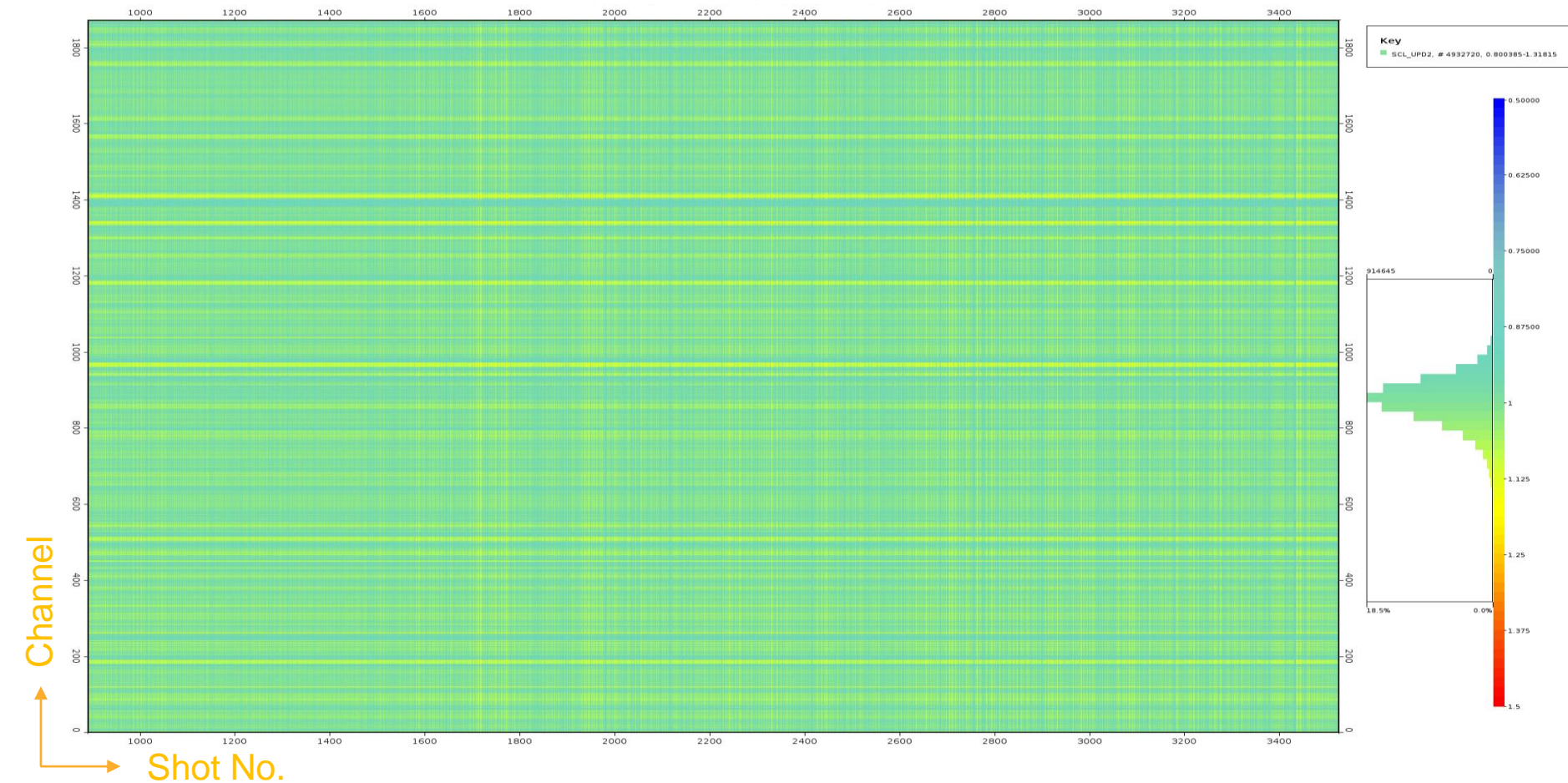
Seq 018 Amplitude Map **after** Shot Channel Scaling

