

# UOBR017-SCAN018 Post-Stack Processing Report

GTO-19-C031-02 SCAN Acquisition Seismic Processing Order #2

3 MARCH 2021

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2D Seismic PreSTM Processing, Onshore Netherlands

- Initially the same post migration processing was applied as was used for the previous set of SCAN lines (EBN project: GTO-19-C031-01, DUGRef: sCAnPr\_005).
- The full post migration processing was presented in:
  - sCAnPr\_007\_UOBR017-SCAN018\_PostMigProcessing\_210304\_draft\_pgh.odp
- Testing on line SCAN001-011 had shown that the spectral broadening applied could be improved. A new spectral broadening methodology was approved along with a new final bandpass filter.
- This new post-stack spectral broadening and final bandpass filter was also applied to UOBR017-SCAN018, and the results are presented in this report.

## Processing sequence

- Data reformat: SEGY to internal format
- Geometry: Crooked line with 2.5 m CDP interval
- Weak shots: 0-500 m offsets only
- Spherical divergence correction: T
- Geophone response correction:
- Refraction statics: Delay-time using  $V_0 = 1000$  m/s  $V_R = 1700$  m/s SRD = NAP
- Noise attenuation: +/-1250 m/s Weiner dip filter
- Edits: Kill invalid shots and receivers
- Noise attenuation: Despike
- Noise attenuation: Wavelet (D20) transform filter (muting the largest 10% of coefficients by 90% in scales 6-10)
- SCAC 1: Source and receiver designed on NMO corrected gathers over 200-2200 ms
- Noise attenuation: TFDN
- Inverse Q:  $Q = 100$  phase and amplitude using 40 Hz reference frequency and 12 dB gain stabilisation
- DBS: Surface consistent with 160 ms operator length with 16 ms predictive gap  
0.1% white noise stabilisation - Design window: 200-3000 ms
- Velocity analysis: 1 km interval
- Noise attenuation: 1.75 ms/tr (2857 m/s) dip filter and wavelet transform filter on shots
- Residual statics: Surface consistent using MASTT
- Velocity analysis: 1 km interval
- Residual statics: Surface consistent using MASTT

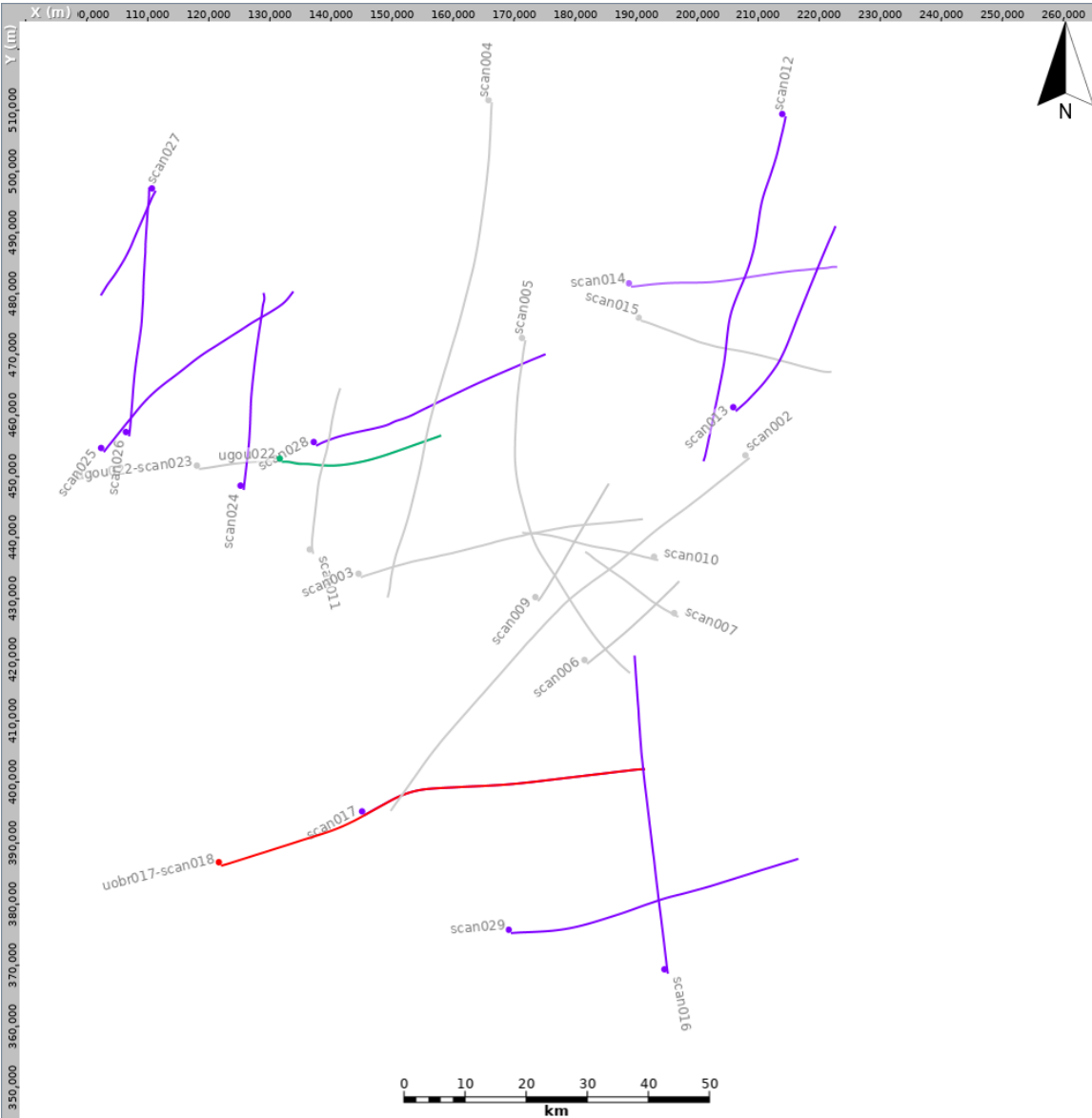
## Processing sequence (continued)

- SCAC 2: Source and receiver designed on NMO corrected gathers over 200-2200 ms
- Remove spherical divergence: T
- Low cut filter: 2.5 Hz low cut filter
- Migration (PreSTM 1): Isotropic 4th order curved ray Kirchhoff using smoothed (5000-300-3) stacking velocities
- Velocity analysis: Remove PreSTM 1 velocities and pick 2nd order velocities at 1 km intervals and 500 m where required - Effective Eta picked automatically every 250 m
- Migration (PreSTM 2): Kirchhoff VTI migration using smoothed (2000-200-2) 2nd order picked velocities and auto picked effective Eta
- Migration (PreSTM 3): Kirchhoff VTI migration using smoothed (500-100-2) 2nd order picked velocities and auto picked effective Eta
- Radon: Using polygon subtraction
- Noise attenuation: Dip filter on CDPs
- Trim statics: 12 ms correlation length
- Noise attenuation: Cadzow rank-reduction on CDP-offset (time-variant matrix)
- Noise attenuation: Common offset dip filter
- Zero phase filter: Statistical filter, trough polarity
- Trace drop: Limited to the offset range input to the migration (501 CDP smoother on fars, 51 CDP minimum and 10 CDP smoother for near offsets)
- Velocity analysis: 1 km interval
- Scaling: 2000 ms AGC on scaled stacks only
- Stack:  $1/N$  ( $1/\sqrt{N}$  for scaled stacks) with picked mute (45 degree mute used in testing)



