

# Update on DAS and geophone VSP surveys at the CaMI Field Research Station, Newell County, Alberta

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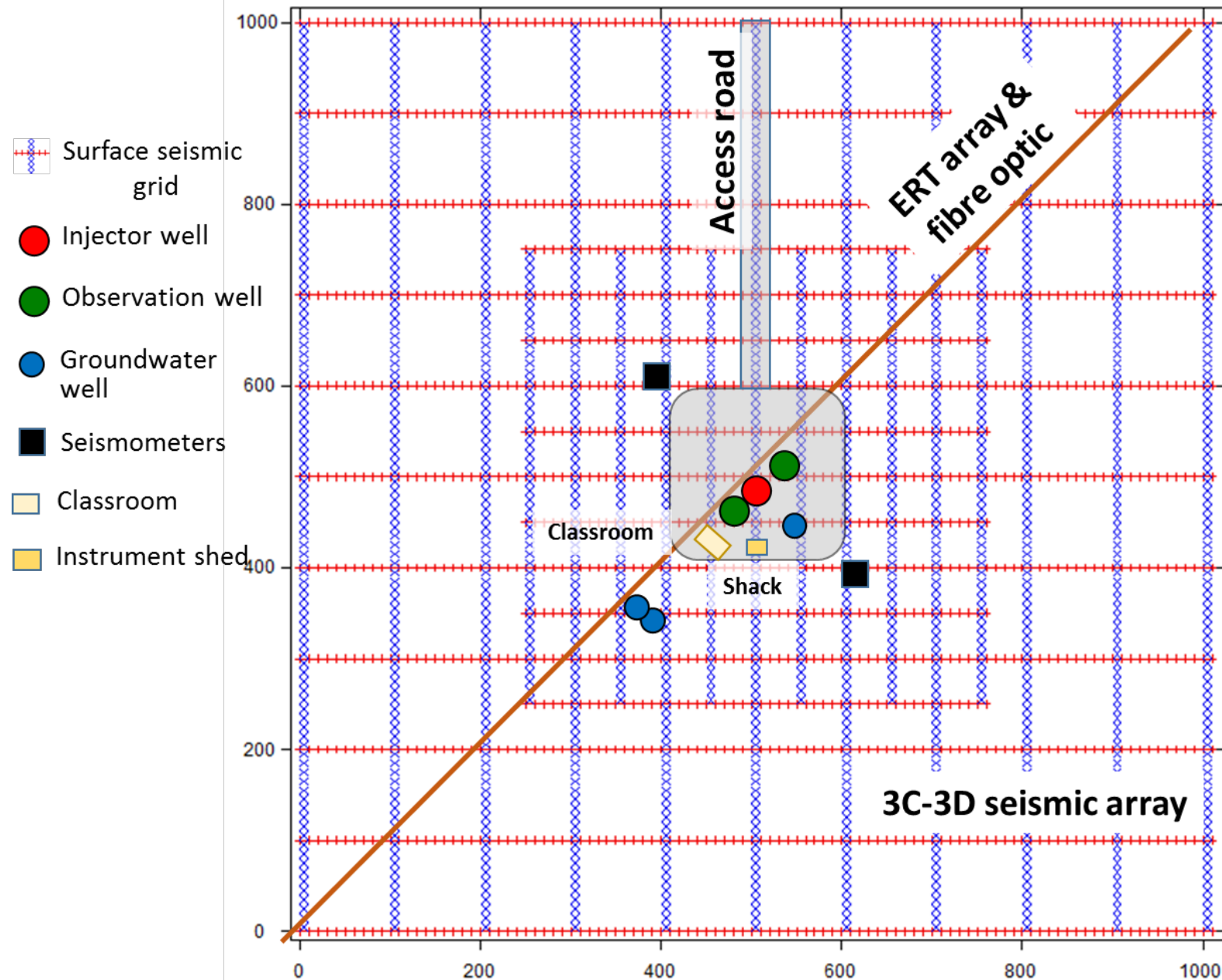