24

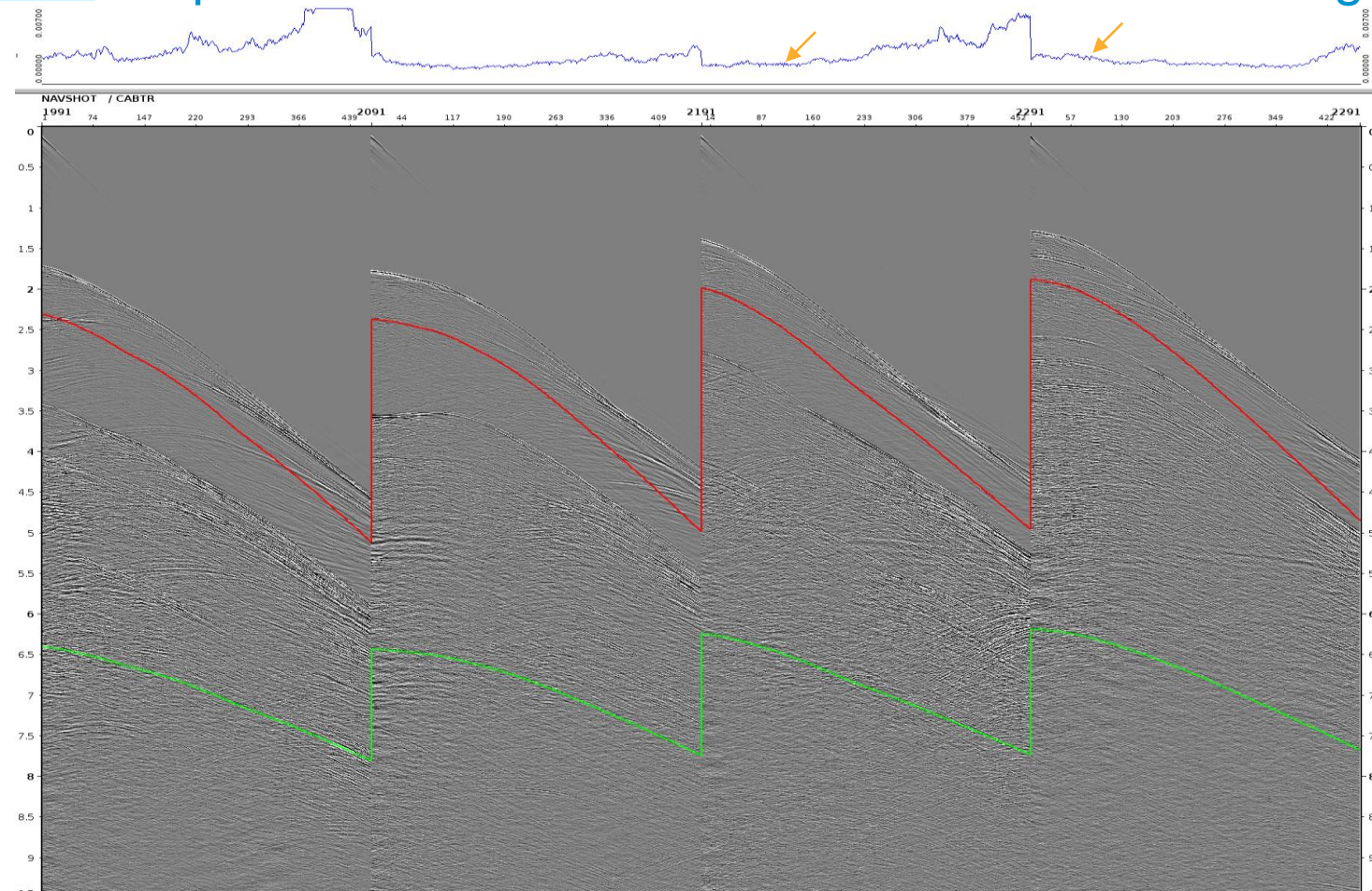


Seq 018 Shot & Channel Scalar Map

25



Seq 018 Shot Gathers before Shot Channel Scaling

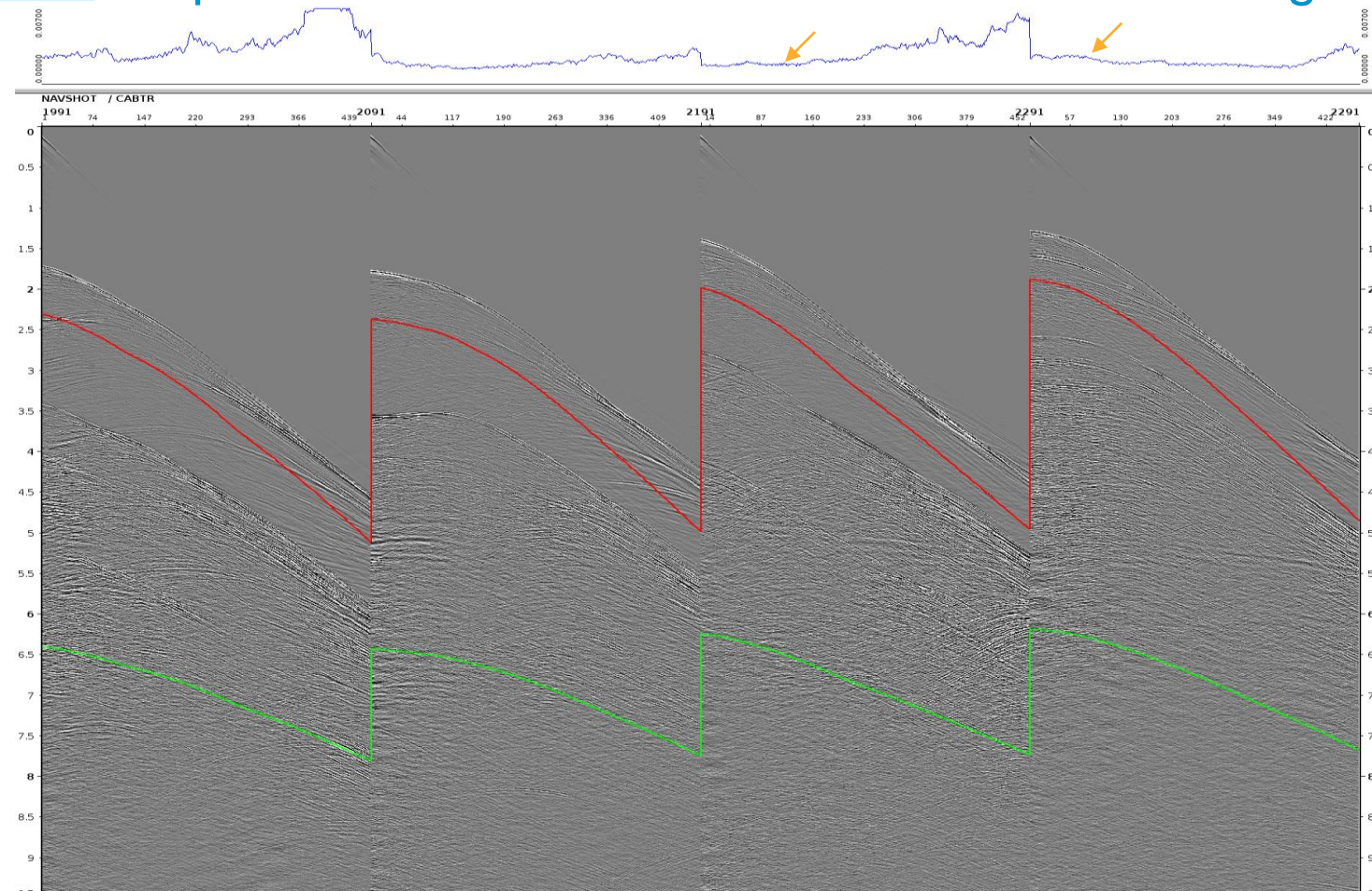


- Blue curve plot the RMS amplitude computed from defined window (between red-green).
- After shot & channel scaling, amplitude variation reduced without changing the AVO trend.
- AVO – Amplitude Versus Offset.



