

UGOU022-SCAN023 Post Migration Processing Report

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

15 JANUARY 2021

Energie Beheer Nederland B.V.

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).
- EBN requested additional Radon testing and selected a milder Radon to be applied to UGOU022-SCAN023 as shown in the following presentation on line UGOU021:
 - (sCAnPr_007_UGOU021_PostMigRadonTesting_210113.pdf).
- DUG noted that there is some residual dipping noise on the final stack using the standard post migration flow. Therefore DUG recommended using a harsher time-variant dip filter with a larger analysis window:
 - Previous dip filter: 0.5 ms/trace in the shallow, 3 ms/trace in mid, 1 ms/trace in deep.
 - Revised dip filter: 0.5 ms/trace in the shallow and 1 ms/trace in mid and deep.
- Note that 'shallow' refers to the top 300 ms, and deep to the area below a smooth horizon just below the Base North Sea.
- This report includes the milder Radon and an updated post-stack dip filter.

Processing sequence

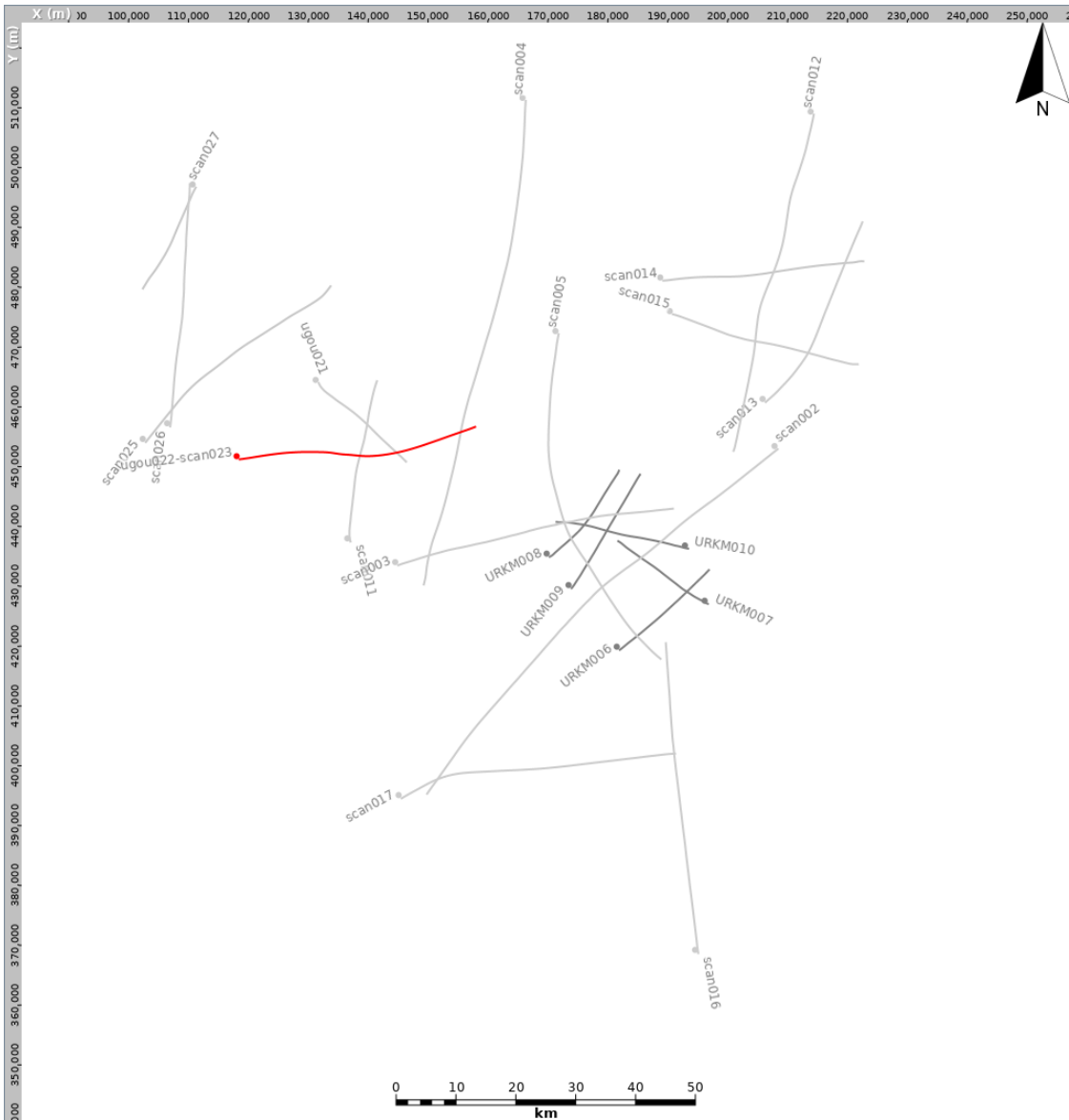
- Data reformat: SEGY to internal format
- Geometry: Crooked line with 2.5 m CDP interval
- Weak shots: 0-500 m offsets only
- Spherical divergence correction: T
- Geophone response correction:
- Refraction statics: Delay time using $V_0 = 1000$ m/s $V_R = 1700$ m/s SRD = NAP
- Noise attenuation: +/-1250 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
- Noise attenuation: TFDN on CDPs

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 require
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)
- 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)

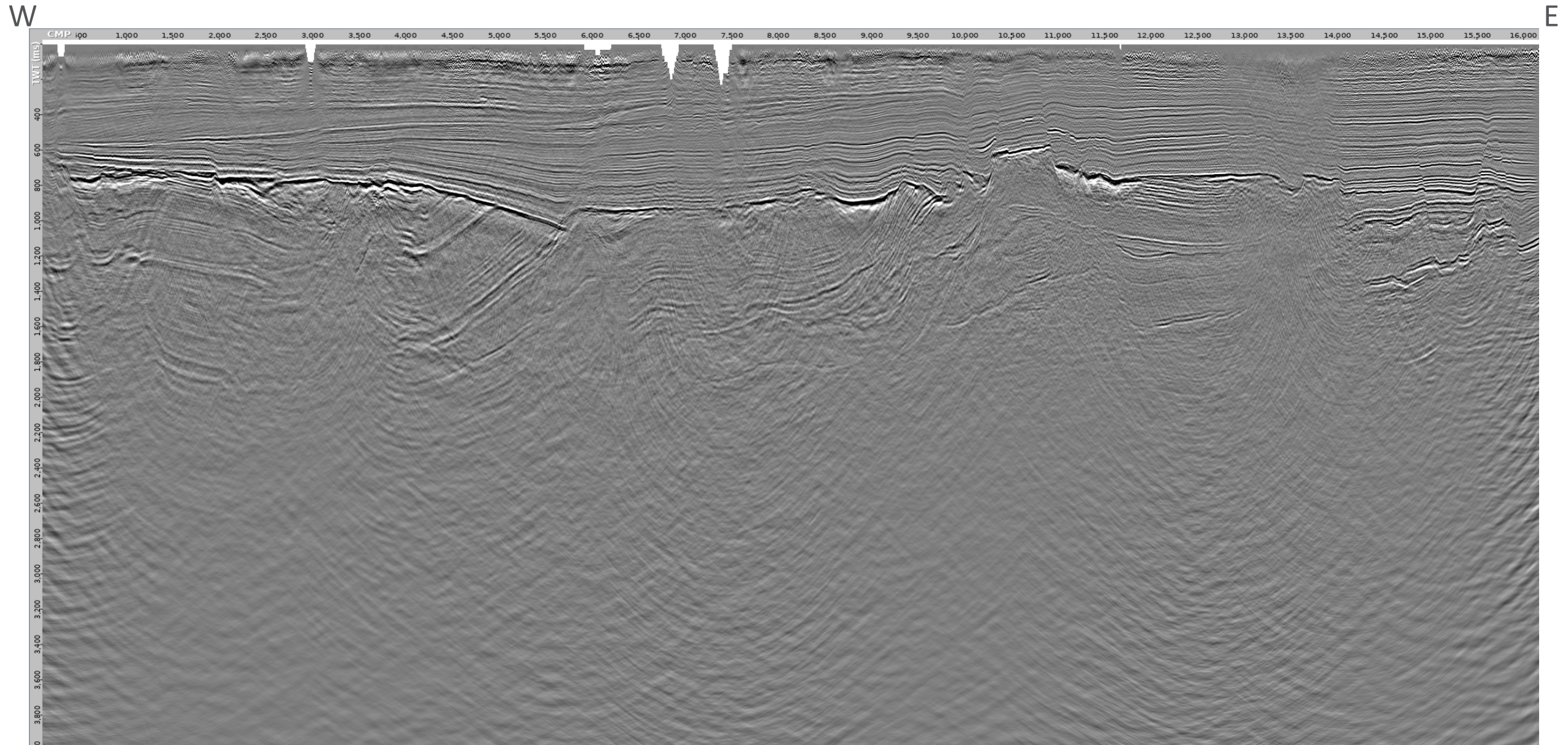
Processing sequence (continued)

- Spectral broadening: Using True Amplitude Frequency Equalisation (TAFE) frequency gain pairs
- Noise attenuation: 0.5 ms/trace dip filter in shallow, 1 ms/trace in mid to 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
6-12-90-110 Hz at 2 s
6-12-35-55 Hz at 3 s
- Post-stack cosmetic mute
- Output SEG-Y



