

UOBR017-SCAN018 PreSTM 2 Report Update

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

21 JANUARY 2021

Energie Beheer Nederland B.V.

2D Seismic PreSTM Processing, Onshore Netherlands

- This report documents the results of running the first iteration of PreSTM and subsequent velocity update with Eta.
- Also included is an interval velocity intersection display with SCAN002.
- After feedback from EBN, the velocities were re-picked in the area of CDP 21500 to the end of the line. In this area the velocities vary from the simple geological model but were selected to stack in features that were observed in the fast-track.

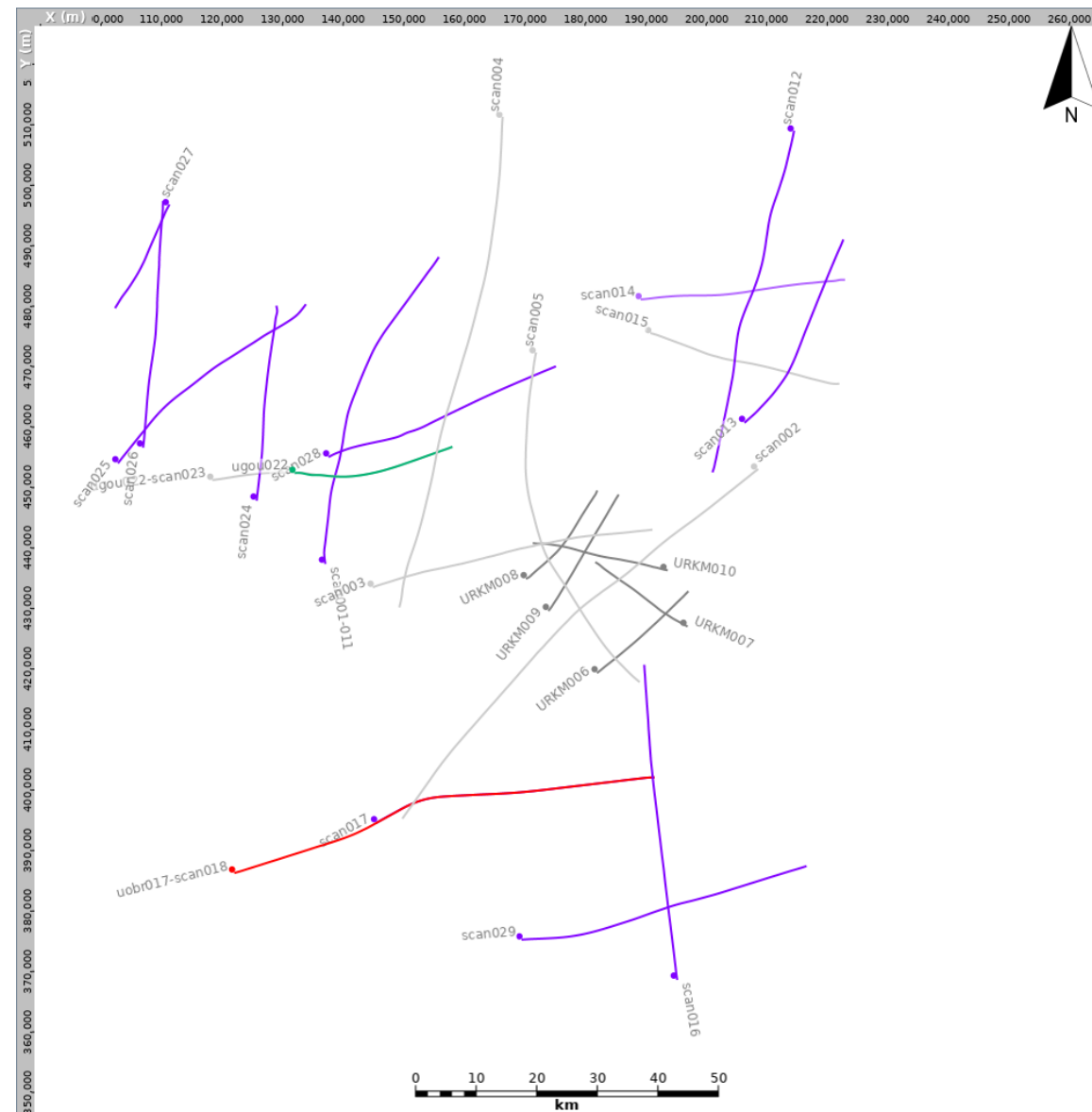
Processing sequence

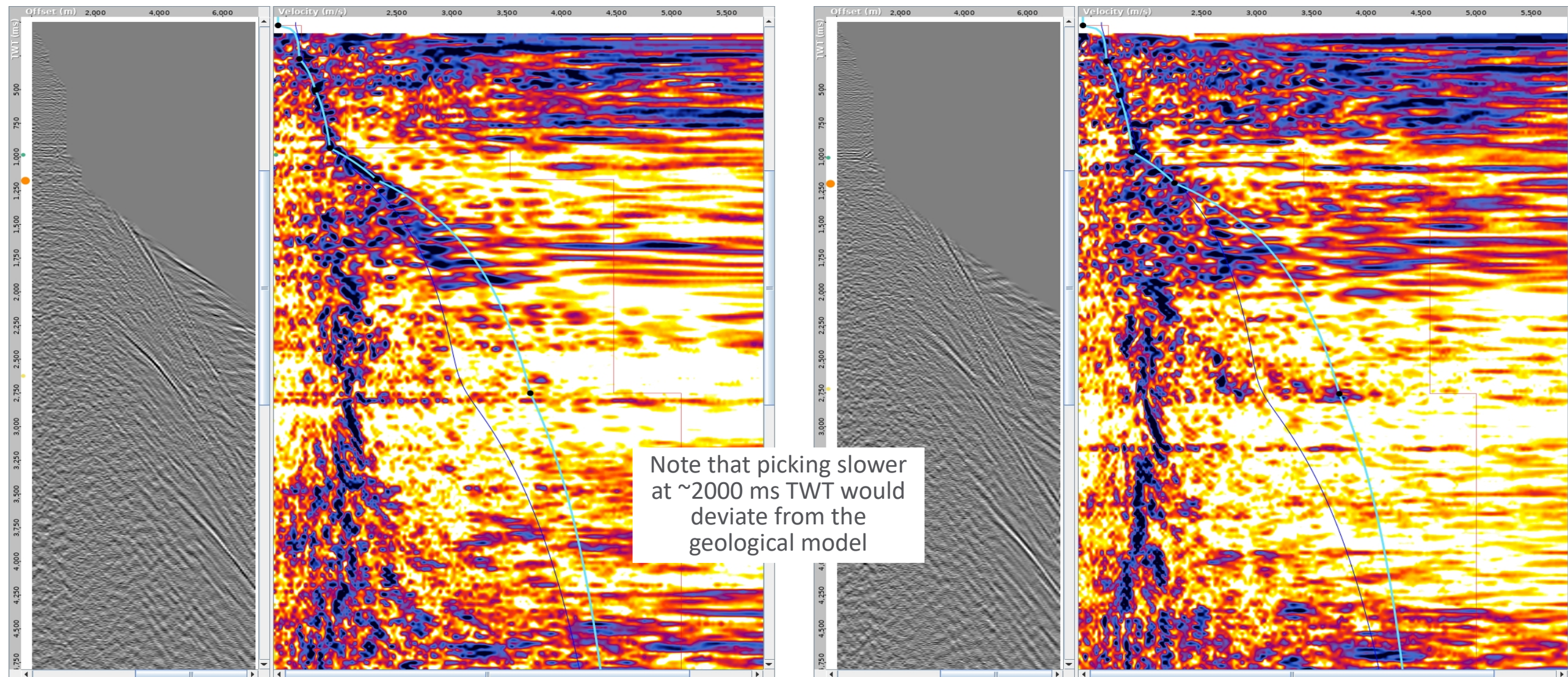
- Data reformat: SEGY to internal format
- Geometry: Crooked line with 2.5 m CDP interval
- Weak shots: 0-500 m offsets only (not applied for 016)
- Spherical divergence correction: T
- Geophone response correction:
- Refraction statics: Delay time using $V_0 = 1000$ m/s $V_R = 1700$ m/s $SRD = NAP$
- 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
- SCAC 2: Source and receiver designed on NMO corrected gathers over 200-2200 ms

Processing sequence (continued)

- 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 (2000-200-10) 2nd order picked velocities and auto picked effective Eta
- Migration (PreSTM 3): Kirchhoff VTI migration using smoothed (500-100-2) 2nd order time-tomography and auto picked effective Eta
- Conversion to zero phase:
- Trace drop: Far offsets dropped to match migration input gather
- Stack: 1/N (1/√N for scaled stacks) with 45° mute
- Bandpass filter: 2-6-120-150 Hz on selected stacks only
- Scaling: 1000 ms AGC on selected stacks only
- Migration parameters: 3 km aperture
TV dip: 0-45° 1250-45° 2500-30°
Anti-alias constant = 2
- Smoothing parameters: Horizontal half width (m) – vertical half width (ms) – relative weight at max time