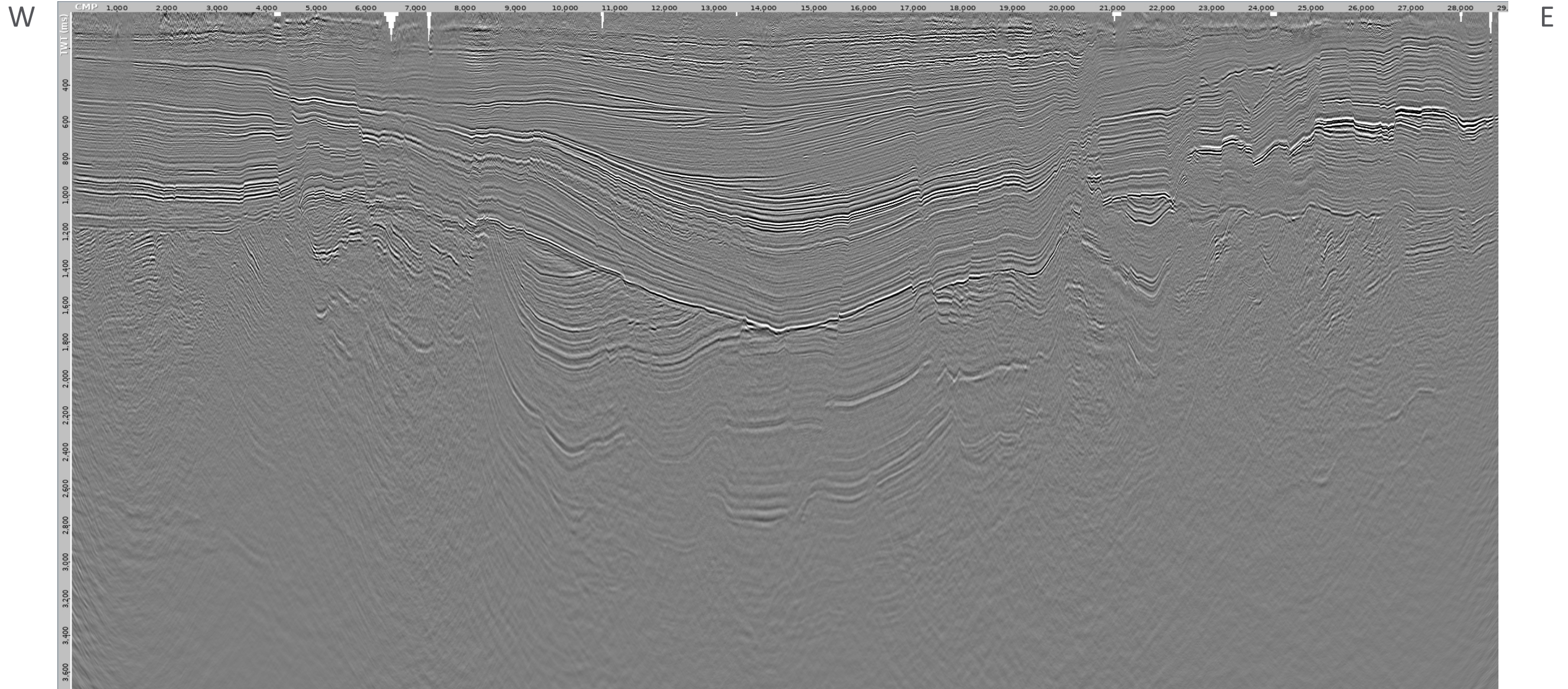
## Processing sequence (continued)

- Spectral broadening: Using matching filter
- Noise attenuation: 0.5 ms/trace dip filter in shallow, 3 ms/trace in mid and 1 ms/trace in deep
- Noise attenuation: Cadzow filter on stack
- Noise attenuation: Structurally Oriented Filter (SOF)
- Time-variant bandpass filter: 6-8-100-190 Hz at 0 s  
4-8-100-120 Hz at 2 s  
4-8-35-55 Hz at 3 s
- Post-stack cosmetic mute
- Output to SEG-Y



