High-effort
seismic acquisition

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Outline

- Introduction—what is “high-effort” seismic acquisition?
- The Longview experiment
- Processing strategy
- Results
- Conclusions

High-effort seismic acquisition

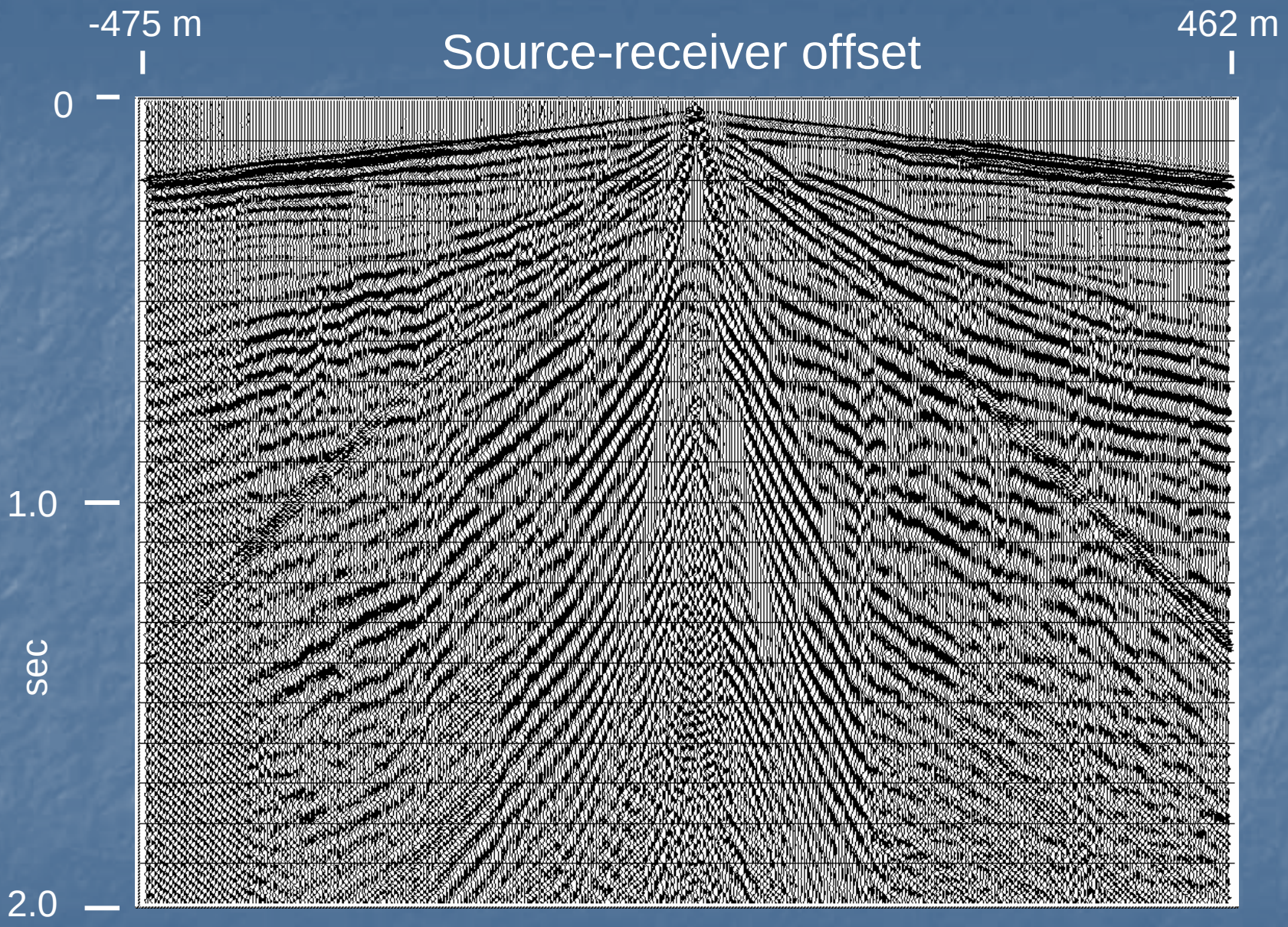
- ***Single*** geophone per station
- ***Small*** geophone ***station increment*** (2.5 m)
- ***Small*** source interval (5 m)
- ***One*** channel per geophone (lots of boxes and connections)

The Longview experiment

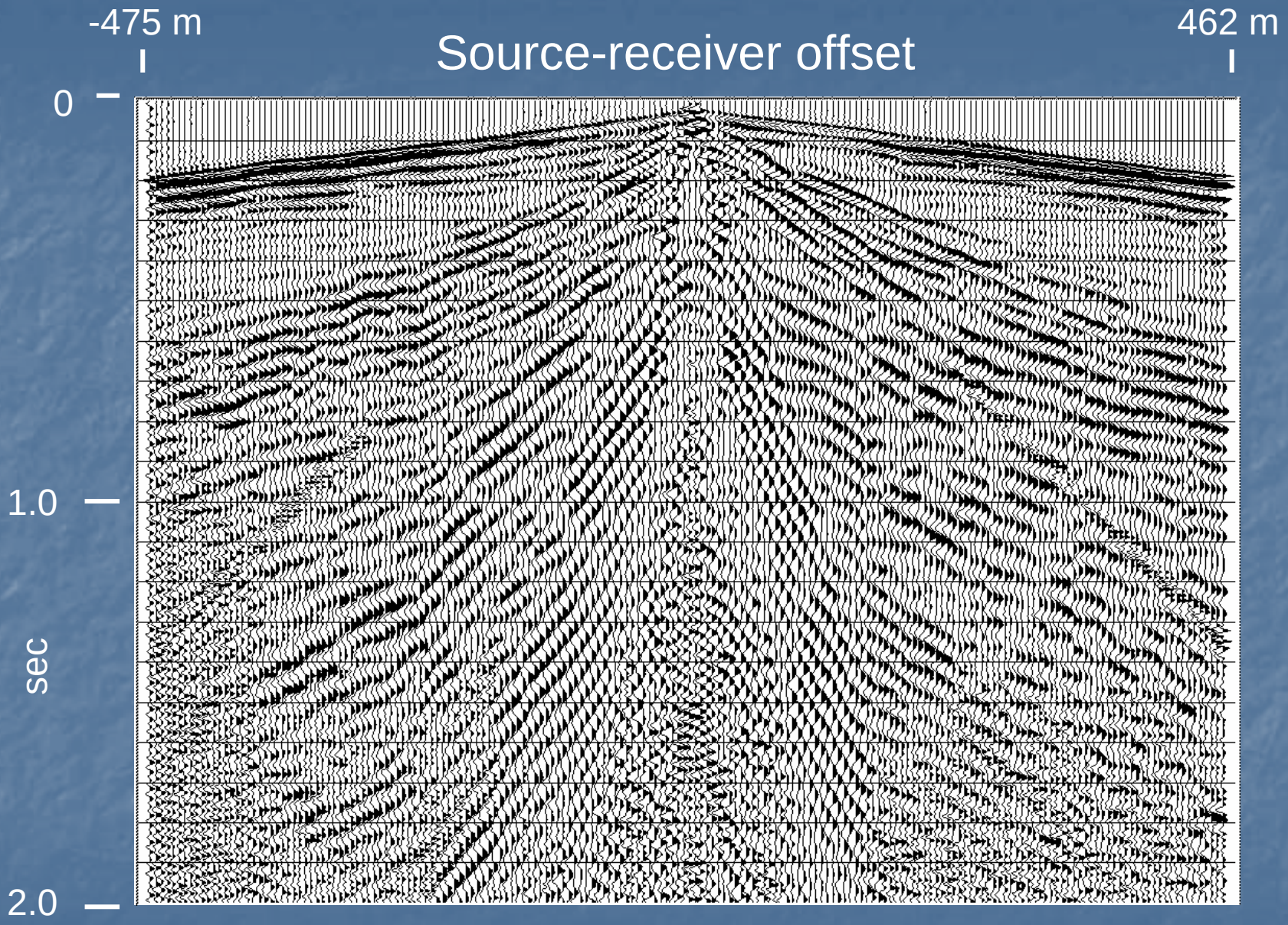
- ***2D*** seismic line ***937.5 m*** long, east of Longview, Alberta
- ***376*** single phone stations
- ***2.5 m*** geophone interval
- ***5 m*** source interval
- Source—mini-vibrator, ***4 sweeps*** per VP, ***8 seconds*** per sweep, ***10-200 Hz***
- Total acquisition time—***10 hours***