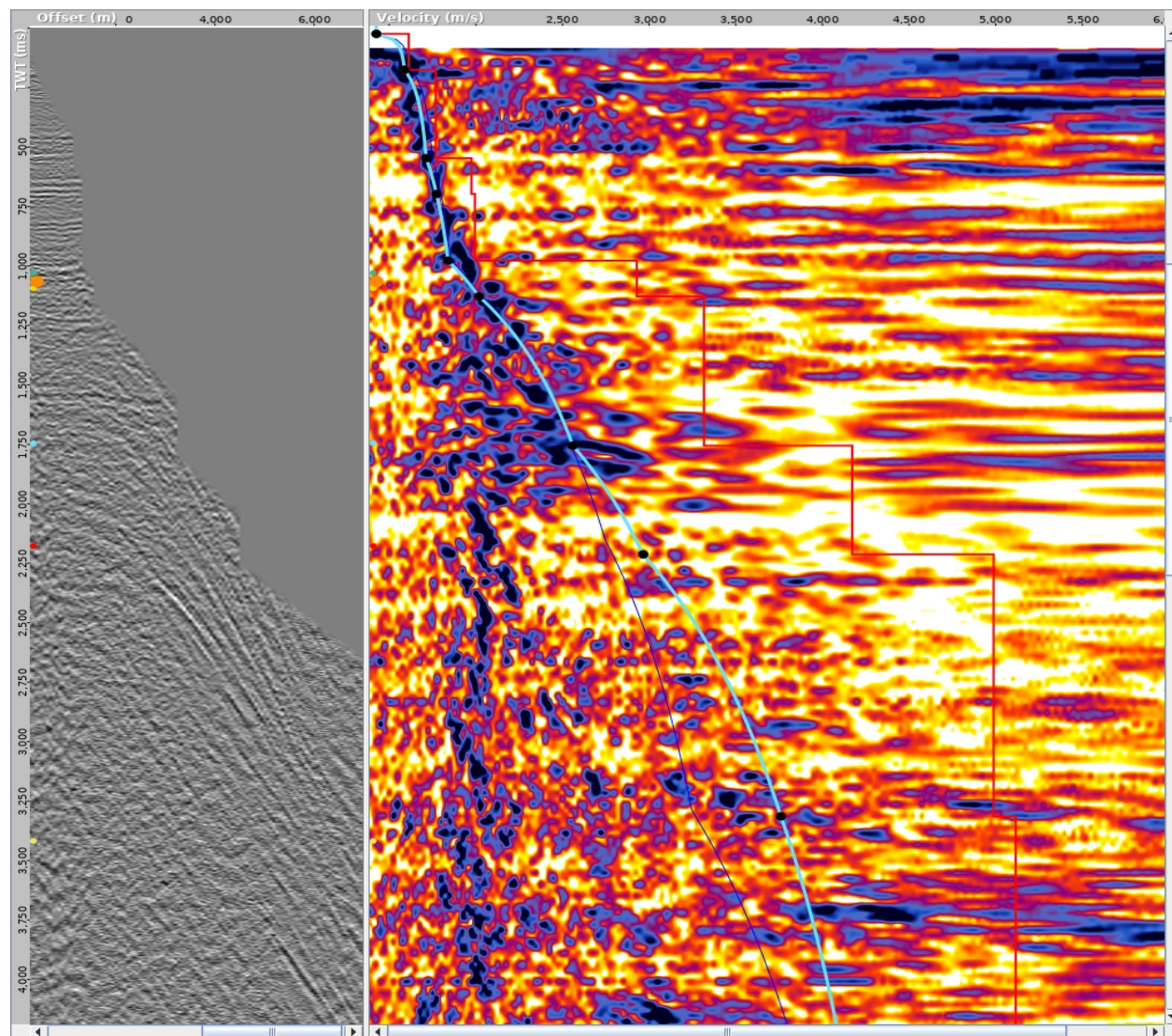
Map





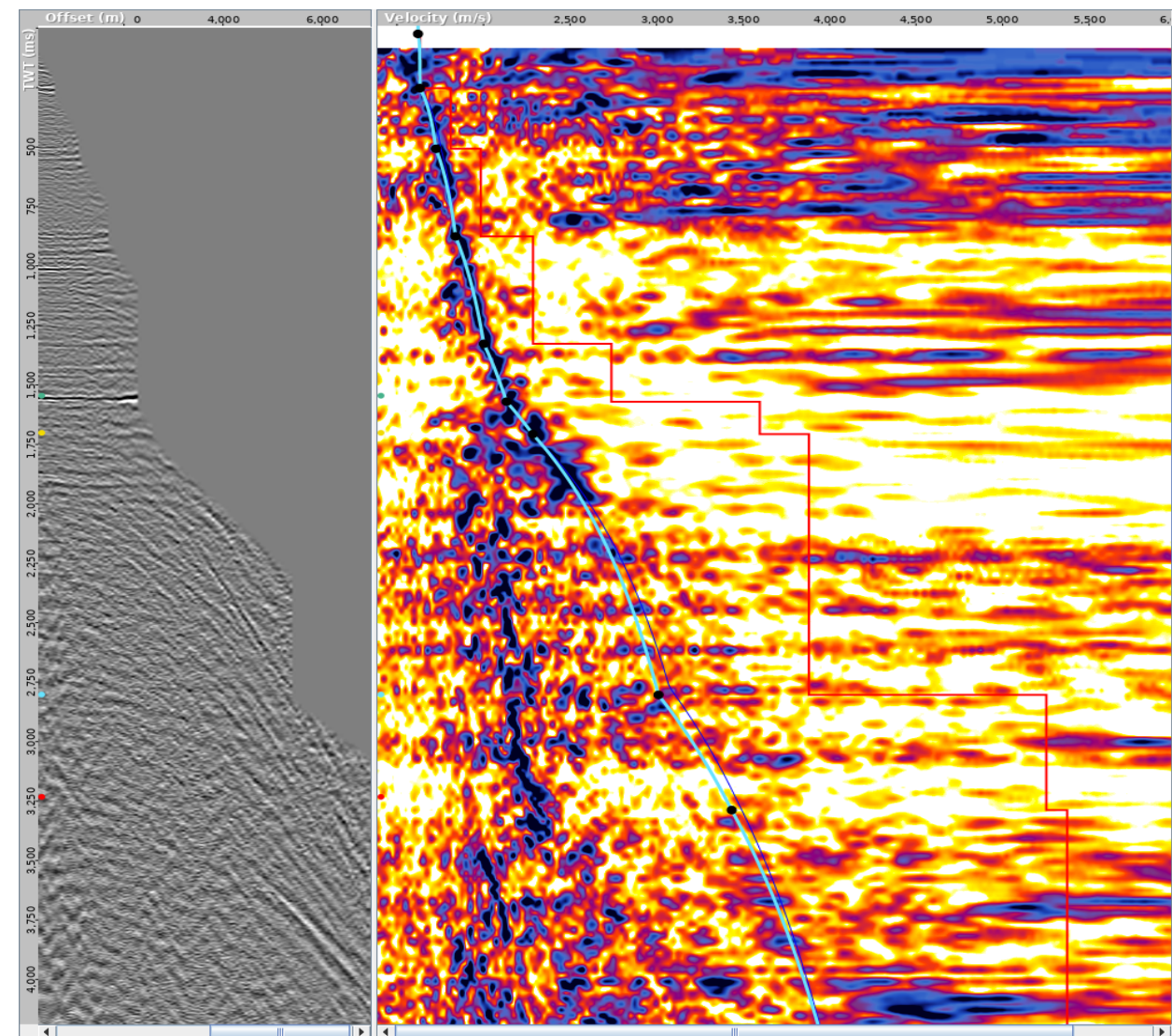
PreSTM 1 velocity function

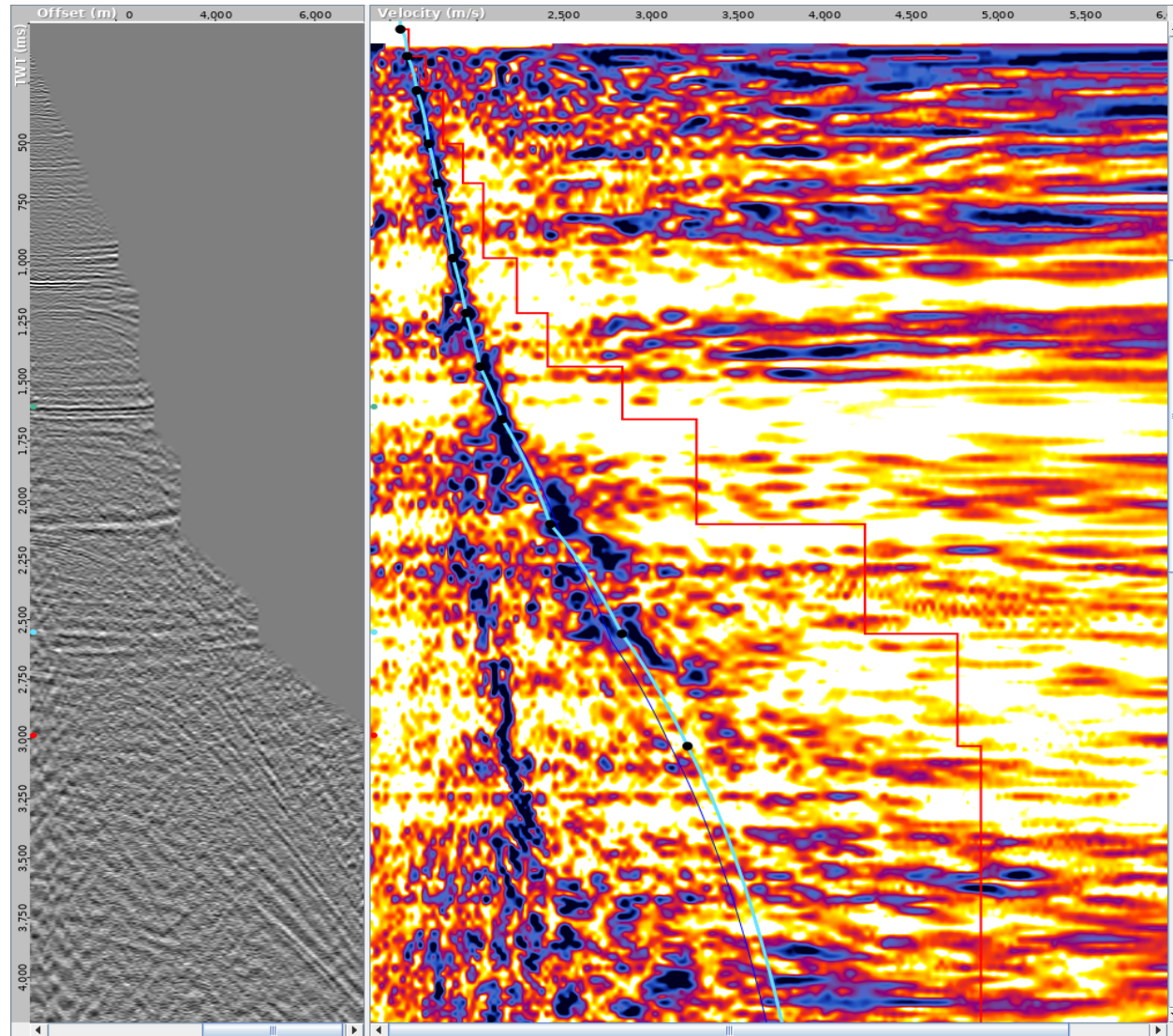
Post PreSTM 1 RMS velocity picks (corresponding interval velocity)



PreSTM 1 velocity function

Post PreSTM 1 RMS velocity picks (corresponding interval velocity)