# CaMI.FRS location



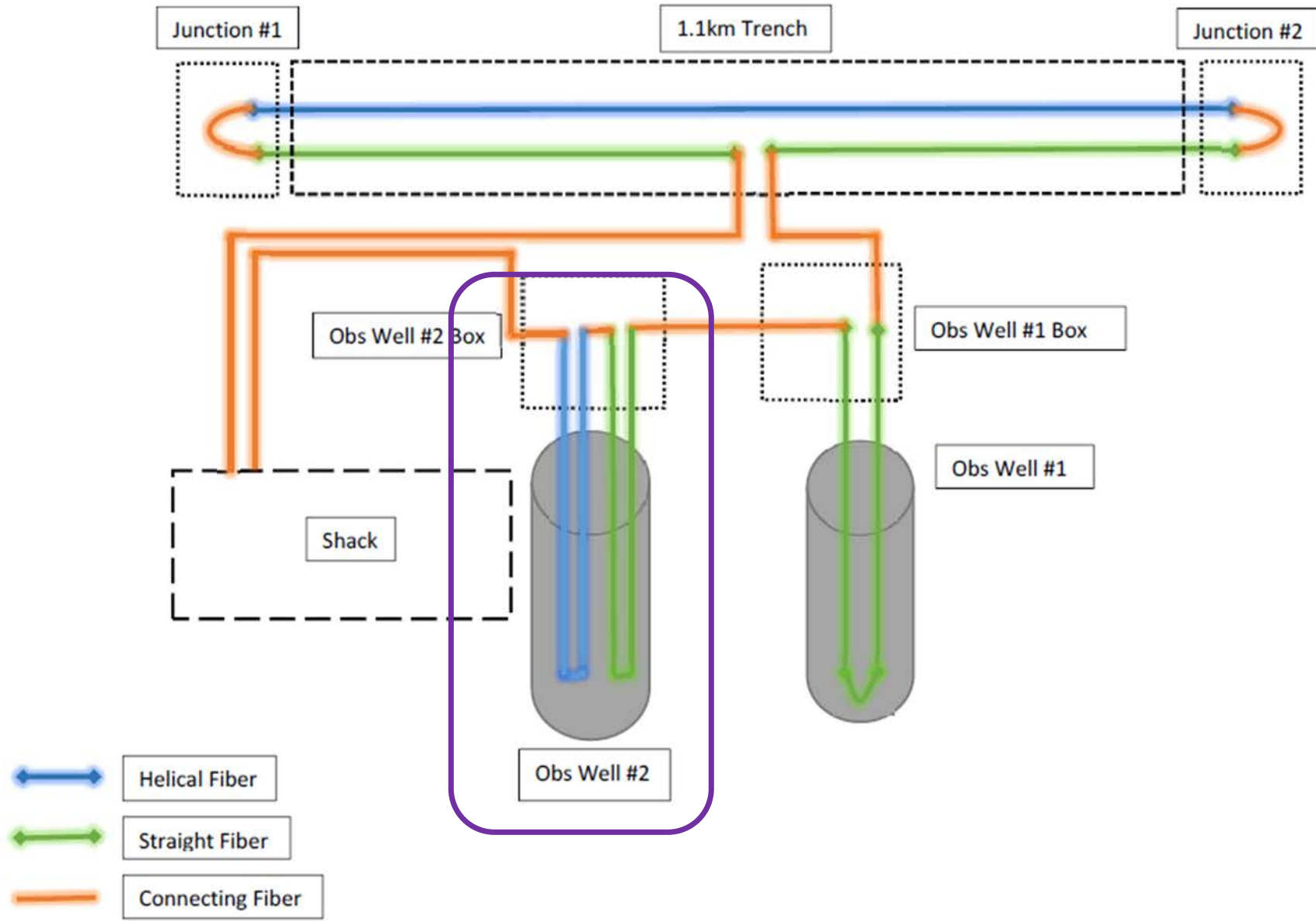


# CaMI Field Research Station



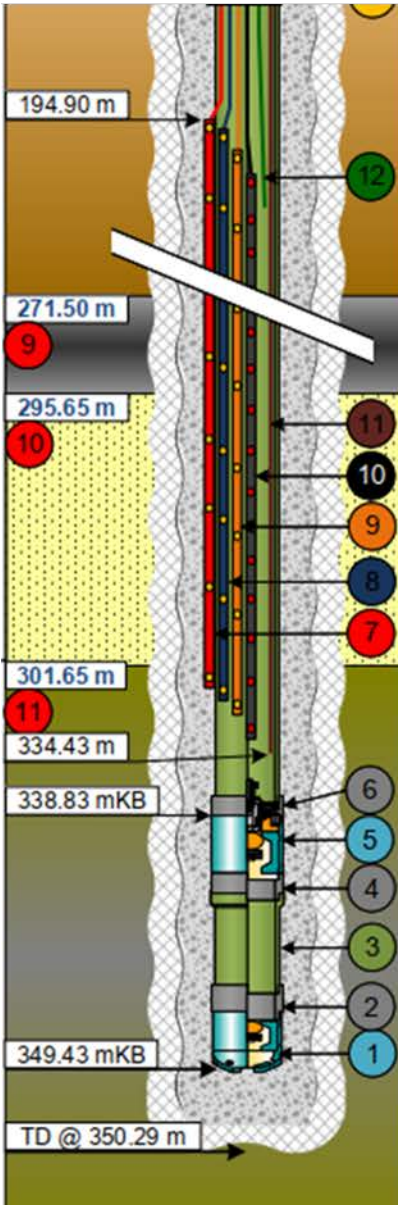


# CaMI.FRS fibre loop

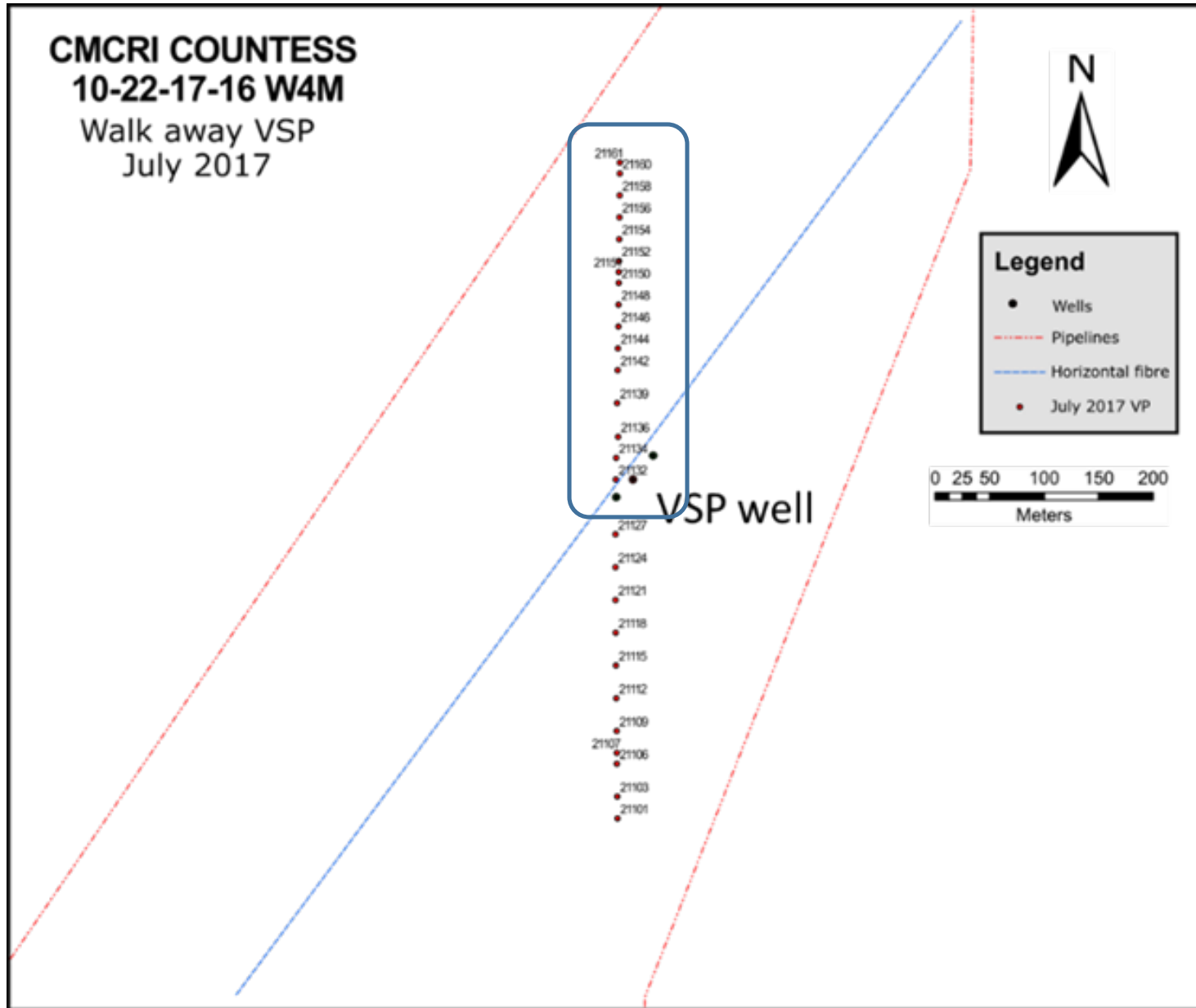




# CaMI.FRS geophysics observation well

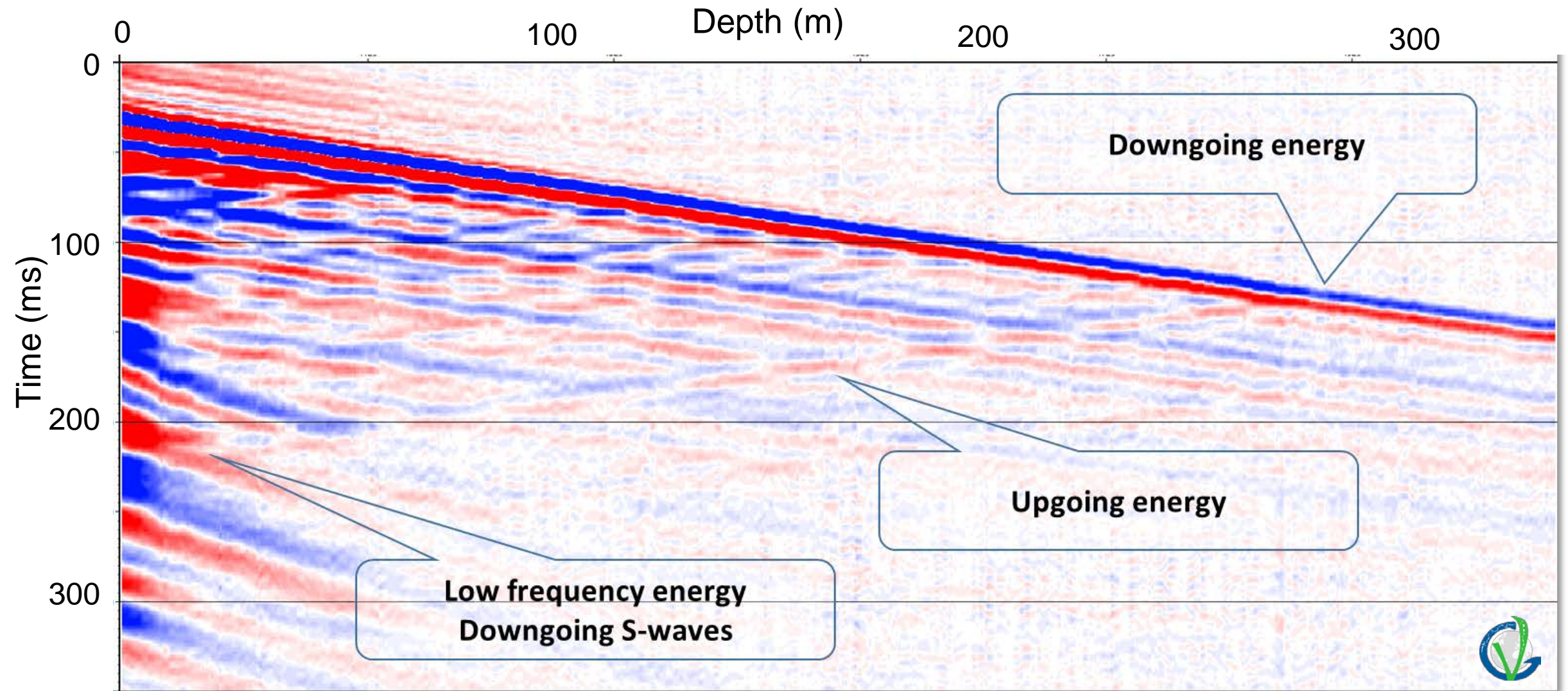


- 350 m deep
- Fibreglass casing
- Integrated fibre optic cable pack (DAS, DTS)
- Heat-pulse cable
- Experimental helical-wound fibre optic cable
- 16-level electrical resistivity cable (ERT) @ 5 m intervals outside casing
- 24-level 3C geophone array @ 5 m intervals outside casing
- Well accessible for wireline tools





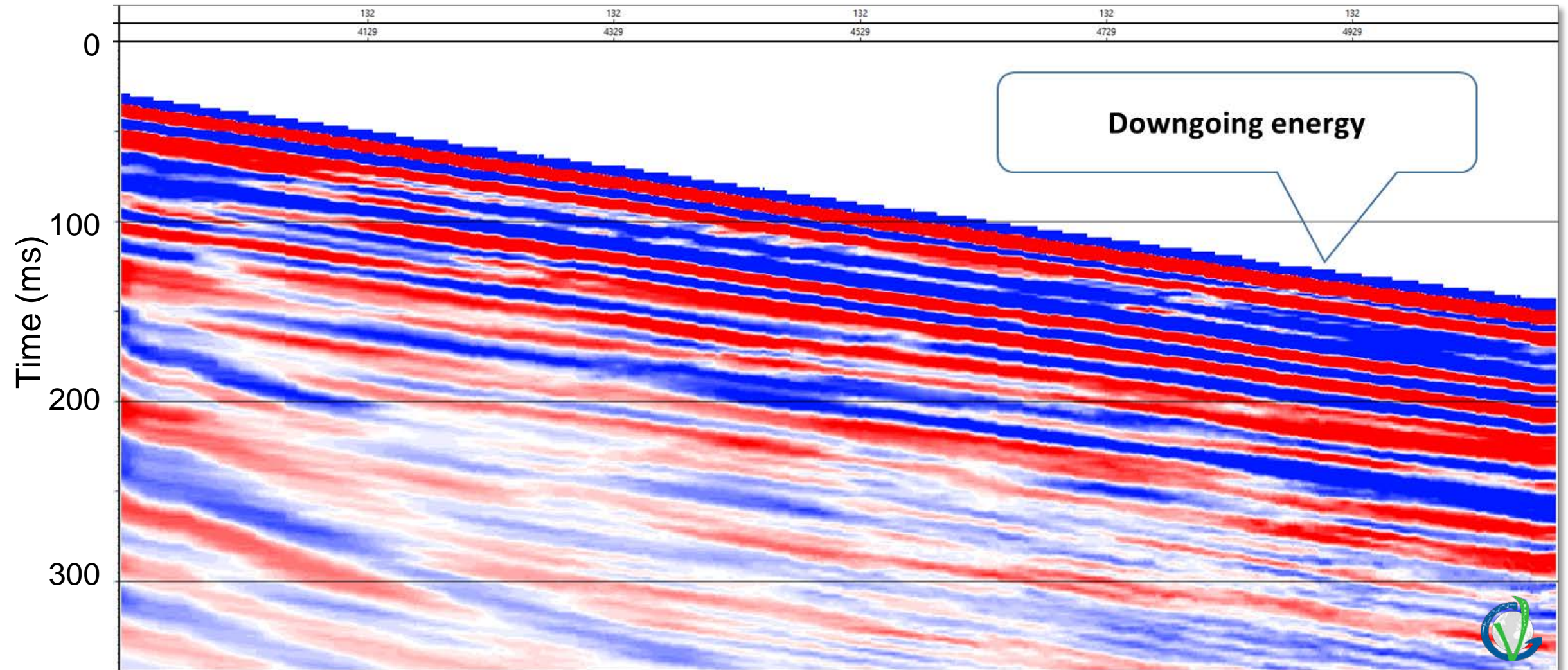
# Raw DAS record (well-source offset 9 m)