Processing strategy

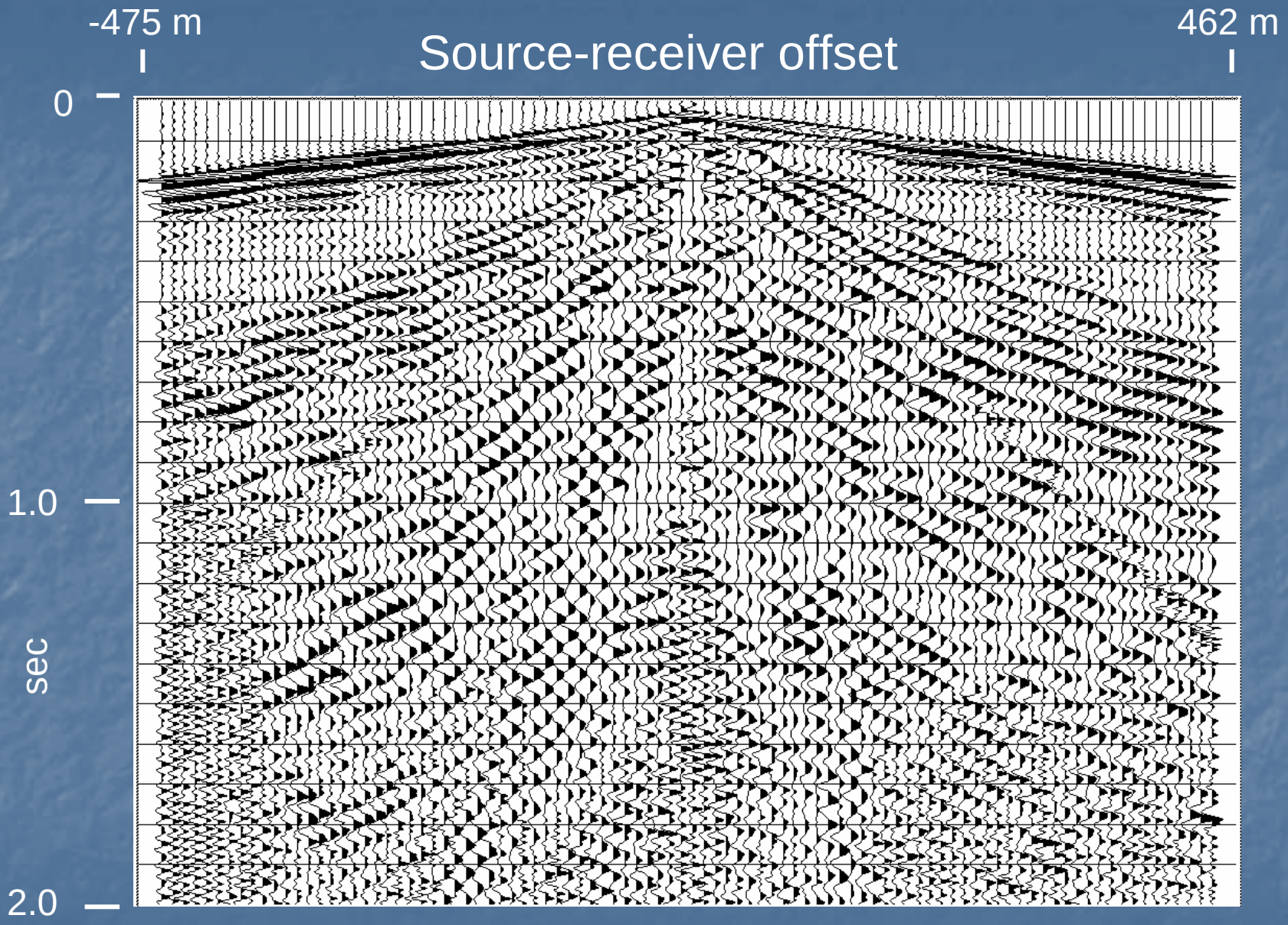
- Create new ***pseudo-surveys*** corresponding to ***5m, 10m, 20m, and 40m*** receiver arrays
- Use ***radial trace filtering*** to attenuate coherent noise, using only ***visible information*** on shot displays.
- Apply ***Gabor deconvolution*** to shot gathers
- Apply ***Gabor deconvolution*** in the ***radial trace domain*** to all gathers
- Determine ***NMO*** velocities and ***residual statics*** on 2.5 m data set, apply to ***all*** data sets
- ***Stack*** all data sets
- Apply post-stack ***Kirchhoff migration***
- ***Compare*** migrated images