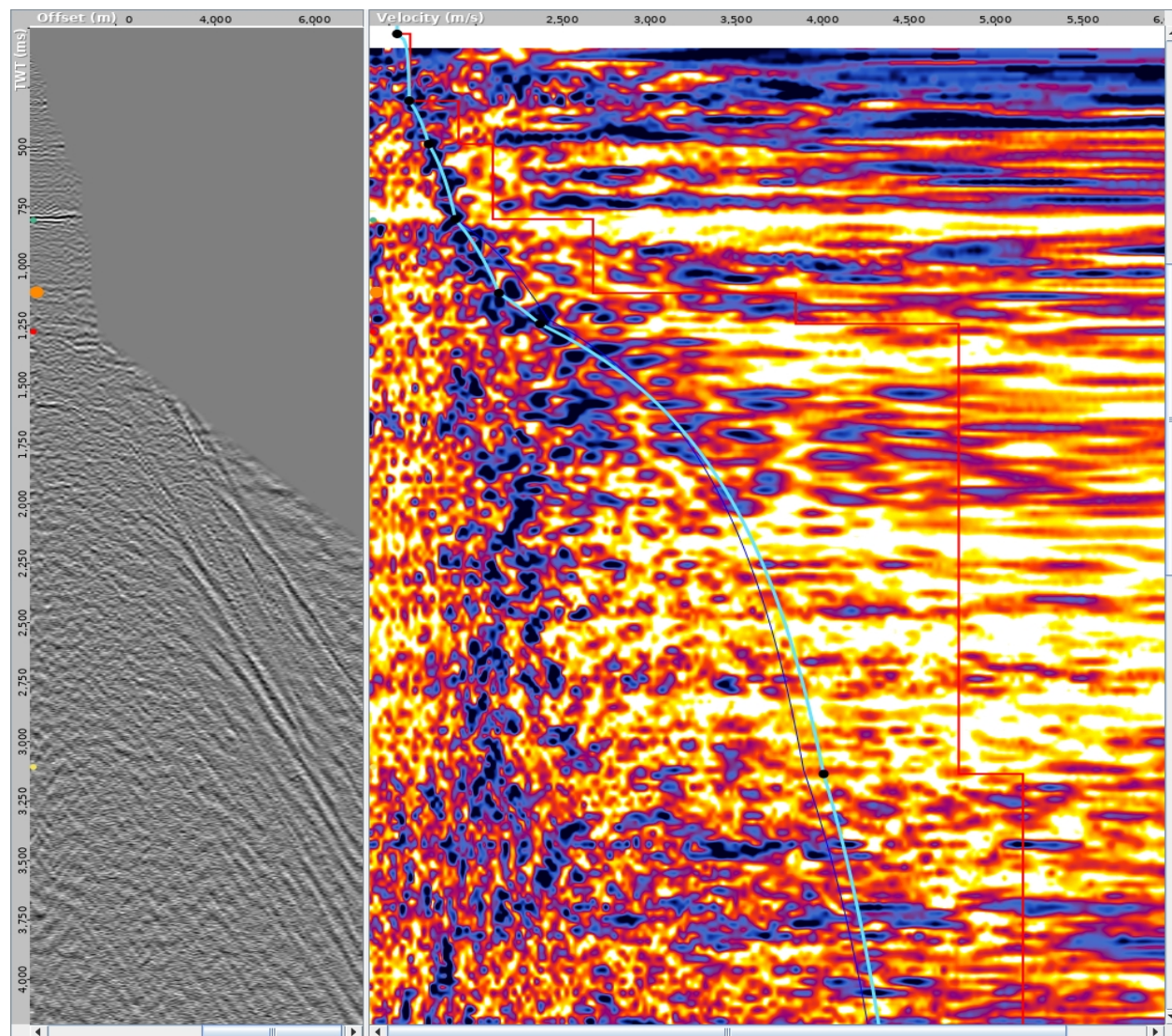




PreSTM 1 velocity function

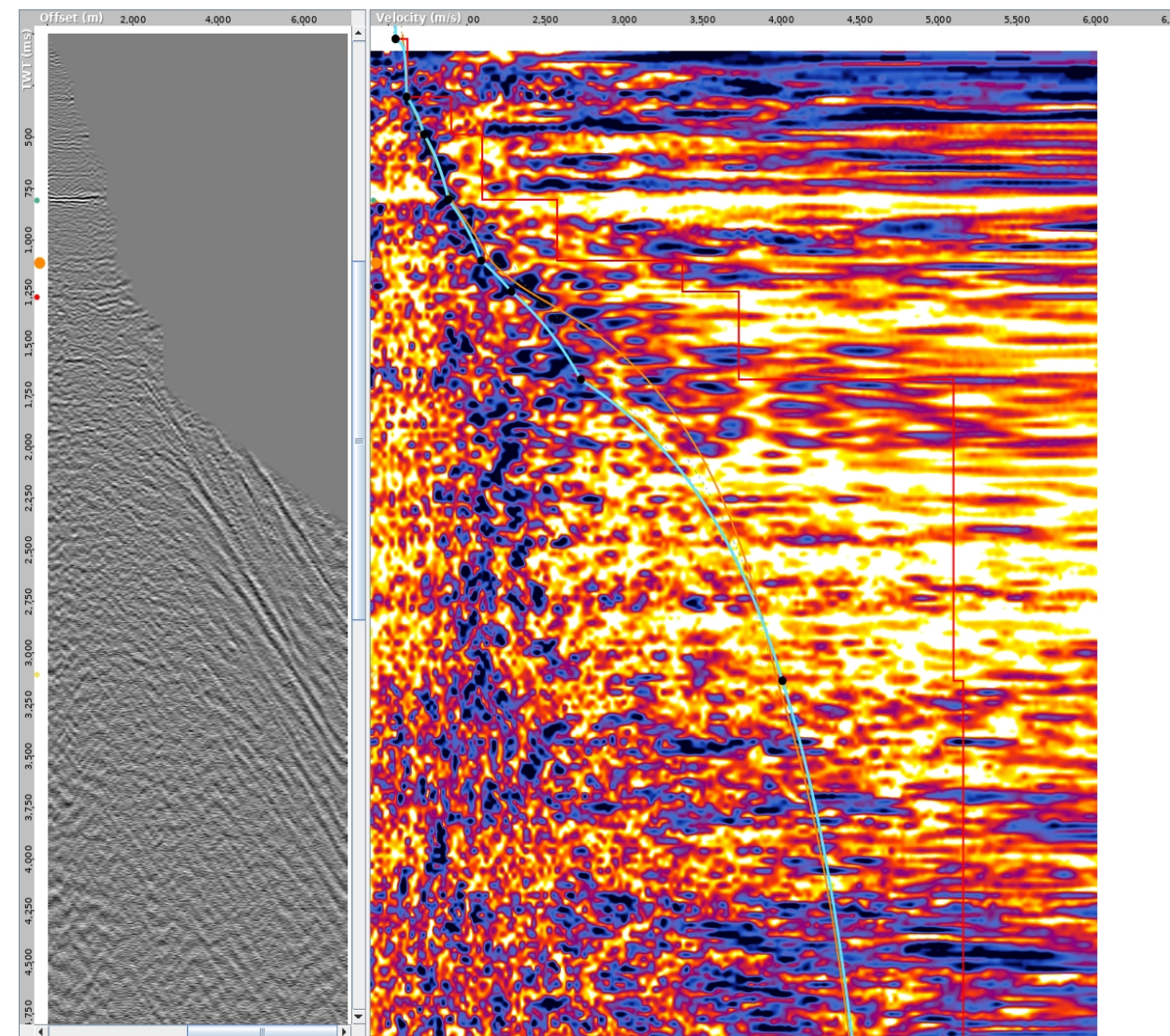
Post PreSTM 1 RMS velocity picks (corresponding interval velocity)

Original PreSTM 2 picks



PreSTM 1 velocity function
Post PreSTM 1 RMS velocity picks (corresponding interval velocity)

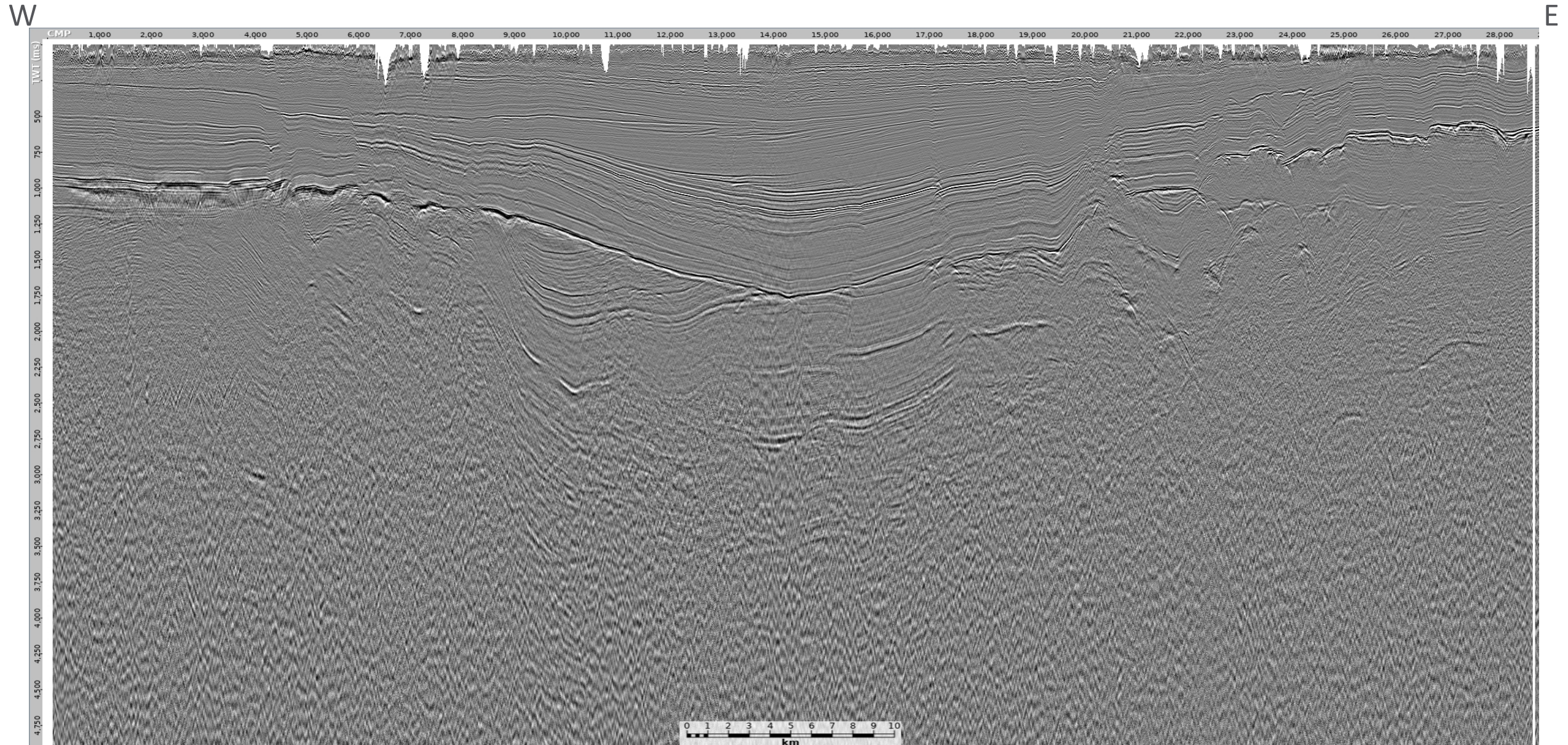
Updated PreSTM 2 picks



Re-picked PreSTM 1 velocity function
Original PreSTM 1 RMS velocity picks (corresponding interval velocity)

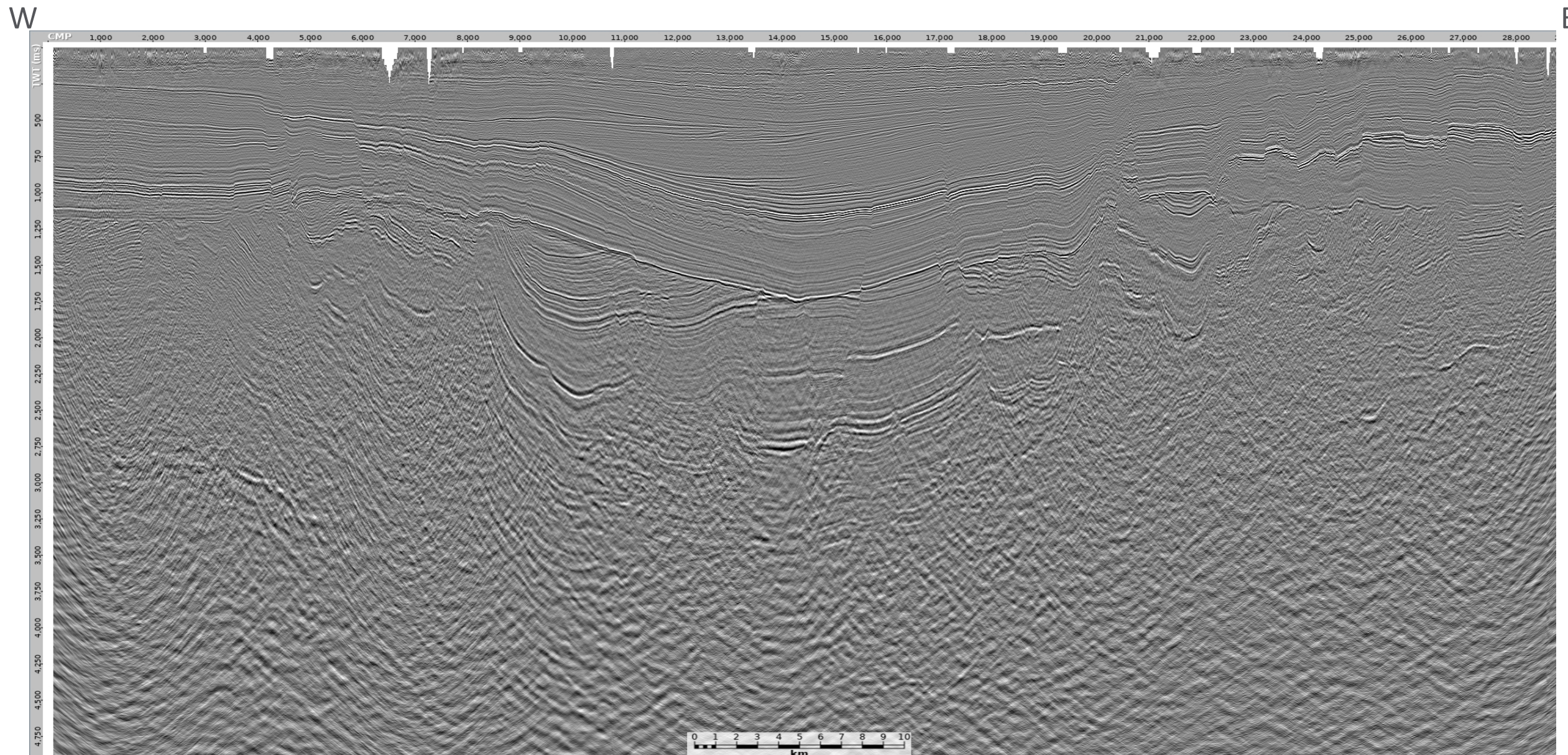
UOBR017-SCAN018 pre-migration true amplitude stack (not zero phase)