# UOBR017-SCAN018 stack with picked mute, no post-stack processing

At floating datum



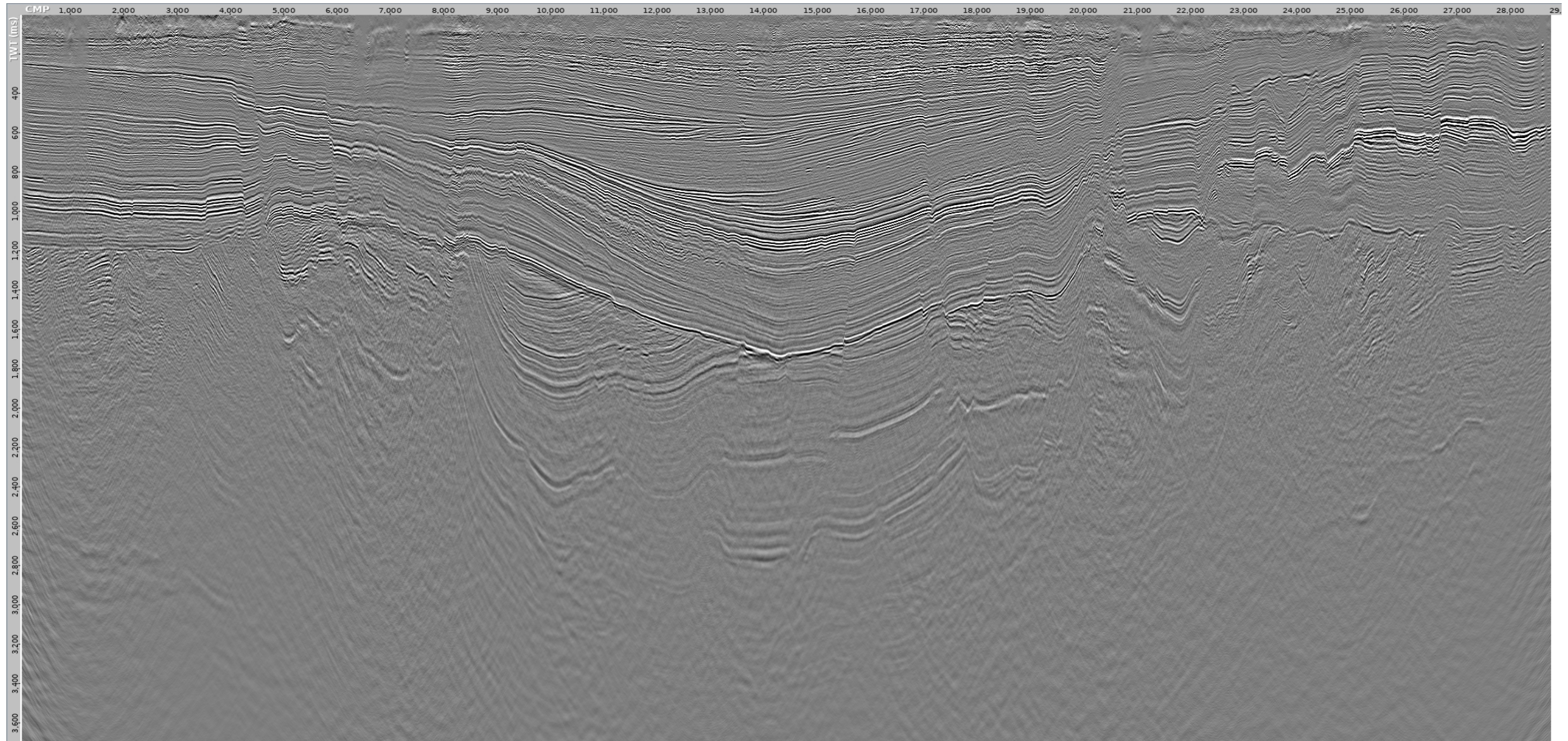


# UOBR017-SCAN018 stack with spectral broadening and dip filter

At floating datum



W



E

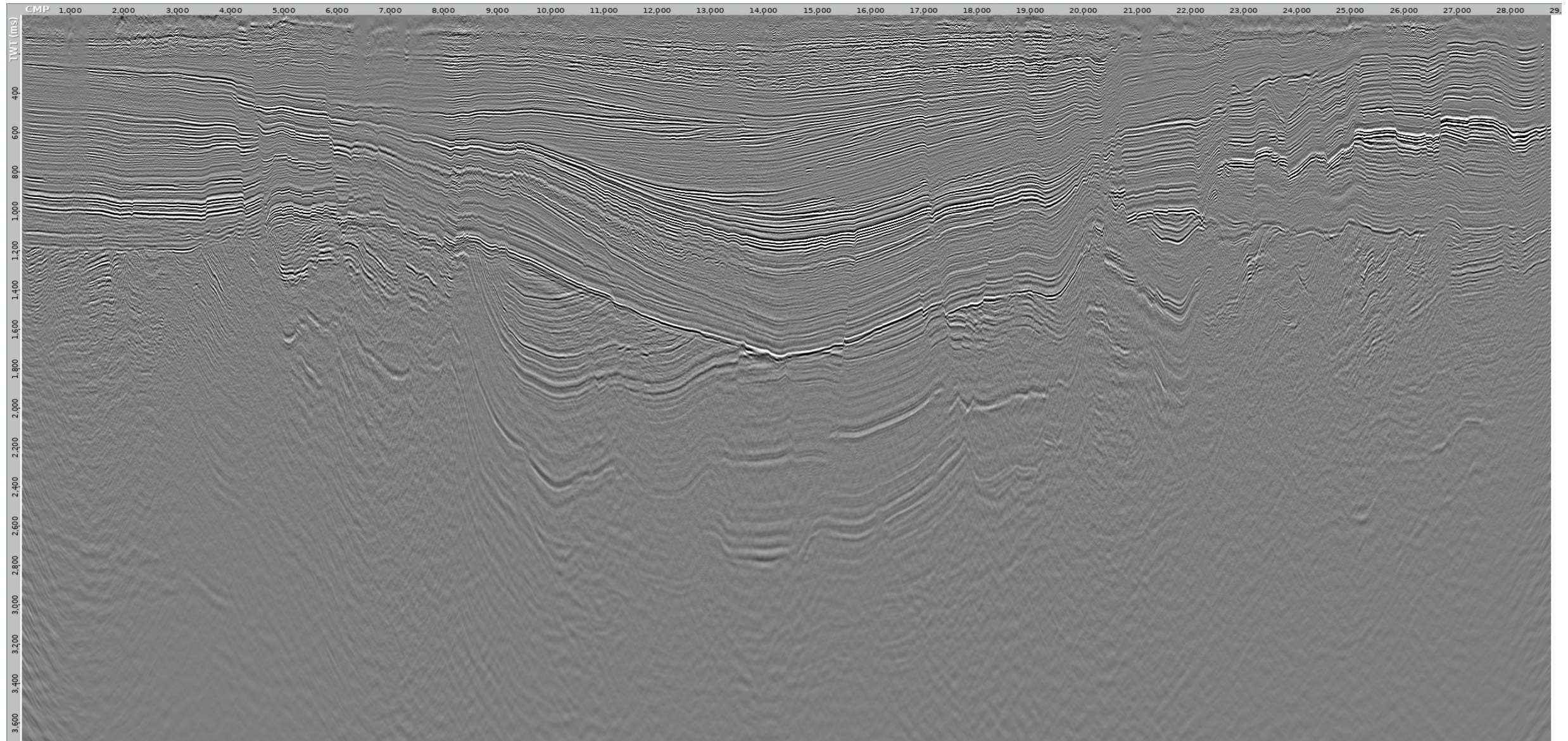


# UOBR017-SCAN018 stack with dip filter, SOF and time-variant bandpass filter

At floating datum



W



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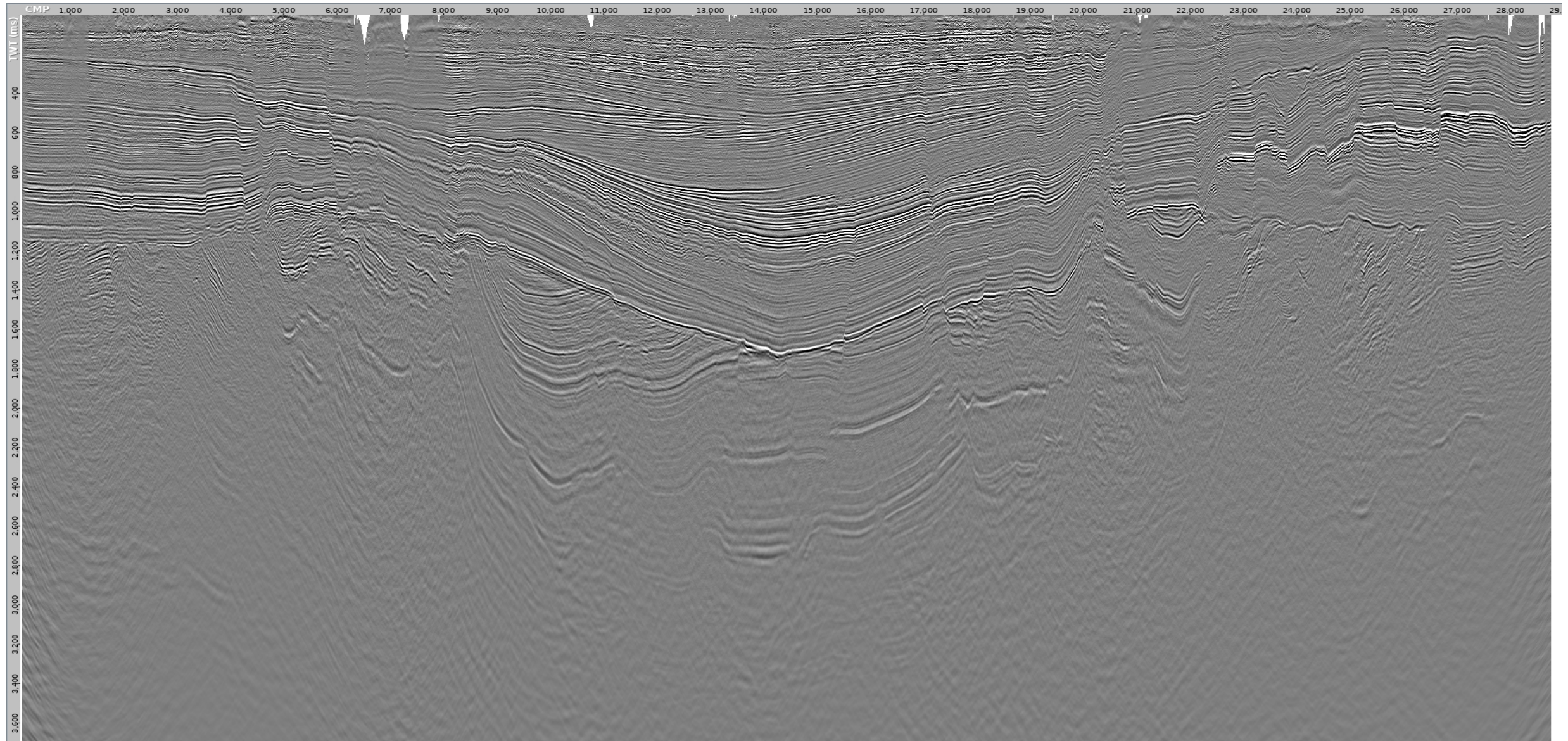