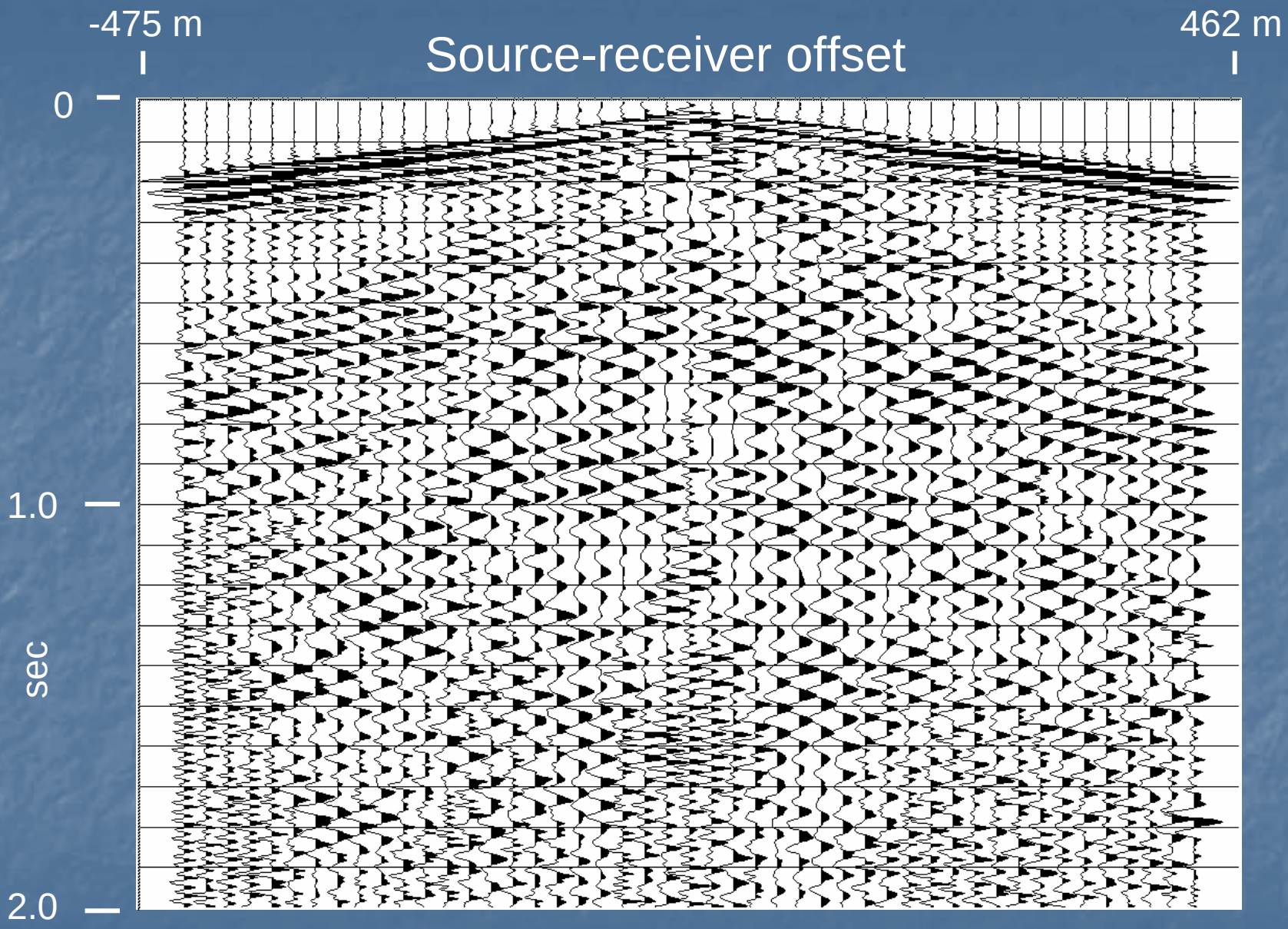
Shot number 291, full resolution ***2.5 m station interval***



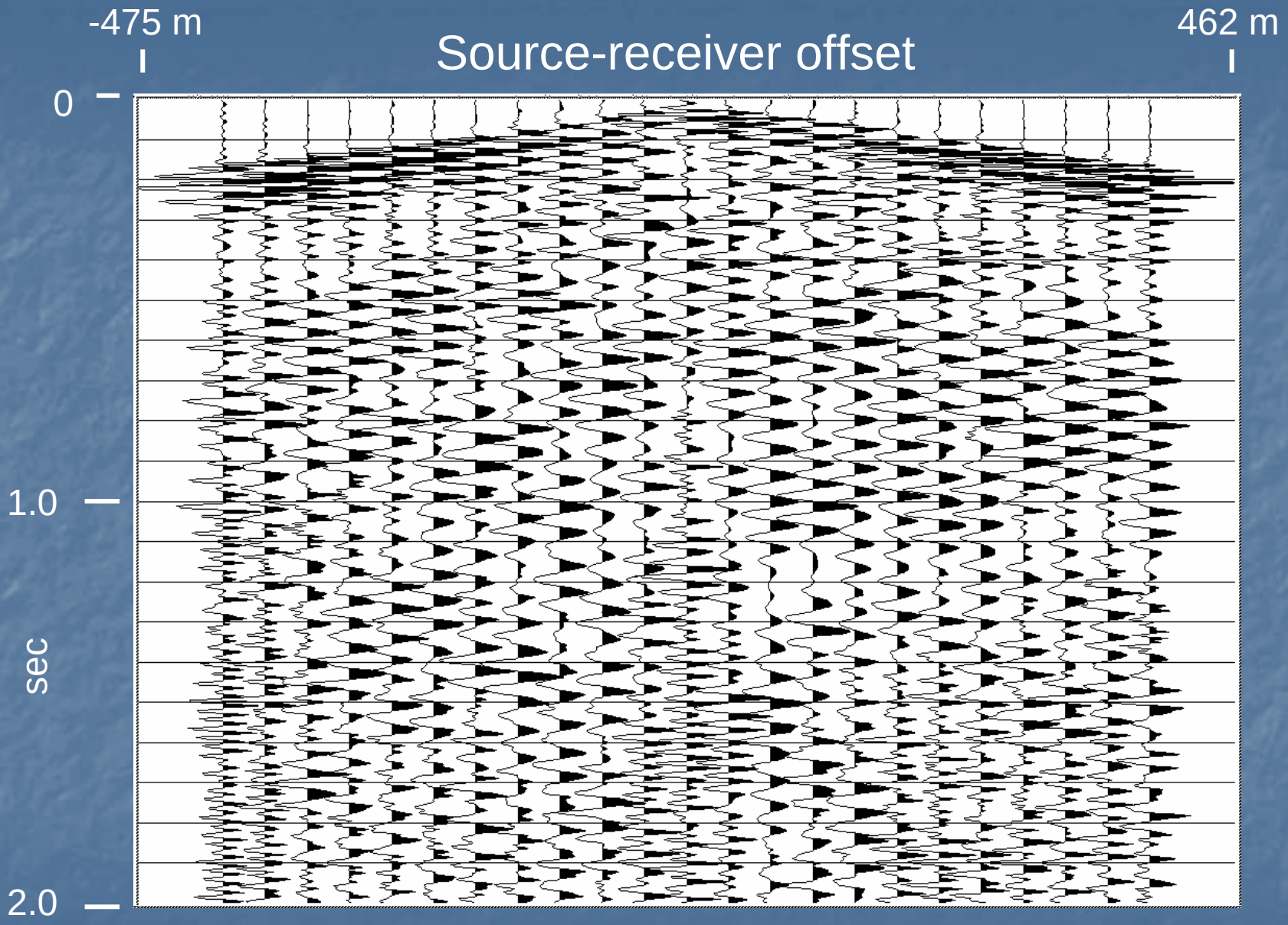
Shot number 291, ***5 m simulated station interval***