At floating datum with 2-6-120-150 Hz filter and 1000 ms post-stack scaling



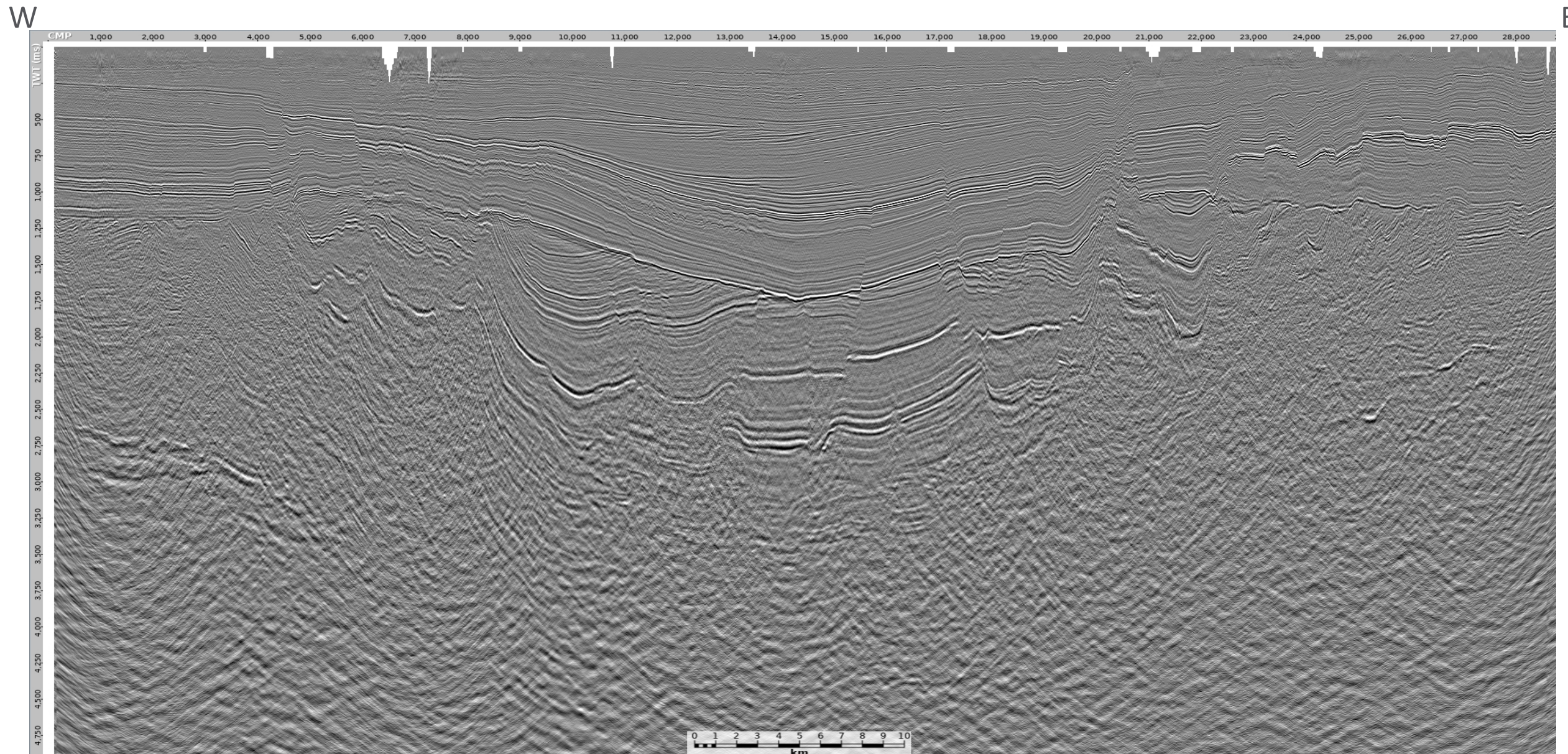
UOBR017-SCAN018 PreSTM 1 true amplitude stack

At floating datum with 2-6-120-150 Hz filter and 1000 ms post-stack scaling



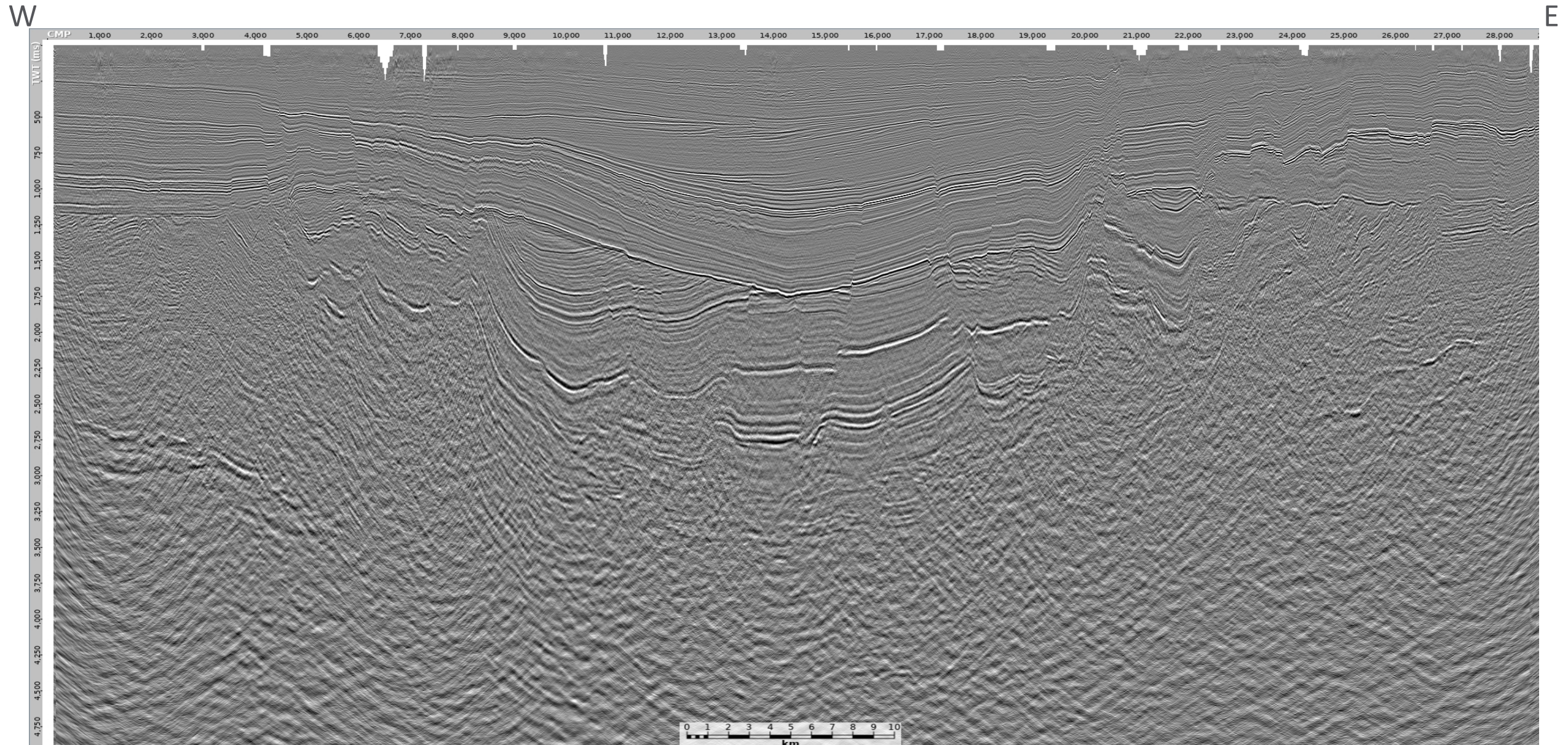
UOBR017-SCAN018 PreSTM 2 true amplitude stack

At floating datum with 2-6-120-150 Hz filter and 1000 ms post-stack scaling



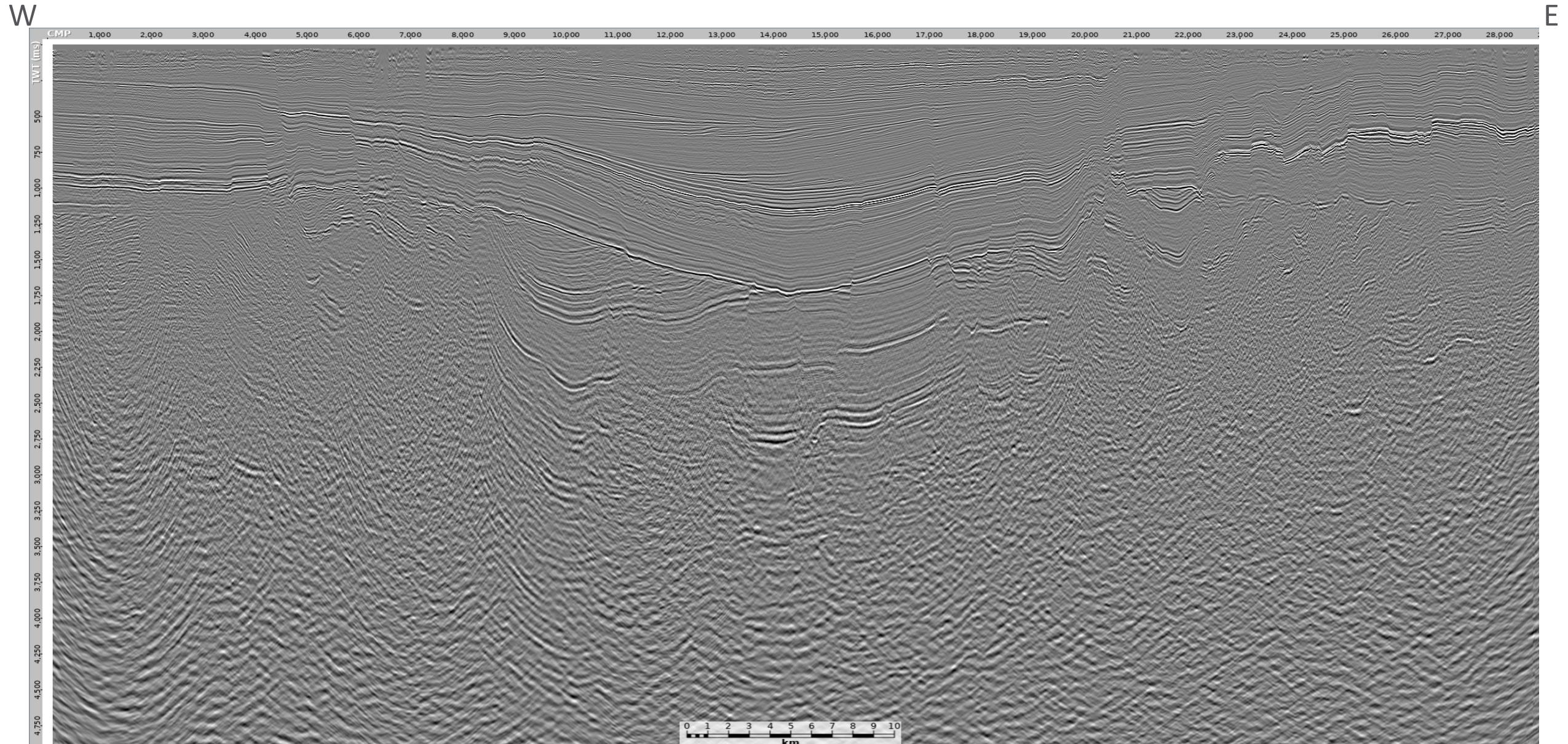
UOBR017-SCAN018 re-picked PreSTM 2 true amplitude stack