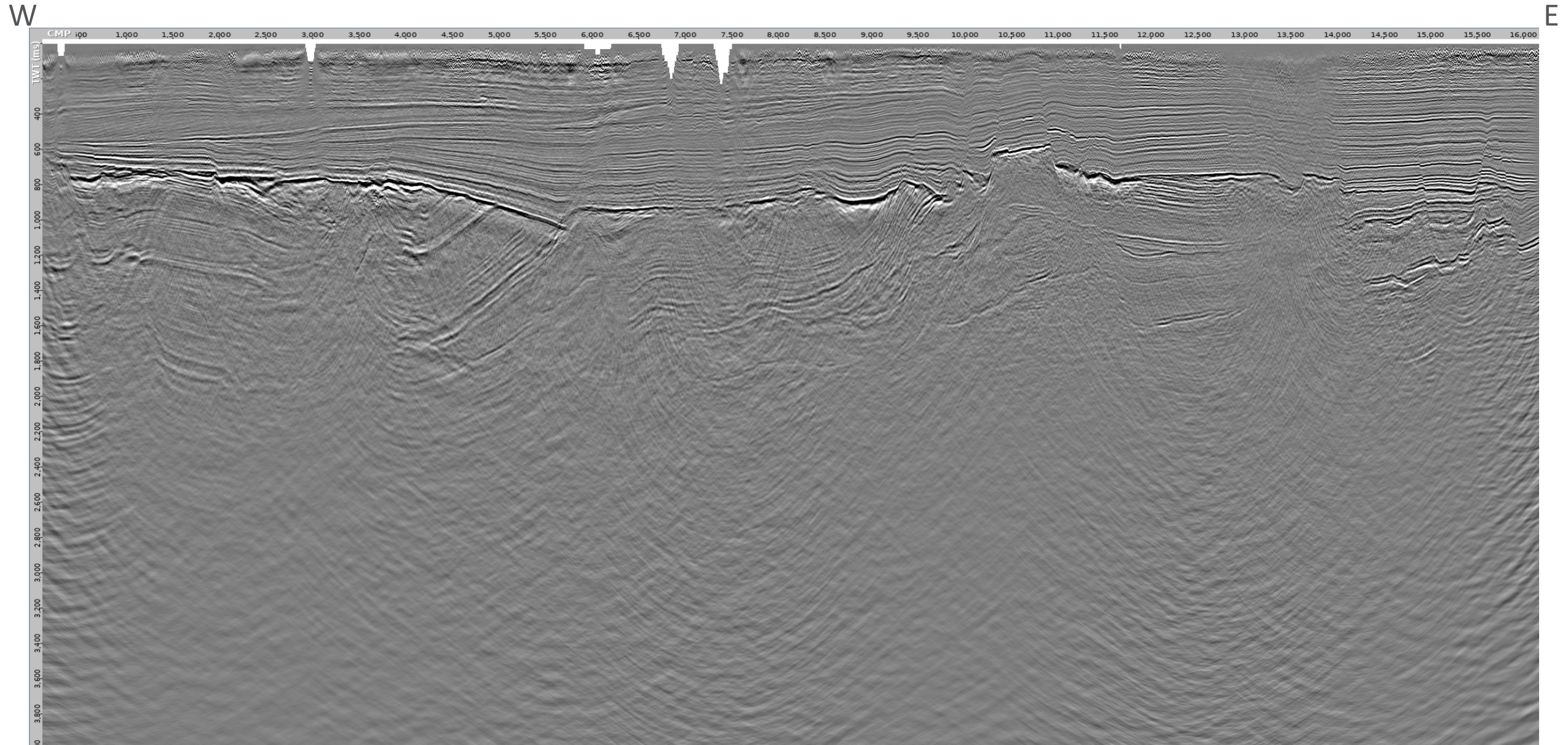
UGOU022-SCAN023 PreSTM 3 stack

At floating datum



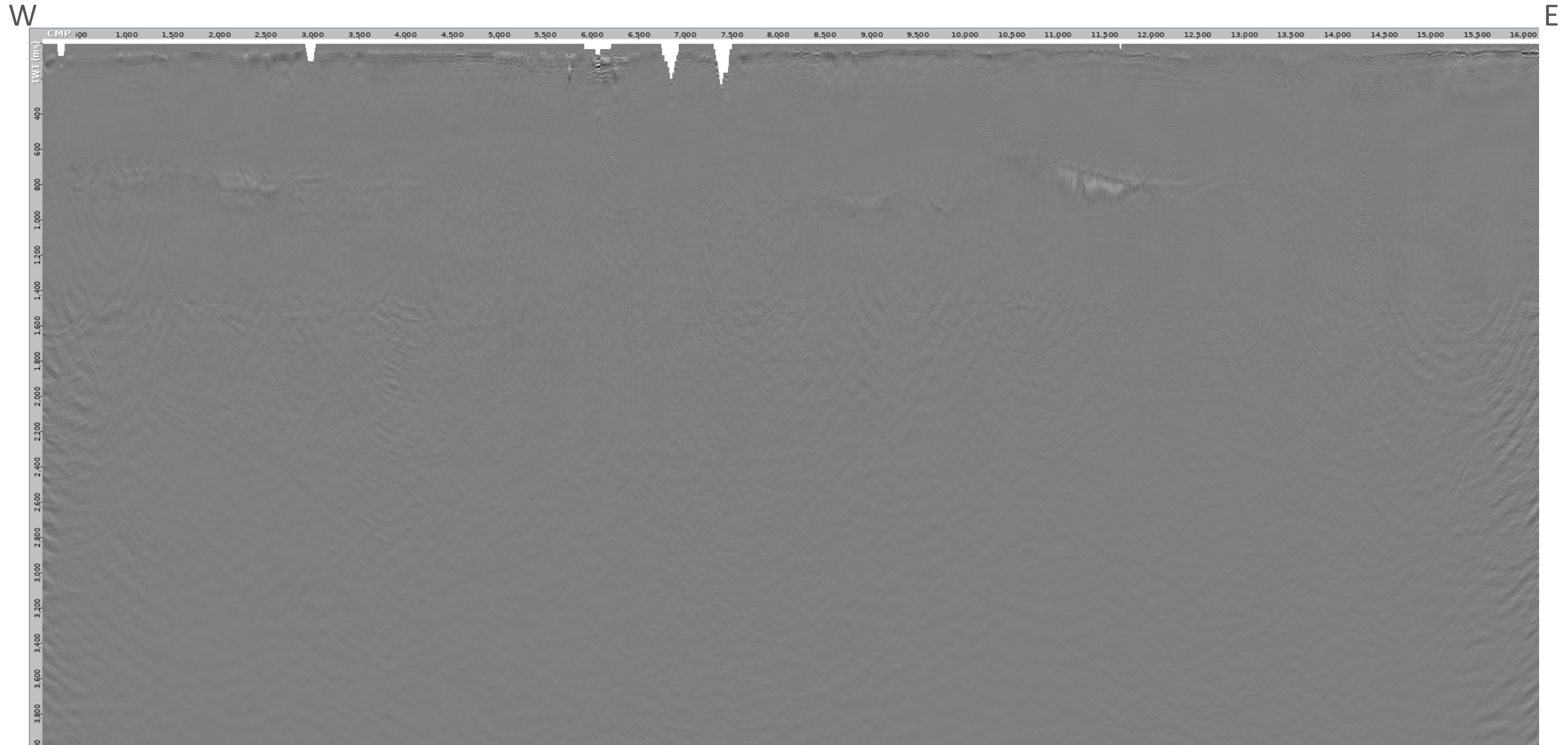
UGOU022-SCAN023 stack with Radon and dip filter on CDPs

At floating datum



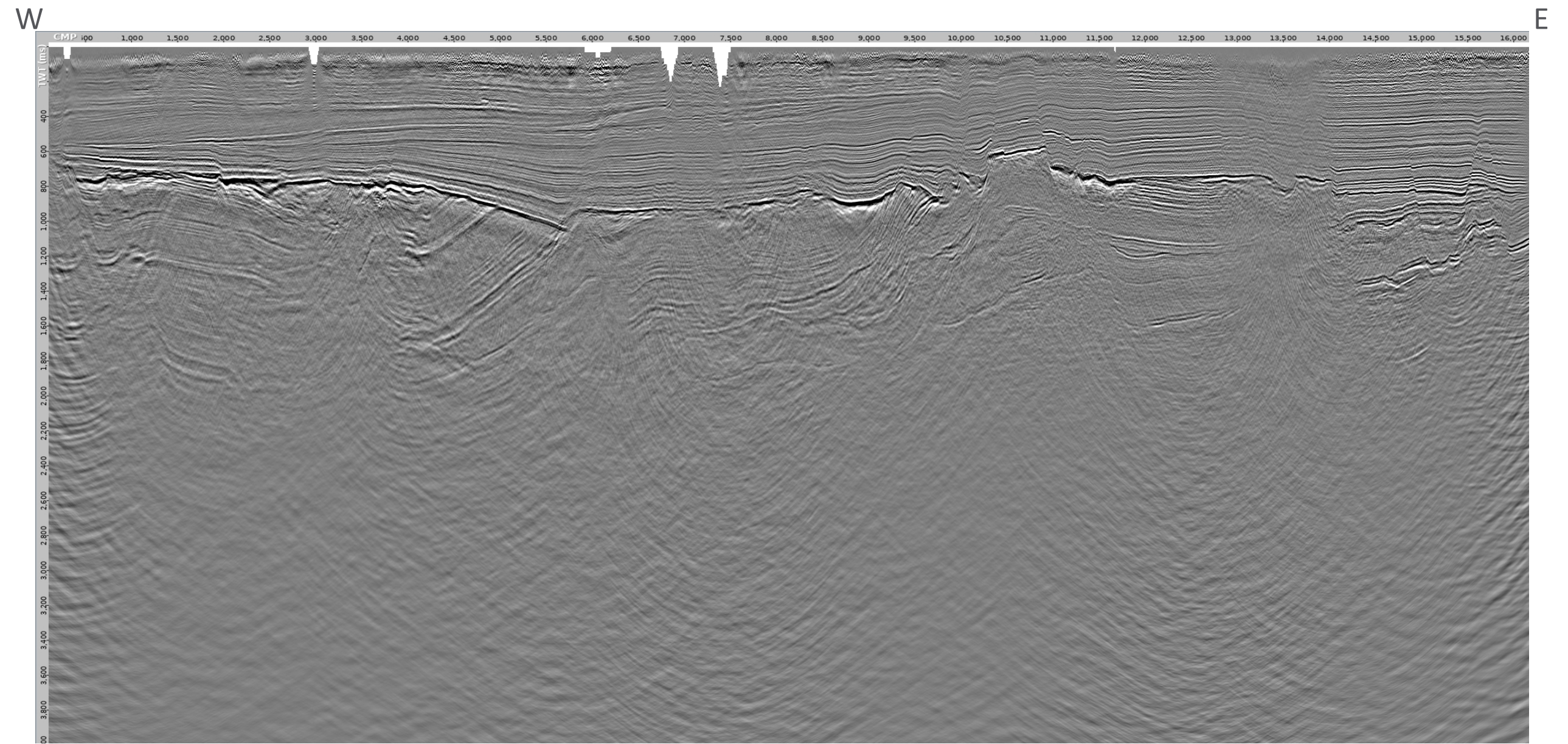
UGOU022-SCAN023 stack with Radon and dip filter on CDPs difference

At floating datum



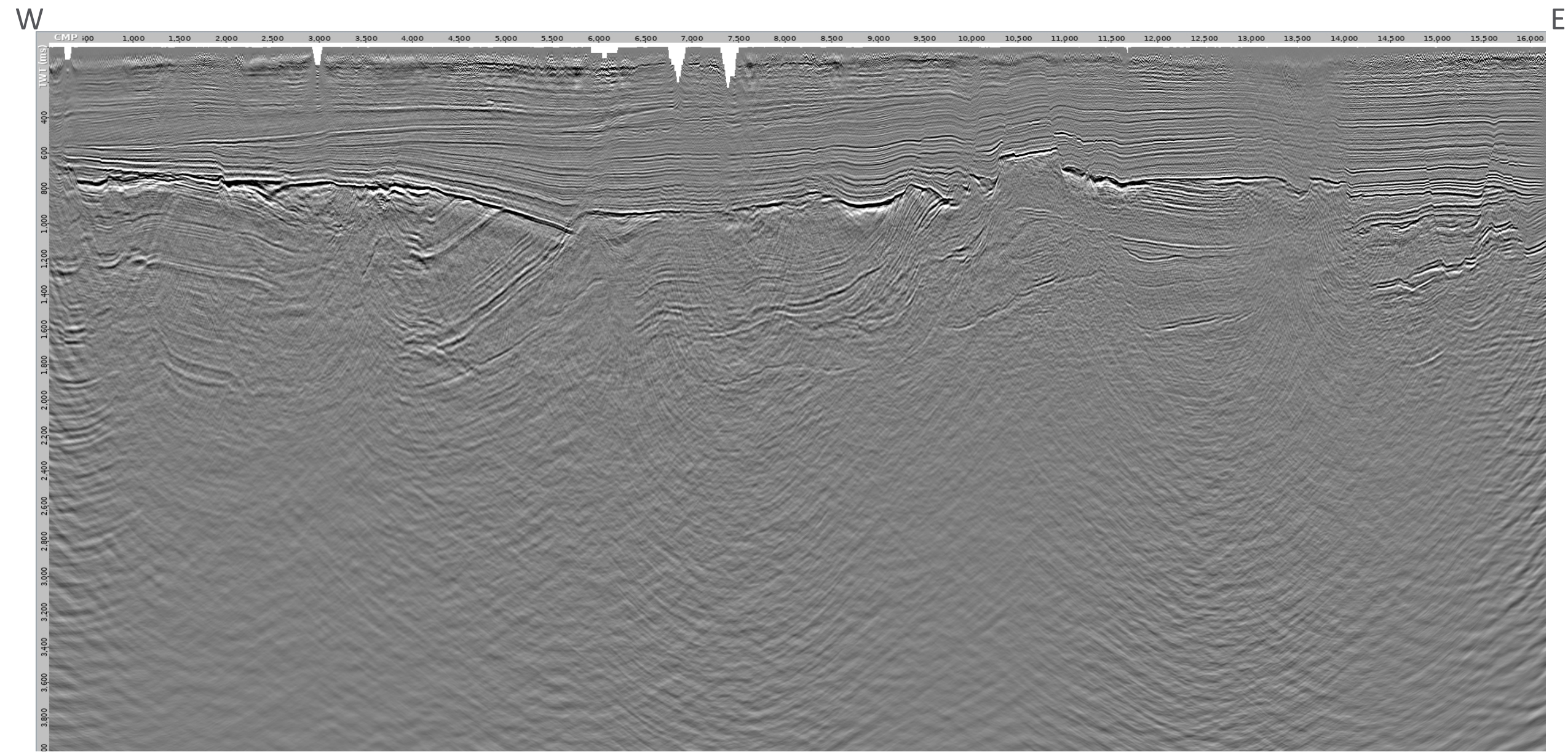
UGOU022-SCAN023 stack with Radon and dip filter on CDPs (REPEAT SLIDE)