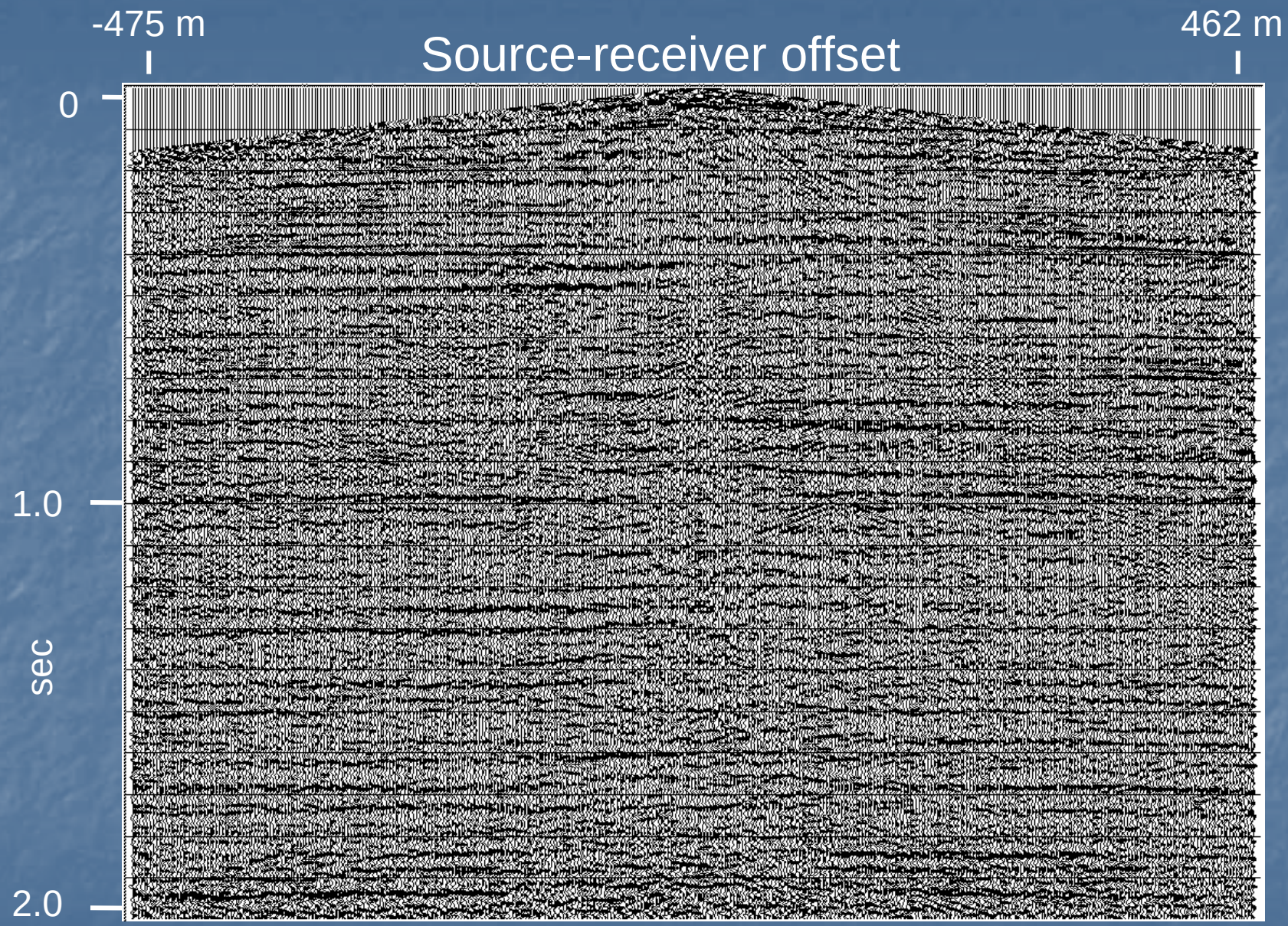
Shot number 291, ***10 m simulated station interval***



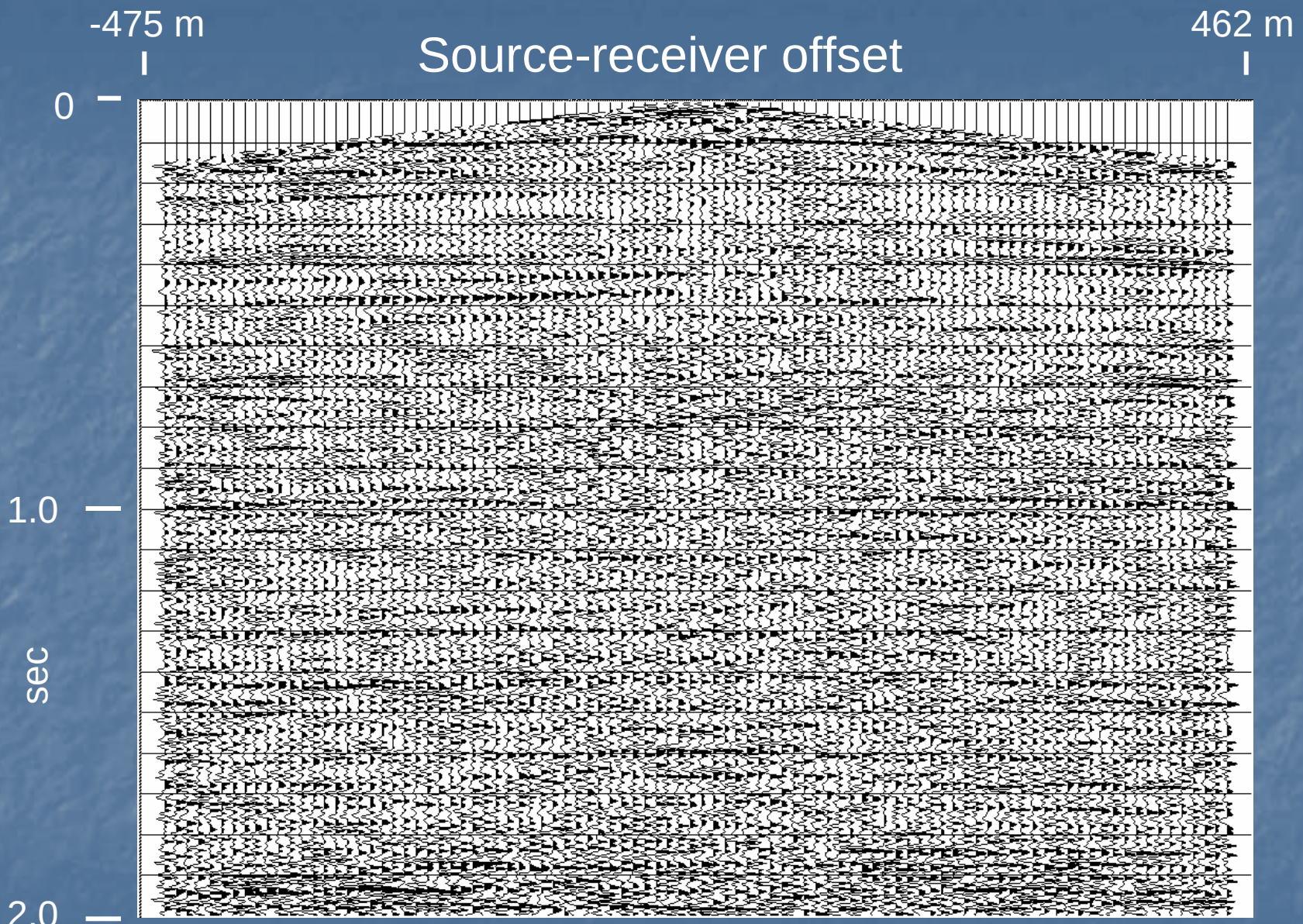
Shot number 291, ***20 m simulated station interval***