At floating datum with 2-6-120-150 Hz filter and 1000 ms post-stack scaling



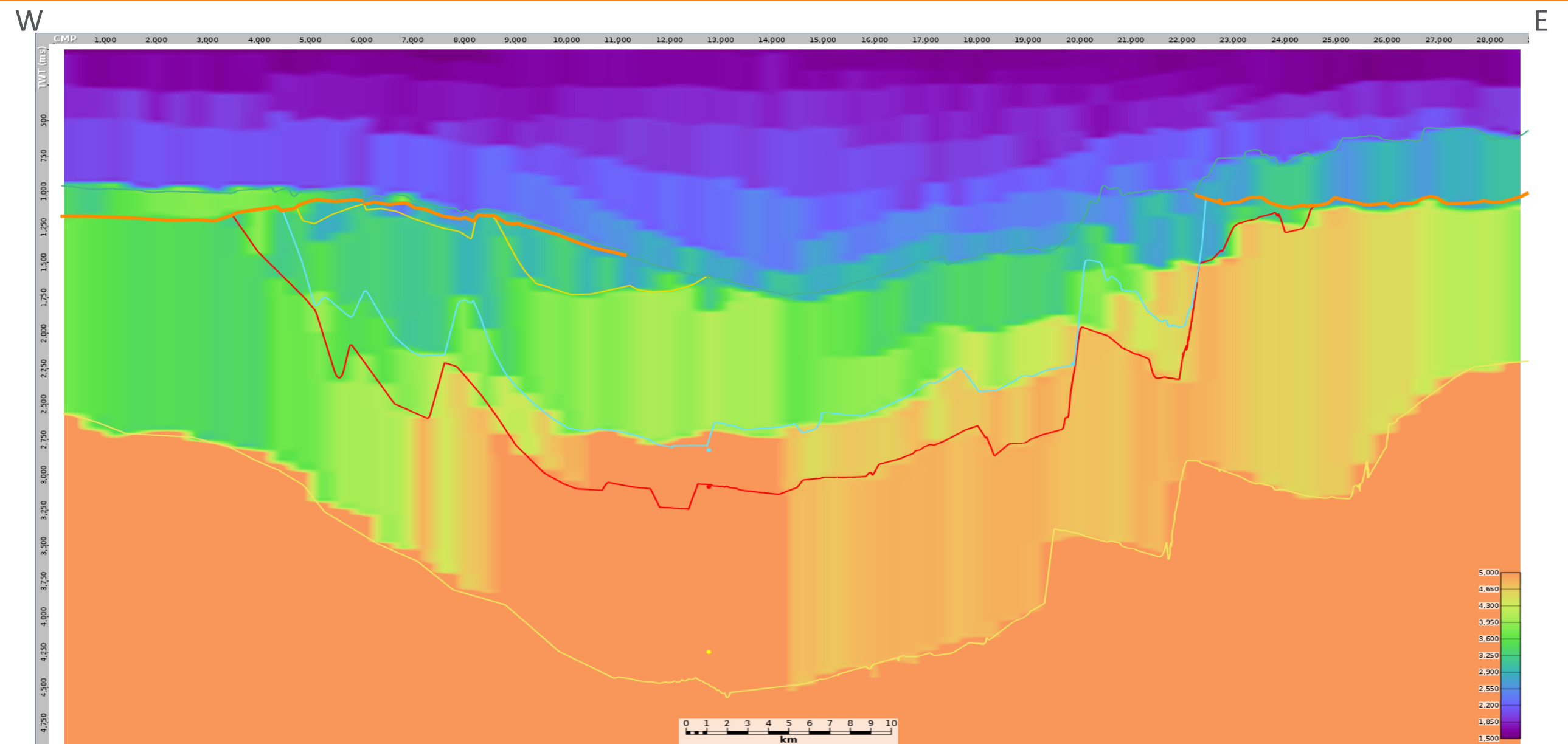
UOBR017-SCAN018 fast-track true amplitude stack

At floating datum with 2-6-120-150 Hz filter and 1000 ms post-stack scaling



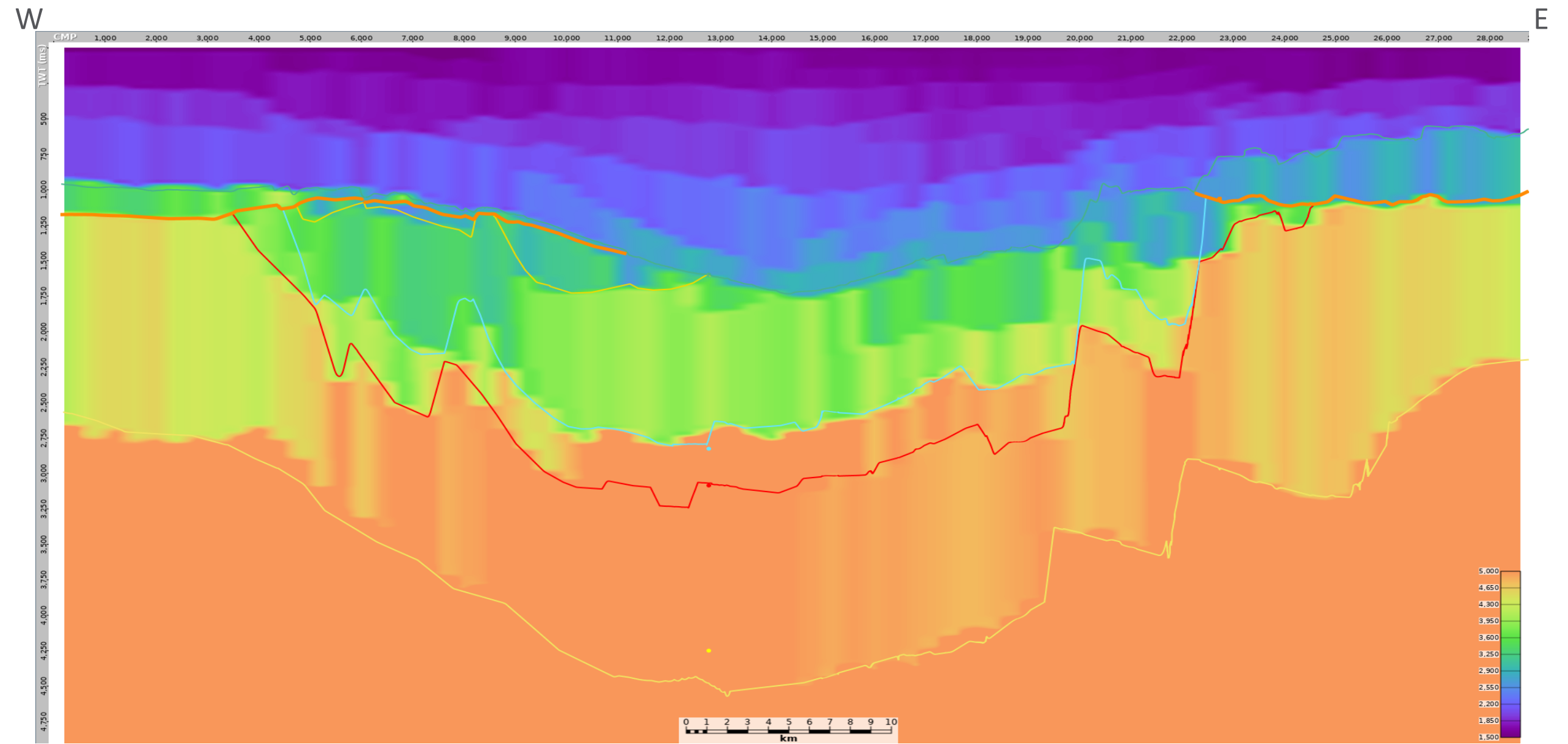
UOBR017-SCAN018 PreSTM 1 interval velocity

At floating datum



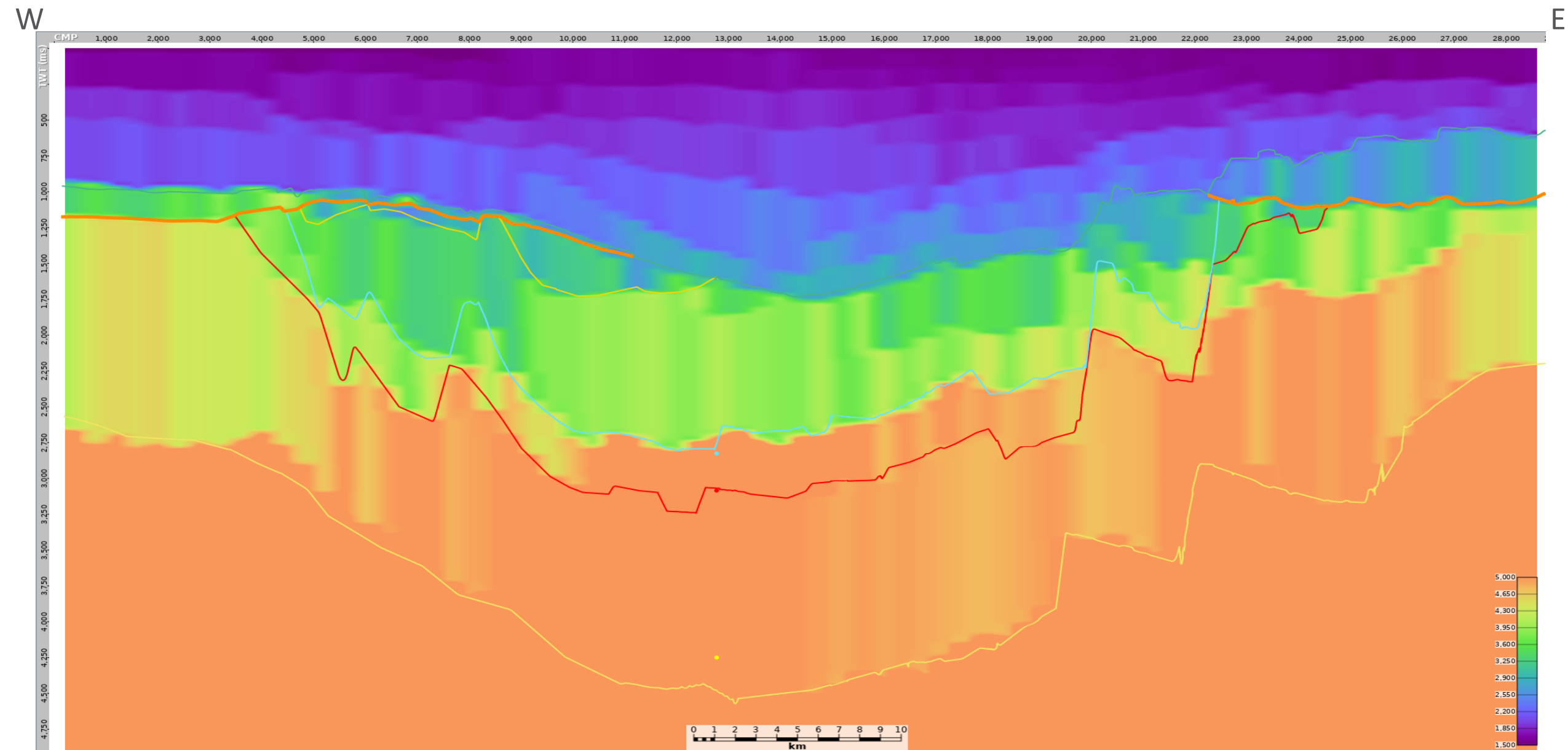
UOBR017-SCAN018 PreSTM 2 interval velocity