At floating datum



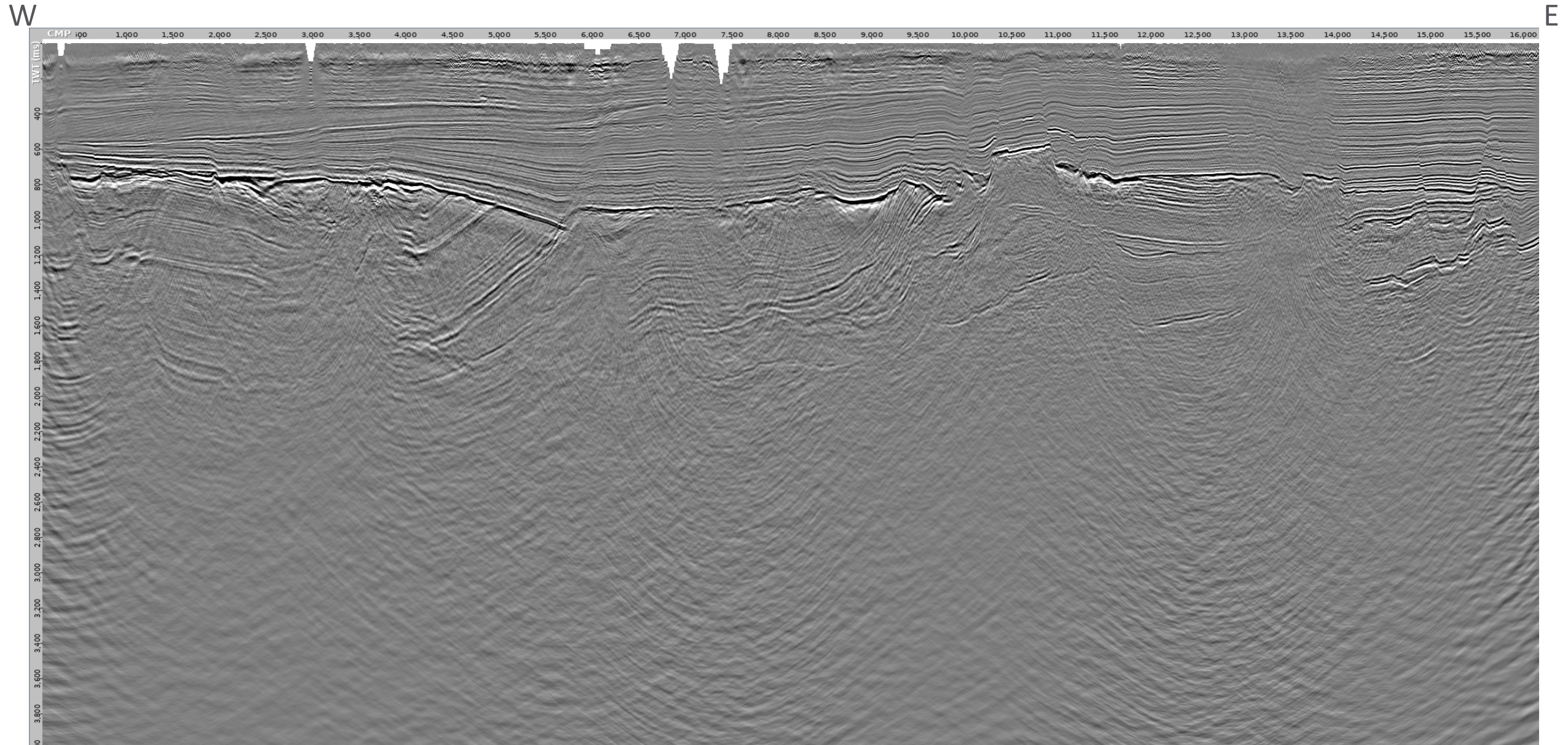
UGOU022-SCAN023 stack with trim statics

At floating datum



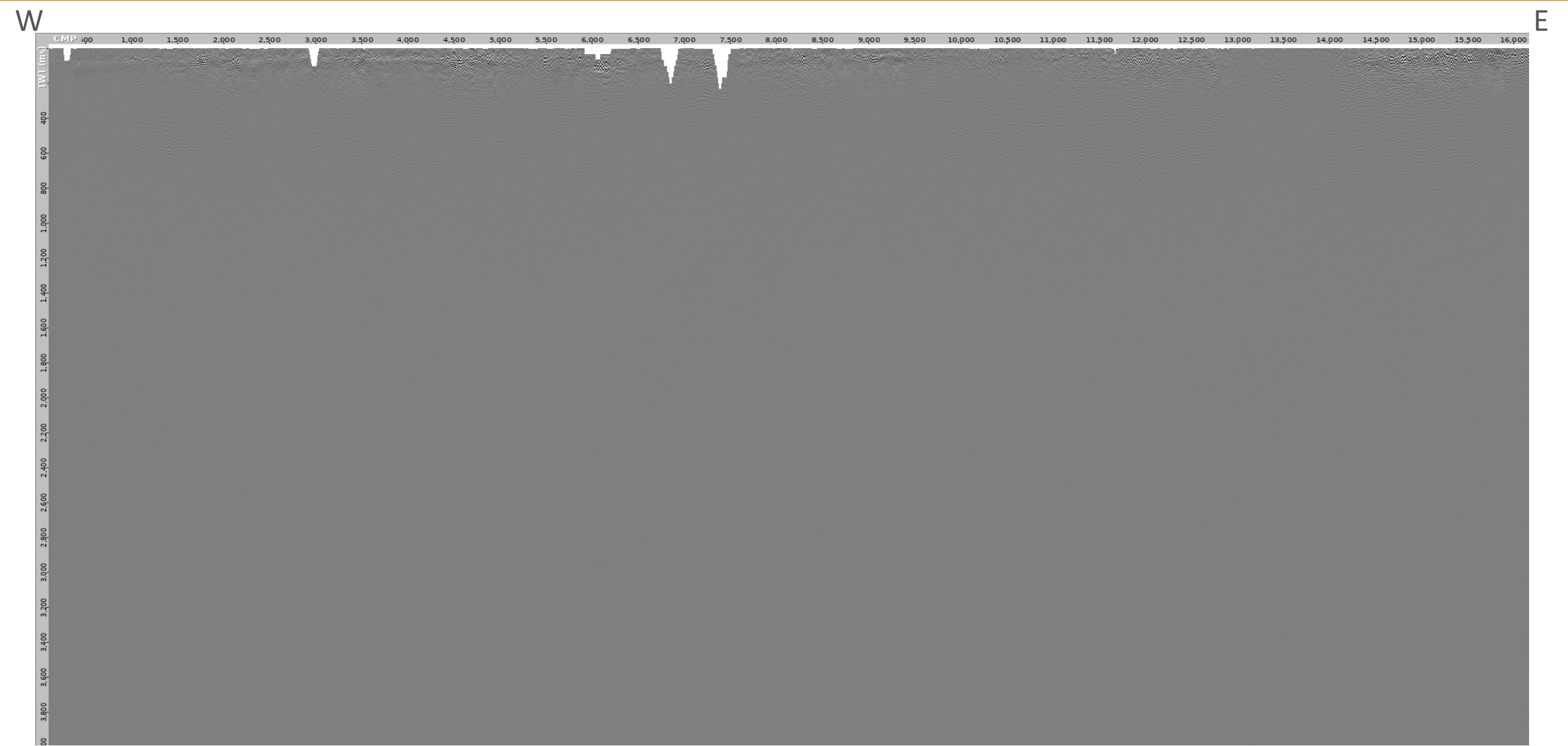
UGOU022-SCAN023 stack with CDP Cadzow noise attenuation, dip filter

At floating datum



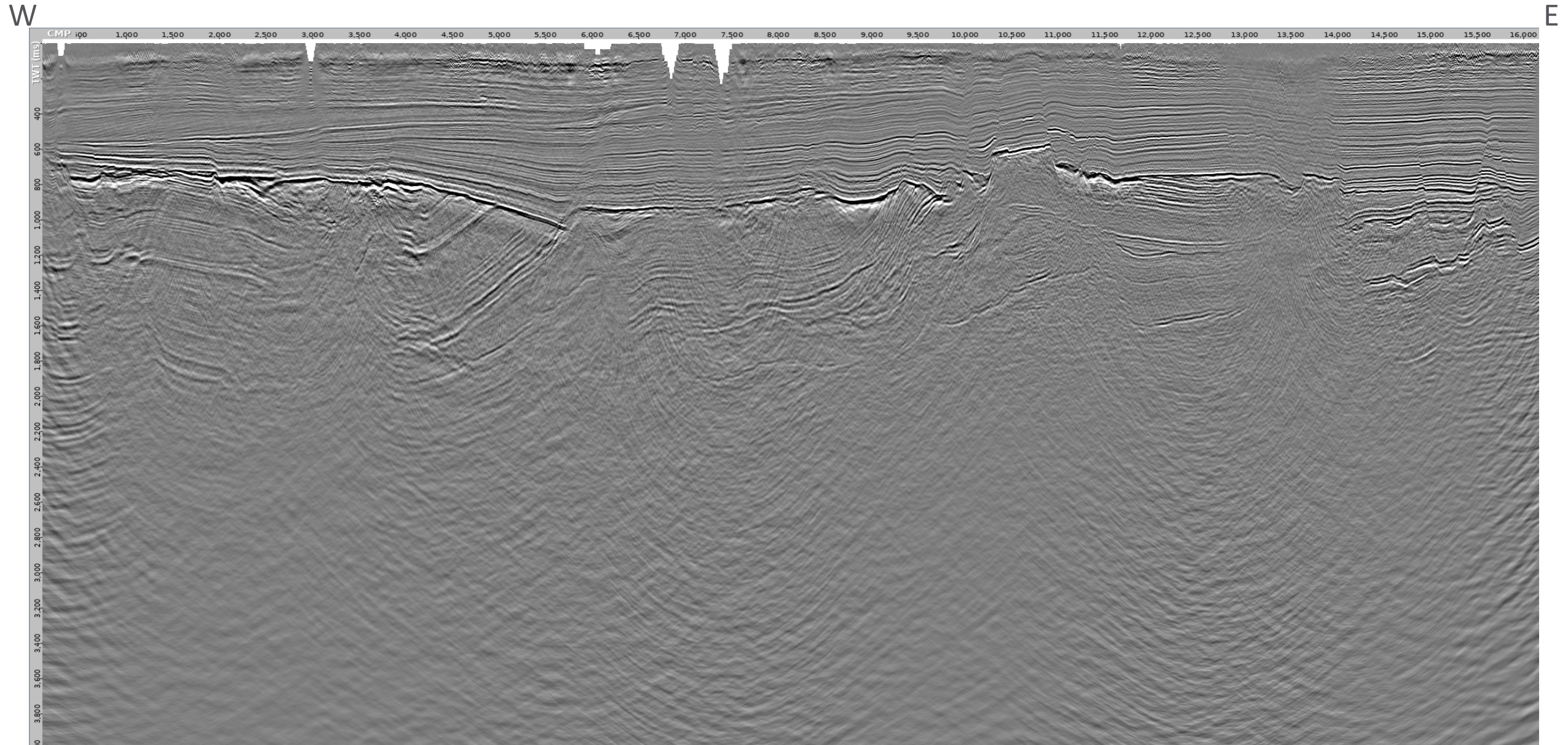
UGOU022-SCAN023 stack with CDP Cadzow noise attenuation and dip filter difference