Gauge length = 10 m; Trace spacing = 0.25 m; Vibe source 10-150 Hz over 16 s (4 sweeps)



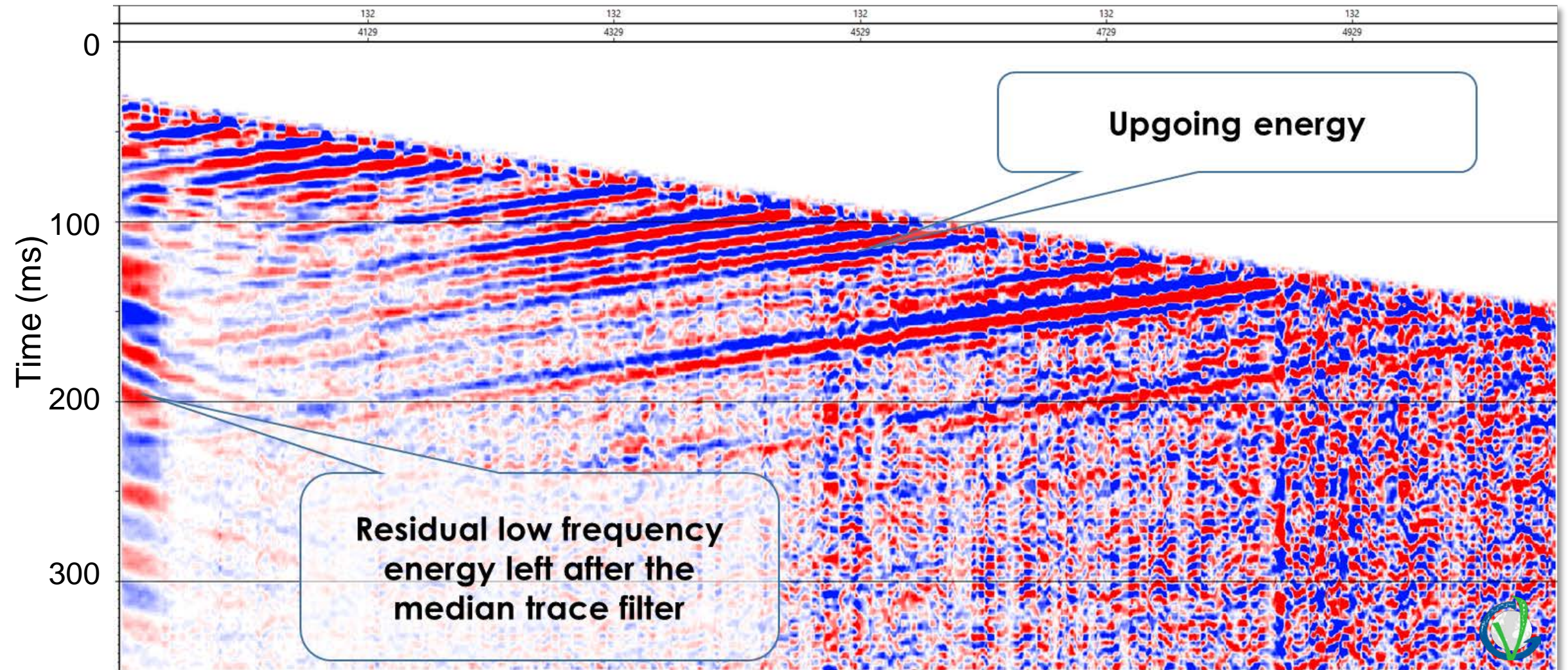
# Downgoing wavefield after wavefield separation using median filter