At floating datum



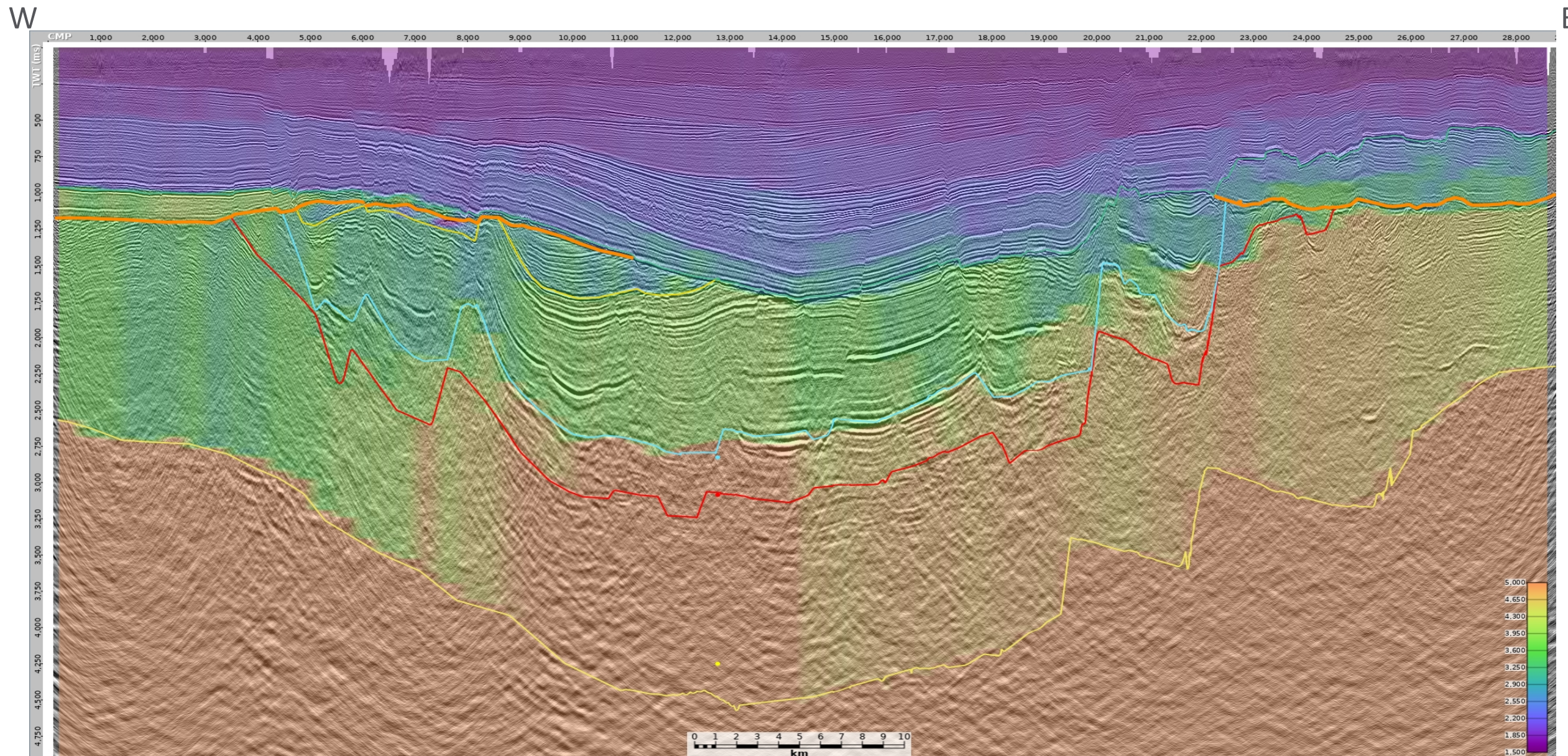
UOBR017-SCAN018 PreSTM 2 re-picked interval velocity

At floating datum



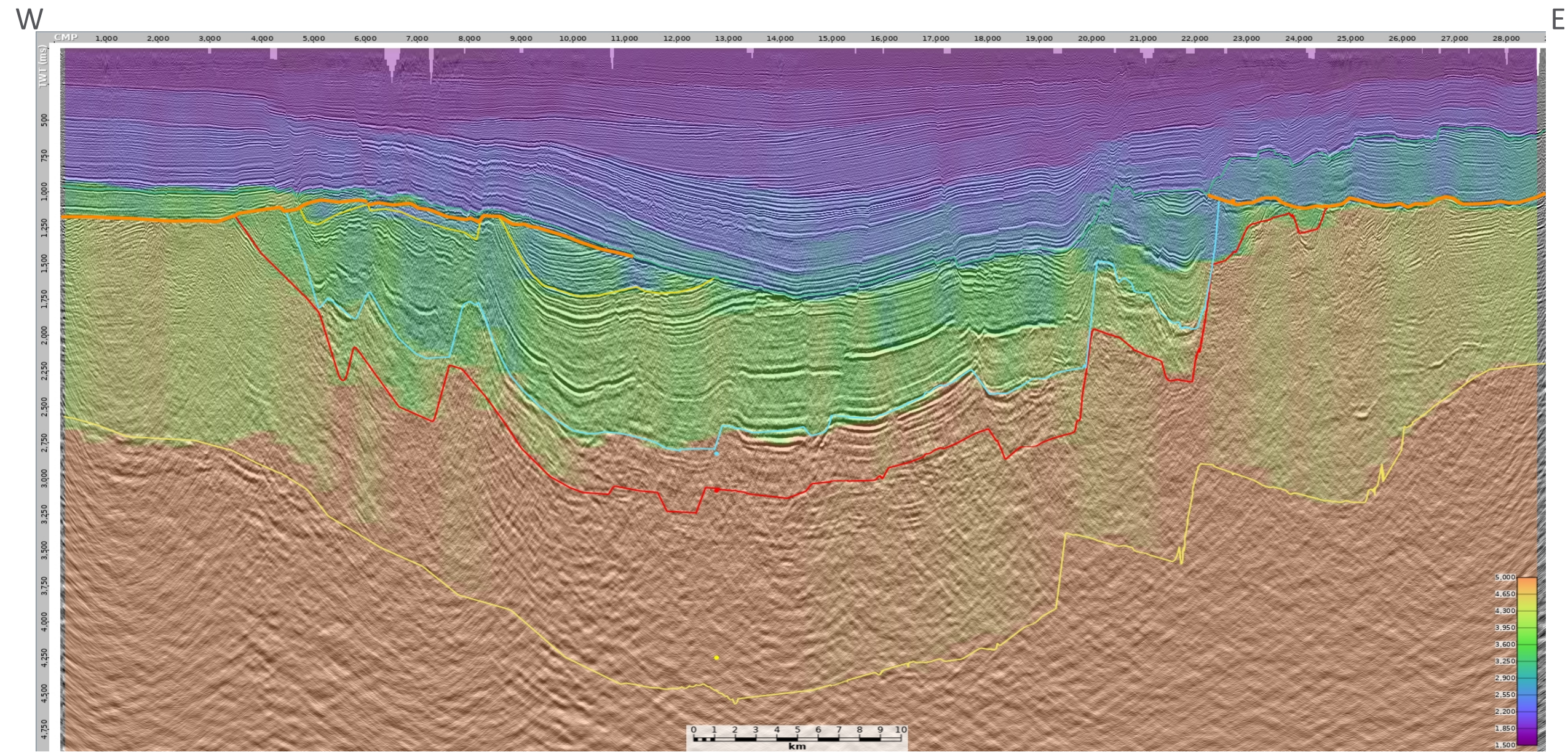
UOBR017-SCAN018 PreSTM 1 stack with interval velocity overlay

At floating datum - stack has 500 ms pre-stack AGC applied



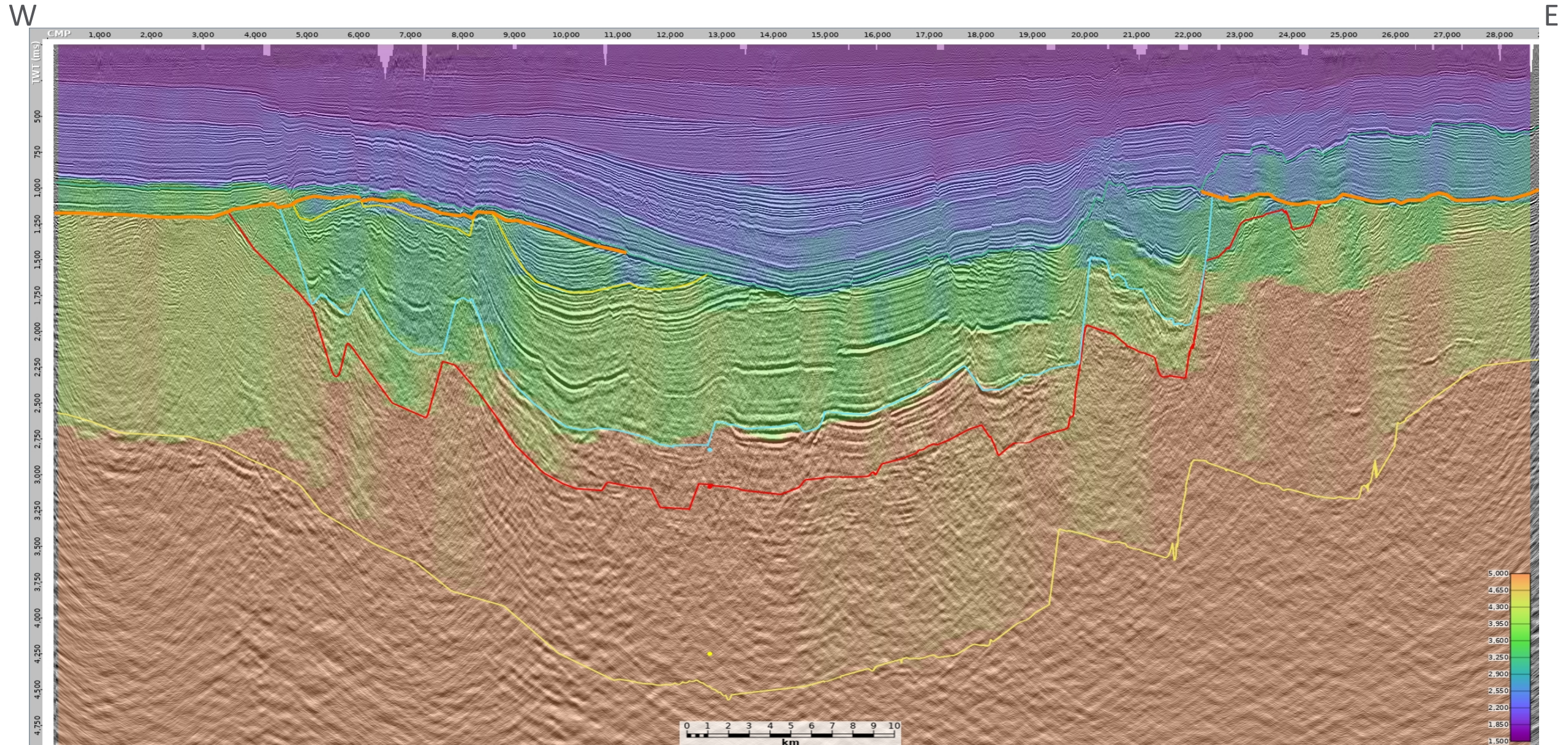
UOBR017-SCAN018 PreSTM 2 stack with interval velocity overlay