At floating datum



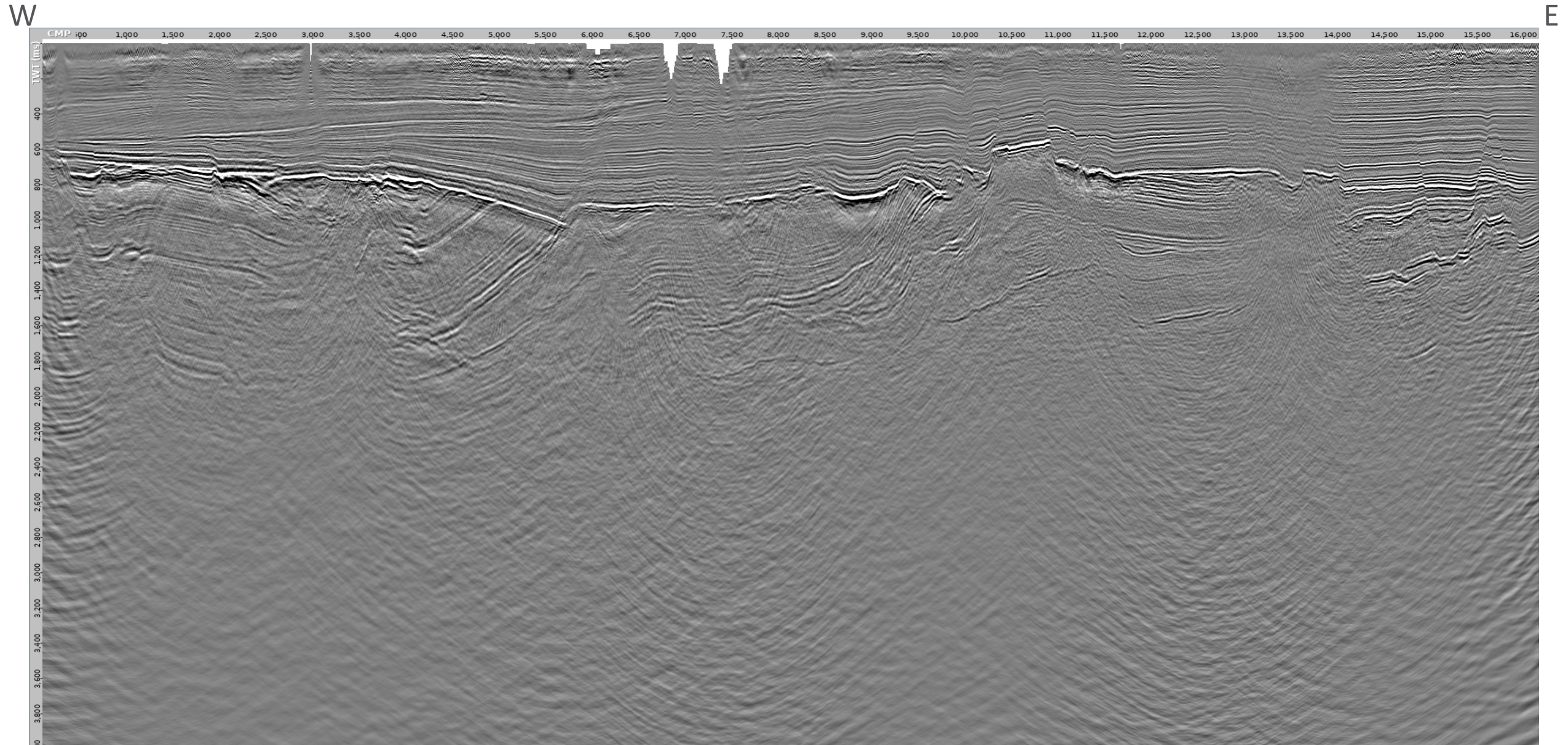
UGOU022-SCAN023 stack with CDP Cadzow noise attenuation, dip filter (REPEAT SLIDE)

At floating datum



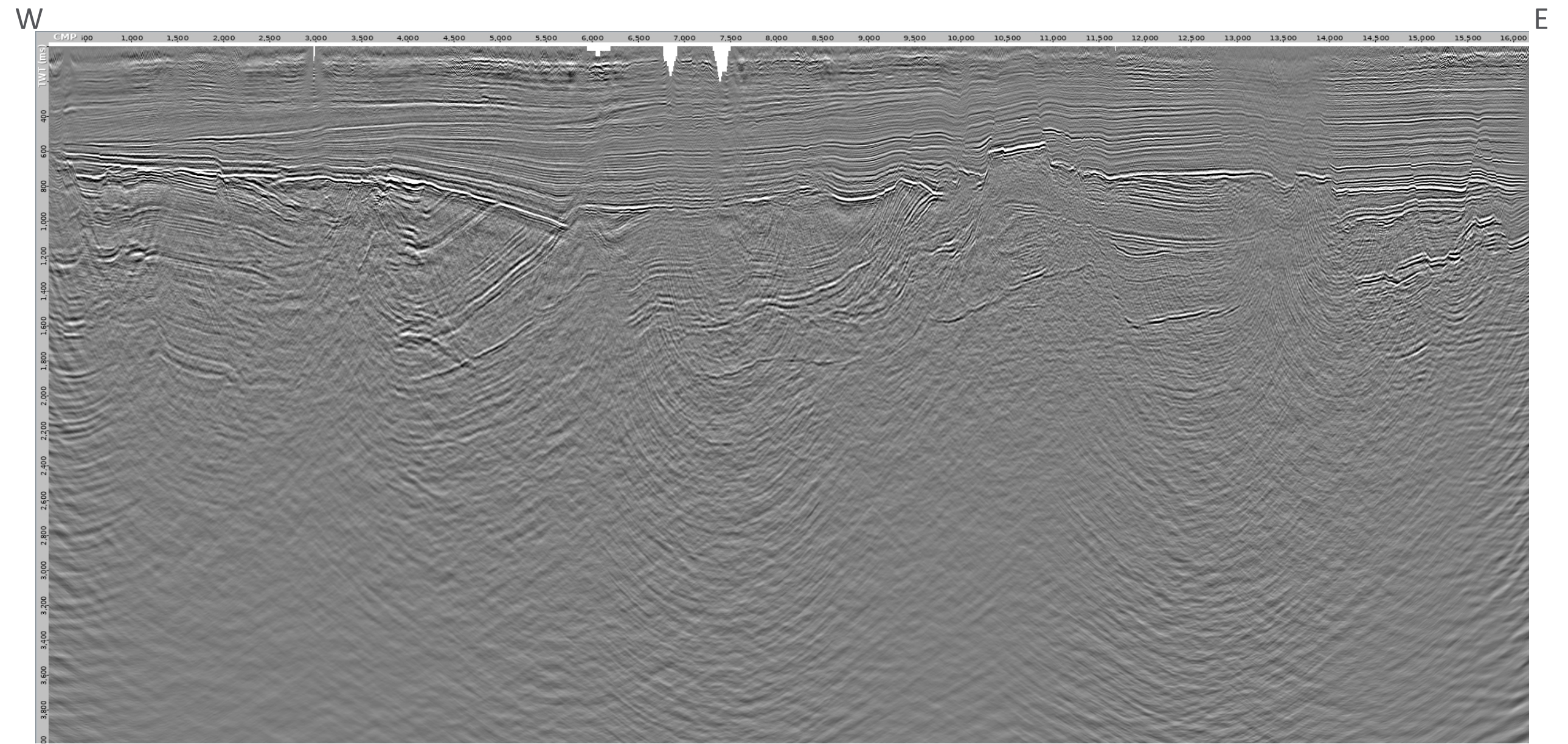
UGOU022-SCAN023 stack with CDP Cadzow noise attenuation, dip filter, zero phase operator applied

At floating datum



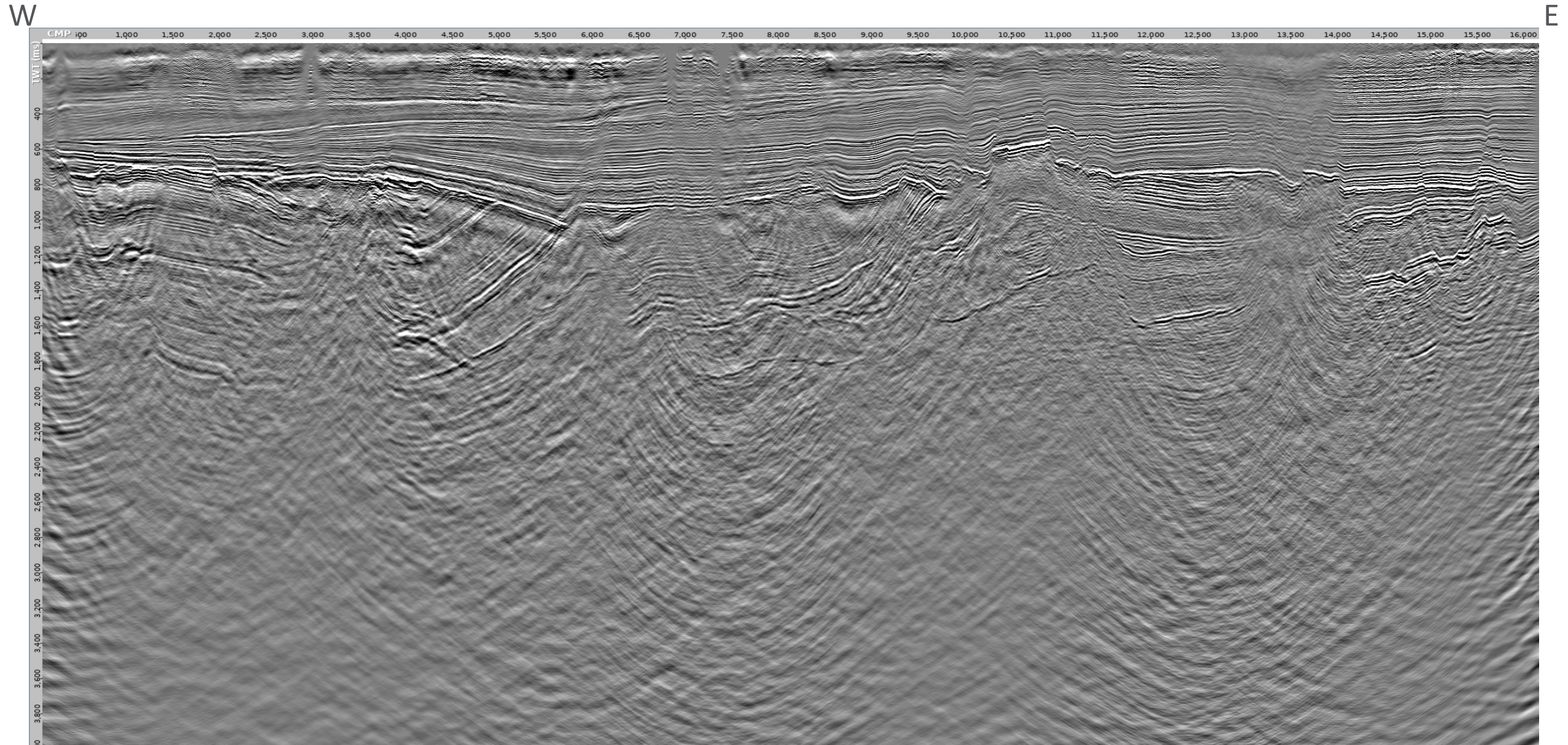
UGOU022-SCAN023 stack with picked mute

At floating datum



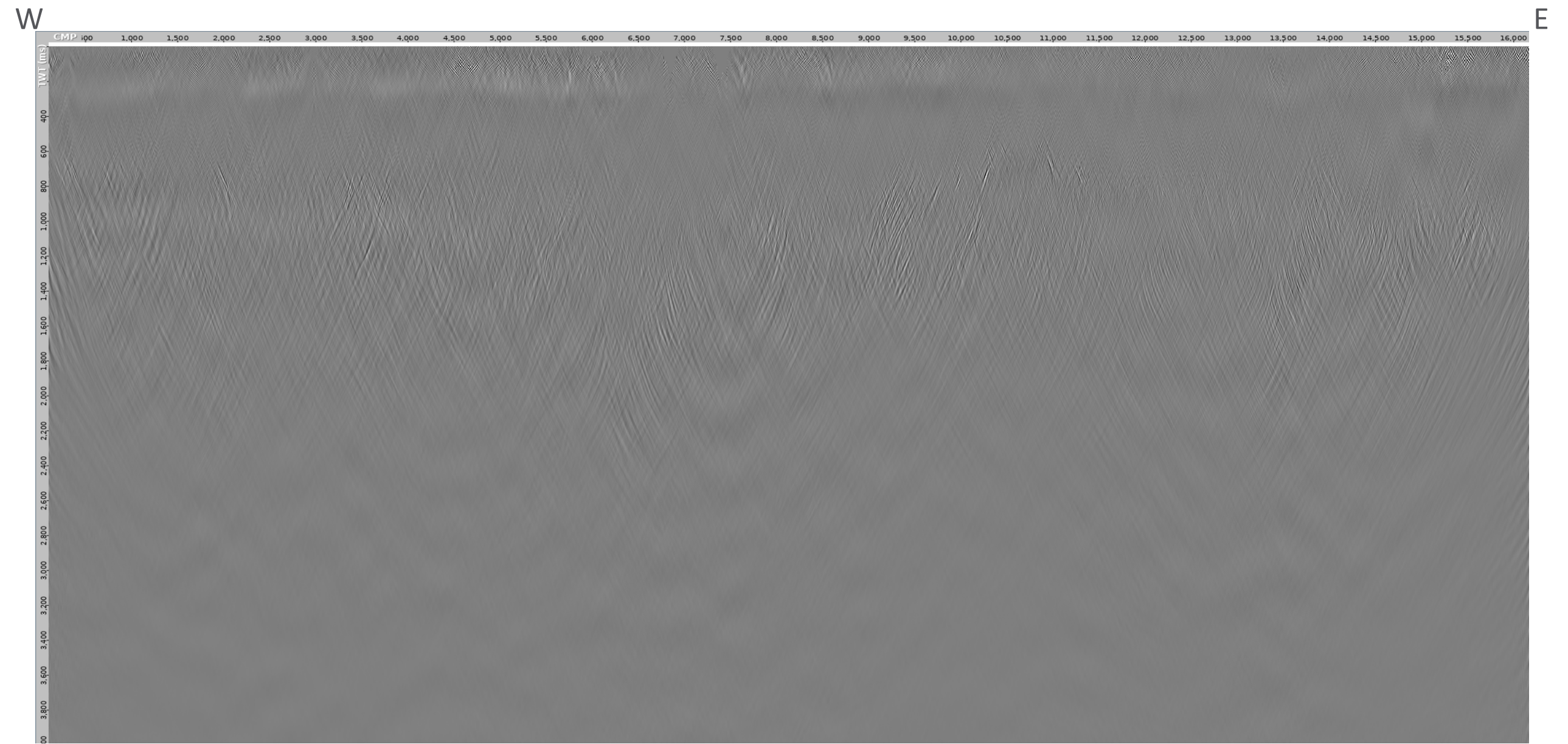
UGOU022-SCAN023 stack with spectral broadening and dip filter