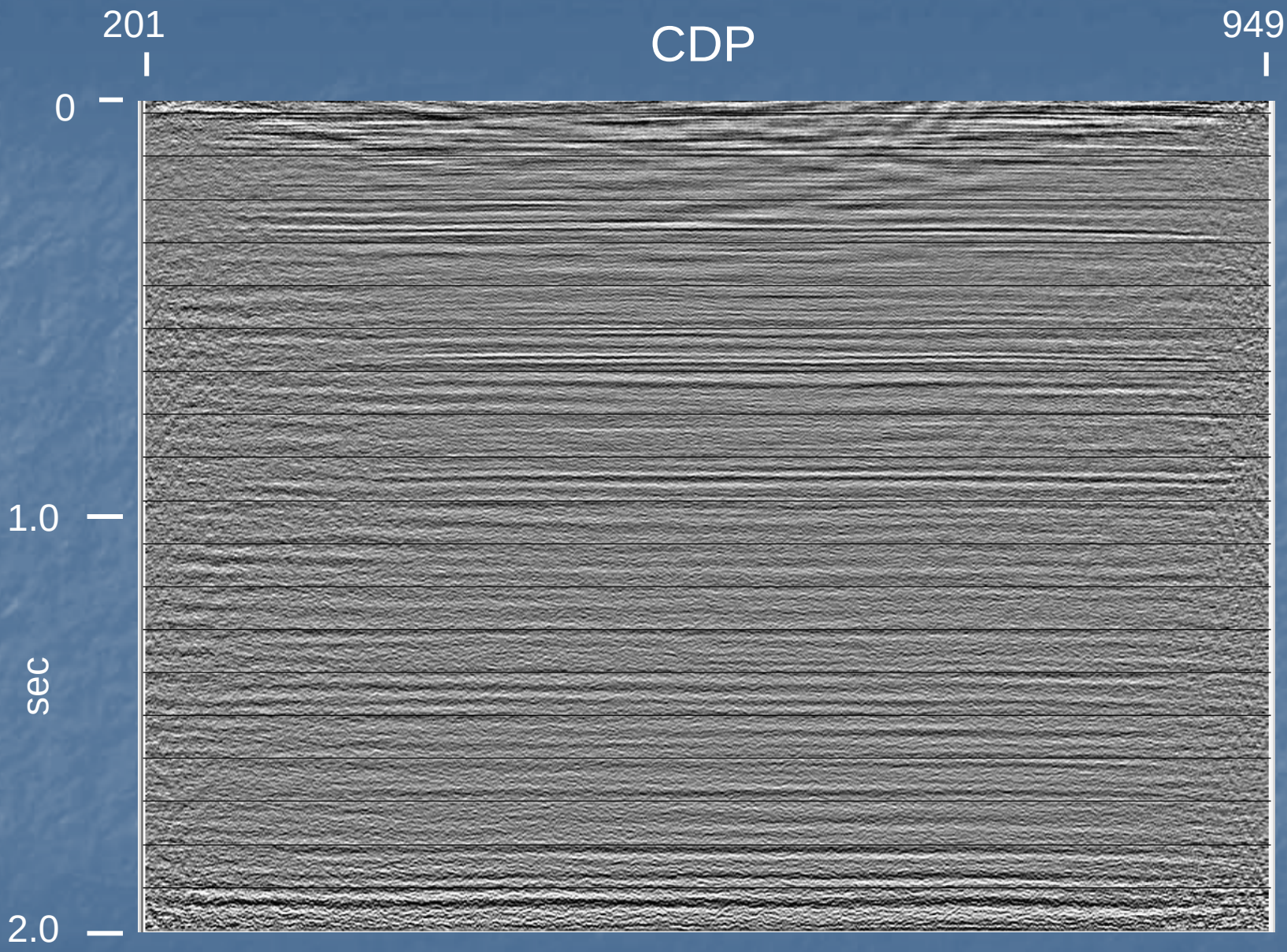
Shot number 291, ***40 m simulated station interval***



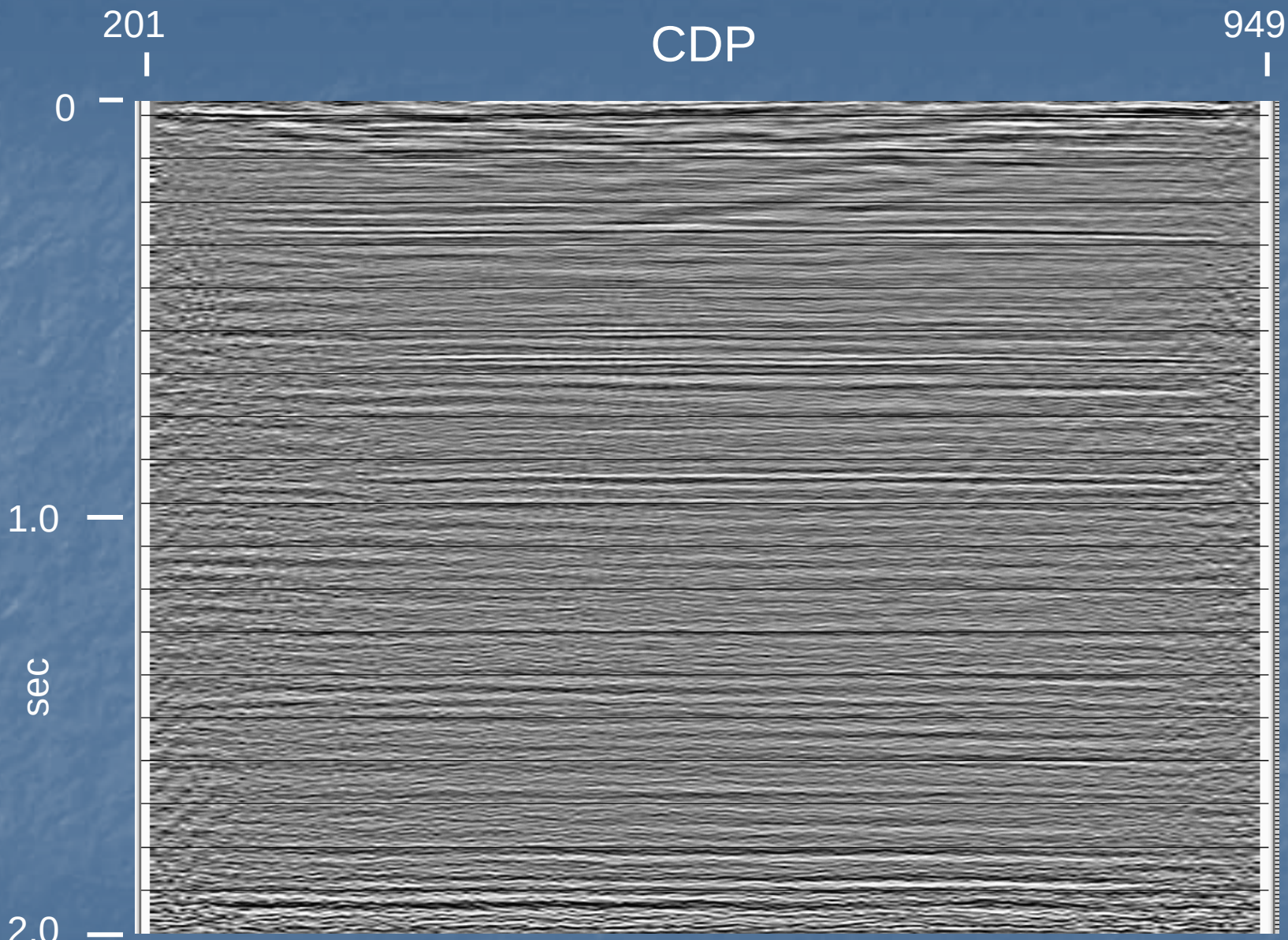
Shot number 291, ***2.5 m station interval***, radial filtered, 1 pass
XT domain Gabor decon, 1 pass ***RT domain Gabor decon***