Seq 018 Shot Gathers **after** Shot Channel Scaling

27



- Blue curve plot the RMS amplitude computed from defined window (between red-green).
- After shot & channel scaling, amplitude variation reduced without changing the AVO trend.
- AVO – Amplitude Versus Offset.

Seq018 Stack before Shot Channel Scaling (zoom in shallow area) ²⁸



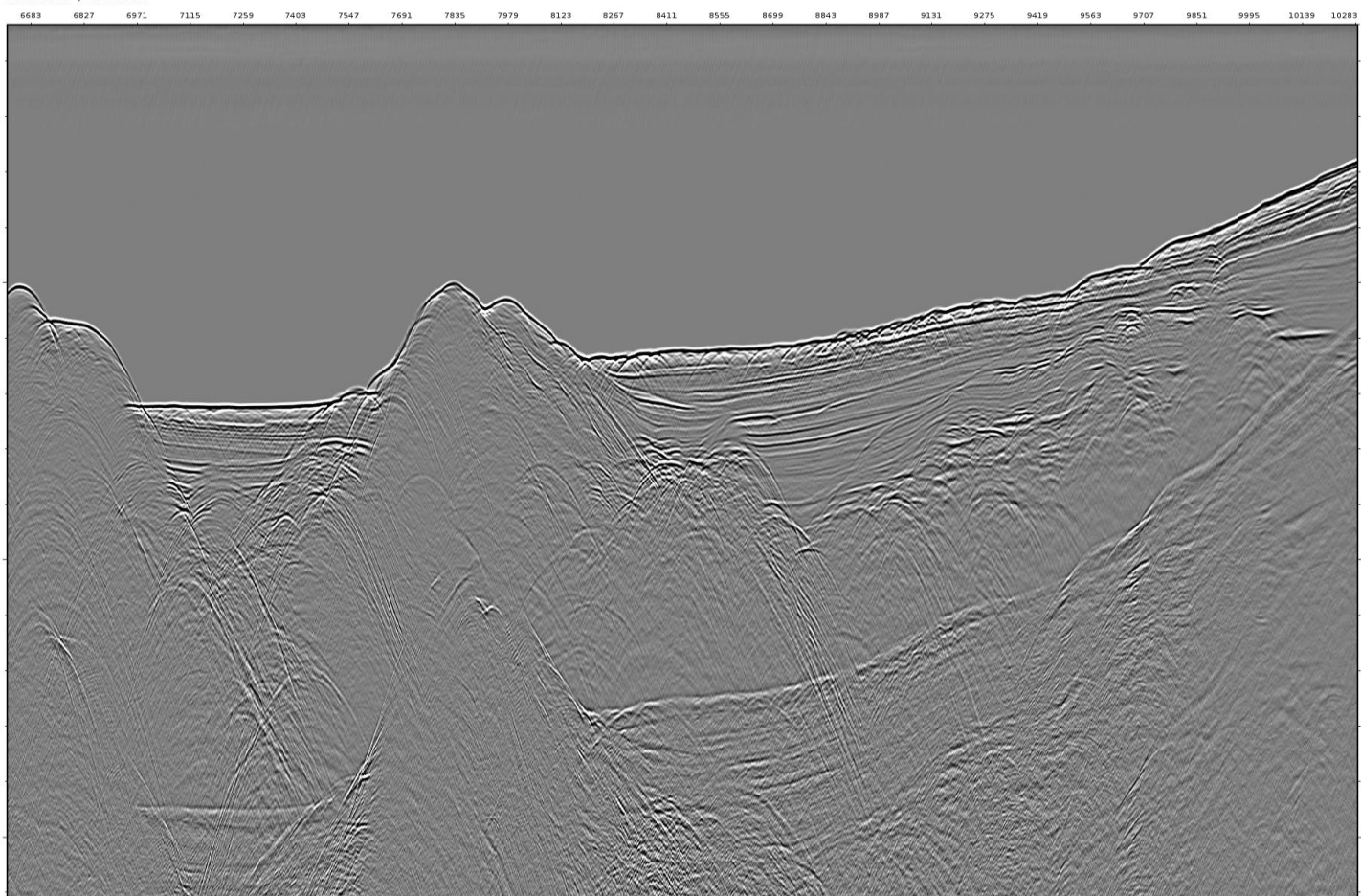
- No visible amplitude trend change on stack