At floating datum



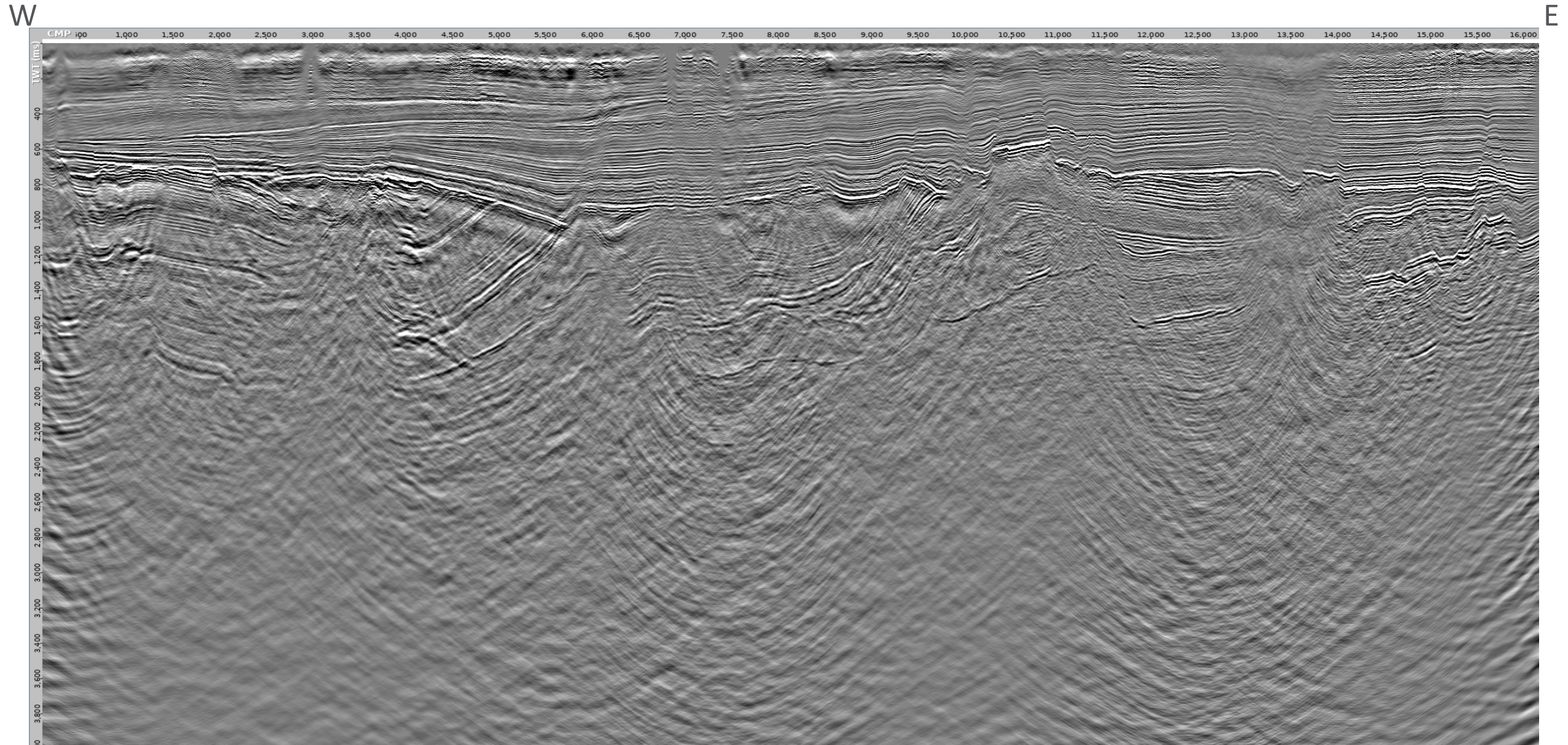
UGOU022-SCAN023 stack difference with dip filter relative to no dip filter

At floating datum



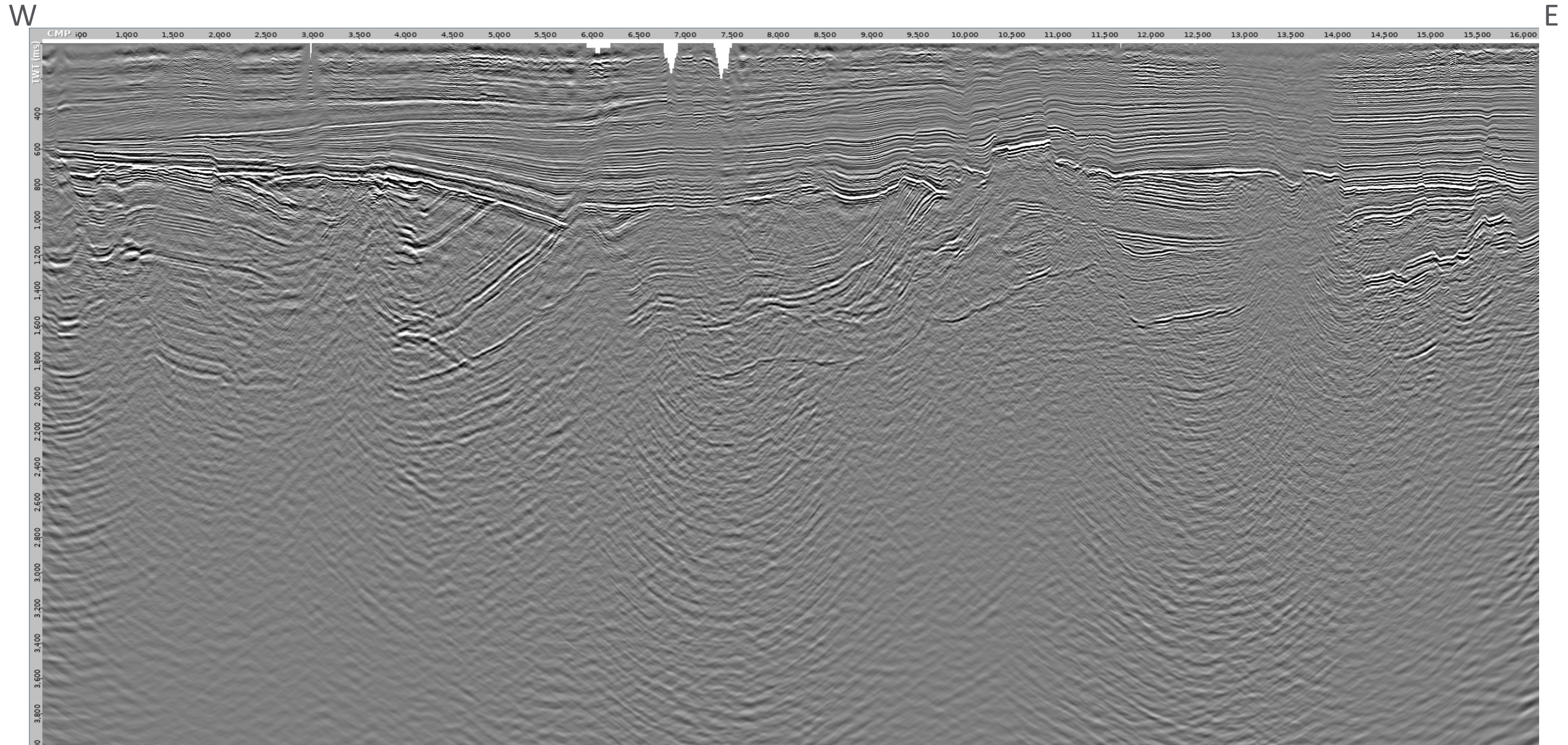
UGOU022-SCAN023 stack with spectral broadening and dip filter (REPEATED)

At floating datum



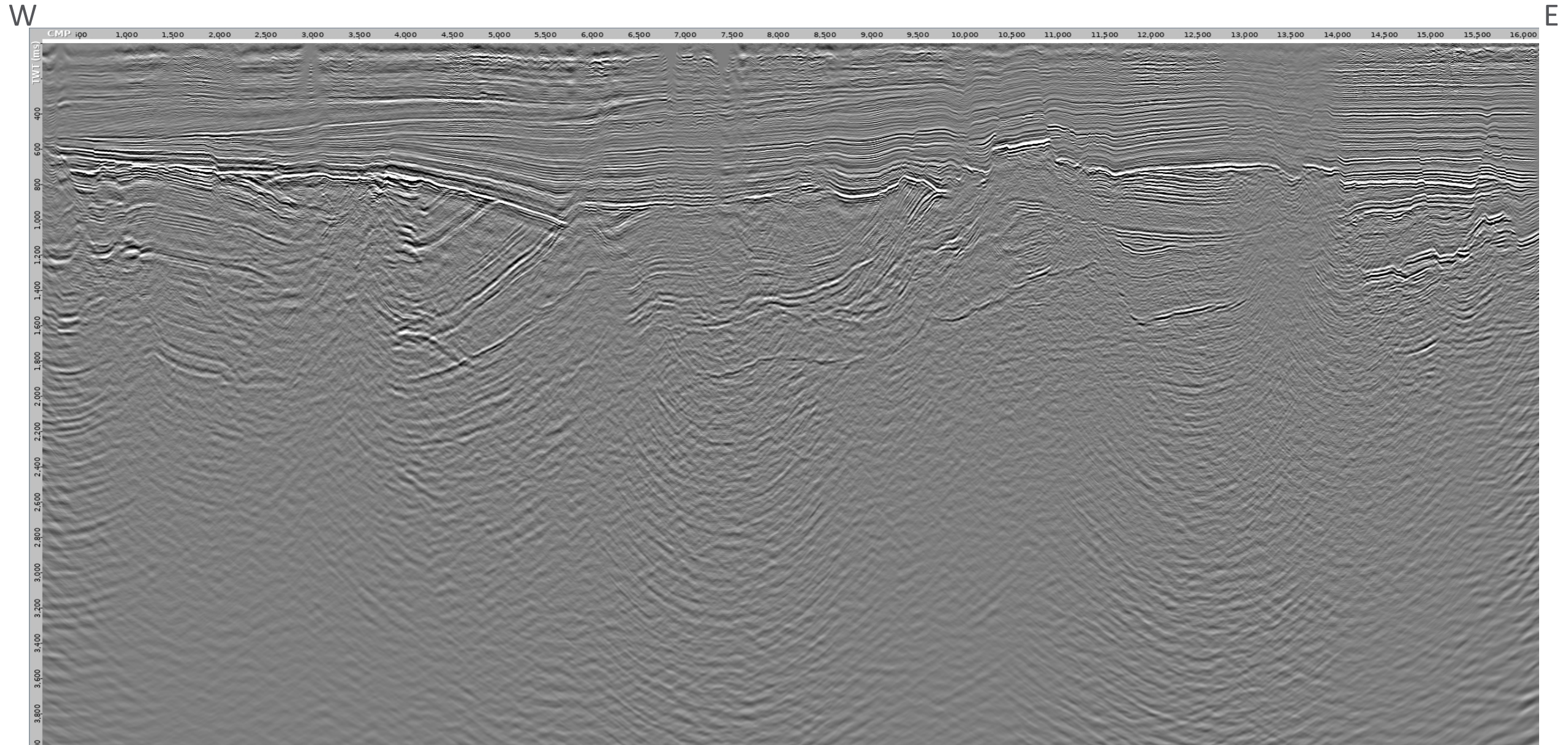
UGOU022-SCAN023 stack with original dip filter, SOF and time-variant bandpass filter stack