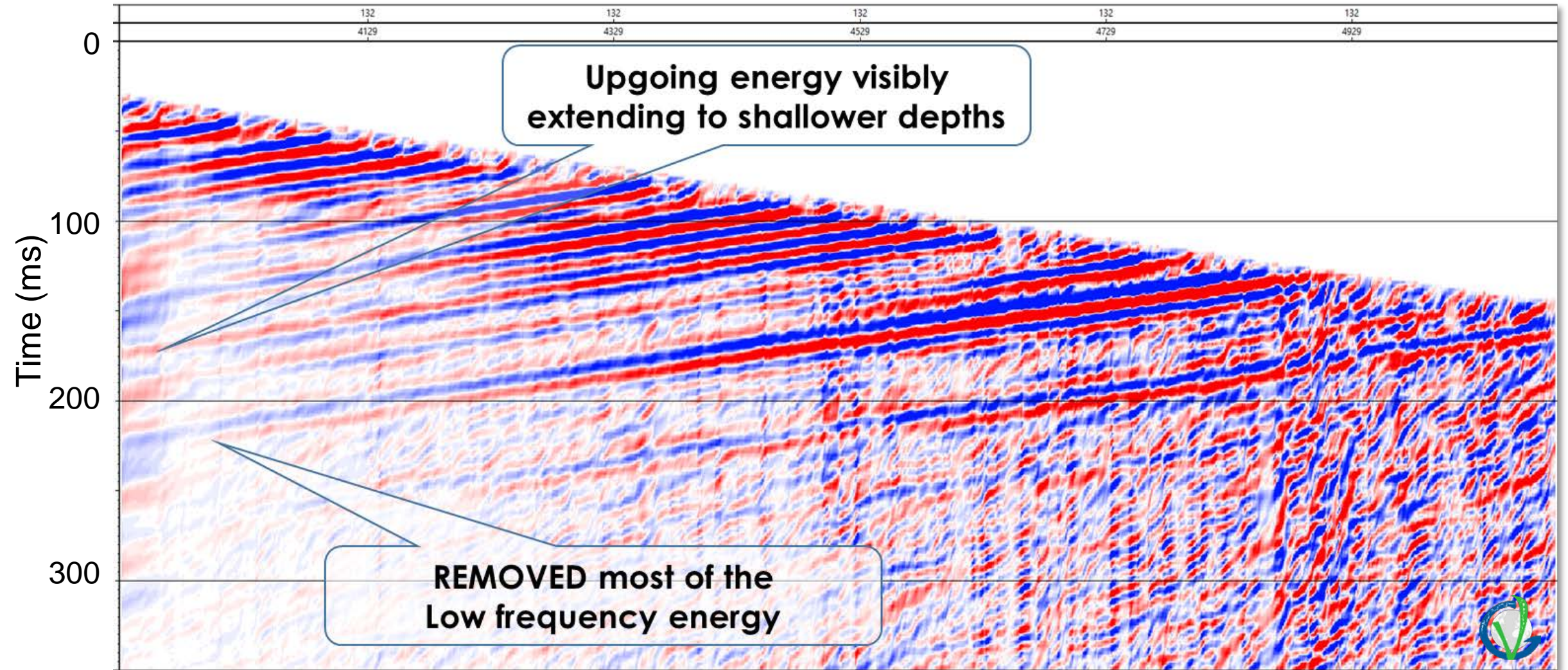


# Upgoing wavefield after wavefield separation using median filter



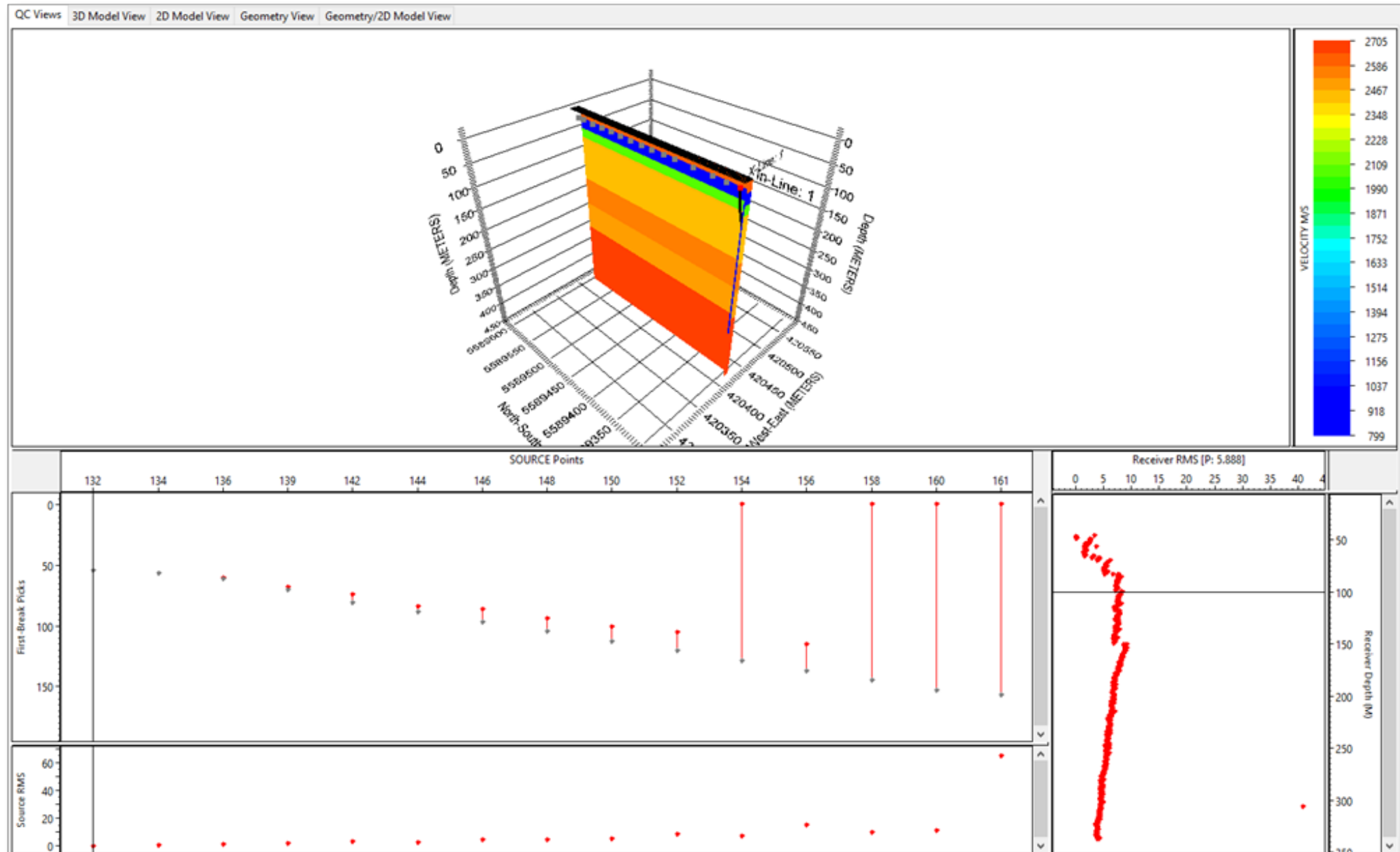


# Upgoing wavefield (median filter + FK filter)



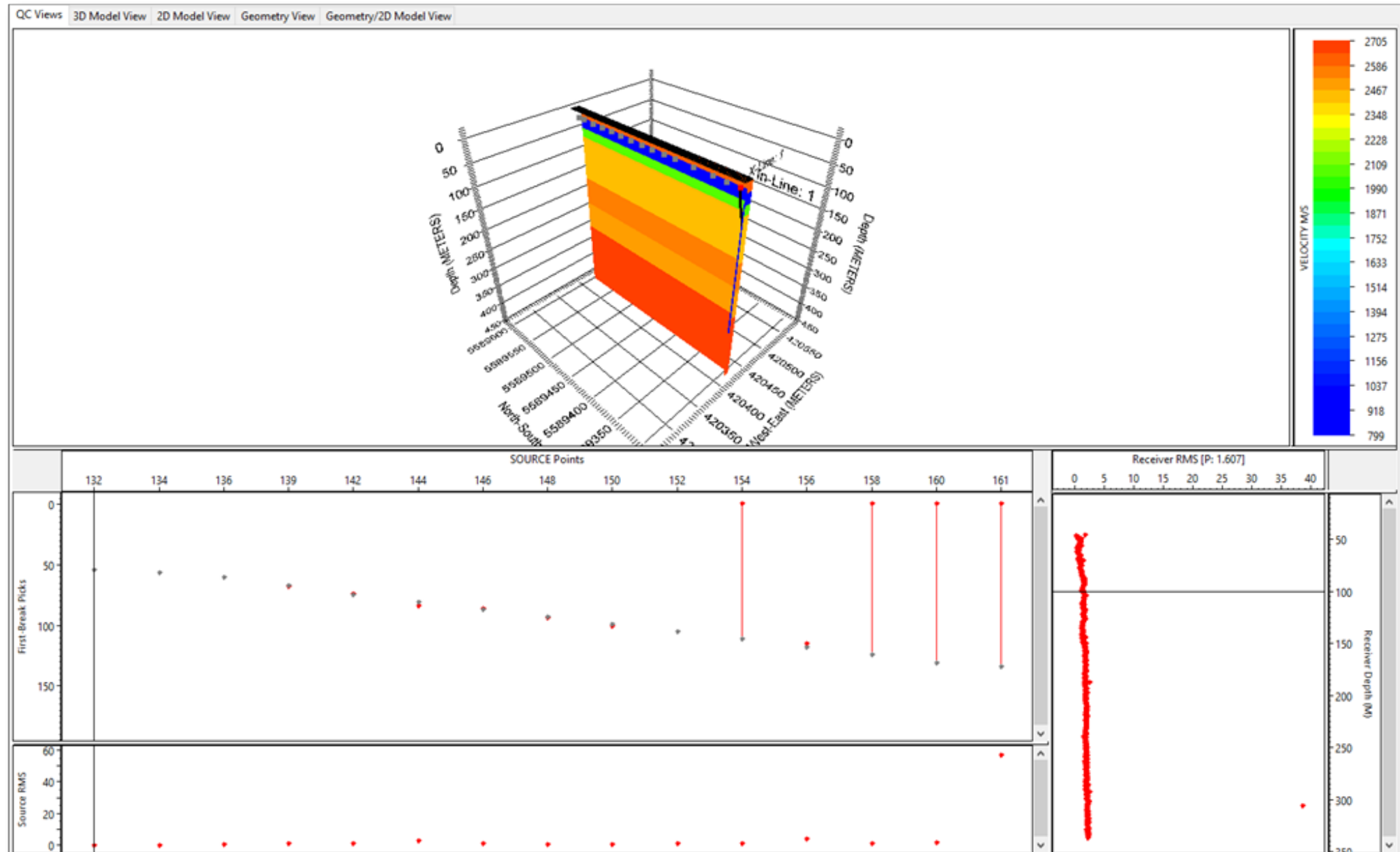


# Initial velocity model



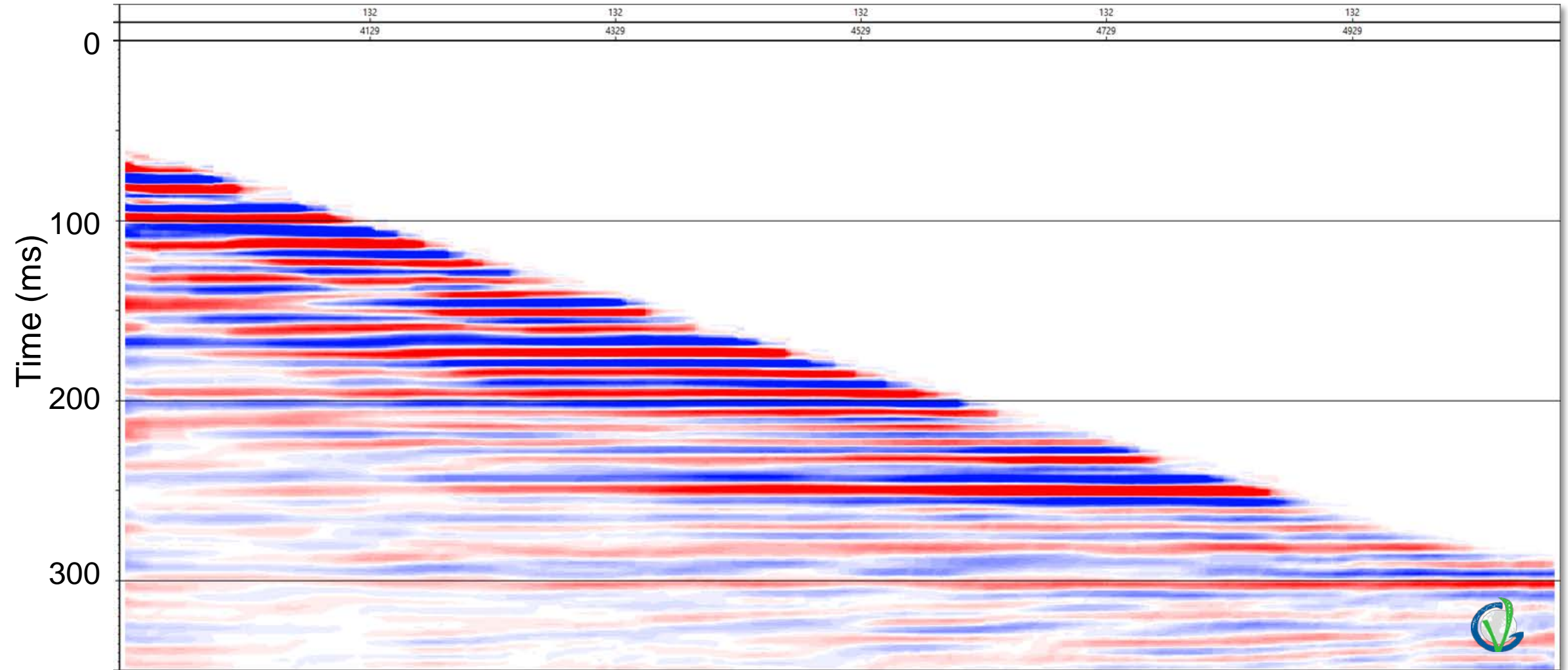