# UOBR017-SCAN018 final stack

At flat datum



W



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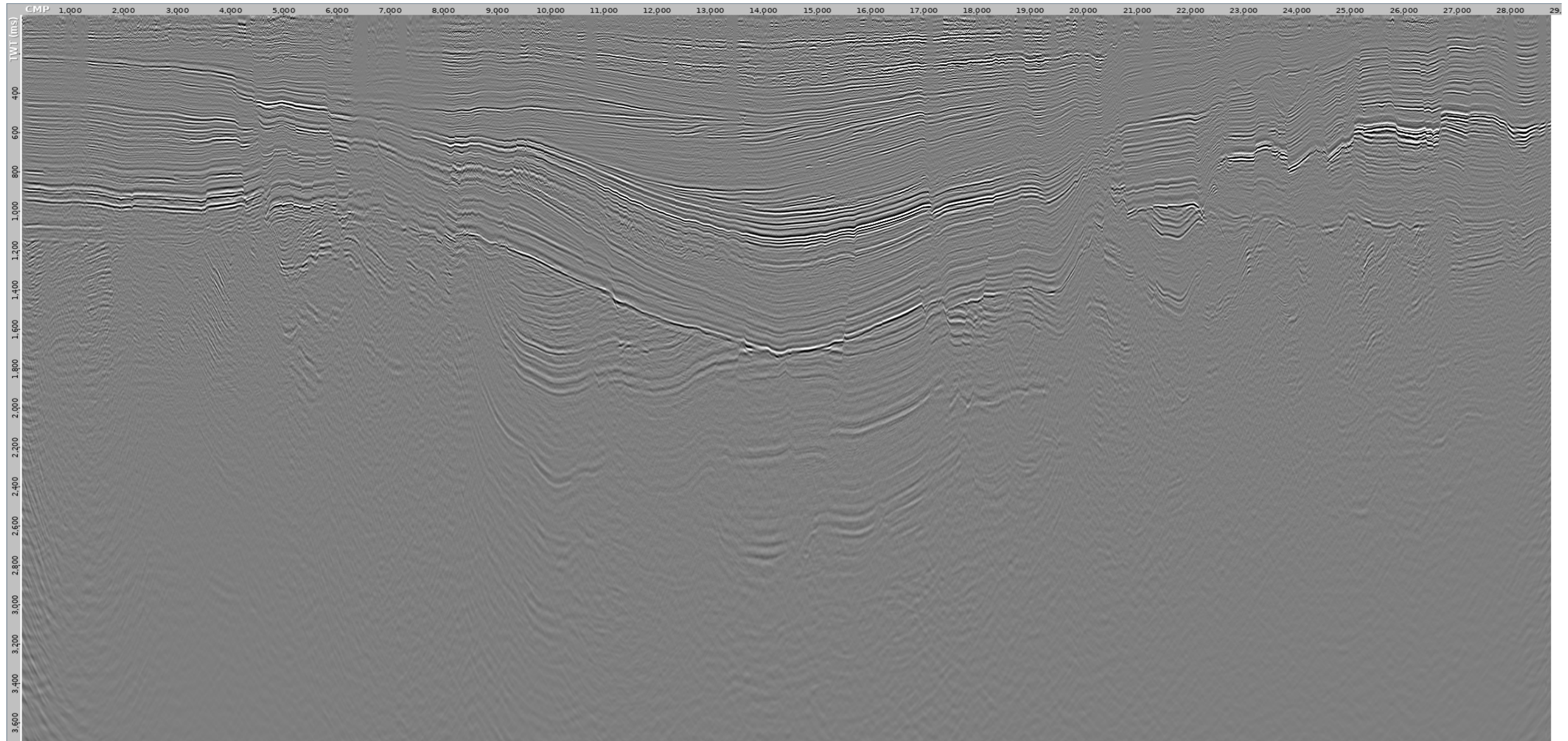