Seq018 Stack **after** Shot Channel Scaling (zoom in shallow area)

29

SUBLINE 1 / CROSSLINE

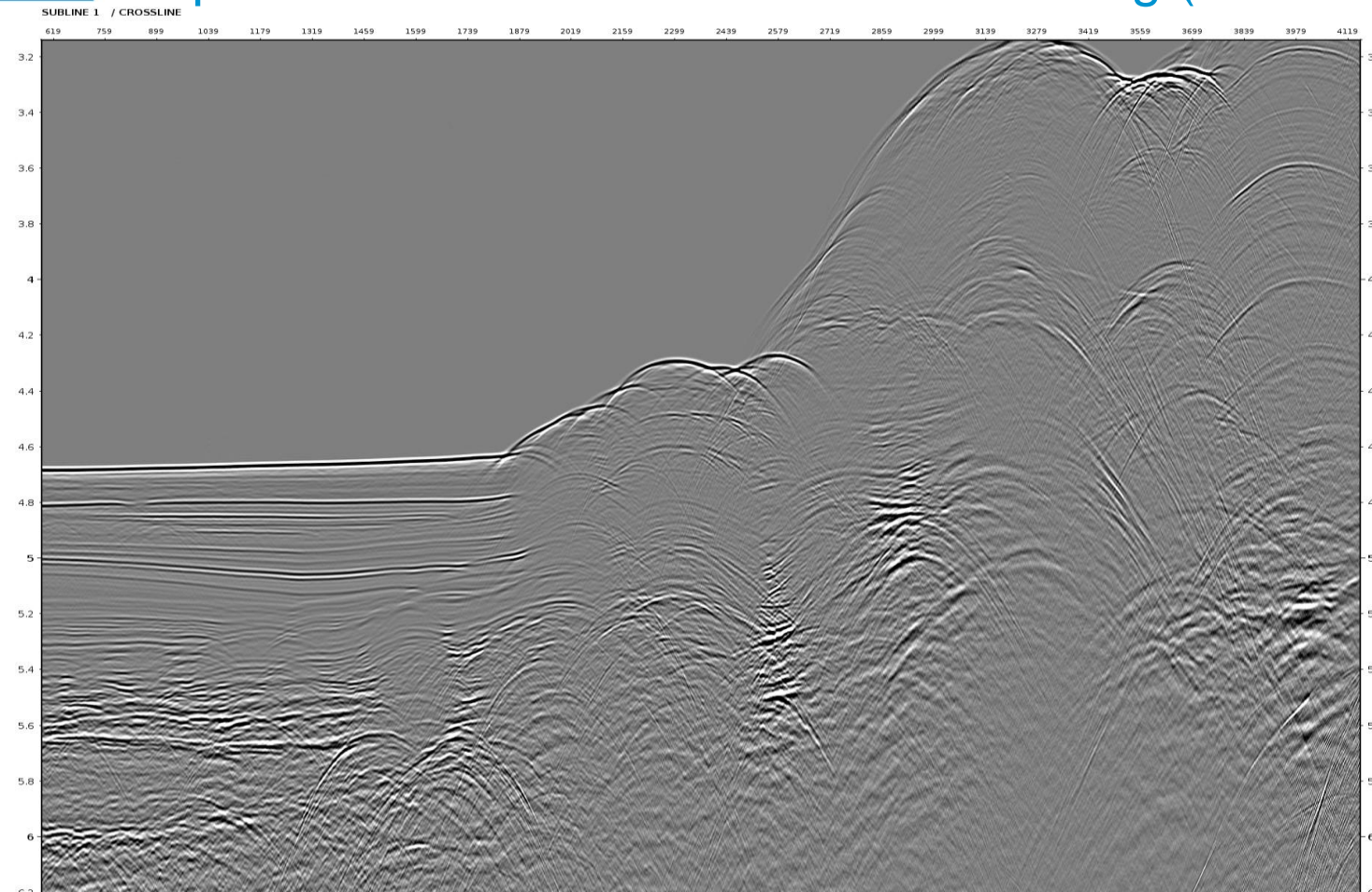


- No visible amplitude trend change on stack



Seq018 Stack before Shot Channel Scaling (zoom in deep area)

30



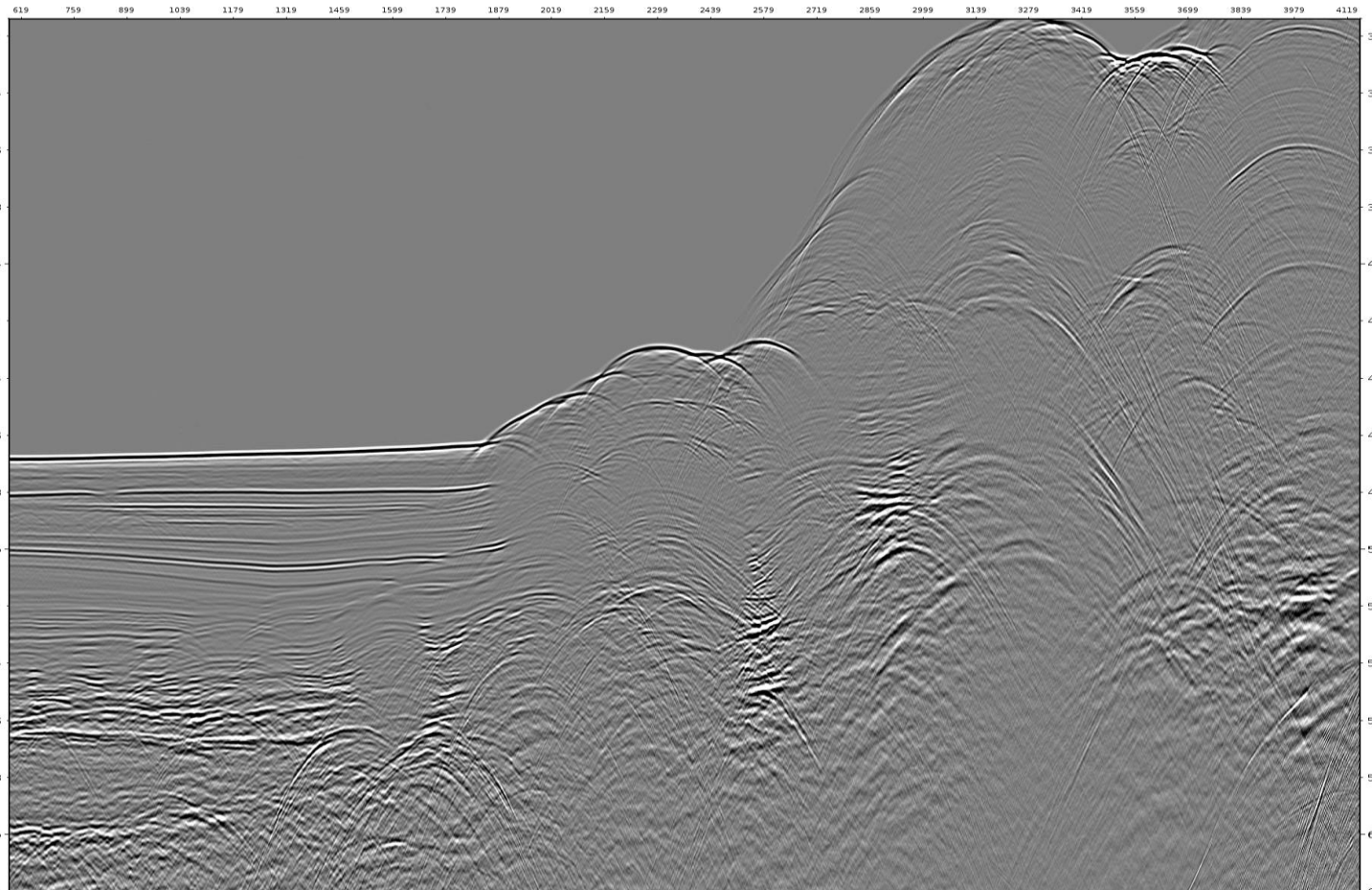
- No visible amplitude trend change on stack