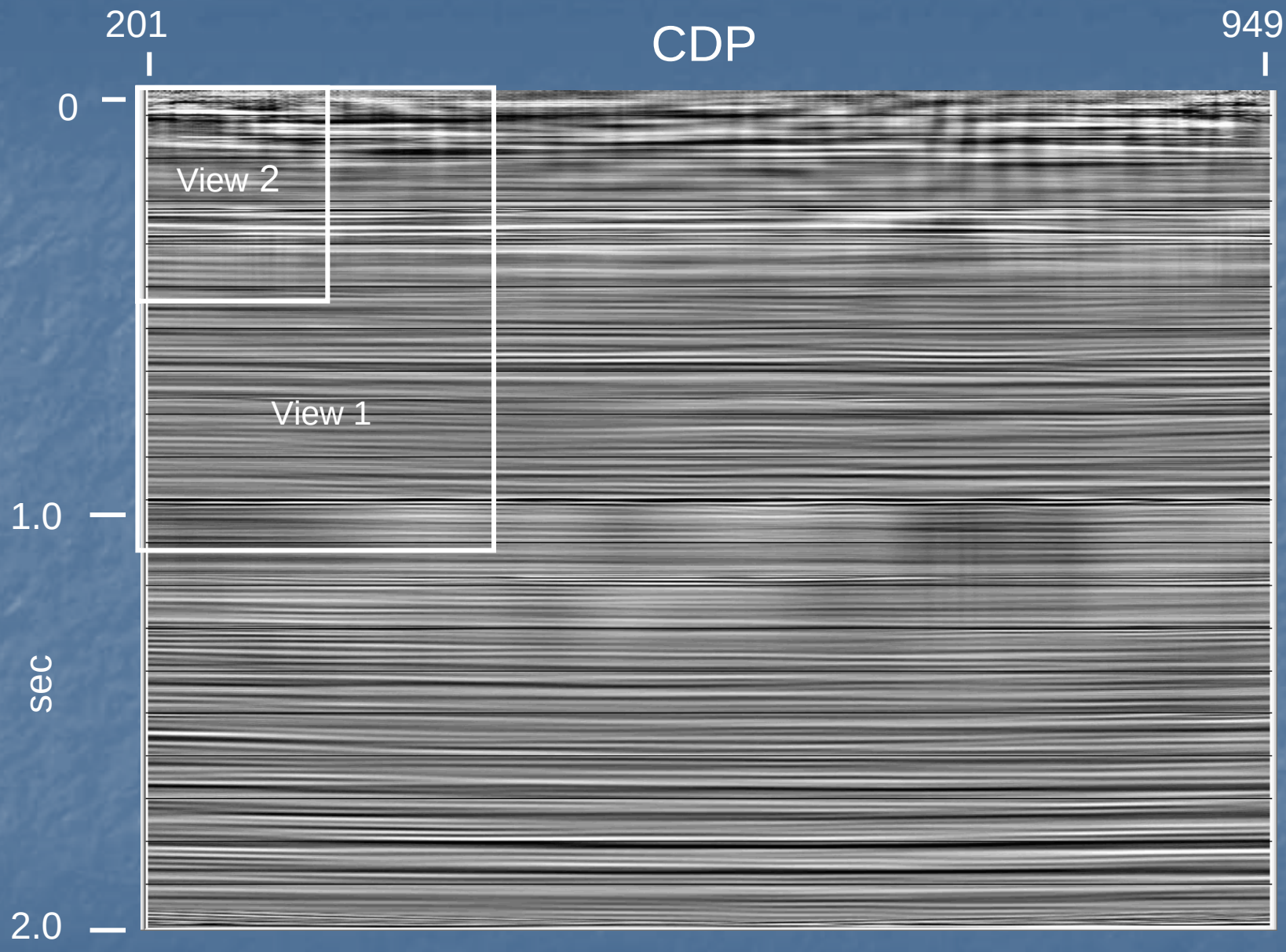
Shot number 291, ***10 m station interval***, radial filtered, 1 pass
XT domain Gabor decon, 1 pass ***RT domain Gabor decon***



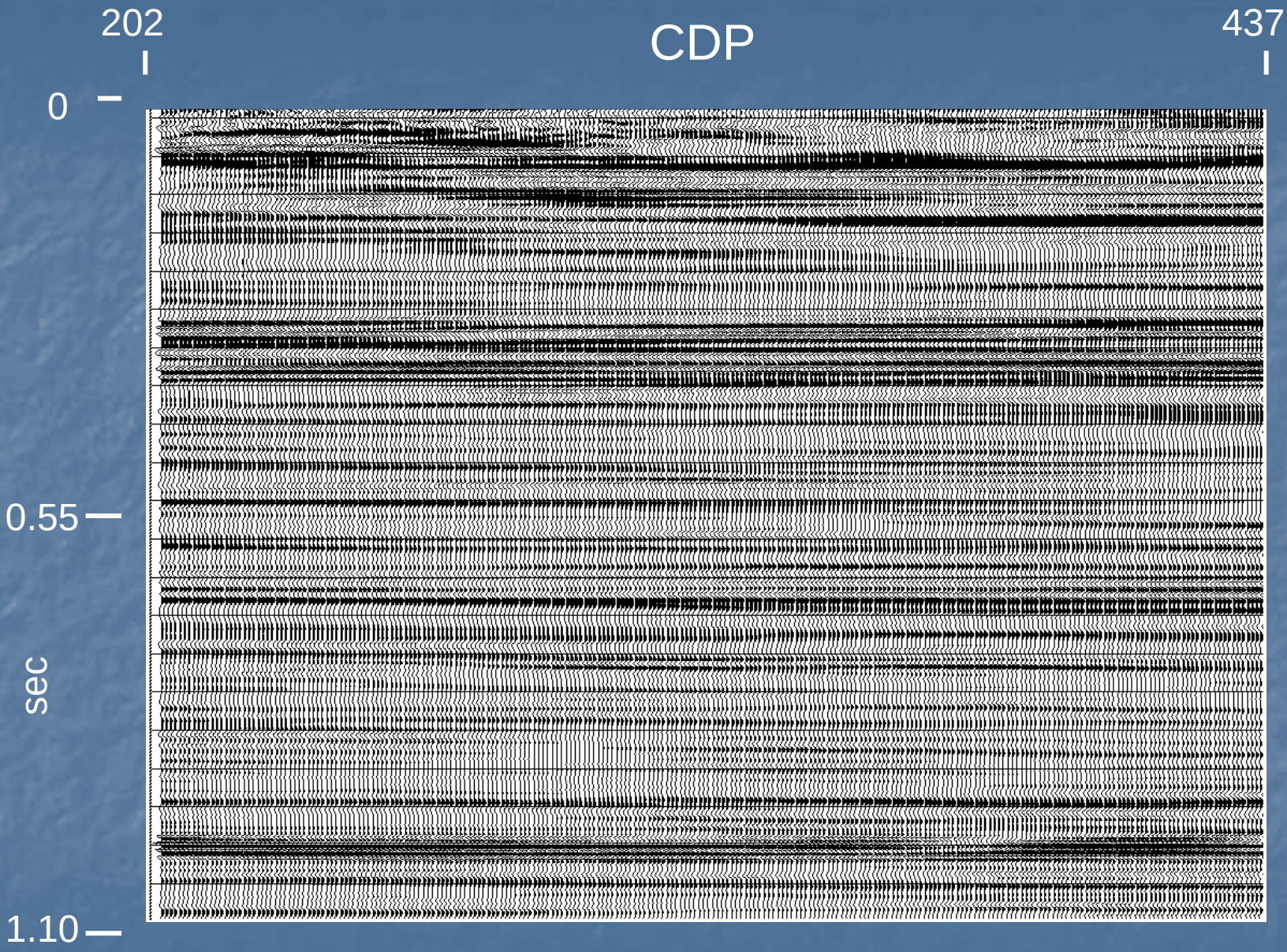
Unmigrated stack for full resolution ***2.5 m station interval***