# UOBR017-SCAN018 fast-track true amplitude stack

At flat datum



W



E

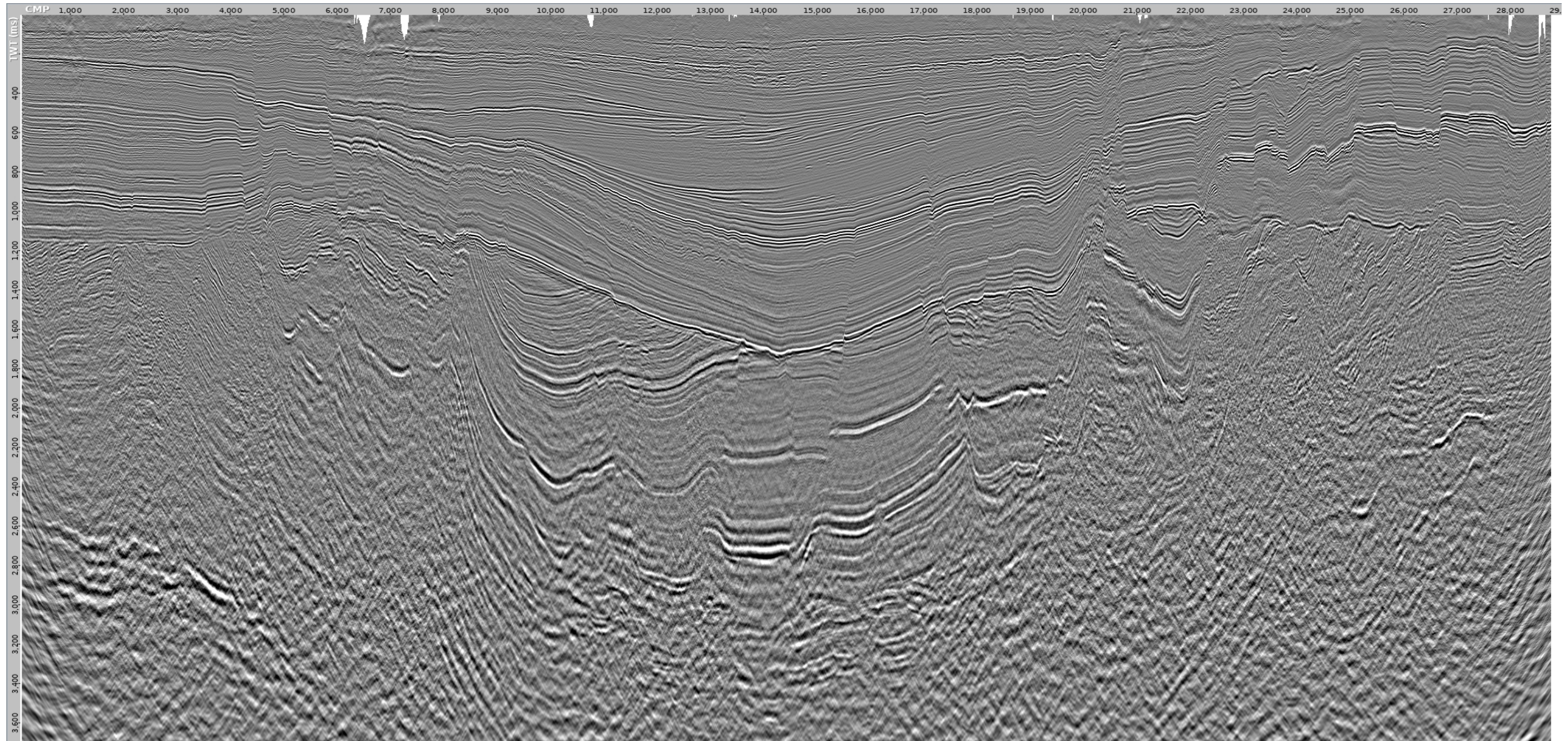


# UOBR017-SCAN018 final AGC stack on flat datum

At flat datum



W



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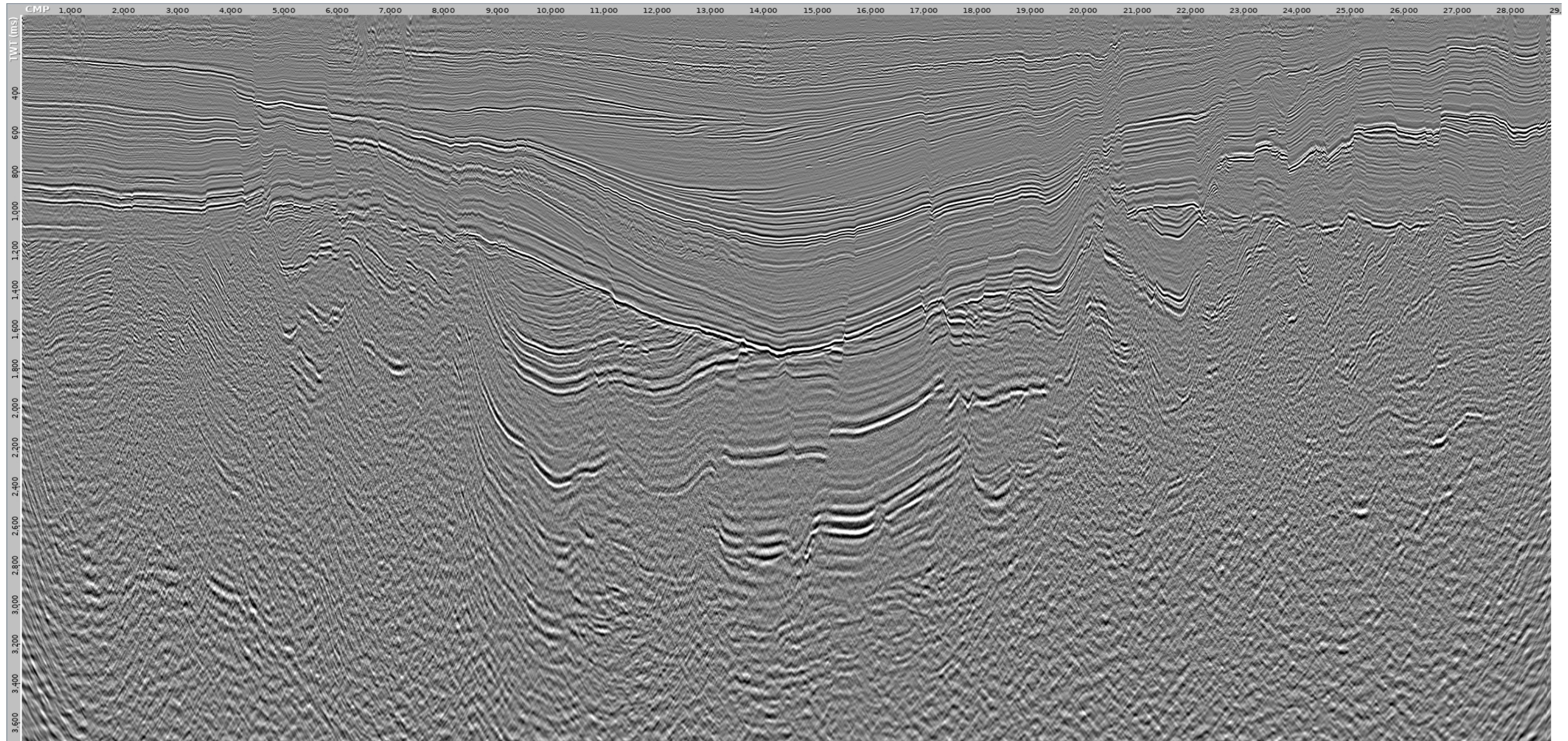