# Final velocity model

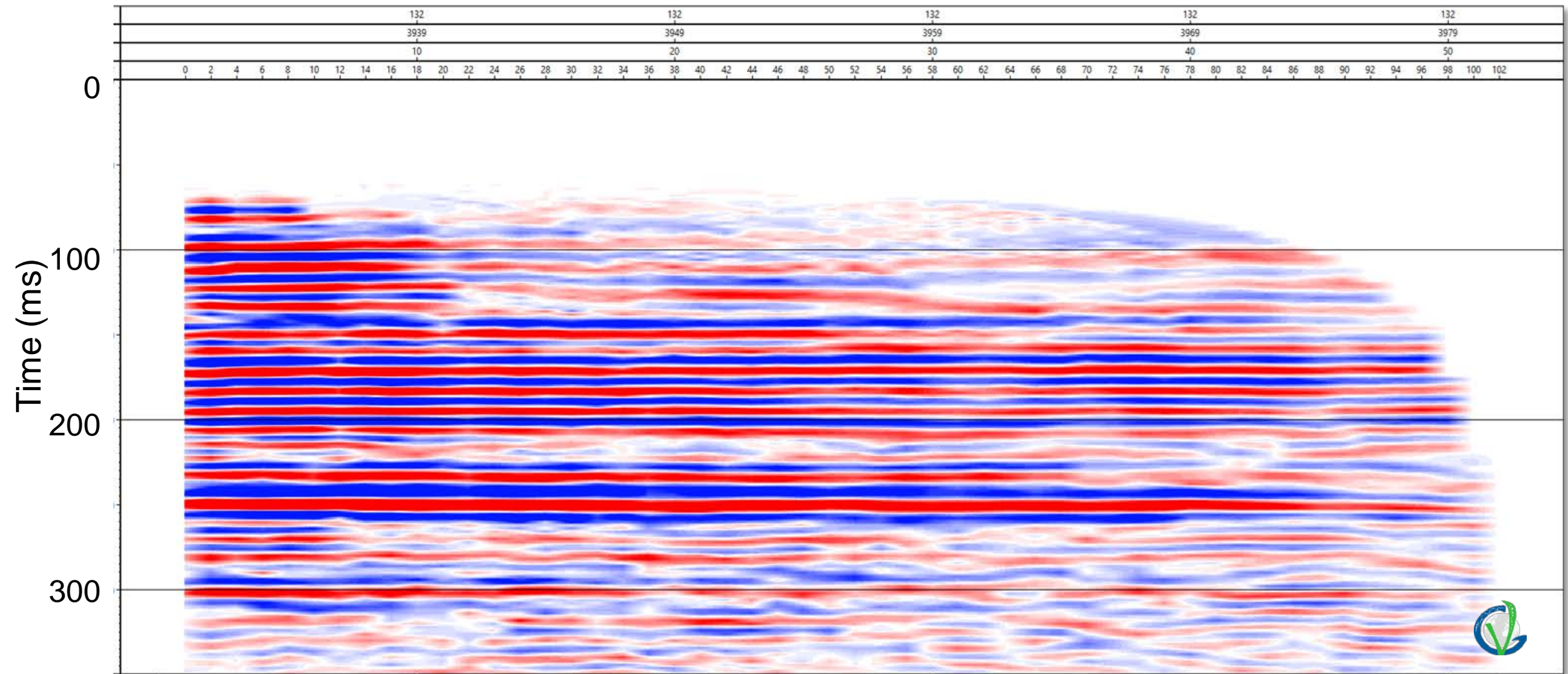




# Flattened upgoing PP events (near offset source)

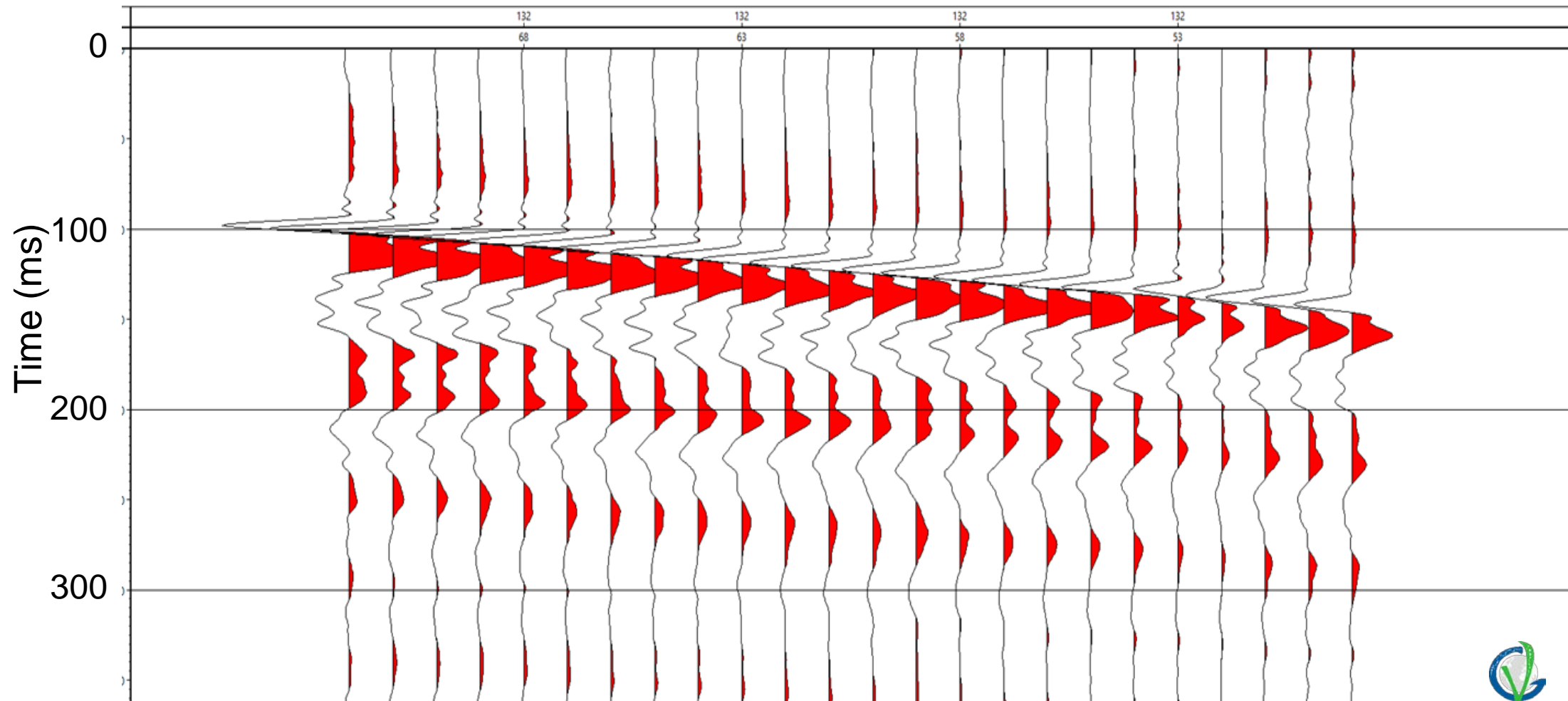


Flattened up-going energy after median filter, FK filter, shot statics, deconvolution and normal moveout corrections applied.