Seq018 Stack **after** Shot Channel Scaling (zoom in deep area)

31

SUBLINE 1 / CROSSLINE

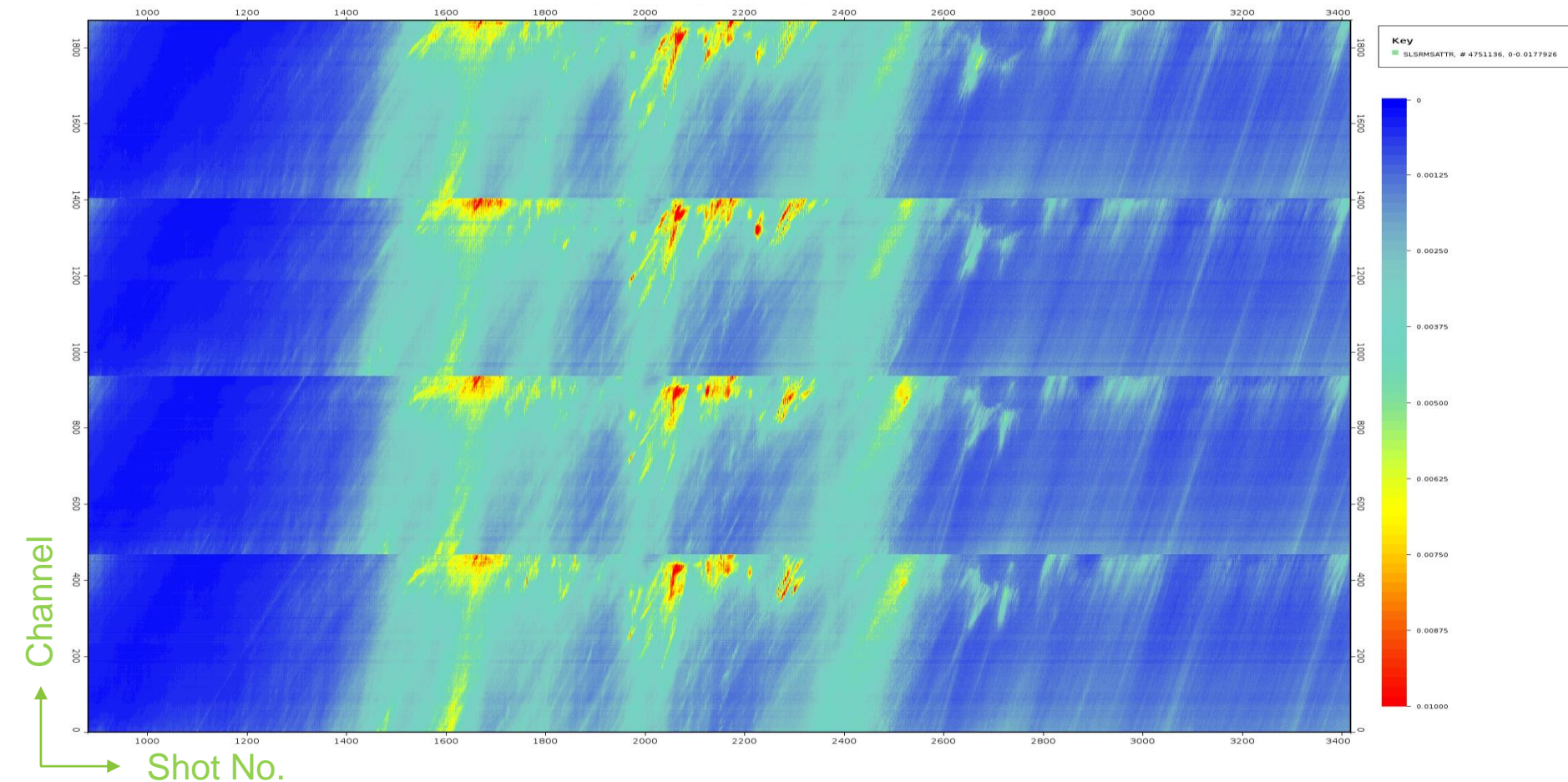


- No visible amplitude trend change on stack



Seq 039 Amplitude Map before Shot Channel Scaling

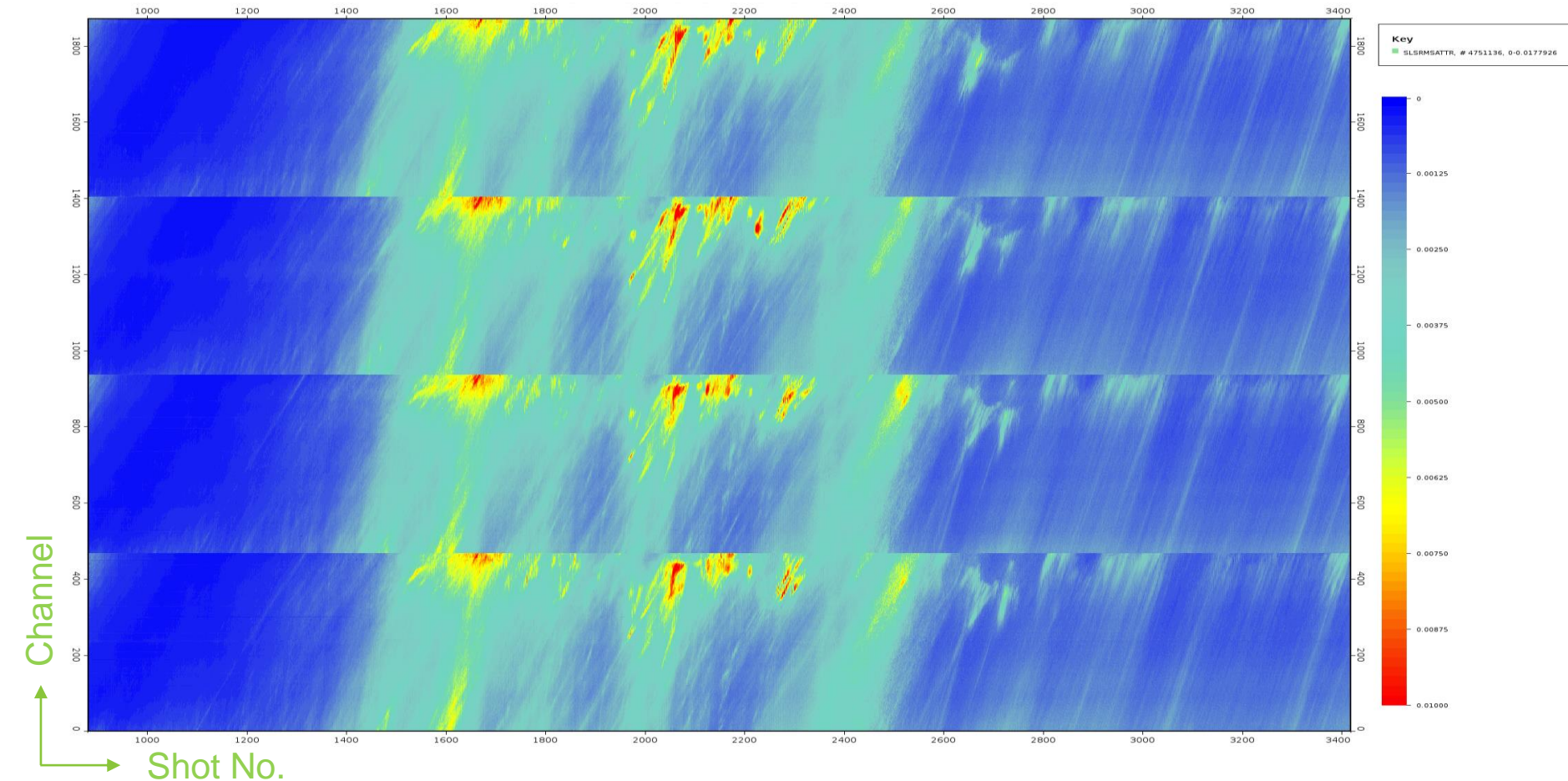
32





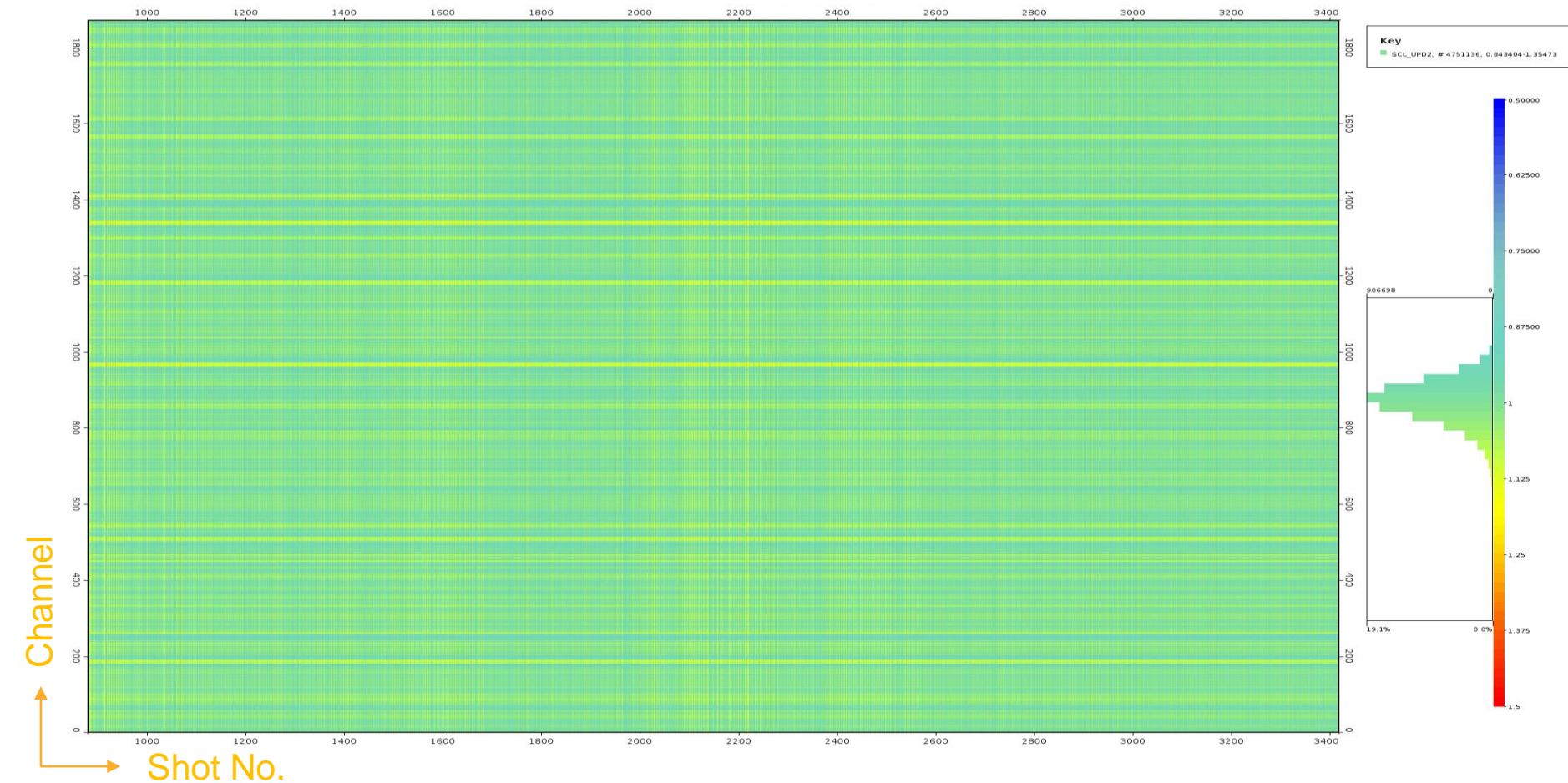
Seq 039 Amplitude Map **after** Shot Channel Scaling