# UOBR017-SCAN018 fast-track AGC stack

At flat datum



W

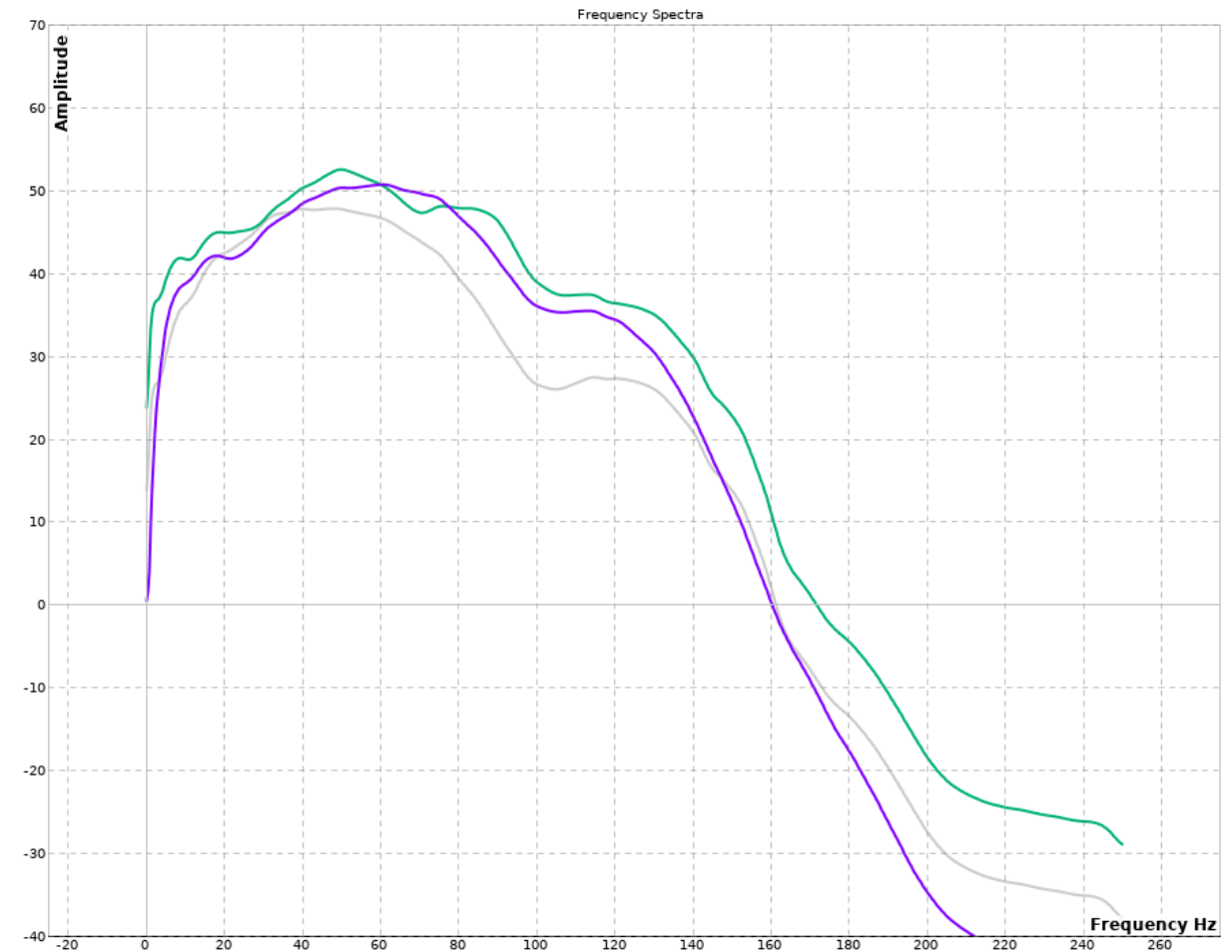


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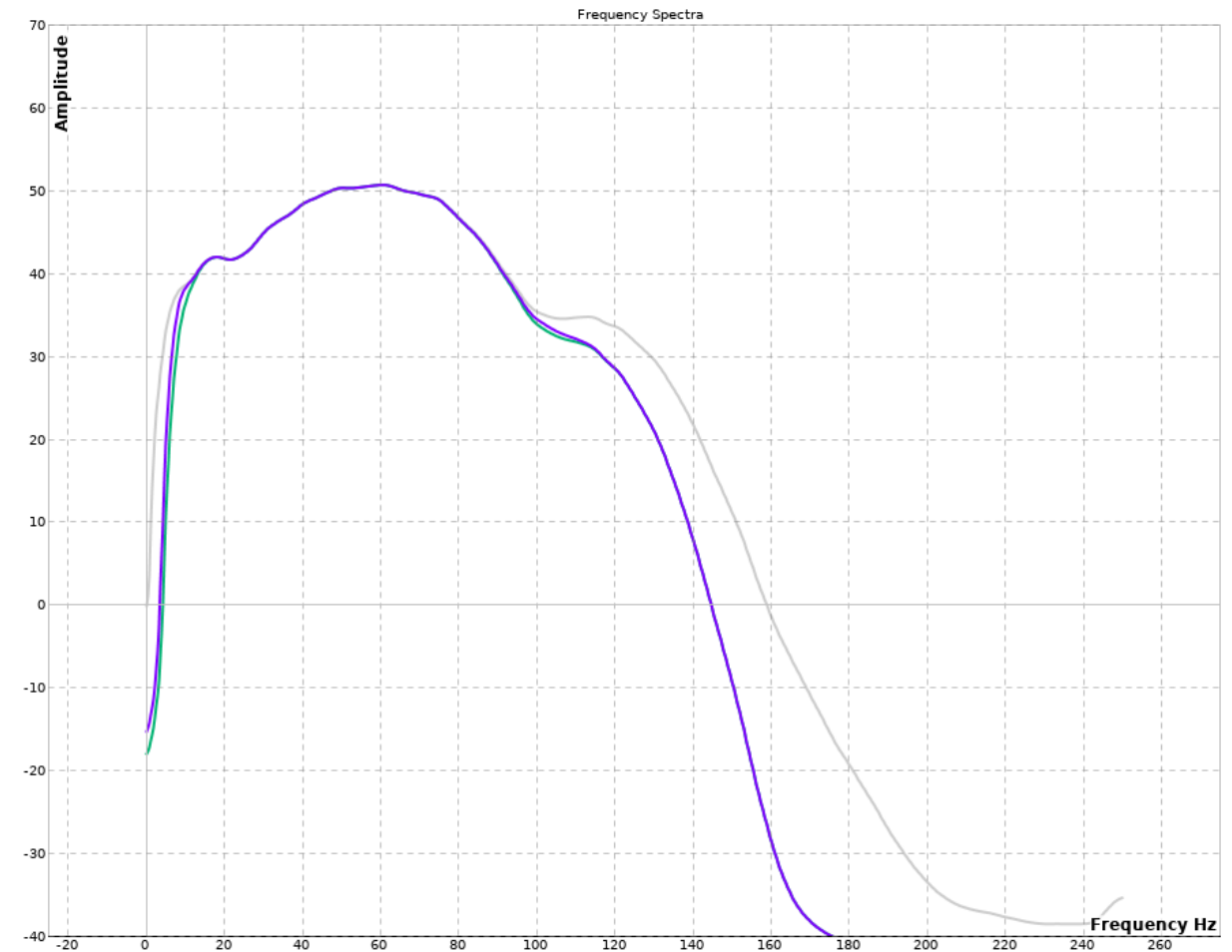
# Frequency spectra from spectral broadening

- Frequency spectra were generated using a 250-2500 ms TWT analysis window:
  - Grey = Before spectral broadening
  - Green = Old production TAFE spectral broadening
  - Purple = New spectral broadening using matching filter