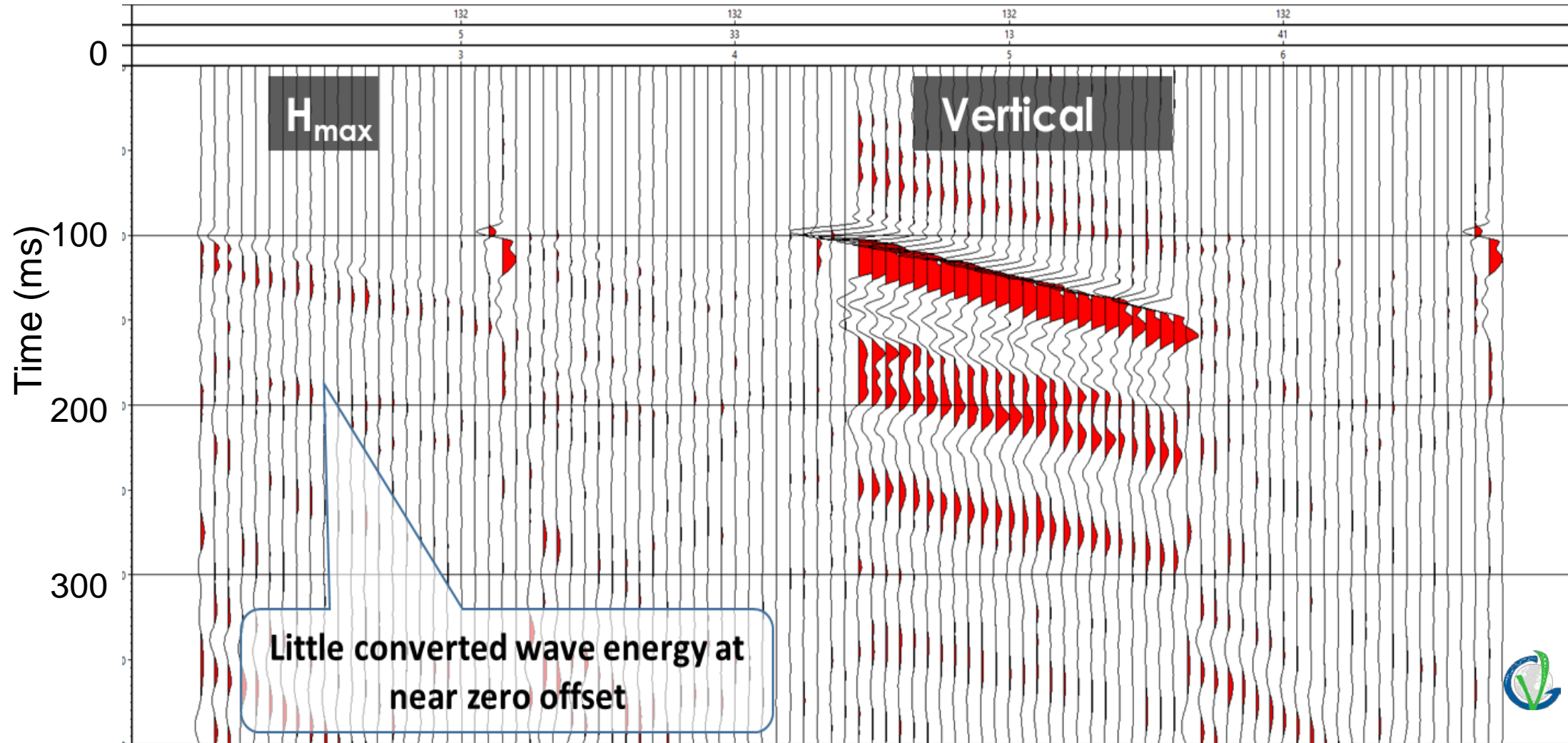
# Vertical component geophone data (source-well offset = 9 m)