At floating datum



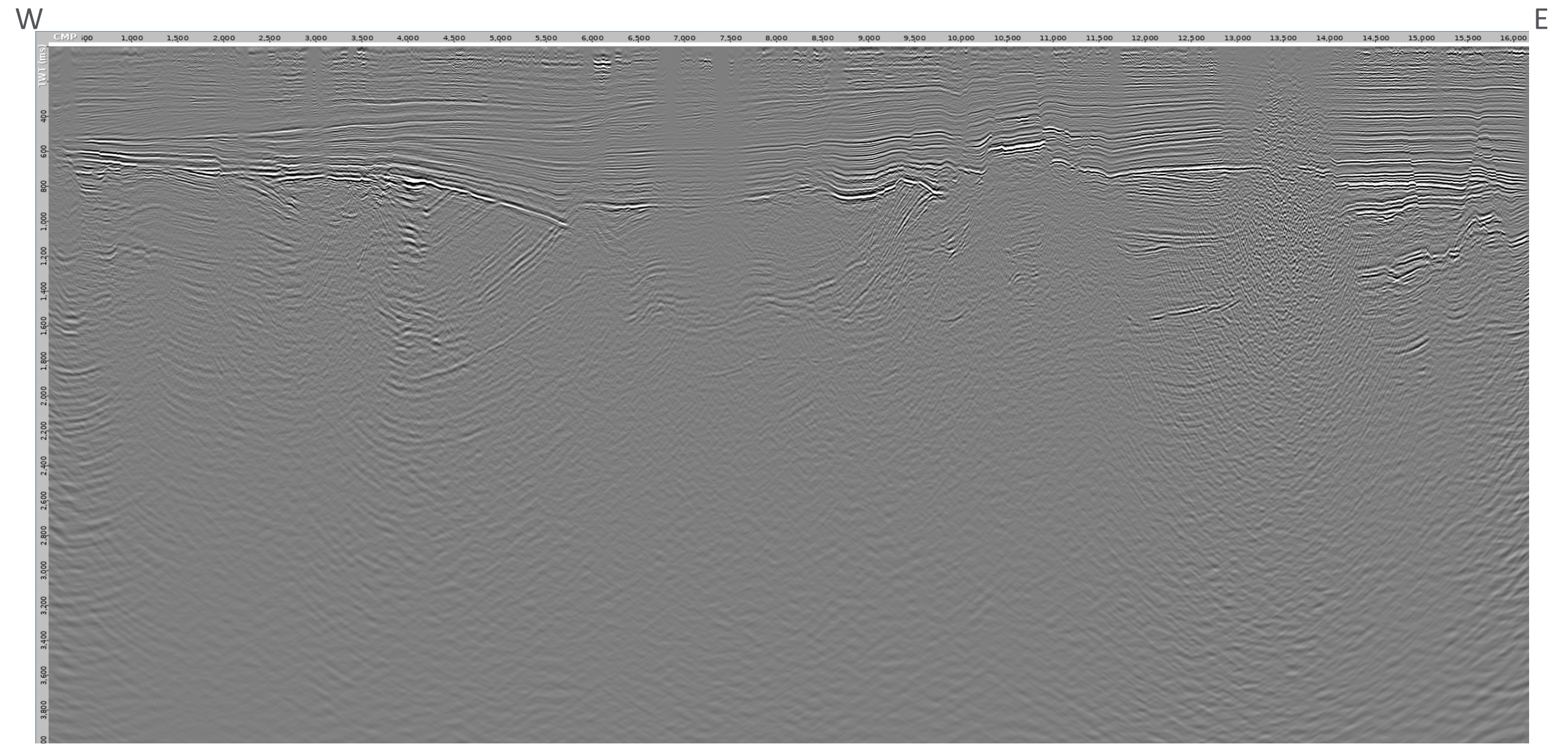
UGOU022-SCAN023 stack with original dip filter, SOF and time-variant bandpass filter stack on flat datum

At flat datum



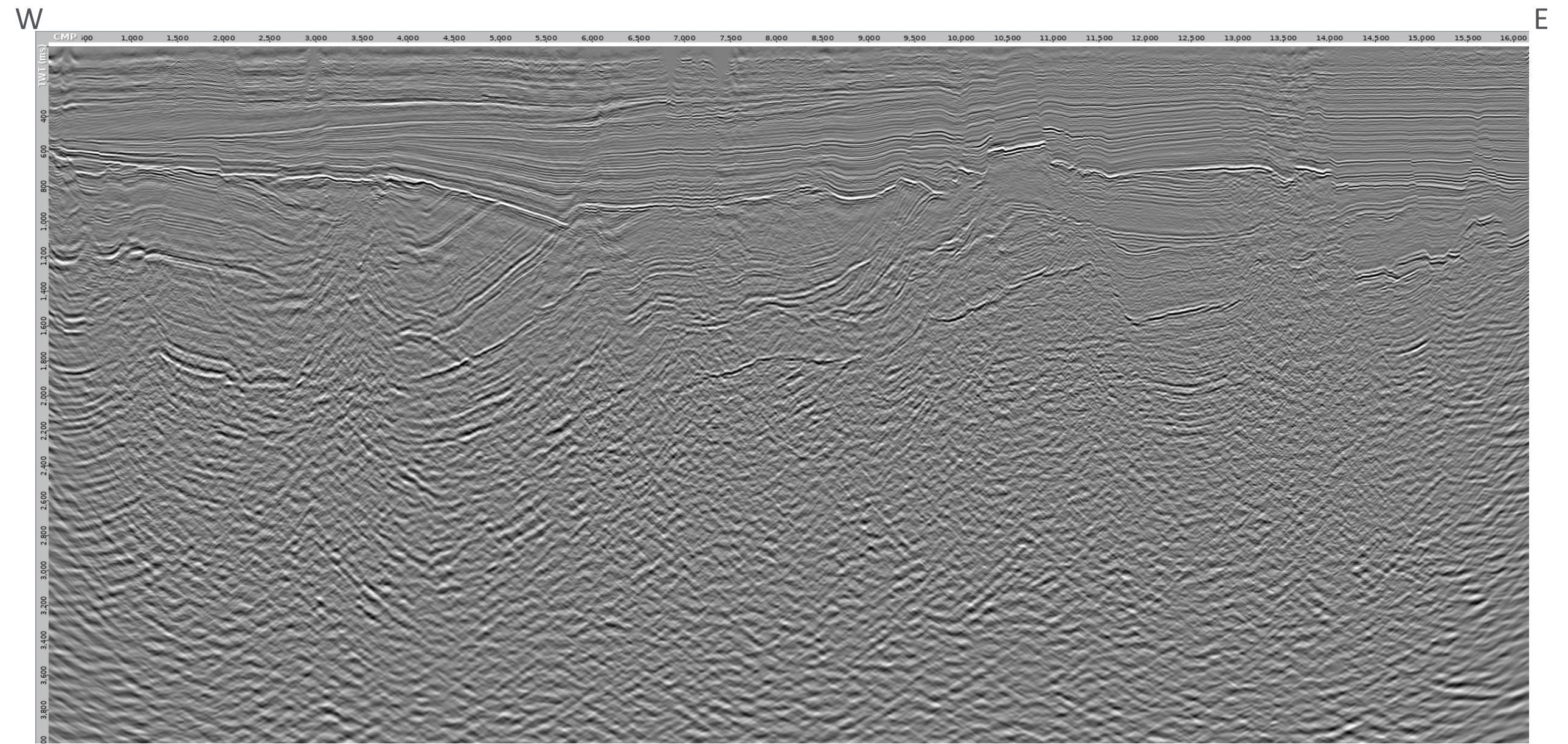
UGOU022-SCAN023 fast-track true amplitude stack

At flat datum



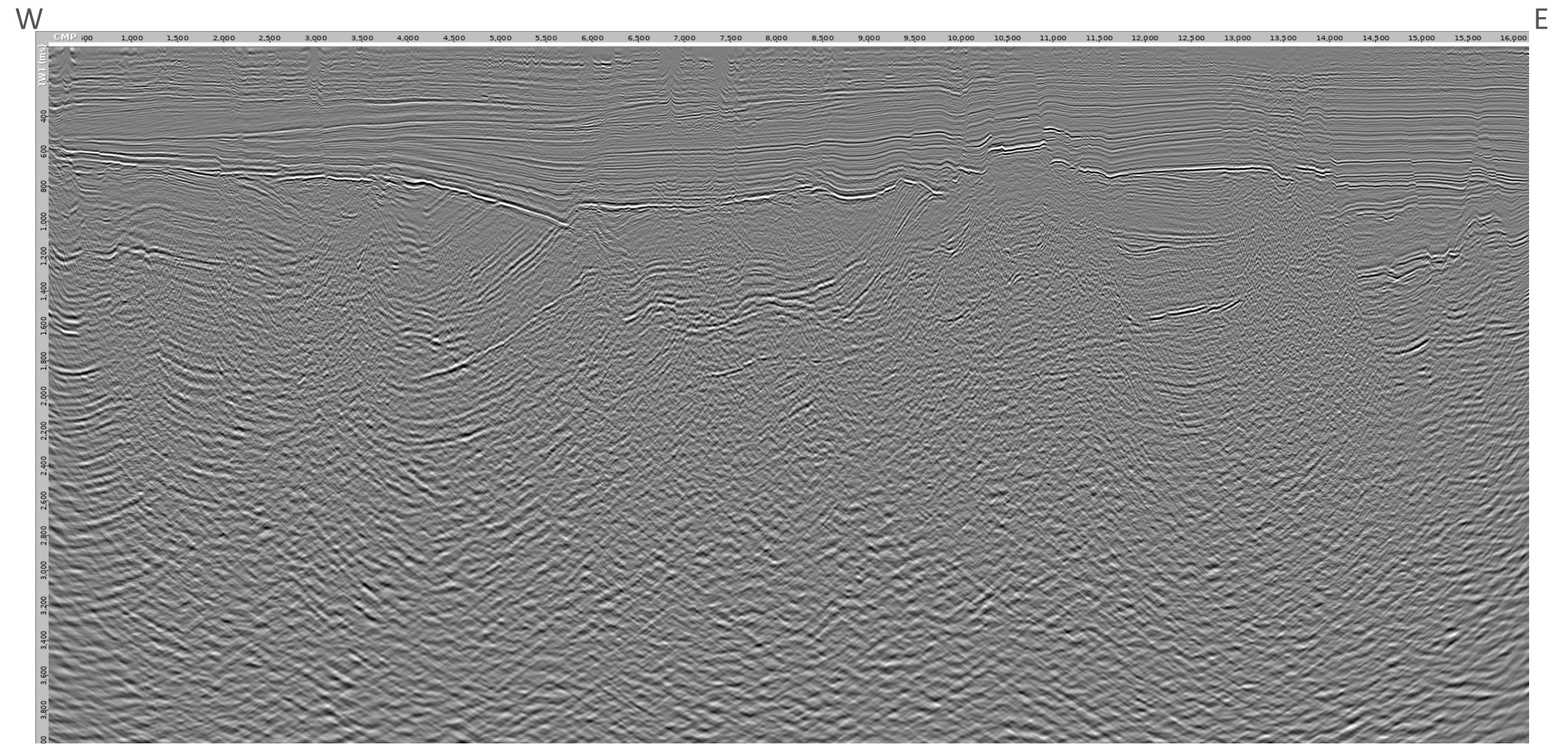
UGOU022-SCAN023 final AGC stack on flat datum