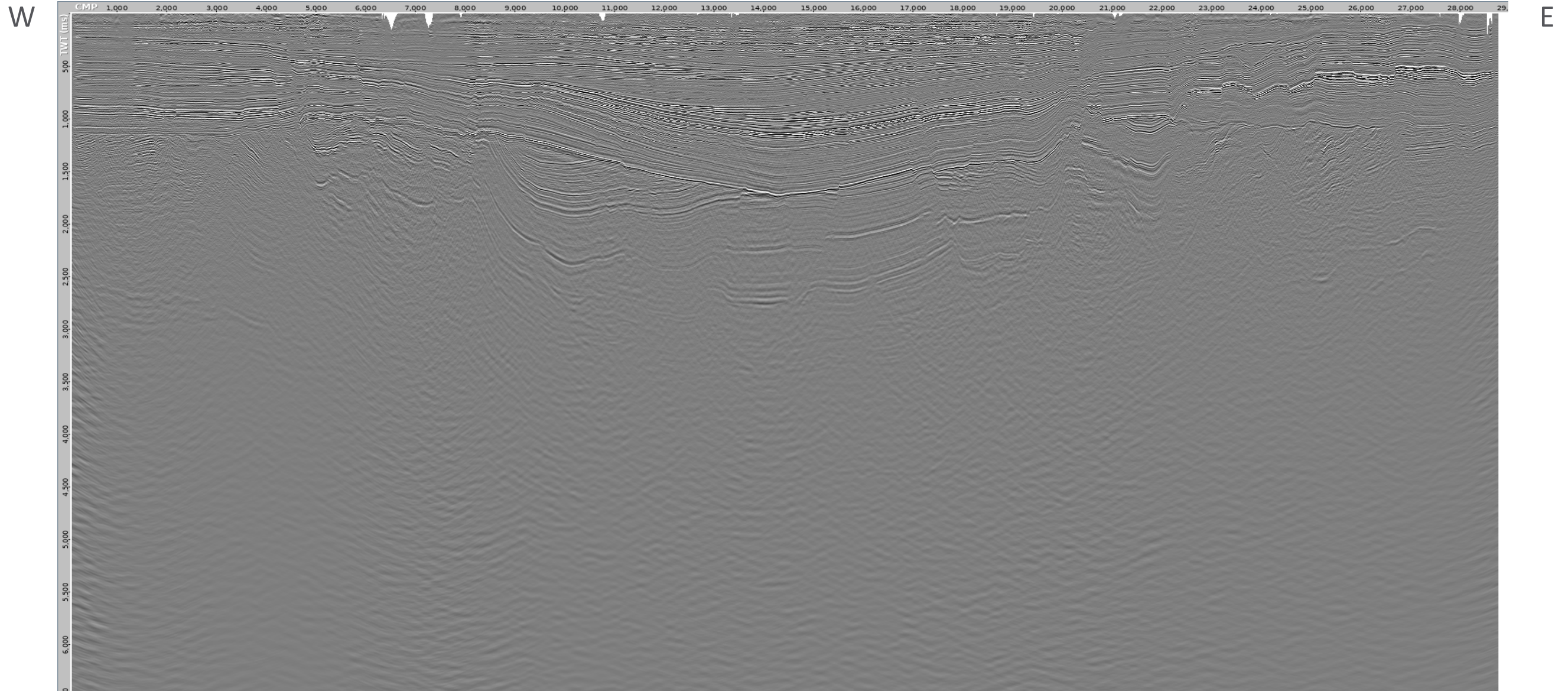
## Frequency spectra from spectral broadening (continued)

- Frequency spectra were generated using a 250-2500 ms TWT analysis window:
  - Grey = Before bandpass filter
  - Green = Old bandpass filter:
    - 6-8-100-190 Hz at 0 s
    - 6-12-90-110 Hz at 2 s
    - 6-12-35-55 Hz at 3 s
  - Purple = New bandpass filter:
    - 6-8-100-190 Hz at 0 s
    - 4-8-100-120 Hz at 2 s
    - 4-8-35-55 Hz at 3 s