At floating datum - stack has 500 ms pre-stack AGC applied



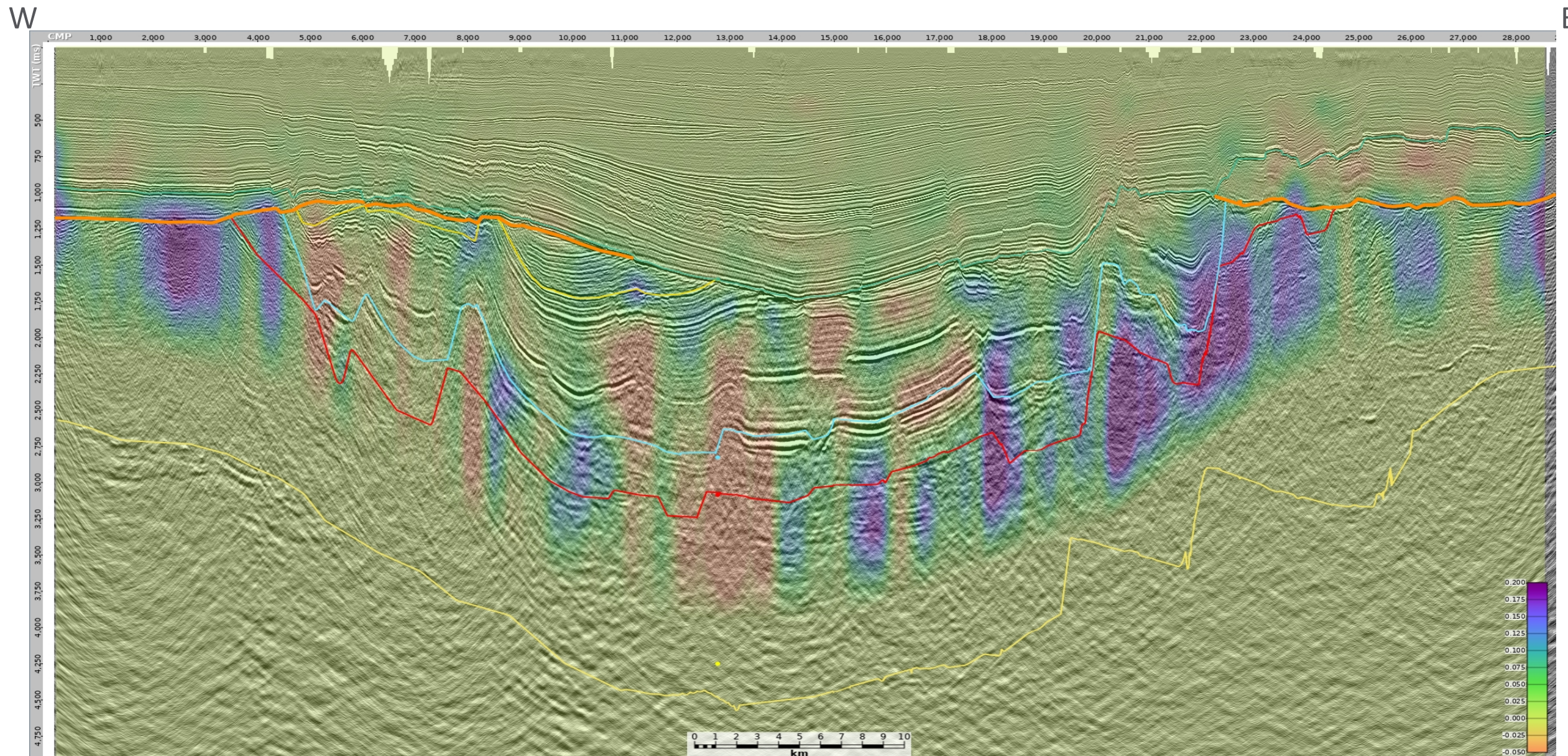
UOBR017-SCAN018 PreSTM 2 re-picked stack with re-picked interval velocity overlay

At floating datum - stack has 500 ms pre-stack AGC applied



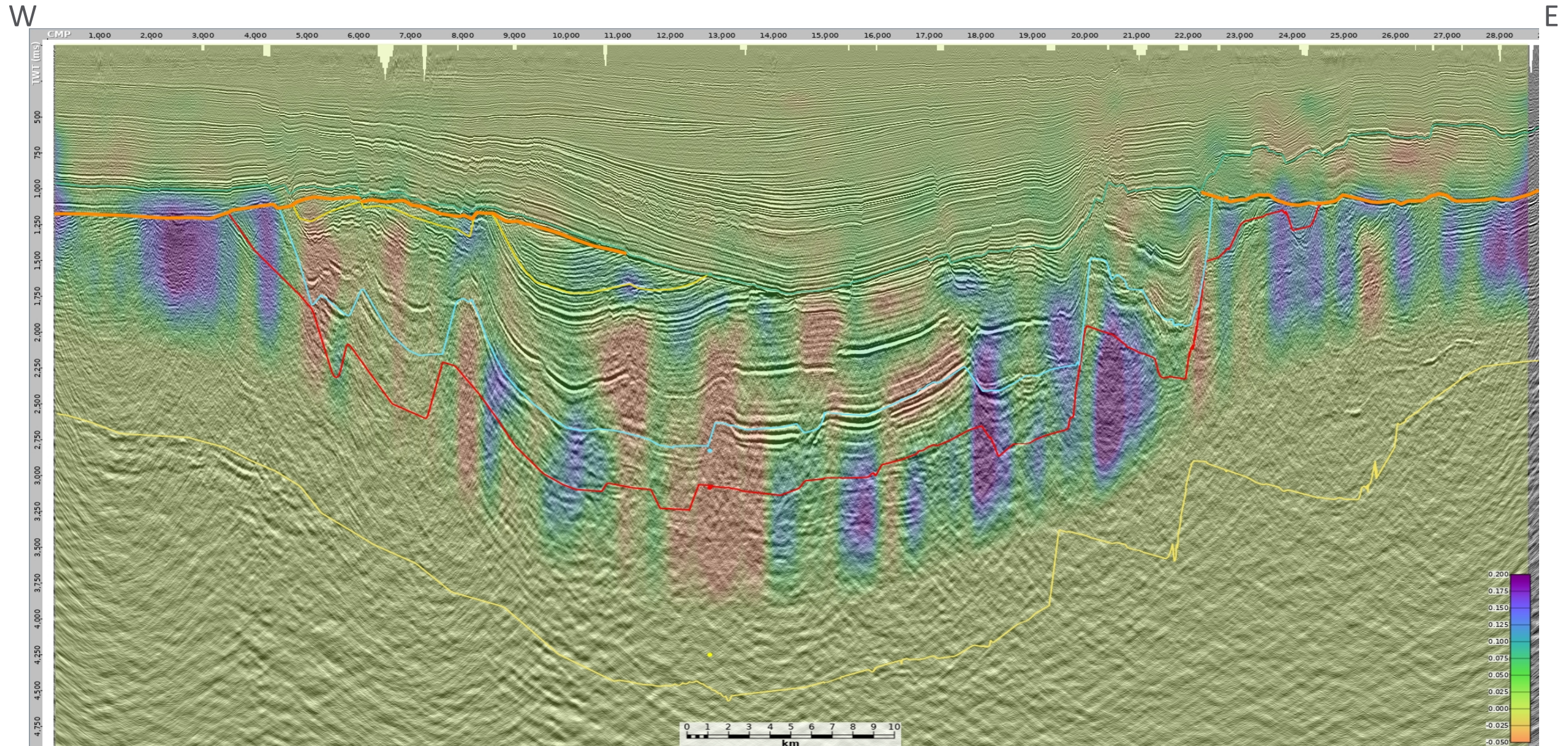
UOBR017-SCAN018 PreSTM 2 stack with Eta overlay