At flat datum



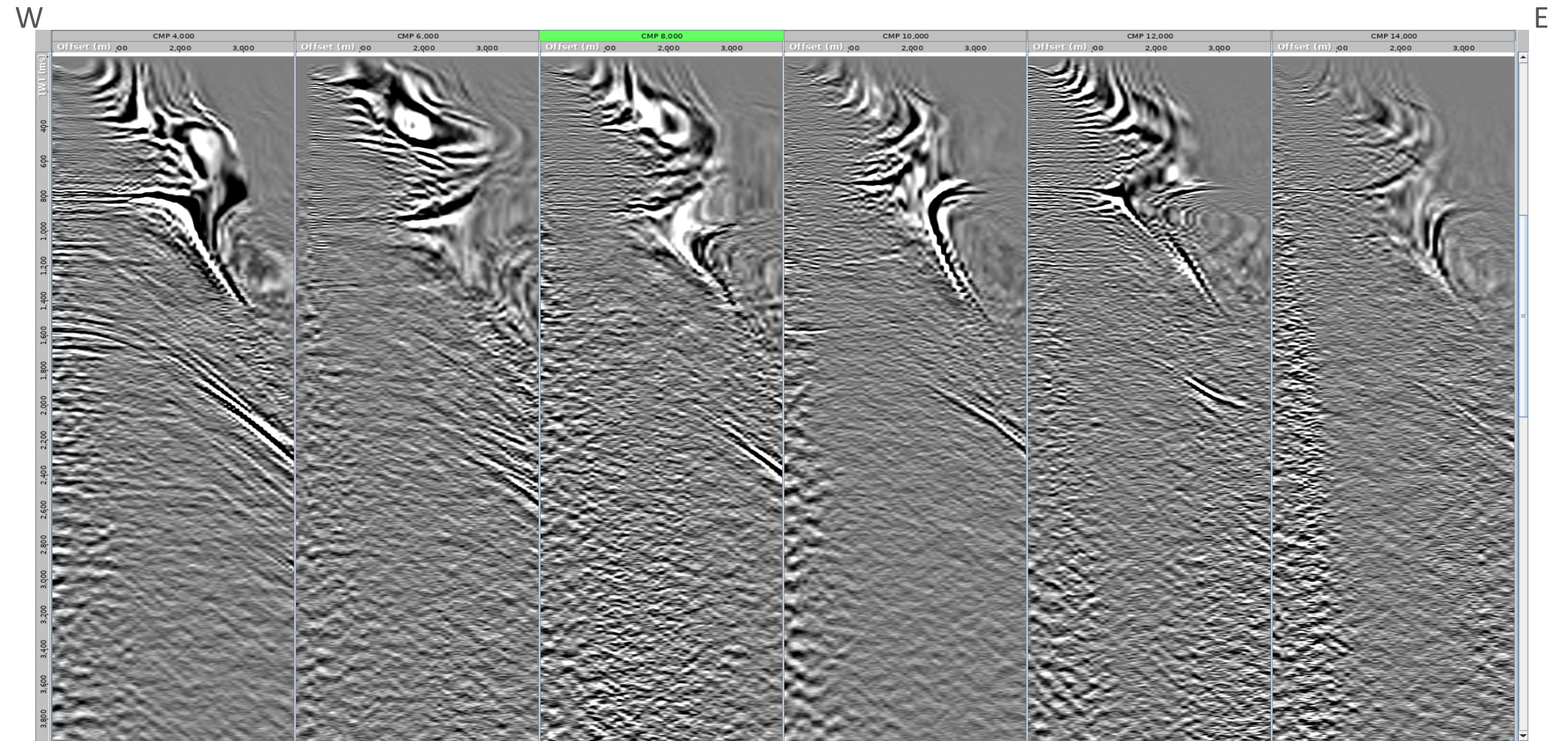
UGOU022-SCAN023 fast-track AGC stack

At flat datum



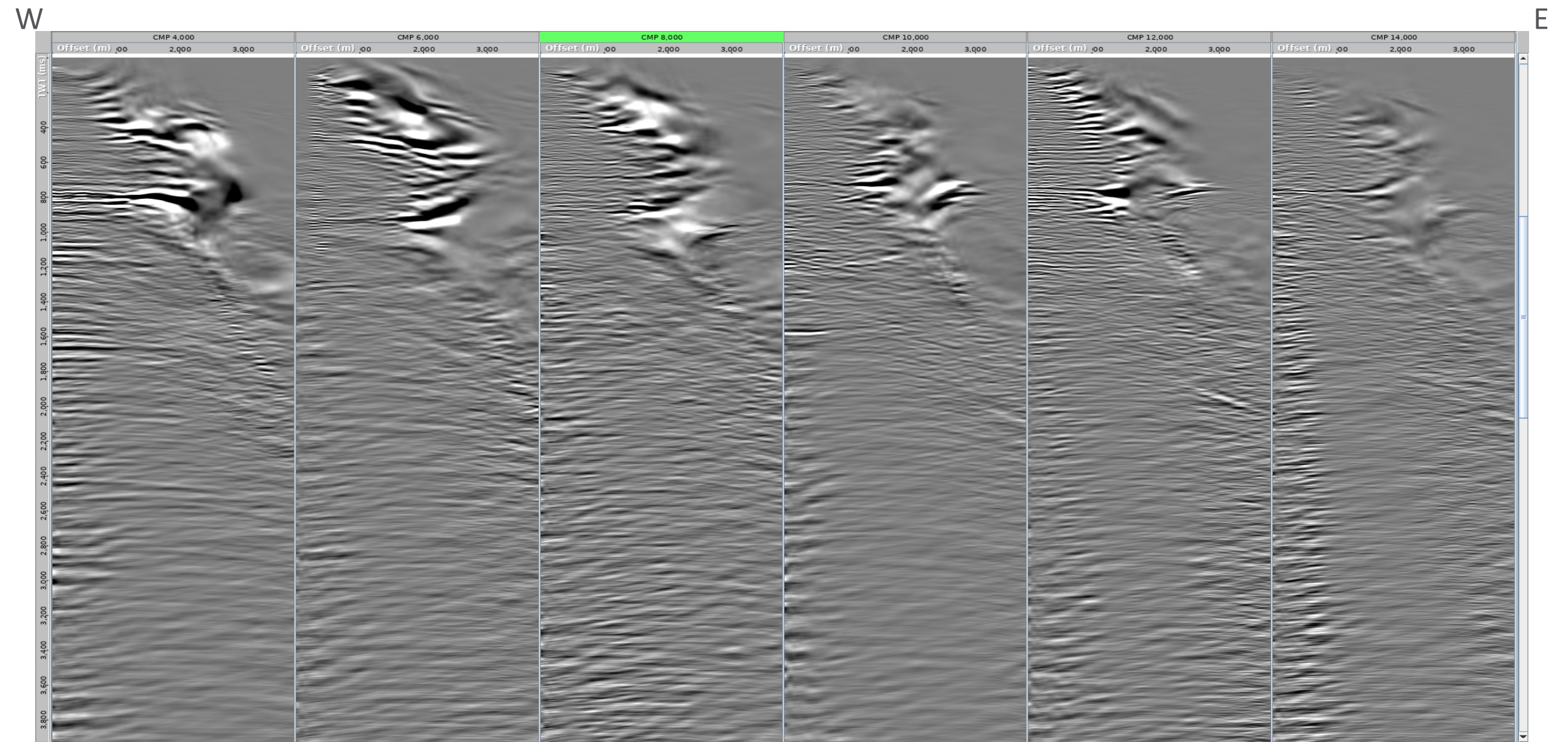
UGOU022-SCAN023 raw migration CDPs

At floating datum



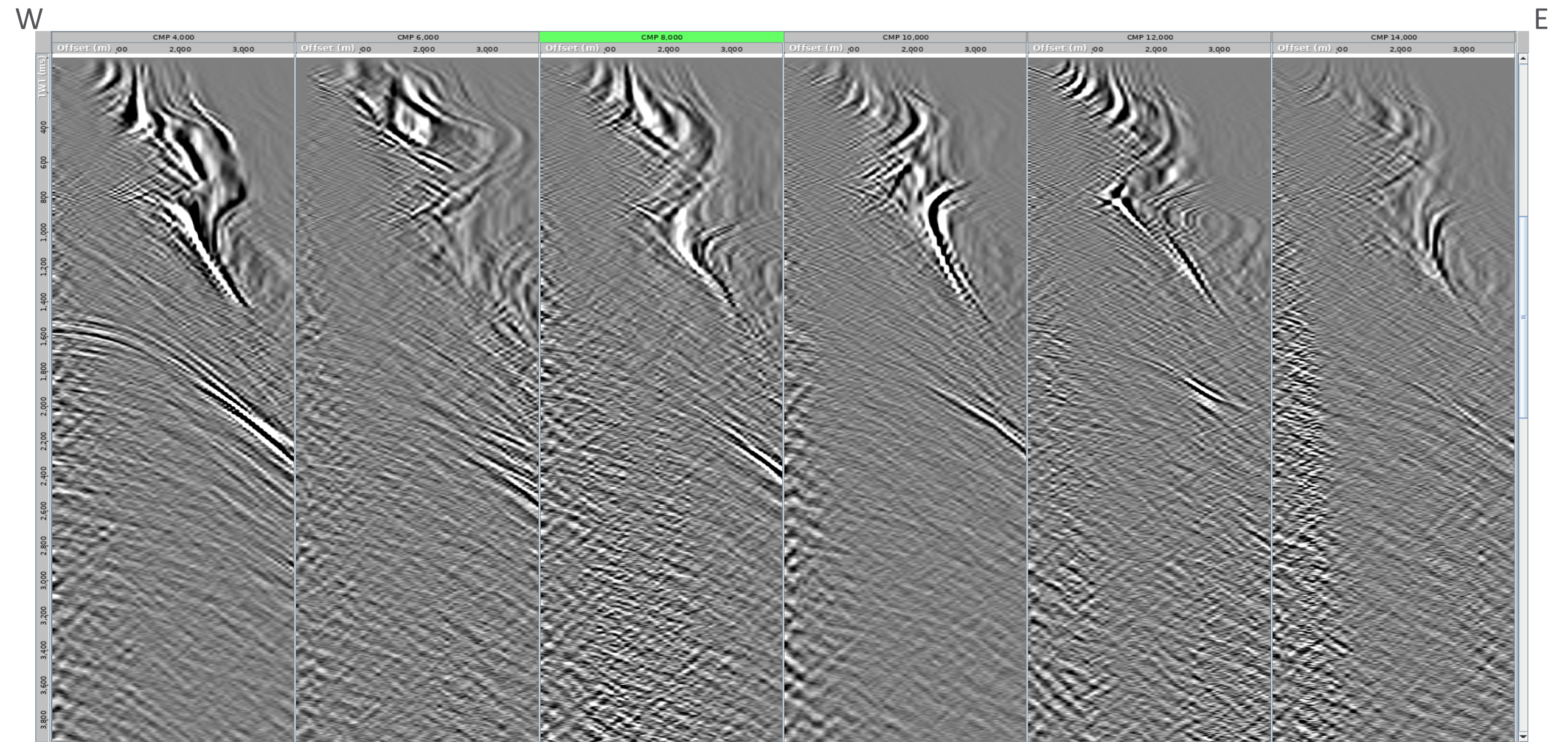
UGOU022-SCAN023 CDPs with Radon and dip filter

At floating datum



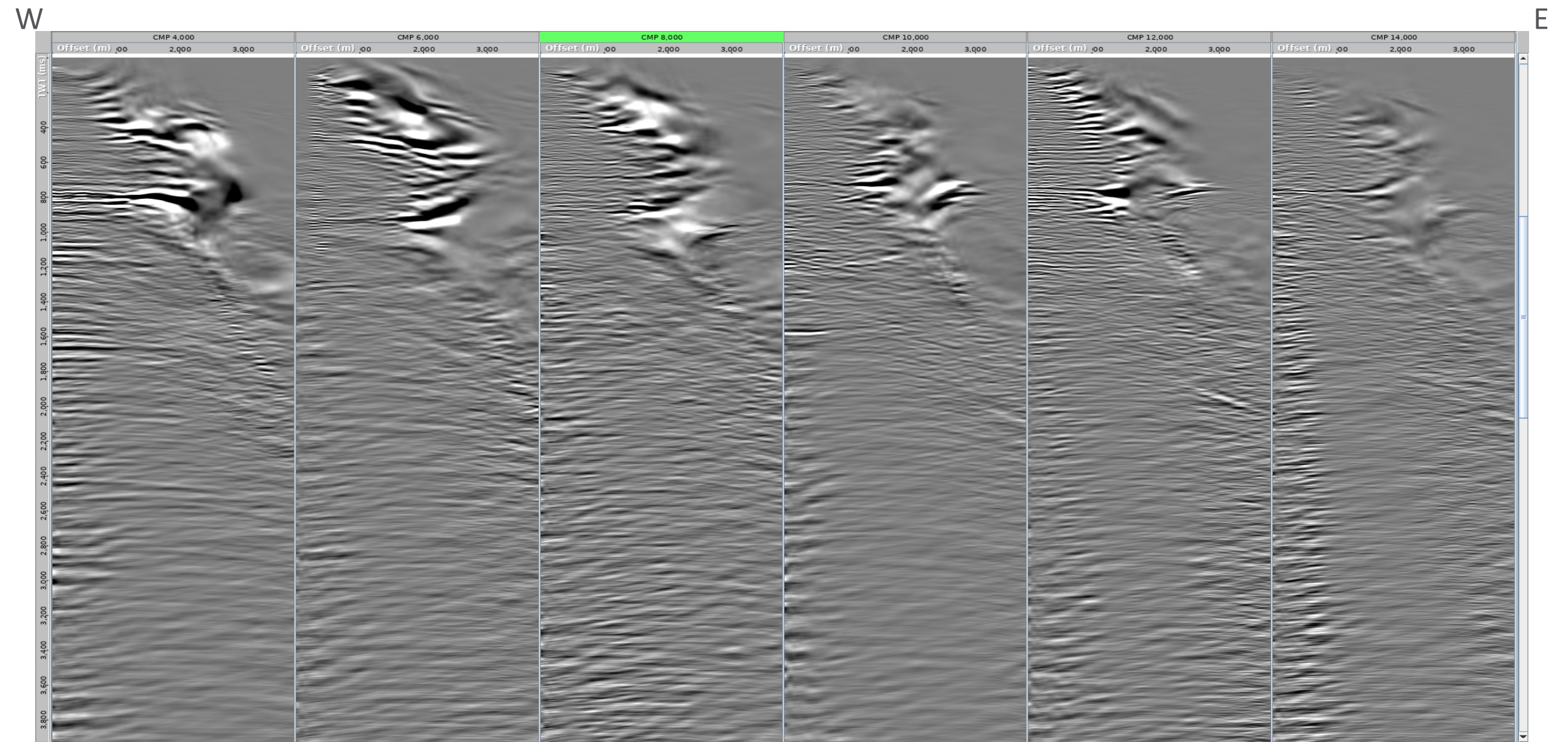
UGOU022-SCAN023 CDPs with Radon and dip filter difference