33



Seq 039 Shot & Channel Scalar Map

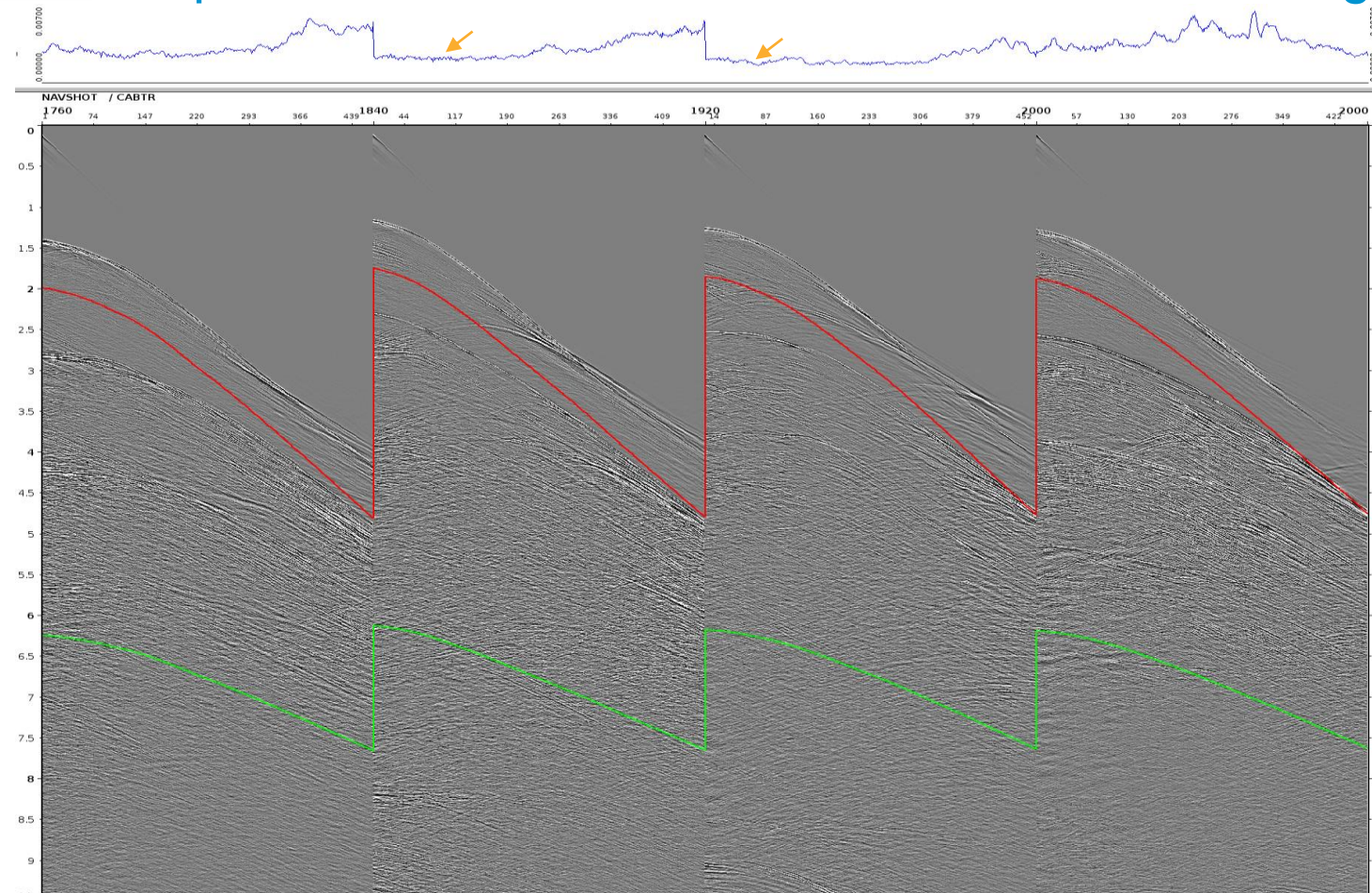
34





Seq 039 Shot Gathers before Shot Channel Scaling

35

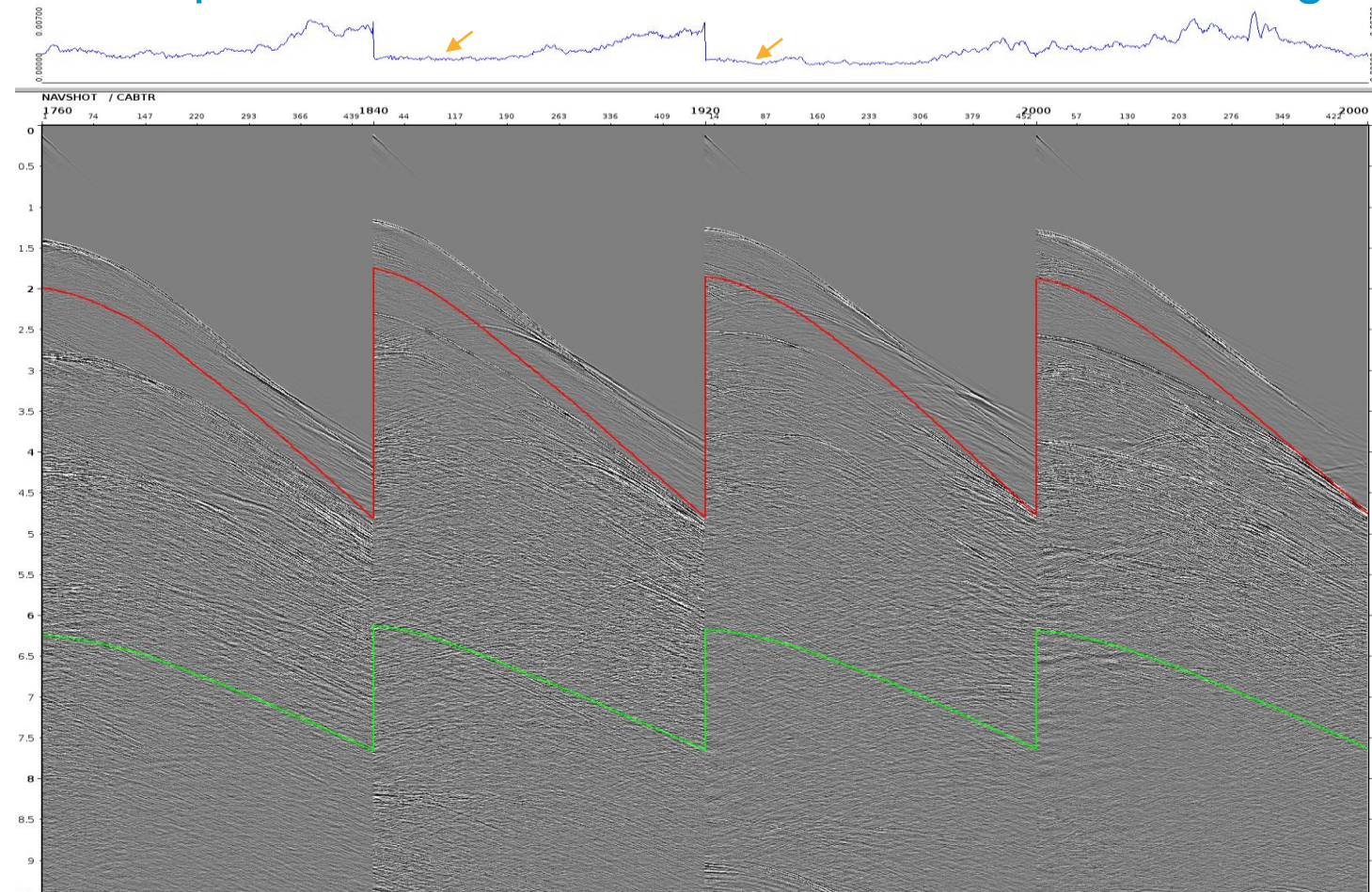


- Blue curve plot the RMS amplitude computed from defined window (between red-green).
- After shot & channel scaling, amplitude variation reduced without changing the AVO trend.
- AVO – Amplitude Versus Offset.