At floating datum - stack has 500 ms pre-stack AGC applied

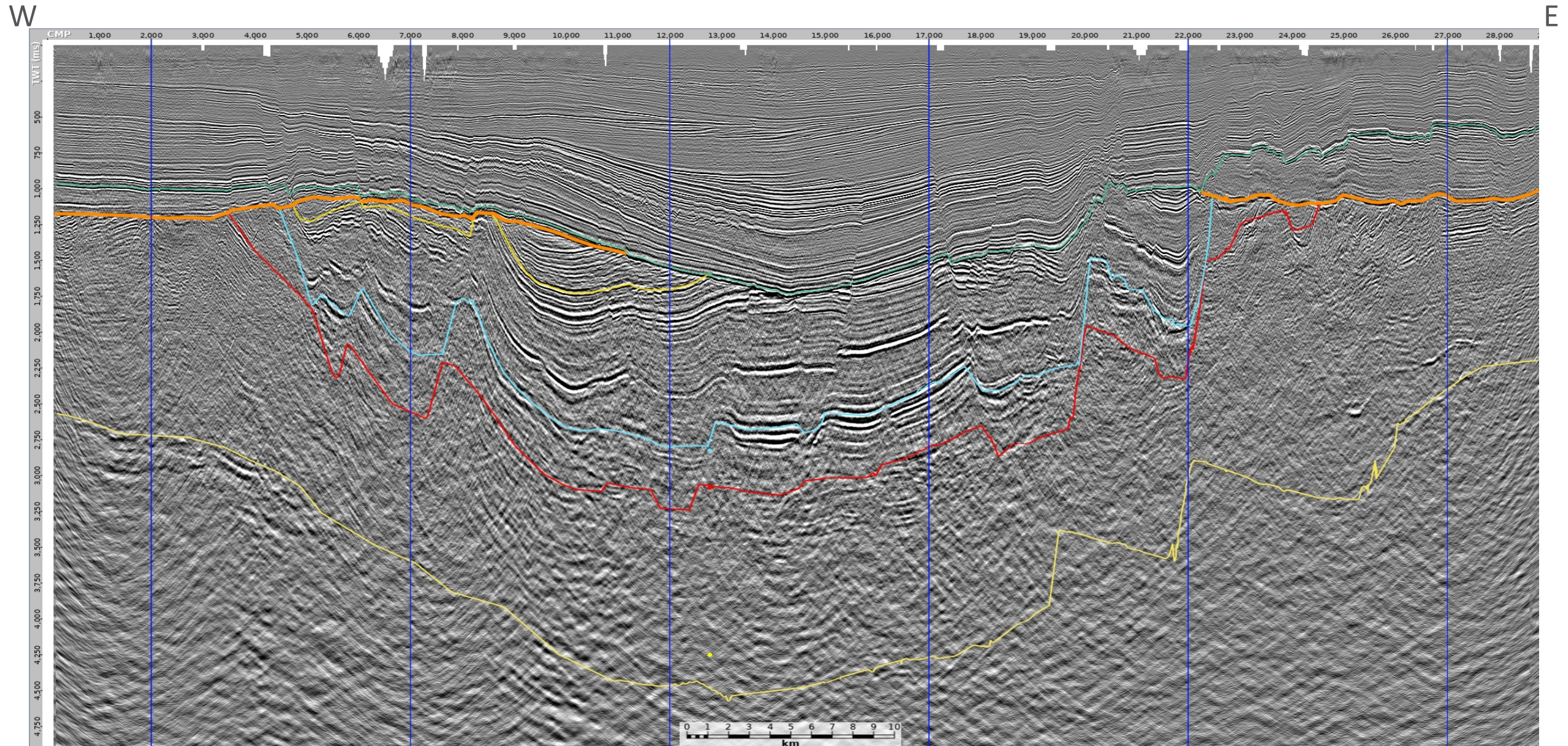


UOBR017-SCAN018 PreSTM 2 stack with re-picked Eta overlay

At floating datum - stack has 500 ms pre-stack AGC applied

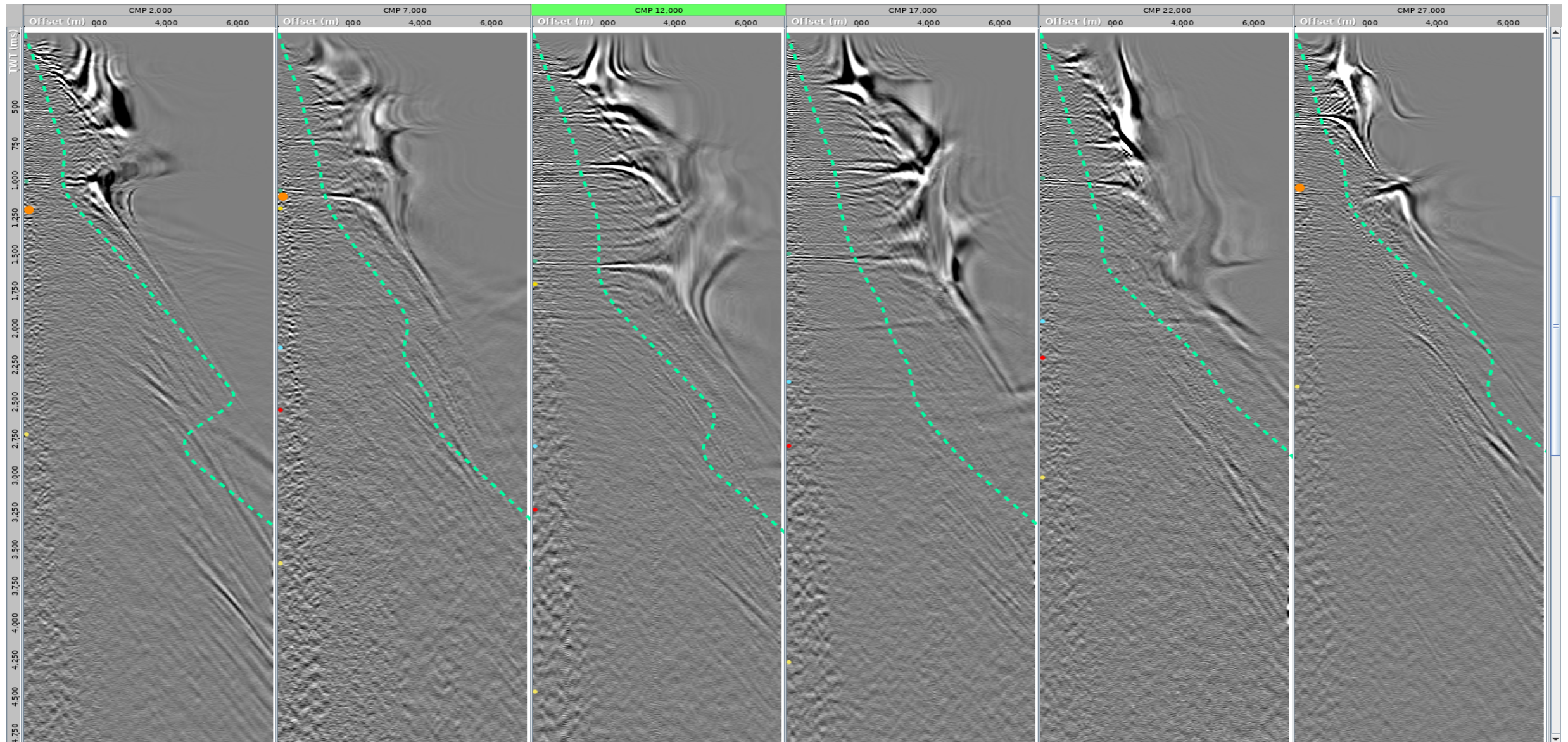


UOBR017-SCAN018 gather locations for subsequent slides



UOBR017-SCAN018 PreSTM 1 gathers

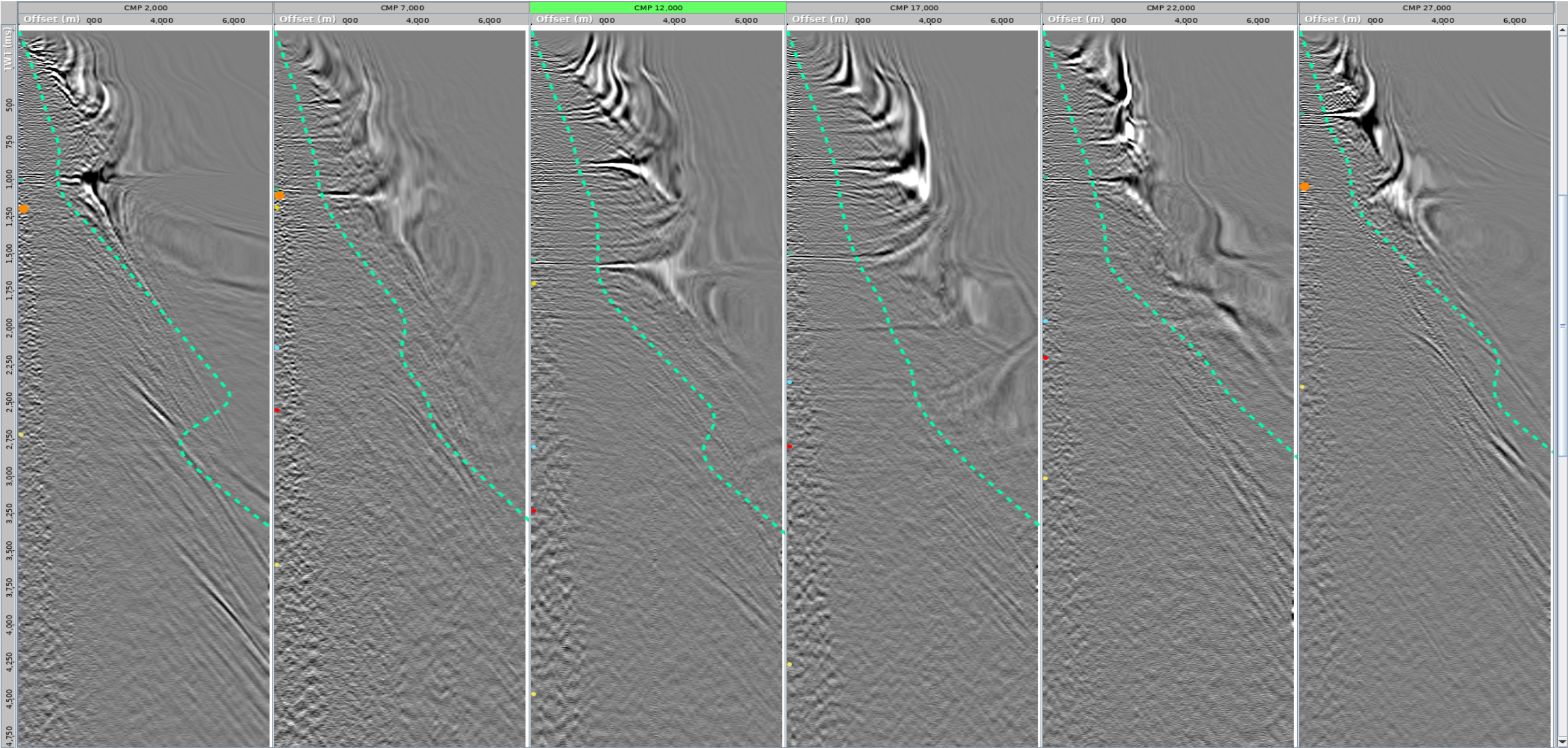
At floating datum



45°

UOBR017-SCAN018 PreSTM 2 gathers

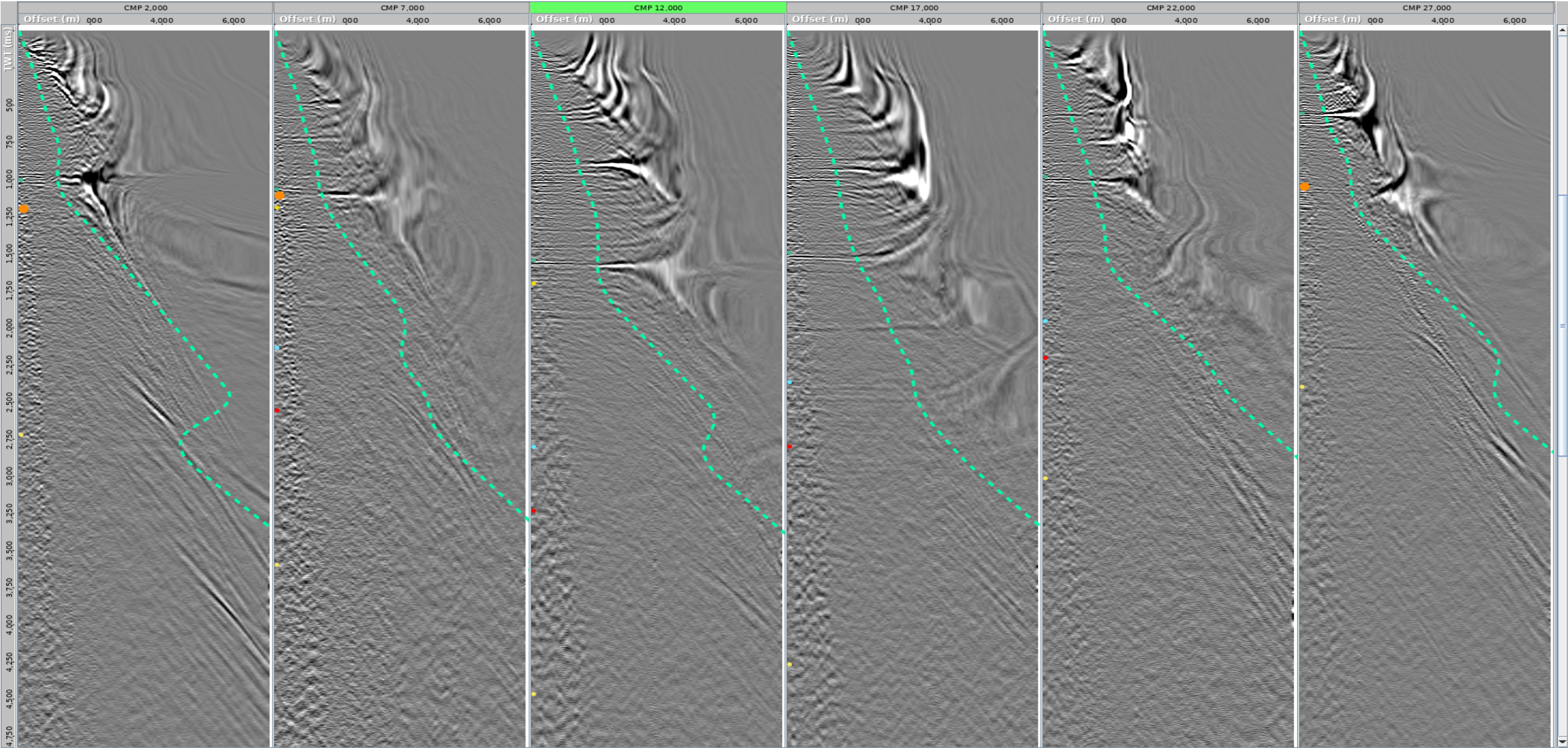
At floating datum



45°

UOBR017-SCAN018 PreSTM 2 re-picked gathers

At floating datum



45°

UOBR017-SCAN018/SCAN002 interval velocities at intersections

At floating datum