5 m geophone spacing from 191 to 306 m depth



# Hmax and Vertical components after rotation (offset = 9 m)

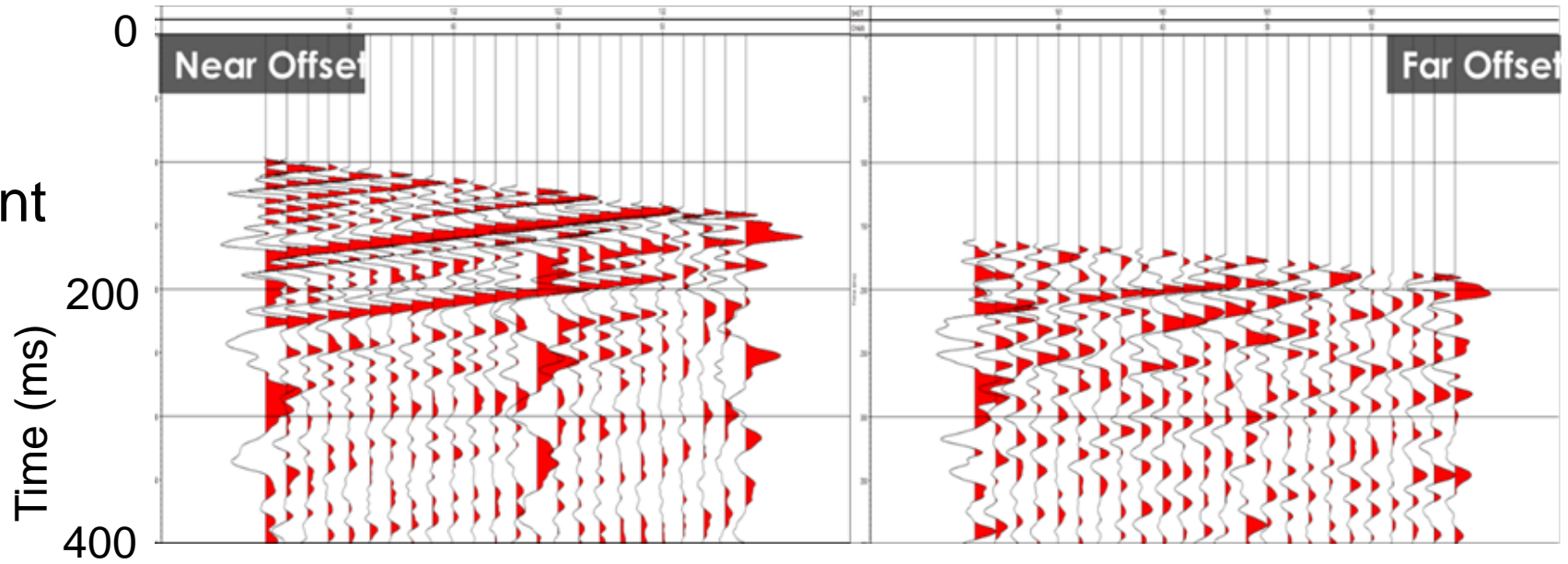




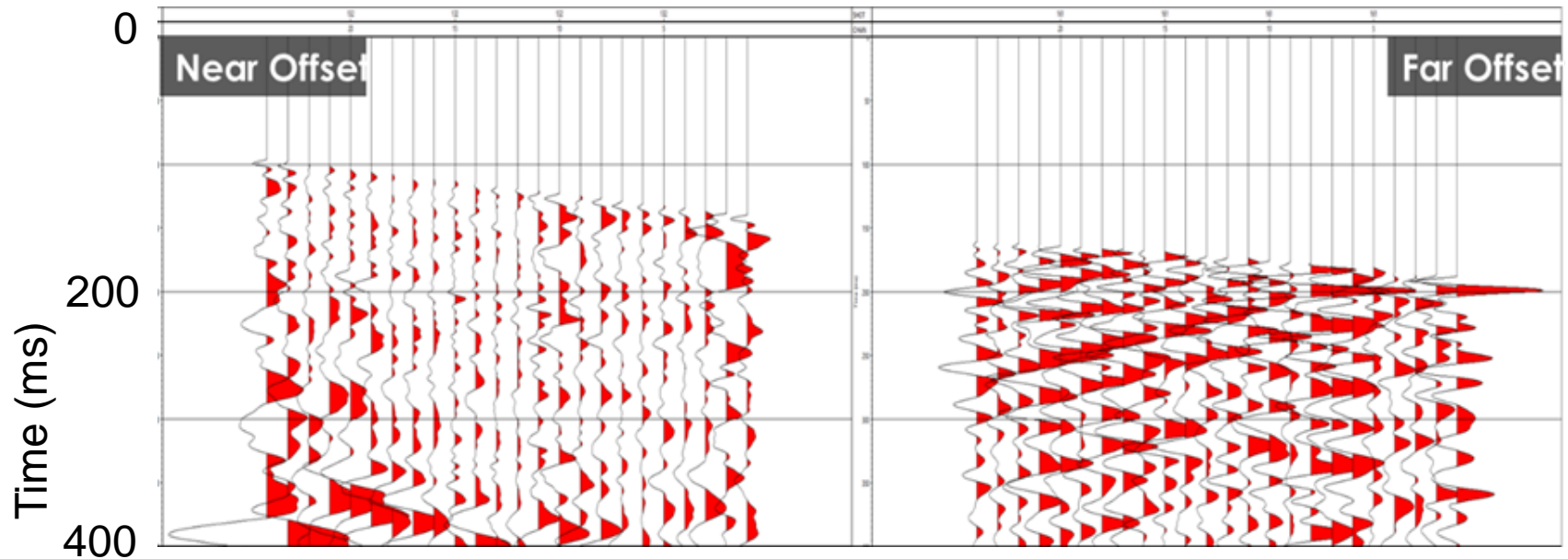


# Upgoing wavefields for near and far offset sources

Z component

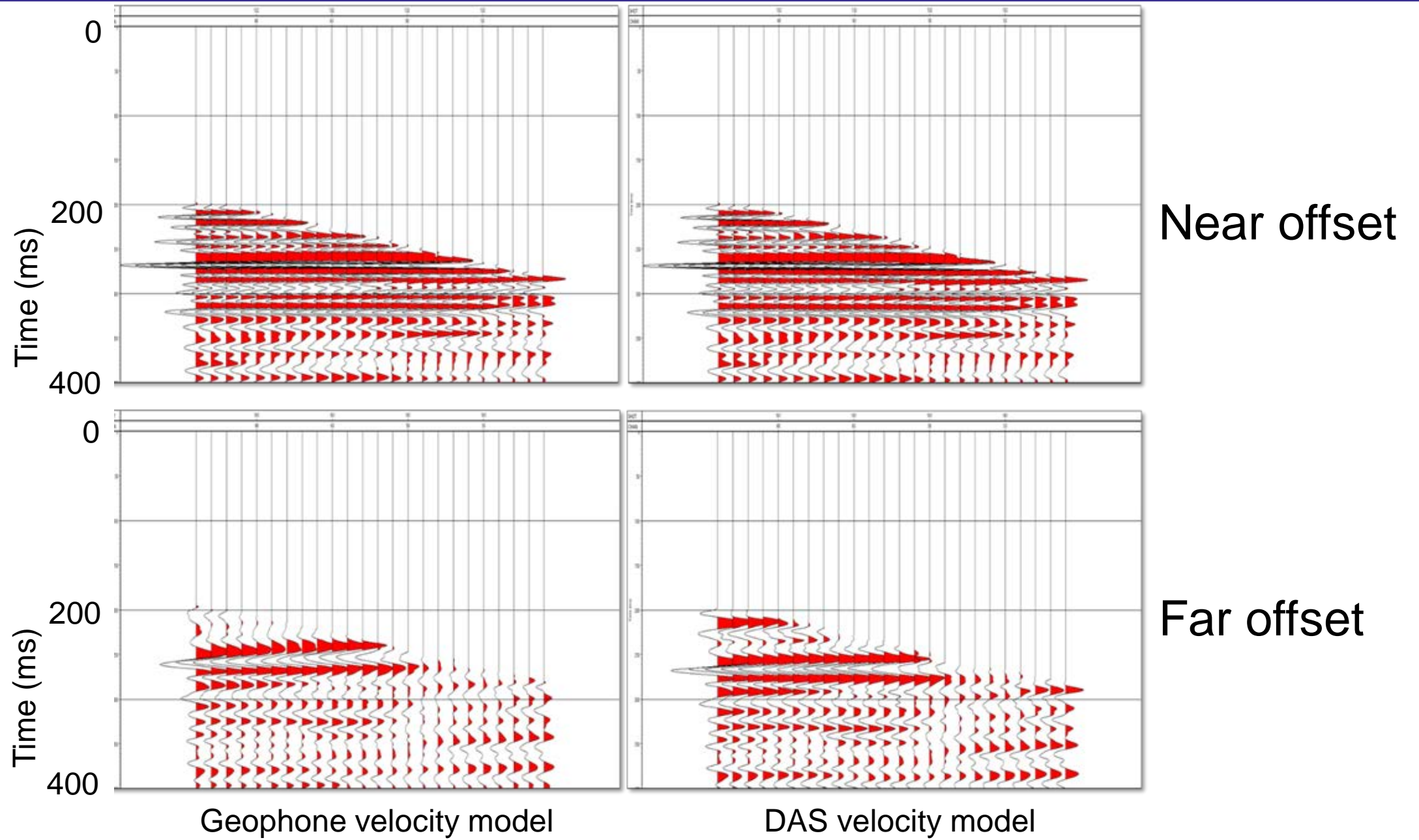


Hmax component



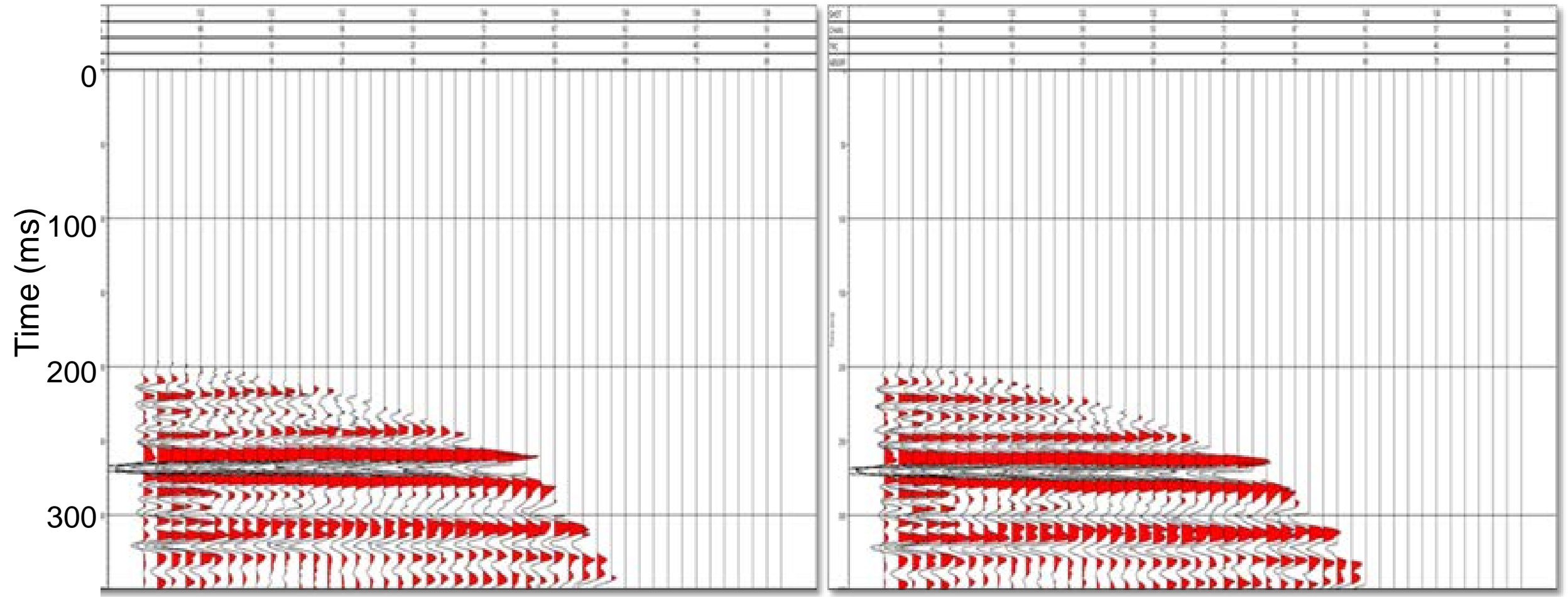


# NMO corrected Z gathers with geophone and DAS velocity models





# VSP-CDP geophone stacks: geophone vs DAS velocity models

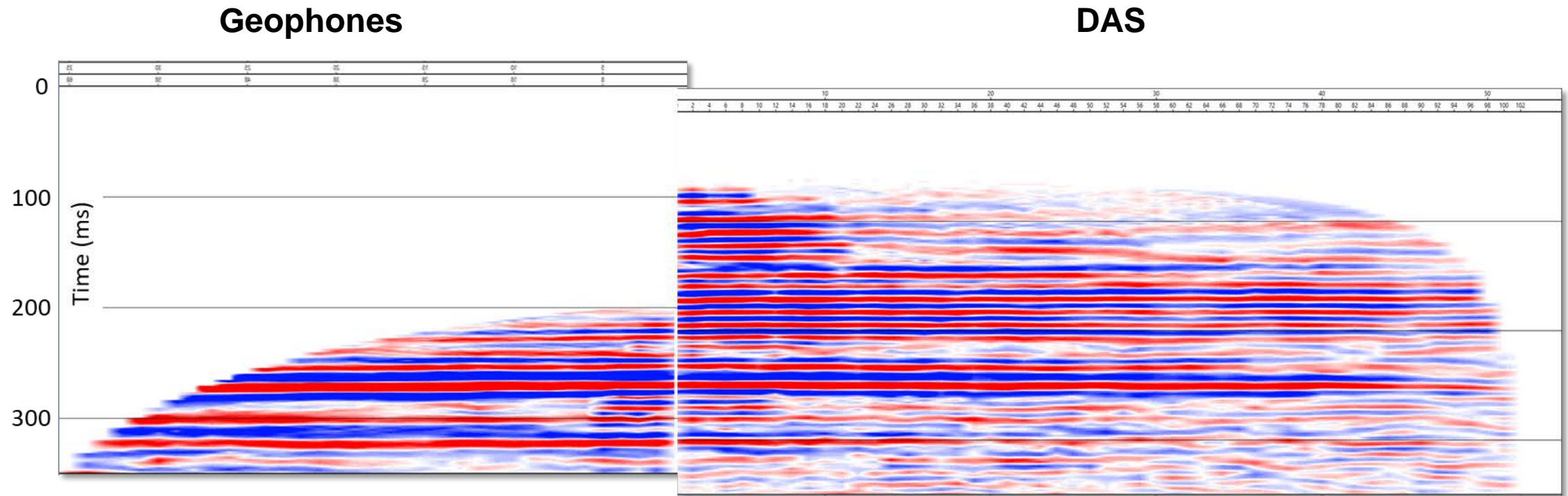


Geophone velocity model

DAS velocity model

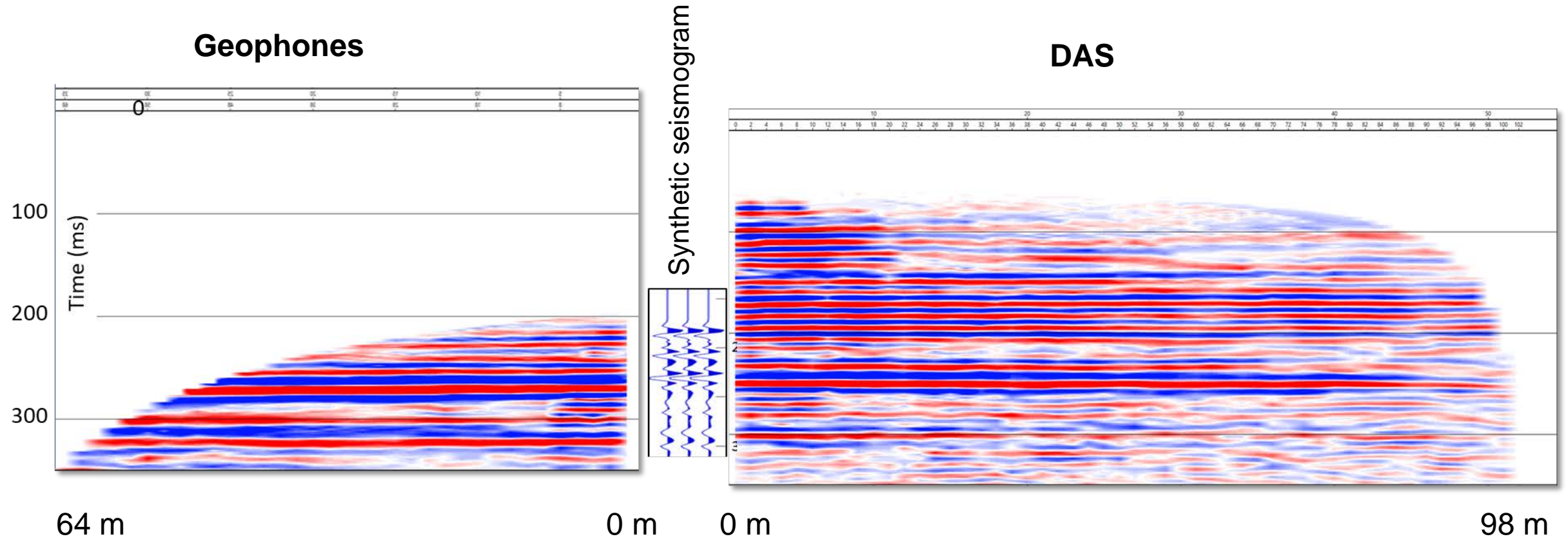


# VSP-CDP sections (geophones and DAS)



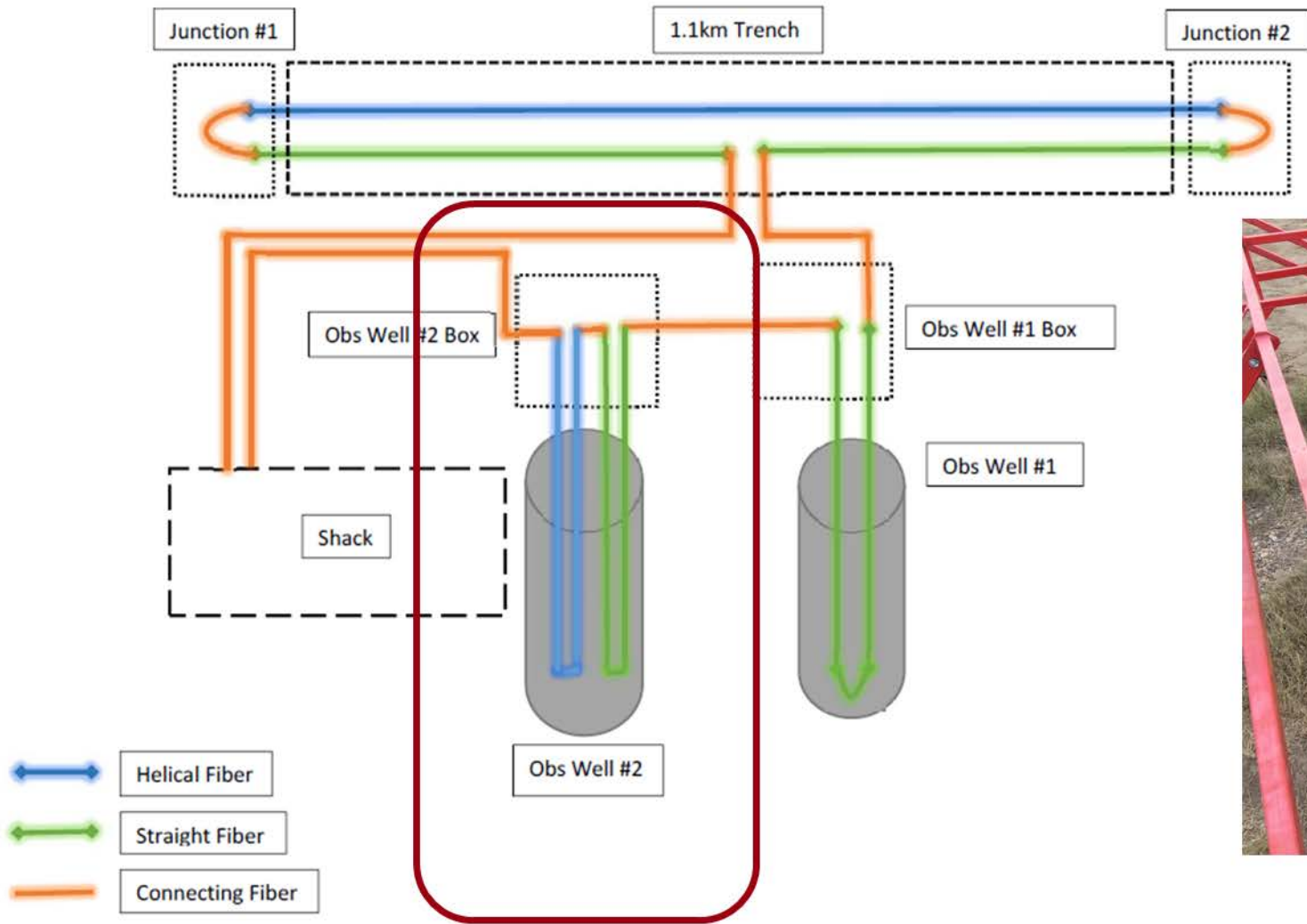


# VSP-CDP sections (geophones and DAS)



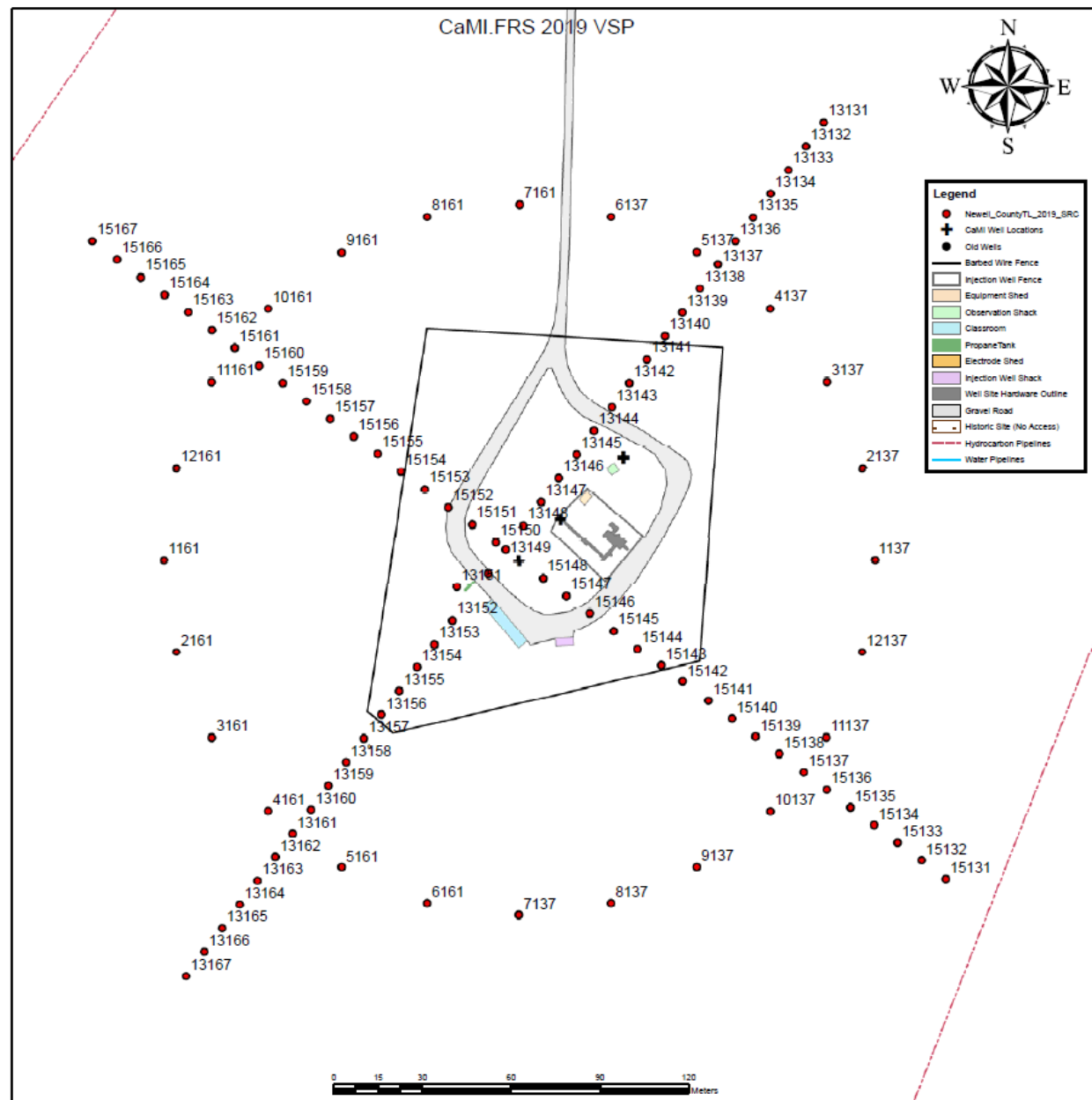


# DAS test facility for engineered fibre – Obs Well #2





# Walkaway and walkaround time-lapse VSP geometry





- High quality geophone and DAS data acquired
- DAS data provides velocity model to surface
- Shot statics and velocity model updates achieved through first break travel time inversion
- P-S upgoing converted wave data captured in geophone data
- Geophone data images reservoir to 64 m from VSP well
- DAS data images reservoir to 98 m from VSP well
- DAS VSP-CDP section shows amplitude loss at far offsets due to fibre directivity (straight fibre).
- Geophysics well is suited for fibre tests of amplitude vs coupling pressure.





- CREWES sponsors
- CaMI JIP sponsors
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