Seq 039 Shot Gathers after Shot Channel Scaling

36

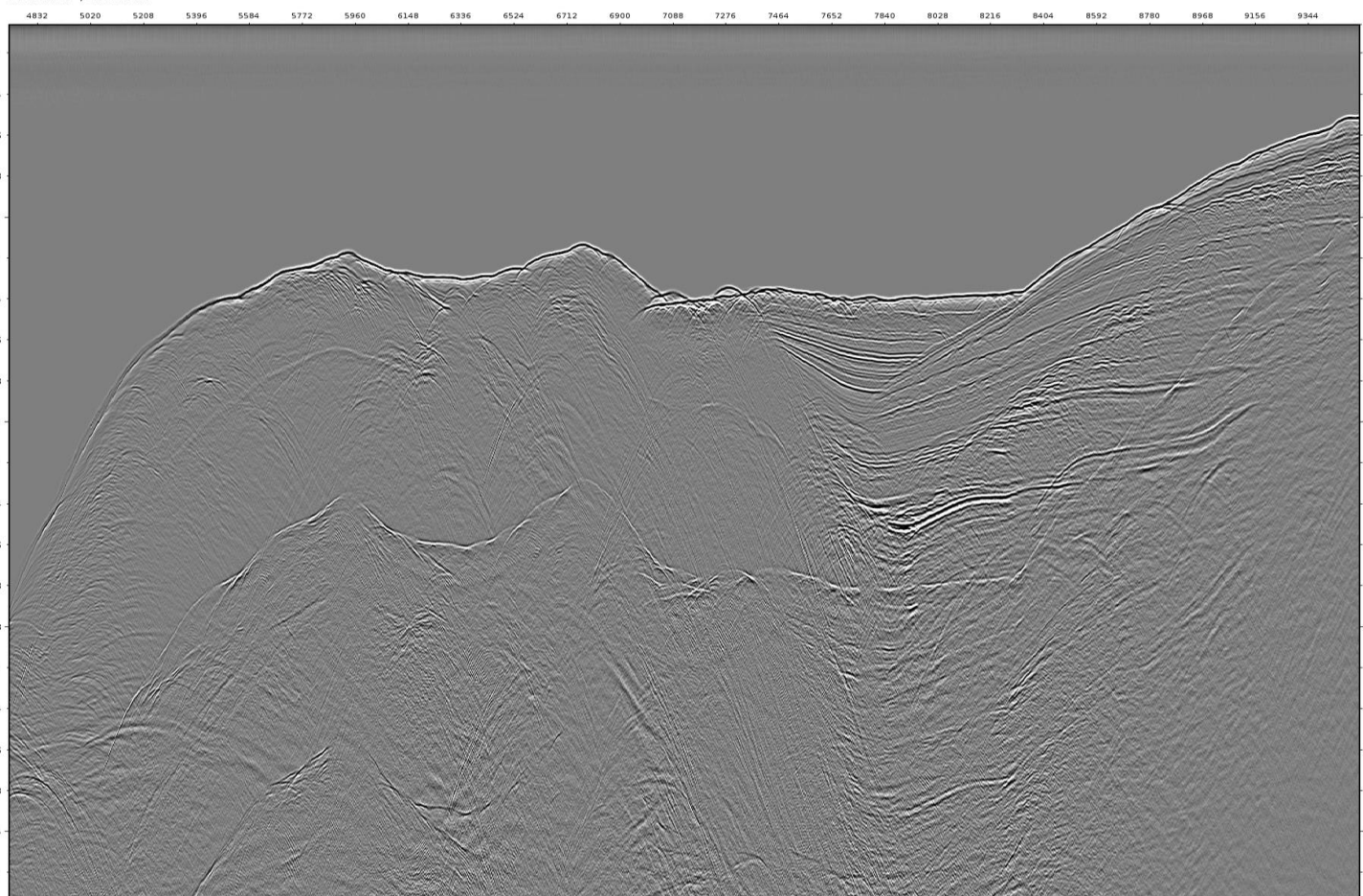


- Blue curve plot the RMS amplitude computed from defined window (between red-green).
- After shot & channel scaling, amplitude variation reduced without changing the AVO trend.
- AVO – Amplitude Versus Offset.



Seq039 Stack before Shot Channel Scaling (zoom in shallow area) ³⁷

SUBLINE 1 / CROSSLINE

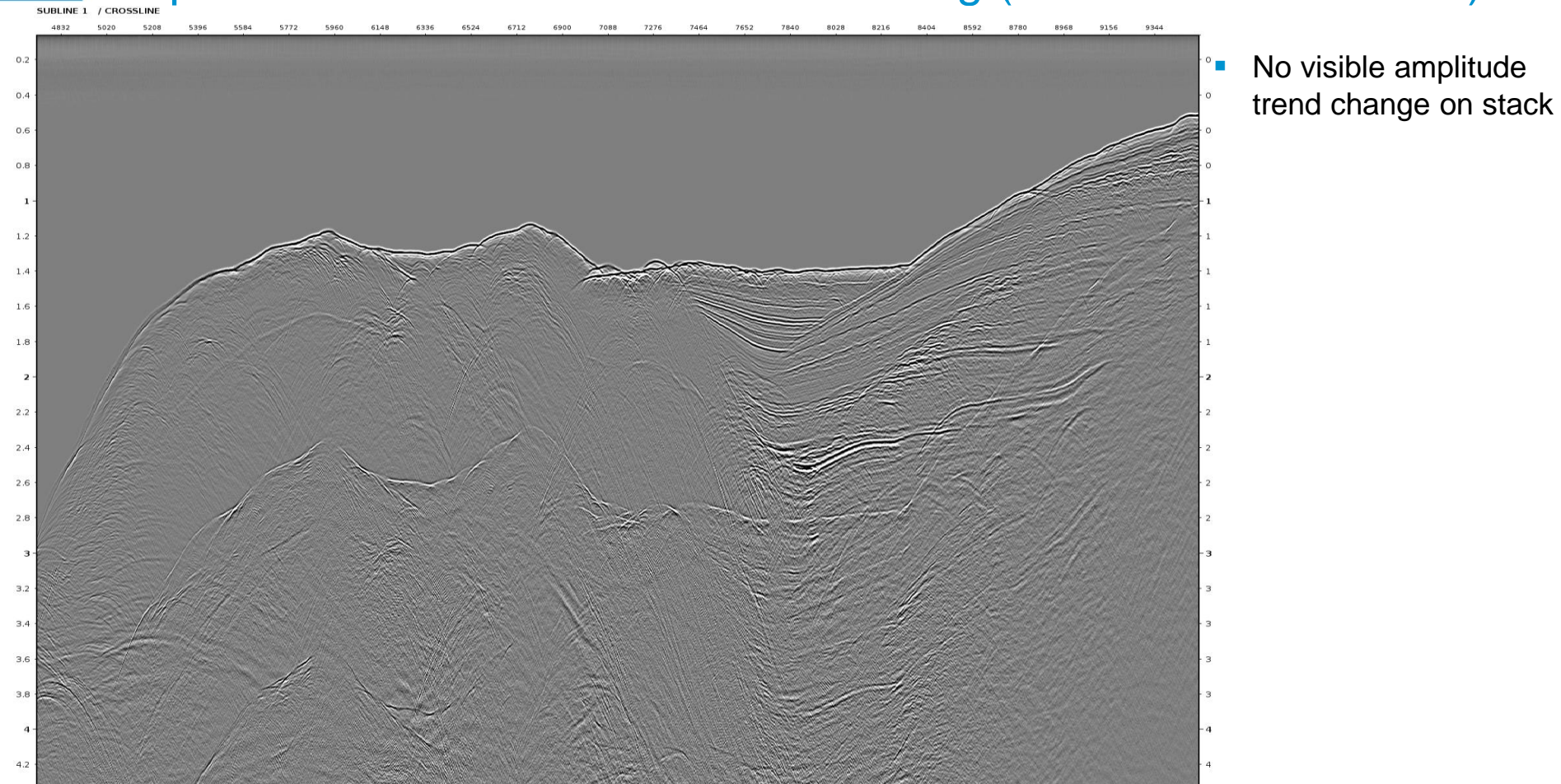


- No visible amplitude trend change on stack



Seq039 Stack **after** Shot Channel Scaling (zoom in shallow area)