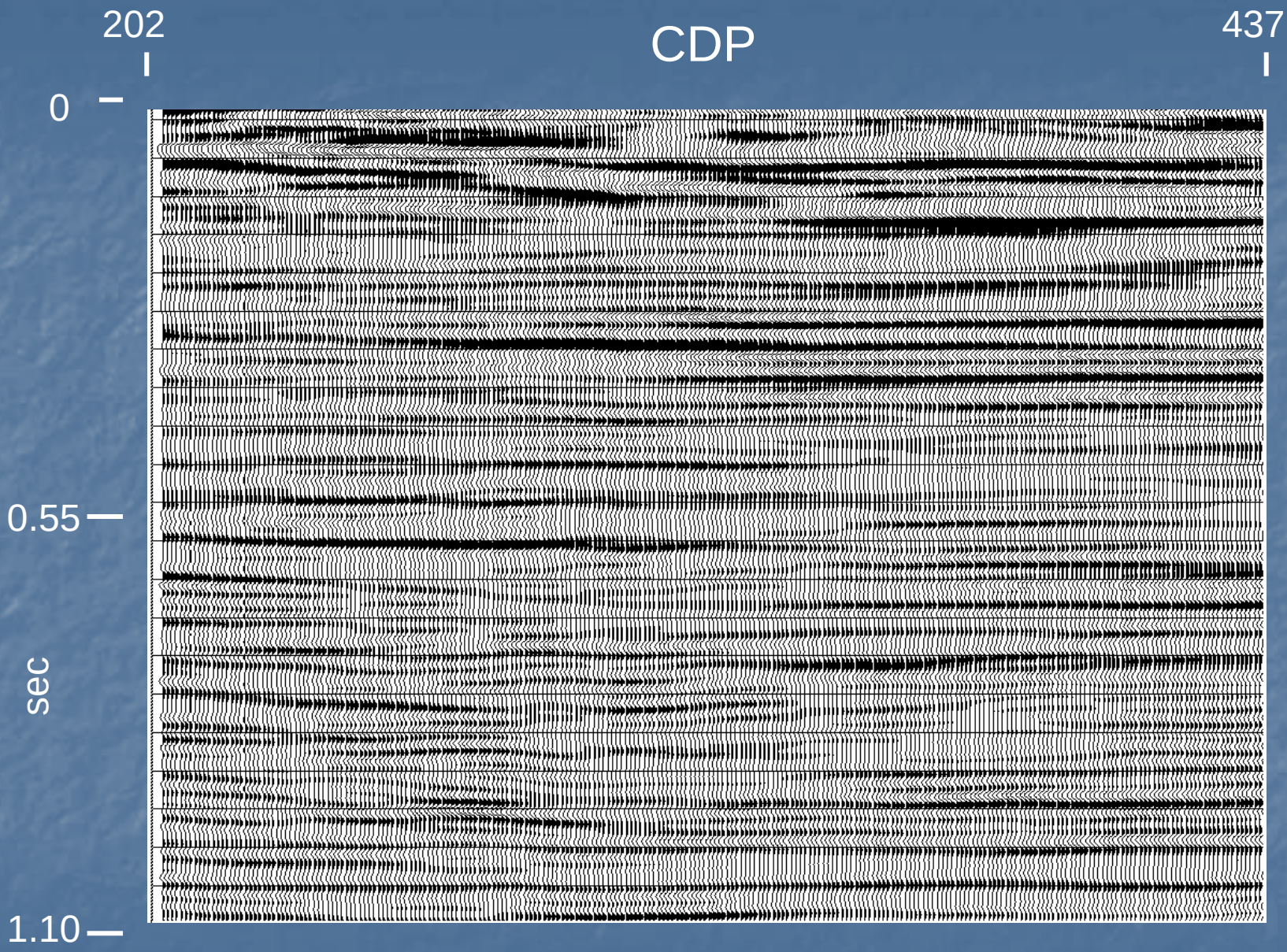
Unmigrated stack for simulated ***10 m station interval***