# UOBR017-SCAN018 final stack to 6 s

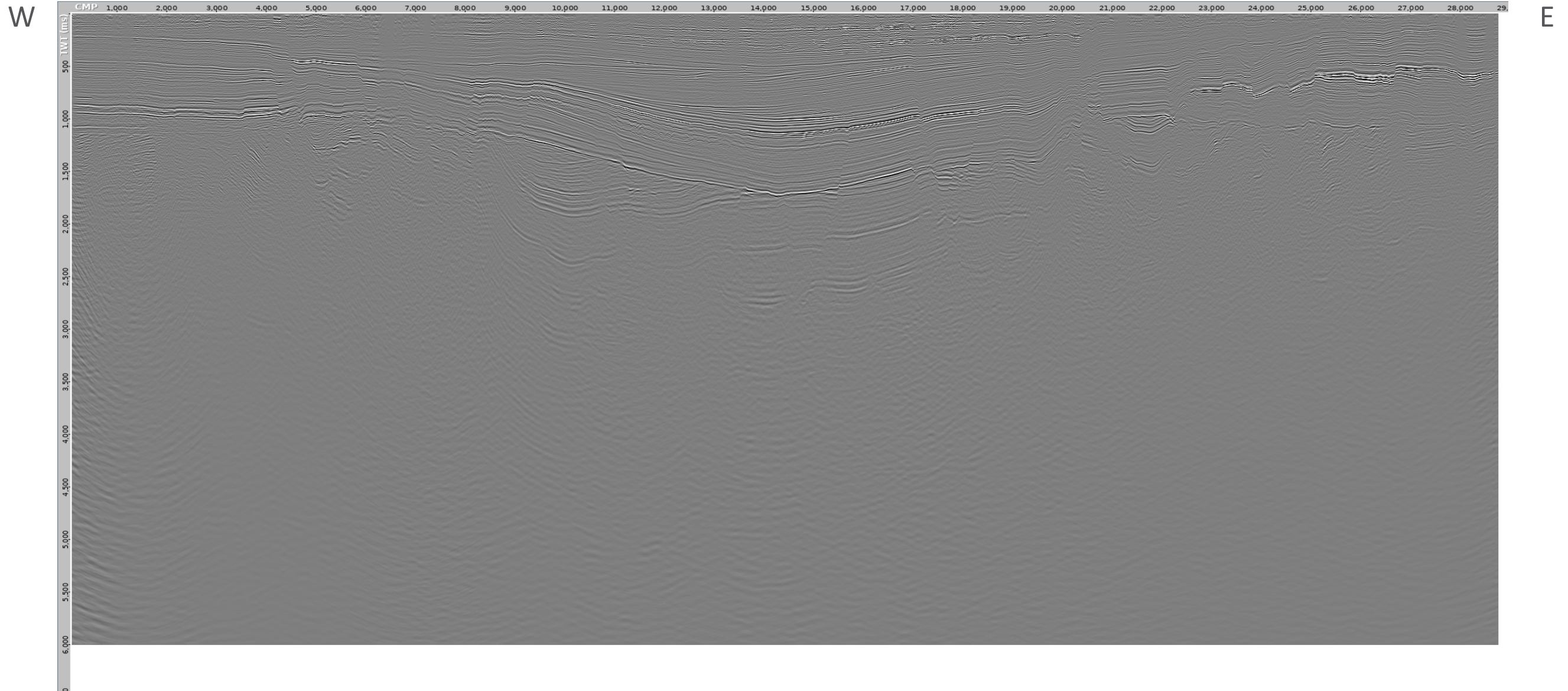
At flat datum





# UOBR017-SCAN018 fast-track true amplitude stack to 6 s

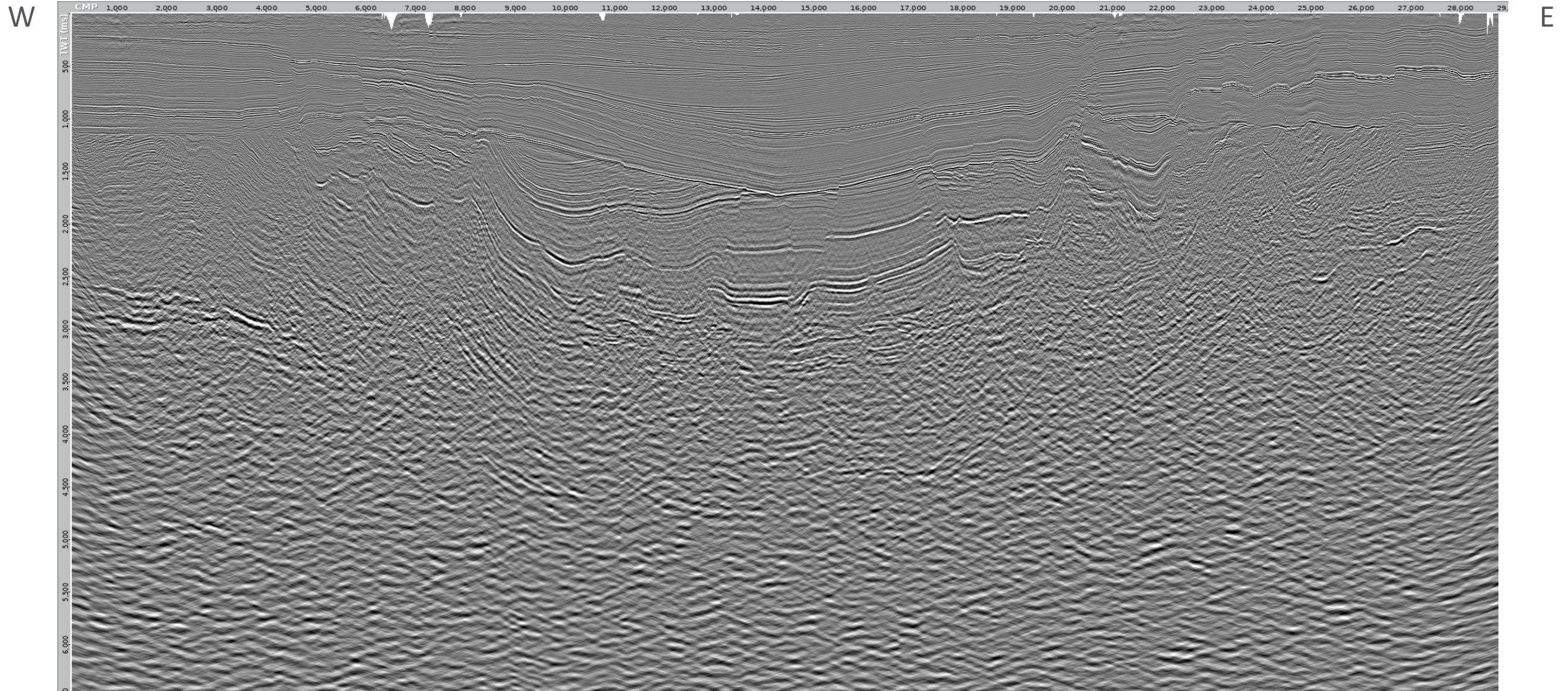
At flat datum





# UOBR017-SCAN018 final AGC stack on flat datum to 6 s

At flat datum



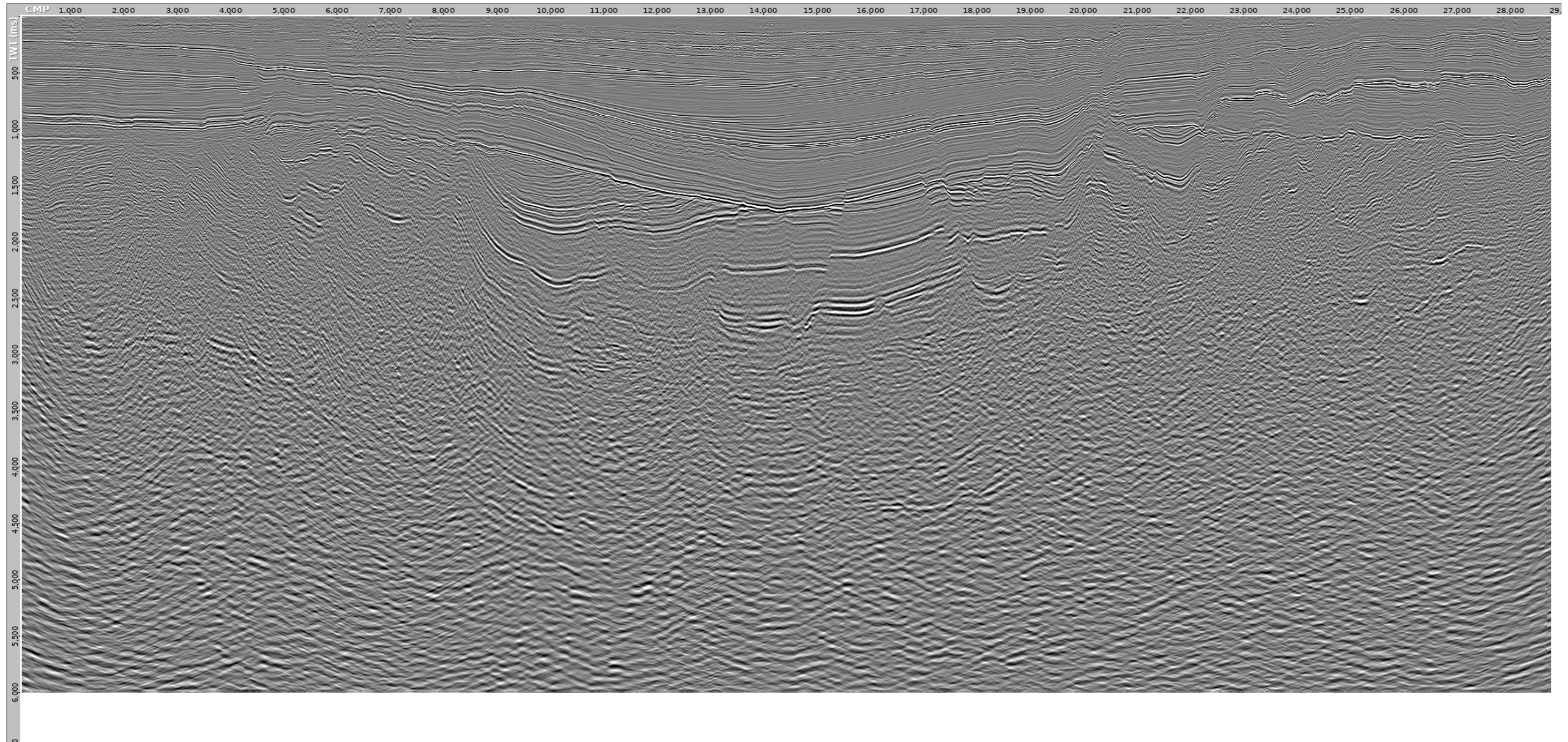


# UOBR017-SCAN018 fast-track AGC stack to 6 s

At flat datum



W



E