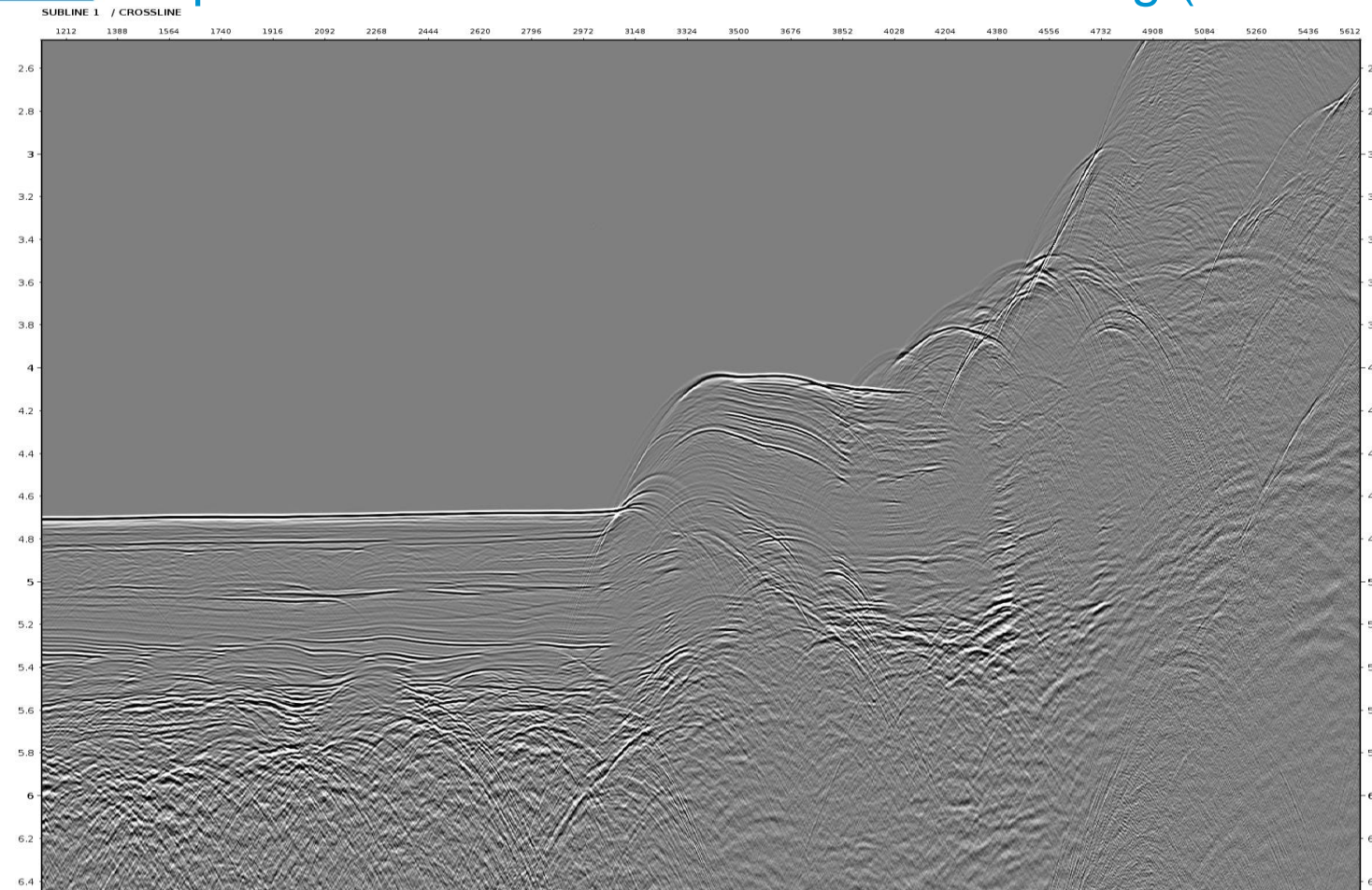
38





Seq039 Stack before Shot Channel Scaling (zoom in deep area)

39



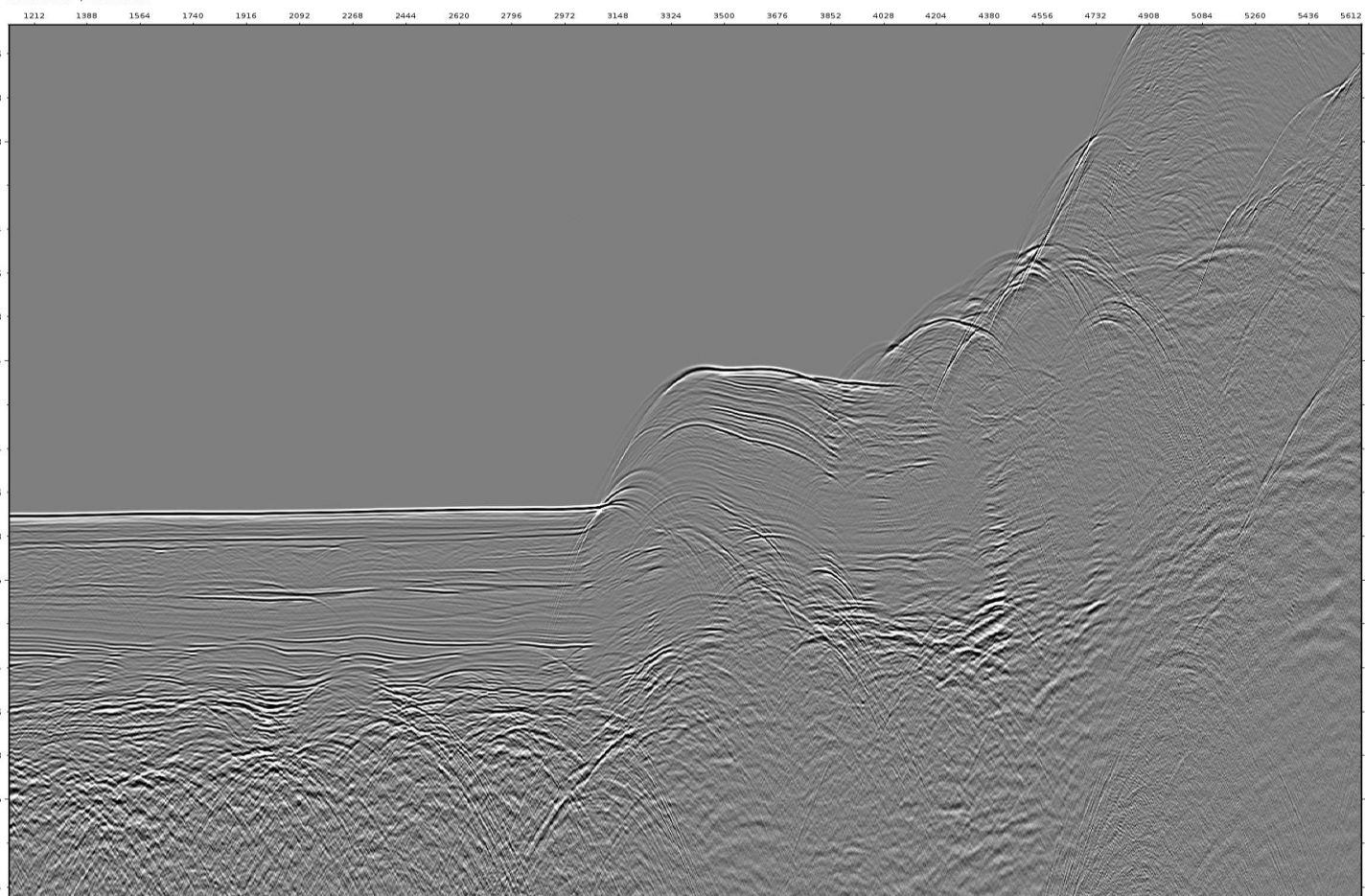
- No visible amplitude trend change on stack



Seq039 Stack **after** Shot Channel Scaling (zoom in deep area)

40

SUBLINE 1 / CROSSLINE



- No visible amplitude trend change on stack