At floating datum



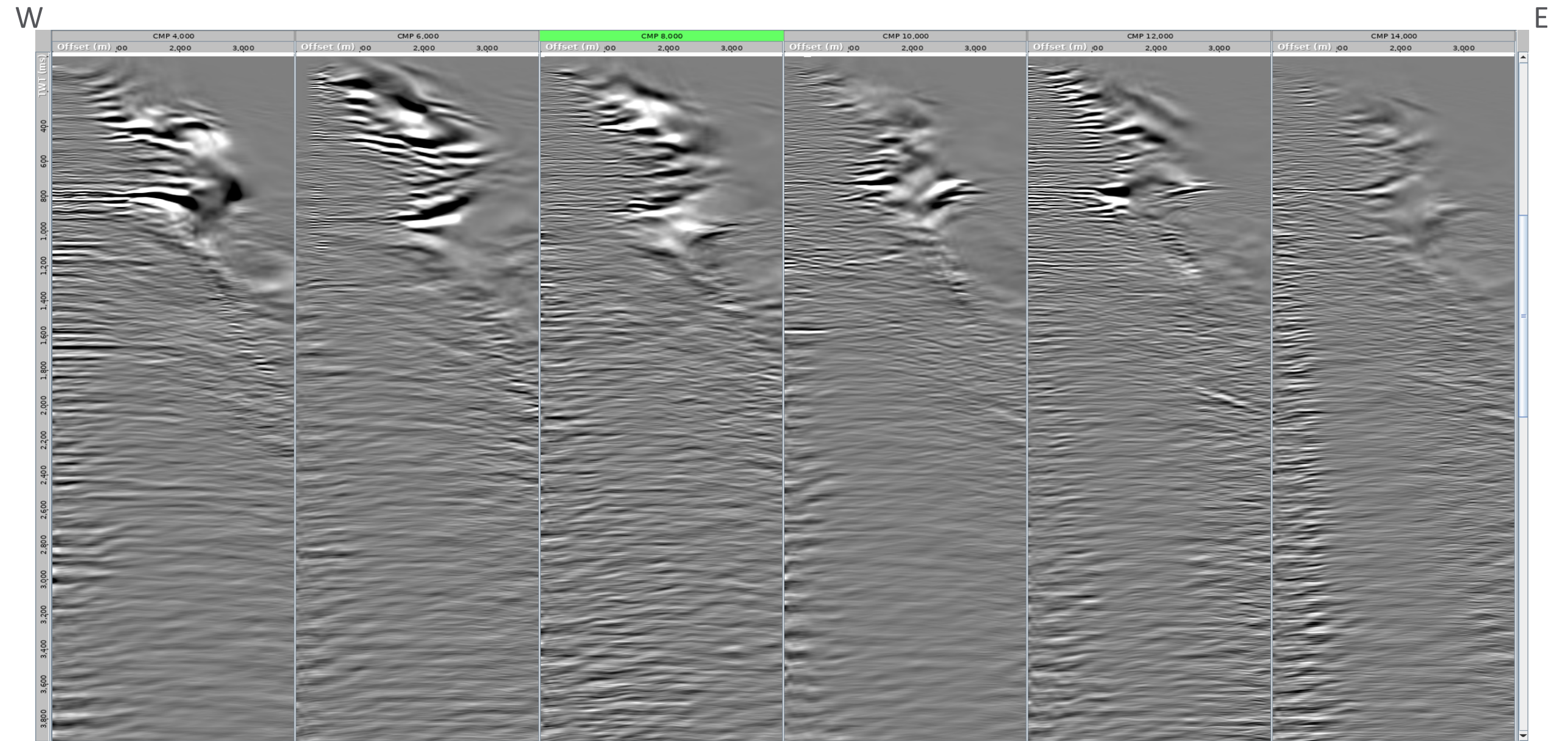
UGOU022-SCAN023 CDPs with Radon and dip filter (REPEAT SLIDE)

At floating datum



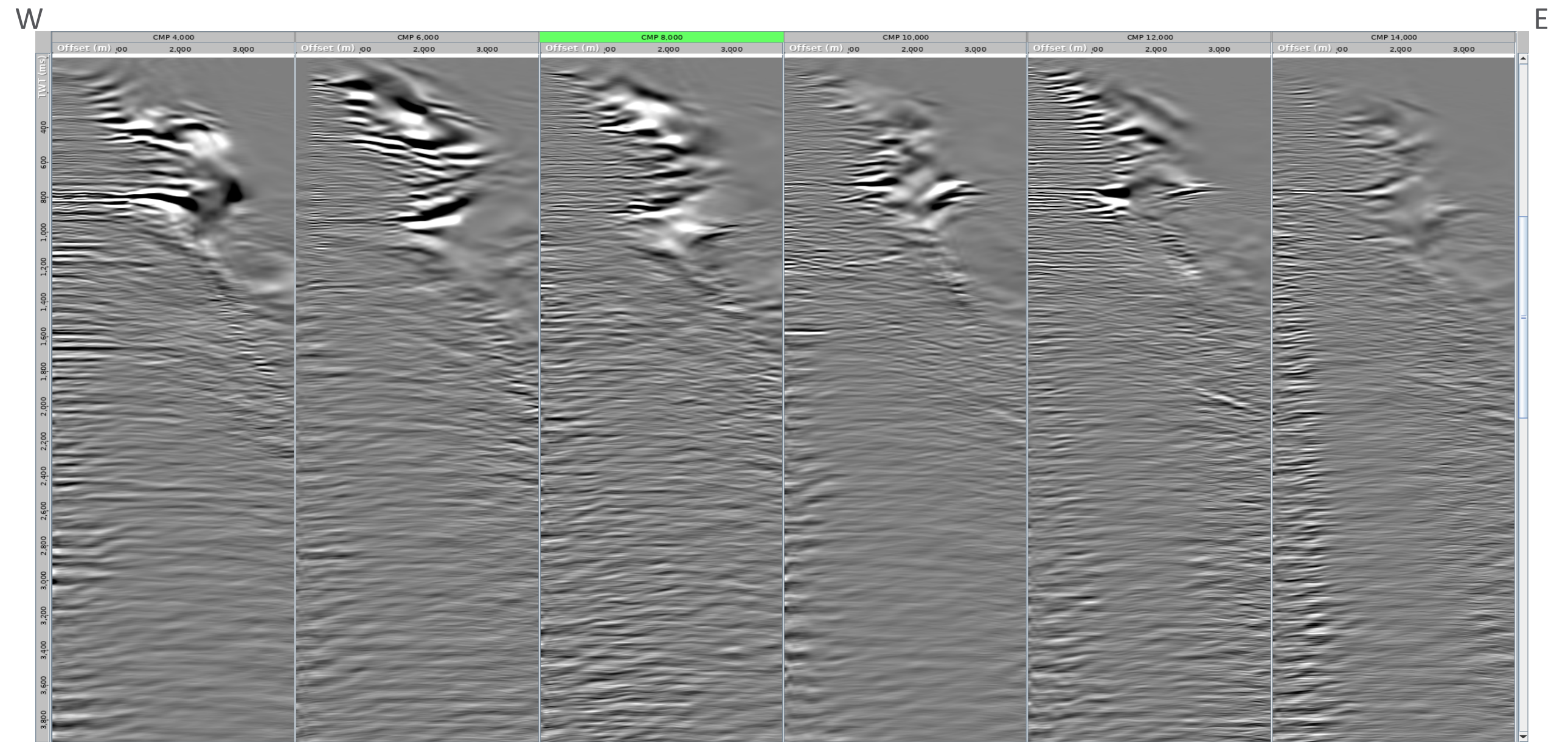
UGOU022-SCAN023 CDPs with trim statics

At floating datum



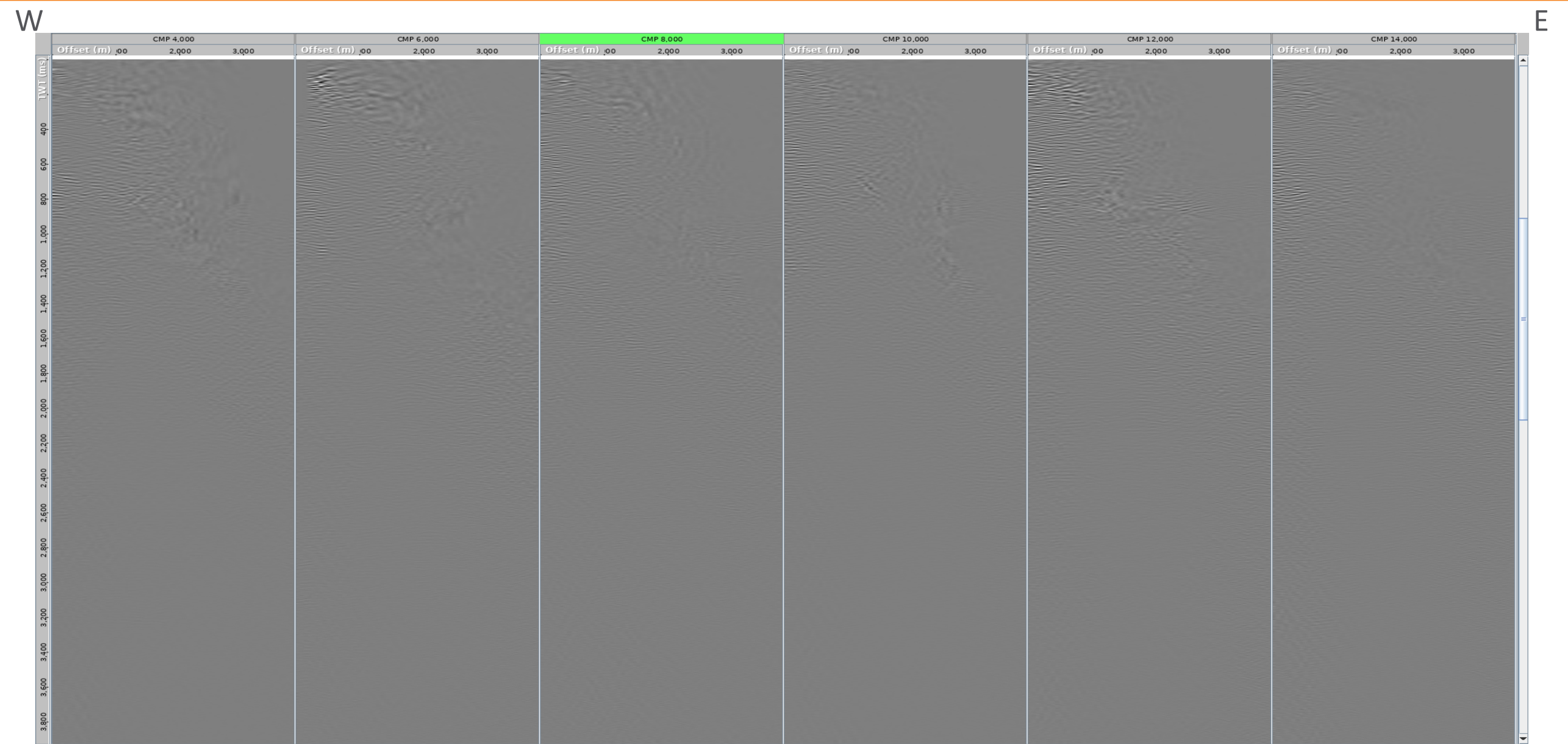
UGOU022-SCAN023 CDPs with trim, Cadzow on CDP-offset and dip filter

At floating datum



UGOU022-SCAN023 CDPs with Cadzow on CDP-offset and dip filter difference

At floating datum



UGOU022-SCAN023 CDPs with Cadzow on CDP-offset and dip filters, with mute overlay

At floating datum