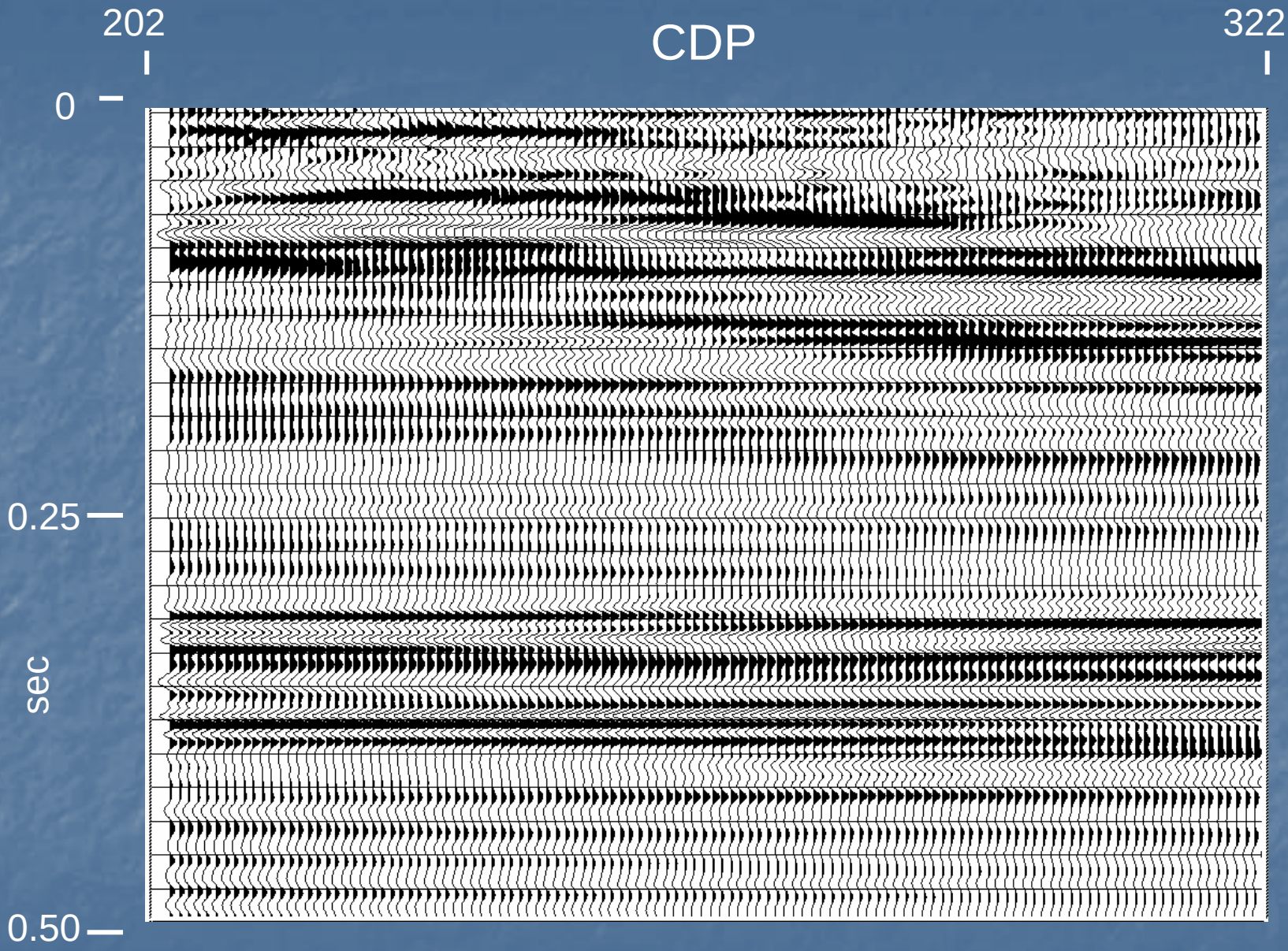
Migrated stack for full resolution 2.5 m station interval, showing the position of two zoom views to follow.



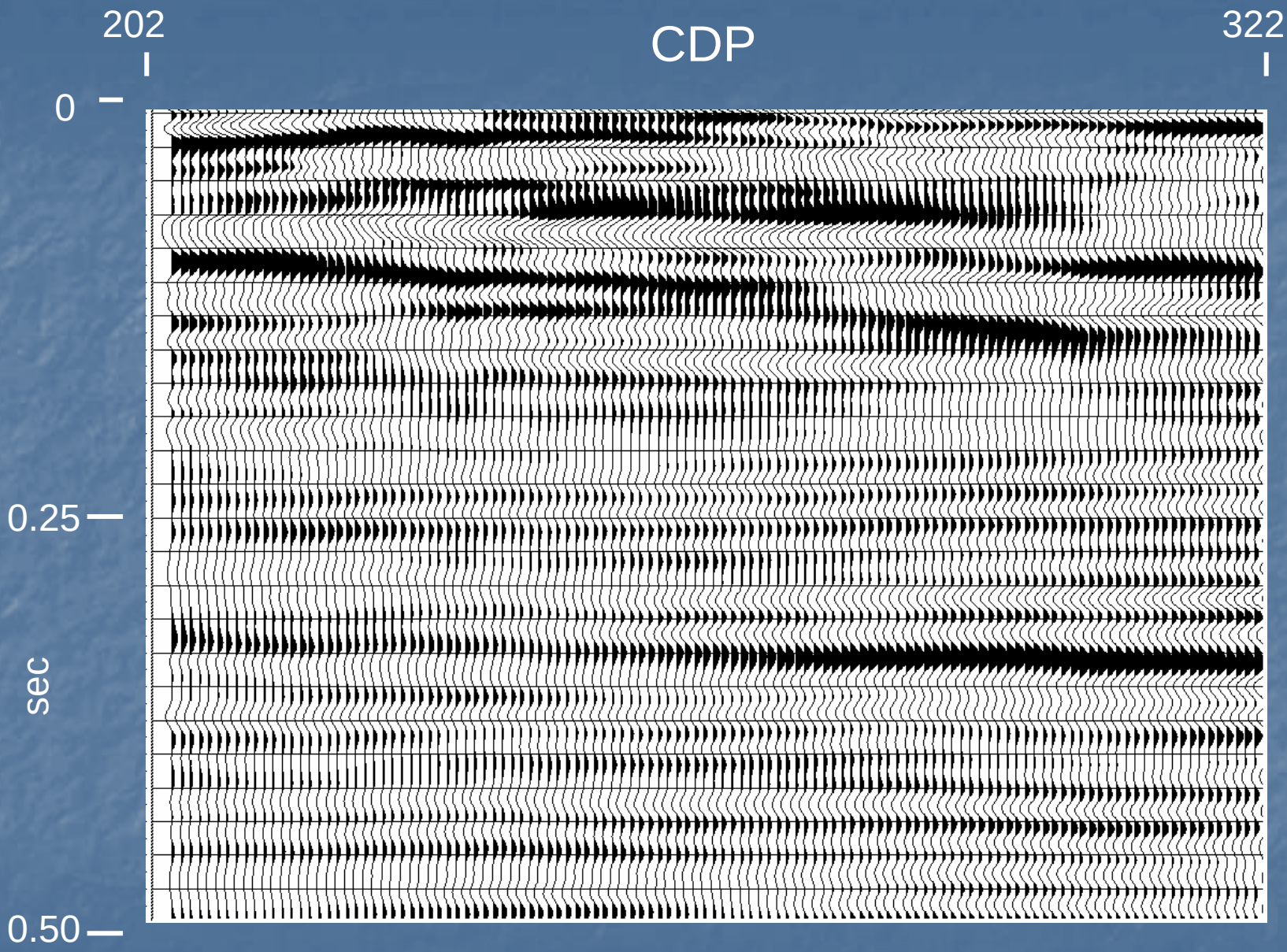
Migrated stack for full resolution ***2.5 m station interval***
view 1



Migrated stack for simulated ***10 m station interval***
view 1



Migrated stack for full resolution ***2.5 m station interval***
view 2



Migrated stack for simulated ***10 m station interval***
view 2

Conclusions

- Lateral and vertical ***resolution*** can be ***improved*** by “high-effort” acquisition
- Source and receiver ***arrays*** are ***no substitute*** for multi-channel ***filtering***
- “High-effort” acquisition involves ***no additional geophone planting***, but does require ***more recorder channels, cables, boxes,*** and ***recording and connection time***

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